Dwarsrivier Chrome Mine (Pty) Ltd

FINAL Environmental Impact Assessment for the Proposed Reworking of Backfilled Opencast Pits

Report Purpose

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Tanja Bekker is registered as a Professional Natural Scientist in the field of Environmental Science with the South African Council for Natural Scientific Professions (SACNASP) and is also a registered Environmental Assessment Practitioner (EAP) with the Environmental Assessment Practitioners Association of South Africa (EAPASA), a legal requirement stipulated by the National Environmental Management Act, 1998. She is further certified as an ISO 14001 Lead Auditor. Her qualifications include BSc. Earth Sciences (Geology and Geography), BSc. (Hons.) Geography and MSc. Environmental Management. In addition to her tertiary qualifications, she obtained a Certificate in Project Management, and completed the Management Advancement Programme at Wits Business School.

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Quality Control

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Executive Summary

Introduction

Dwarsrivier Chrome Mine (Pty) Ltd (hereafter referred to as 'DCM' or 'the mine'), is wholly owned by Assore Limited. The mine is situated approximately 60km northwest of Lydenburg, 25km south of Steelpoort and 63km northeast of Roossenekal in the Limpopo Province. The mine currently holds the surface rights for the Remainder of Portion 1 (Portion 1) and Portion 0 (Remaining Extent) of the farm Dwarsrivier 372KT, as well as Portion 4 (a portion of Portion 3) of the farm De Grooteboom 373KT.

The operation is located in the Fetakgomo Tubatse Local Municipality, within the boundaries of the Sekhukhune District Municipality.

Project Description

DCM has been mining chromite ore from the LG6 seam since 1999. Between 1999 and 2005, ore was mined using opencast methods. The six (6) opencast pits have subsequently been mined out and backfilled, with the exception of the South and North Pit portals from which access is gained to the underground workings. The current mine plan extends the life of the operations to the year 2042.

Assmang initially bought the farm Dwarsrivier 372KT (RE of Portion 1 and Portion 0 (RE)), including all surface and mineral rights, in October 1998. In 2002, the mine purchased a portion of the farm De Grooteboom 373KT, subdividing this portion into Portion 4 (a portion of Portion 3). In addition to the above, the mine also owns mining rights on Portions 6 and 7 of the farm Dwarsrivier 372KT, of which the surface rights are owned by Two Rivers Platinum Mine.

The mine is originally approved in terms of the Minerals Act, 1991 under Mine Licence No. 21/99, which was supported by an Environmental Management Programme (EMPr), approved on 14 December 1999. An amendment to the EMPr (now the EMPr, 2010) was commissioned by the mine in order to improve overall environmental management on the mine site in line with recognised Environmental Management Best Practice, stemming from improved understanding of on-site environmental system functioning and potential mining impacts, through a review of significant additional specialist assessments for the mine site. This Amended EMPr (EMPr, 2010) specifically made provision for the reworking of the Old Tailings Storage Facility (Old TSF) in Section 4.5.2. This section in the EMPr further made provision for the backfilling of the North and South Opencast Pits, stating:

1. "Tailings – fine reject from the plant in slurry form, at the end of the plant process, is deposited in various authorised facilities, such as the North Pit…"

and

2. "The South Pit has since reached its capacity to accommodate backfilling with the aforementioned tailings. Tailings is presently diverted to backfill the so-called 'North Pit', until such time as the Mine's proposed new tailings facility has gone through all appropriate authorisation, licensing and approval processes."

Subsequent to the EMPr, 2010, an approval for the Northern TSF was secured by the mine in the Environmental Authorisation Reference: 12/1/9-7/1e/GS4, 9 July 2011 and no further backfilling of the North and South Opencast Pits was undertaken. Rehabilitation by means of shaping and vegetation were commissioned on the North Opencast Pit since 2019.

The backfilling of the opencast pits was further approved in the Water Use Licence (WUL) Reference 16/2/7/B400/C83, dated 21 January 2008.

DCM plans to sell its historic chrome tailings from the Old TSF (an approved reworking activity in the EMPr, 2010) as well as from the backfilled tailings from the two (2) backfilled pits (North and South Opencast Pits). For the purposes of this Waste Management Licence (WML) Application, dry tailings will be recovered from the historic tailings backfill pits situated at the North and South Shafts. The mine anticipates that material will be sold as from the last quarter of 2021 pending the approval of the WML.

Listed Activities

This application is for the purposes of a WML in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 200) (NEMWA) and the NEMWA Listing Notice published in Regulation 921, 2013 (as amended); for the proposed reworking of backfill pits at DCM, Limpopo Province.

The following NEMWA Listed Activity is triggered which requires a full Environmental Impact Assessment (EIA)] process to be undertaken:

Category B, Activity 11 - The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (MPRDA).

Background of the Application

An Application was submitted to the Department of Mineral Resources and Energy (DMRE) on 19 January 2021. The application was for the purposes of a Basic Assessment Process, based on the following legal considerations:

Section 4 of the NEMWA Listing Notice stipulates that a person who wishes to commence, undertake or conduct a waste management activity, must follow the processes as prescribed in terms of the Environmental Impact Assessment Regulations (EIA Regulations) made under Section 24(5) of the National Environmental Management Act, 1998 (NEMA) as part of a waste management licence application contemplated in Section 45 read with section 20(b) of the NEMWA.

NEMA and Regulation 15 of the EIA Regulations empower an Environmental Assessment Practitioner (EAP) to identify the exact authorisation process [EIA or Basic Assessment (BA)] for a proposed project. Therefore, in terms of Regulation 15(3) (read with Regulation 8) of the EIA Regulations, the EAP identified that this project only triggers a BA Process.

The above decision is based on Regulation 8 of the EIA Regulations stipulates that a Competent Authority (in this case the DMRE, Polokwane) may advise or instruct the proponent or applicant of the nature and extent of any of the processes that may or must be followed.

Significantly, and in terms of Regulation 15(3), a full Scoping & EIA process is only mandatory "…if the application is for two (2) or more activities as part of the same development for which S&EIR must already be applied in respect of any of the activities".

Due to the fact that this project only triggers one (1) NEMWA Category B activity and has limited additional environmental impact, it was recommended by the registered EAP, that this project not involve a full EIA and that a BA Process should be allowed. The project will not result in any additional clearance or construction of additional infrastructure, and only involves the reworking of backfill pits via mechanical removal and processing through the existing (approved) Beneficiation Plant.

Ongoing consultation with the DMRE has been undertaken regarding feedback on the application, which included:

- *A letter was submitted with the Environmental Authorisation application to the DMRE – proof of delivery 19 January 2021. In this letter guidance from the Department was requested.*
- *Various emails to follow up on this request was submitted for clarification.*
- *An email from the DMRE was received on 3 February 2021 to allow the EAP to proceed with the stakeholder consultation and based on this, the process was commenced with the consultation which included the full NEMA Stakeholder Consultation process as well as providing the Basic Assessment Report (BAR) for Stakeholder review. The DMRE was also issued with this draft report on 22 February 2021.*
- *Various emails to follow up on this process was sent to the Department and a meeting was held on 26 March 2021.*

The meeting was held with Mr. Thivhulawi on 26 March 2021, whereafter Mr. Thivhulawi consulted with the Departmental legal team and provided feedback that the Basic Assessment Process will not be possible, and that the activity triggers a full EIA process. Two opportunities exist in this matter, to either undertake an Exemption Application or to follow the full EIA process. The DMRE instructed the applicant to follow a full EIA process.

Current Application

Based on the outcomes of the consultation with the DMRE and due to the importance of this project to the applicant, the applicant withdrew the BAR application submitted on 19 January 2021 and submit an application for a full EIA process. The application was submitted on 12 April 2021 and acknowledgment of the application from the DMRE was received on 14 April 2021.

All comments received during the Stakeholder Consultation Phase were submitted into the final Environmental Scoping Report (ESR) submitted to the DMRE on 20 April 2021 and acknowledged by the Department on 3 May 2021.

The draft EIA and EMP Report was made available to all Commenting Authorities and Registered Stakeholders. Up until end of business 23 July 2021 no further comments were received from stakeholders.

This report is the FINAL EIA and EMP report and is made available to all the DMR as the Competent Authority for review and decision.

Aim and Motivation of the Project

Economic Benefit:

Regulation 23 of the MPRDA states in Section 1(a), that subject to subsection 4, the Minister must grant a mining right if the mineral can be mined optimally in accordance with the mining work programme. The mine has been awarded a Mining Right by the Department of Mineral Resources (DMR; now DMRE) and therefore has an obligation to give effect to the following:

- The ongoing development and improvement of the Mining Work Programme which details the planned mining activities to be followed in order to mine the mineral resource optimally; and
- Optimal mining of minerals must be undertaken, as the Minerals and Petroleum Board may recommend to the Minister to direct the holder of a mining right to take corrective measures if the Board establishes that the minerals are not being mined optimally in accordance with the Mining Work Programme. The Minister may, on the recommendation of the Board, suspend or cancel a mining right if the Minister is convinced that any act or omission by the holder justifies the suspension or cancellation of the right.

DCM is actively investigating opportunities for the continued and sustainable mining of chrome reserves and for the purposes of this project, has identified the historic opencast pits as sources for further re-mining of previously deposited chrome resources, which could not be beneficiated by prior technologies, but is now viable through the current plant.

Currently DCM is serviced by 1,200 permanent and 800 contractor employees. The majority of the employees are locals drawn from Lydenburg (alternatively known as Mashishing) and villages around the mine, including Steelpoort Park, Kalkfontein and Buffelshoek.

Giving effect to Waste Reduction:

The reworking of the mineral waste gives effect to the Waste Management Hierarchy as presented in the National Waste Management Strategy, November 2011 and also the National Waste Management Strategy of 2020. The 2011 Strategy states the following:

- A challenge experienced is the lack of a policy and regulatory environment that does not actively promote the Waste Management Hierarchy.
- The report states that while the elimination of waste in its entirety may not be feasible, it is possible through the systematic application of the Waste Management Hierarchy to reach a point within the next few decades where re-use, recycling, recovery and treatment overtake landfills as preferred options for waste management.
- The first goal presented in this strategy as a strategic goal is to “promote waste minimisation, reuse, recycling and the recovering of waste” by focusing on implementing the Waste Management Hierarchy, and with the ultimate aim of diverting waste from landfill.

The section below is an extract of Section 2.3 of the National Waste Management Strategy.

The Waste Management Hierarchy in the National Waste Management Strategy is summarised as follows:

- *Waste avoidance and reduction;*
- *Re-use;*
- *Recycling;*
- *Recovery; and*
- *Treatment and disposal.*

The foundation of the hierarchy, and the first choice of measures in waste management, is avoidance and reduction. This step aims for goods to be designed in a manner that minimises their waste components. Also, the reduction of the quantity and toxicity of waste generated during the production process is important.

The next stage of the hierarchy is re-using waste. Re-using an article removes it from the waste stream for use in a similar or different purpose without changing its form or properties.

After re-use comes the recycling of waste, which involves separating articles from the waste stream and processing them as products or raw materials.

These first four stages of the waste management hierarchy are the foundation of cradle-to-cradle waste management. This approach seeks to re-use or recycle a product when it reaches the end of its life span. In this way, it becomes input for new products and materials. This cycle repeats itself until as small a portion as possible of the original product eventually enters the next level of the waste management hierarchy: recovery.

As a last resort, waste enters the lowest level of the hierarchy to be treated and/or disposed of, depending on the safest manner for its final disposal.

The current 2020 National Waste Management Strategy takes the above strategy further by also focussing on the Circular Economy. A circular economy redefines economic growth by moving away from a take-make-waste industrial model to one that decouples economic activity from the environment and supports a just transition to renewable energy sources. The three key principles of a circular economy are: design out waste and pollution, keep products and materials in use and regenerate natural systems. The two (2) strategic entry points of the waste sector into waste minimisation and the circular economy is waste prevention and waste as a resource, as briefly explained below.

- Waste Prevention (as highlighted in the 2011 National Waste Management Strategy) – this emphasises avoiding and reducing waste before substances, materials and products are discarded.
- Waste as a Resource (key focus in the draft Strategy) – this focuses on stimulating a secondary resources economy based on recycling and recovery of materials and energy from waste i.e. interventions that take place after a product or material has become waste. Circularity can deliver substantial material savings throughout value chains and production processes, generate extra value, transformation of industry towards climate-neutrality, long-term competitiveness and unlock economic opportunities. In terms of the waste management hierarchy practices, recycling of waste for reuse and recovery of materials is prioritised over recovery of energy from waste. The main economic driver lies in exploiting the full potential value of waste.

Giving effect to an approved Environmental Activity as part of Environmental Management and Impact Reduction:

The mine is originally approved in terms of the Minerals Act, 1991 under Mine Licence No. 21/99, which was supported by an EMPr (approved on 14 December 1999). An amendment to the EMPr was, furthermore, commissioned by the mine in 2010 in order to improve overall environmental management on the mine site in line with recognised Environmental Management Best Practice, stemming from improved understanding of on-site environmental system functioning and potential mining impacts, through a review of significant additional specialist assessments for the mine site. This EMPr specifically made provision for the reworking of the Old TSF (Section 4.5.2 of the EMPr, 2010).

Tailings Dam Reworking

Based on a legal assessment conducted for the mine by Adv. Lana van Der Westhuizen of Environmental Law Group, no NEMA Listed Activities or NEMWA Waste Activities are triggered for the reworking of the tailings, but it was recommended that an Addendum be obtained in terms of Section 102 of the MPRDA to extend this operational activity for the purposes of selling of material and state that tailings can be reworked on site, or moved off site to be beneficiated by third parties and to ensure that the management measures are still relevant to the operational procedures.

Notification of the project, for the purposes of a Section 102 amendment was initially initiated on 13 July 2020. The DMRE indicated that a Section 102 amendment would not be required as there are no new uses to approved (verbal communication, 4 August 2020). After numerous discussions with the DMRE, the Section 102 process was withdrawn and a letter of notification of this project was submitted to the DMRE on 20 August 2020. It is however still important that the mine must ensure to obtain written consent from the DMRE for the change in their EMPr which was not included in the consideration of these documents when they were drafted.

Accordingly, the mine has a duty to ensure that the Buyer of the tailings is authorised to store and/or process the tailings. Therefore, a WML is required by the Buyer to store/ establish and/or reclaim/ process the tailings.

For this reason, a notification was submitted to the DMRE as mentioned before, and an Operational EMPr was developed for the purposed of ensuring duty of care and the implementation of best environmental management practices.

The EMPr, 2010 specifically stated the following: "*The processing plant produces significant volumes of waste tailings. The existing tailings dam contains approximately 1.6Mt of material of which an estimated 40% is chromite. This dump will be totally reworked at a rate of 16kt/month, giving the tailings dump a life of approximately 8 years".*

Opencast Pit Reworking

In terms of the opencast pits, the EMPr, 2010 states the following:

"The waste rock has been shown to be a viable aggregate, and as such, waste rock may potentially be removed from site through sale to suitable third parties. Sufficient waste rock will remain at surface for backfilling of surface voids upon final mine closure and rehabilitation. The upgraded spirals plant will be used to recover the chromite from the tailings. To date, tailings were pumped into the so-called 'South Pit' on site. The South Pit has since reached its capacity to accommodate backfilling with the aforementioned tailings. Tailings is presently diverted to backfill the so-called 'North Pit', until such time as the mine's proposed new tailings facility has gone through all appropriate authorisation, licensing and approval processes."

Based on the above, the South Pit reworking is an approved EMPr activity, however the reworking of the North Pit specifically requires a new WML. To ensure an overall management approach, all three activities, namely reworking of the Old TSF, South Pit and North Pit are therefore presented in this report.

Giving effect to sound Environmental Management and the NEMA Duty of Care Principles:

In addition to the above motivation, the 2017 Integrated Water and Waste Management Plan (IWWMP), which was based on the 2016 Numerical Groundwater Model conducted by Irene Leah Environmental and Hydrogeology cc (iLEH) indicated that the re-mining of the North and South Opencast Pits is strongly recommended to manage the migration of the groundwater plume. This project therefore further gives effect to this specialist recommendation.

Alternatives Considered

No location alternatives were investigated for this project as the project is linked to the existing backfilled opencast pits. The only alternative is the No-Go alternative where the status quo remains.

The December 2020 Hydrogeological Study indicated that the removal of the tailings material from North Pit is anticipated to result in the most significant positive impact on groundwater quality in the long-term. In South Pit, the waste rock backfilled is expected to control groundwater quality to a greater extent and the removal of the tailings material is not expected to result in significant impacts on the aquifers.

The removal of tailings backfill from North Pit should therefore be considered a priority, as it is expected to significantly reduce the source to groundwater contamination in this area, especially since the Northern Return Water Dam (RWD) is lined with high-density polyethylene (HDPE).

The key motivations for this project are therefore: 1. Economic benefit of optimally mining available resources; and 2. The removal of the material from the opencast pits will result in the management of long-term groundwater impacts.

Application and Consultation Process

A Basic Assessment Application for the proposed project was initially submitted to the DMRE on 19 January 2021. A letter of acknowledgement from the DMRE was not received. An email from the DMRE was however received on 3 February 2021 to allow the EAP to proceed with the stakeholder consultation and based on this, the process was commenced with the consultation which included the full NEMA Stakeholder Consultation process as well as providing the BAR for Stakeholder review. The DMRE was also issued with this draft report on 22 February 2021.

In terms of the BA Environmental Authorisation Process, a detailed stakeholder consultation process was also undertaken and notification of Interested & Affected Parties (I&APs) of the proposed project commenced on 22 February 2021 with the submission of the draft BAR. The notification process was undertaken by means of the following:

- Newspaper advertisement in the Steelburger/ Lydenburg News, dated 19 February 2021.
- Site Notices erected at the Main Plant entrance, North Mine entrance, Main Offices entrance, as well as the Burgersfort Municipality on 18 February 2021.
- Direct Notifications through a Background Information Document (BID) were distributed to all stakeholders on the registered I&AP database on 22 February 2021.
- The draft BAR, was made available to stakeholders from 24 February 2021 to 26 March 2021 for review.

Comments were received from the following stakeholders as detailed below:

Stakeholder	Representative	Means of consultation	Issue and Response
Eskom	Sebenzile Mhlongo	Via Email 10 March 2021	Request for the applicant to submit a letter of consent. Response: This was submitted to Eskom on 18 March 2021, also refer to Annexure 5.
Neighbouring Mine	Solome Beeslaer	Via Email 26 February 2021	Requested all reporting on the project, including water related information. Response: This was submitted on 6 March 2021, also refer to Annexure 6.
Neighbouring Mine	David Paila	Via Email 2 March 2021	Impacts on traffic and dust in the area – to be included into EIA and EMPr. Response: Please also refer to Table 40 and Section 1.g.iv.4 discussing the recommendation for local labour considerations where possible.
Stakeholder	Mokadi	SMS	Potential job opportunities. Response: Please also refer to Table 40 and Section 1.g.iv.4 discussing the recommendation for local labour considerations where possible. Please refer to Section 1.d.i and 1.e for the legal considerations.
Stakeholder	Luambo Sengani	Email, 19 February 2021	Potential job opportunities. Response: Please also refer to Table 40 and Section 1.g.iv.4 discussing the recommendation for local labour considerations where possible. Please refer to Section 1.d.i and 1.e for the legal considerations.
Stakeholder	Phillmon Ngobeni	Email, 19 February 2021	Potential job opportunities. Response: Please also refer to Table 40 and Section 1.g.iv.4 discussing the recommendation for local labour considerations where possible. Please refer to Section 1.d.i and 1.e for the legal considerations.
DEFF	Ms Ndina	Letter dated 2 March 2021	The mine should do everything in their power to stop the spread of veld fires in their land – to be included into EIA and EMPr. Response: Please also refer to Table 40.
Totolo Makola	Stakeholder in Ga Phasha Village, Steelpoort	Email 24 April 2021	Registering to be included on database. BID provided. Requested information regarding potential job opportunities. Response: Please also refer to Table 40 and Section 1.g.iv.4 discussing the recommendation for local labour considerations where possible. Please refer to Section 1.d.i and 1.e for the legal considerations.
Lancelot Phahledi	Stakeholder interest	Email 29 April 2021, follow up Email 5 May 2021	Requested to participate in waste collection programmes in the future.

Stakeholder	Representative	Means of consultation	Issue and Response
			Submitted registration form requesting: Provision of tools needed to assist backfilling the two opencast pits. Collecting the waste (all types) or remains after backfilling. Provision of engineering or civil works that will be needed since this seems to be a long-term project. All steps involved in the acquisition of the WML. Physical meetings and contents to be covered presently and in the future. Response: "The Licence is question is a Waste Management Licence. The reworking of the backfilled material in the old opencast pits necessitates a Waste Management Licence from the Department of Mineral Resources and Energy (DMRE) as it constitutes a Waste Management Activity in terms of the National Environmental Management: Waste Act, 2008 (NEMWA). The NEMWA identified various Waste Management Activities which an applicant must first get authorisation for before such activity can commence. EnviroGistics has been appointed by the applicant (Dwarsrivier Chrome Mine) as the independent Environmental Consultant to investigate the potential environmental impact of the proposed project on the environment. This is a legal process that must be undertaken before the mine can commence with any reworking activities of the identified opencast pits. Should the DMRE issue the Waste Management Licence to the mine pending the outcomes of the environmental impact assessment, it means that the mine can conduct this activity (therefore excavate the backfilled material) with various environmental management measures to consider. This will either be done by the mine themselves or by third party contracts. The project undertaken by EnviroGistics only involves the impact assessment process for the project in order to either obtain or be rejected a Waste Management Licence by the DMRE. I have attached the Background Information Document, which should provide you with more information on the process being conducted for the mine. Should you consider to obtain a Waste Management Licence for any potential activities, I can provide you with a copy of the legislation you can consider. Your registration document will be included into the Environmental Impact Assessment Report. EnviroGistics forms an independent part in this process and may therefore not form part of the procurement of resources, third parties or employment after the Waste Management Licence is received by the mine. These discussions will be undertaken by the mine themselves should the Waste Management Licence be awarded to them and will follow their procurement processes and rules." Please also refer to Table 40 and Section 1.g.iv.4 discussing the recommendation for local labour considerations where possible. Please refer to Section 1.d.i and 1.e for the legal considerations. In terms of the timeframes of the Project, Please refer to Section 1.q: The recovery process is expected to last between 28 and 35 months.

Please refer to the following table for the comments raised by the DMRE:

#	Comment	Response
1	Details of the future land use for the site and infrastructure after decommissioning in 20-30 years.	The life of mine for DCM is currently in excess of 27 years, although the recovery process of the two opencast pits is expected to last between 28 and 35 months. The re-mining of the Old TSF is an approved activity in terms of the EMPr, 2010. The project will entail the dry removal of the tailings material from the Old TSF and transporting it off site for sale to a third party over a period of 15 – 24 months.

#	Comment	Response
		With the ongoing exploration activities undertaken this life of mine may continue for beyond this period. For this reason, it is reasonably accurate to state the future land uses will still be mining. Various alternatives are being investigated for the future rehabilitation of the opencast pits, which may include backfilling as approved in terms of the 2008 WUL. In this case the life of mine will revert to the planned post closure land use which is wilderness. The current closure plan makes provision for the demolishing of surface infrastructure and the promotion of the growth of the surrounding Sekhukhune Mountain Bushveld species. As mentioned in Table 10 of this report, the IDP states that amongst others, opportunities offered by the local municipality include: (a) mining investment opportunity; (b) land availability opportunity; (c) tourism opportunity; (d) funding source opportunity from private sector; and (e) job creation opportunity from infrastructure investment. The IDP states clearly that, with the exception of the creativity of people, mining still presents the largest opportunity in the area to a sustainable economic base whereby the local economy and the area is growing at a higher pace. Mining is regarded as an opportunity offered by the municipality, with the IDP stating that the mining activities and natural resources available in the area have created a definite potential to develop tourism and thereby to diversify the economic base of the municipality. The municipality will be able to develop sector plans, policies and by-laws which will be utilised for the planning of the area and regulate both the internal and external affairs. For this reason the opportunity for ongoing mining within the Mining Rights area are in line with the municipality IDP. If a final void is left, groundwater levels would recover and stabilise with time. The volume of groundwater inflow to the pits will reduce to near zero at this point, as the gradients towards the pits would be low once groundwater levels have recovered. Under this scenario, groundwater levels inside the final void will be controlled by rainfall and evaporation. Since the rate of evaporation in the area is 1,500mm/a, which is at least twice as high as the Mean Annual Precipitation (MAP), the rate of evaporation is expected to prevent groundwater levels from recovering to surface. This in effect will control the water level inside the final void. It is concluded that if a final void is left, the risk of decant will be controlled and groundwater levels inside the void are unlikely to rise to surface. Backfilling of the reclaimed pits with waste rock may increase the risk of decant. This can however be controlled through implementing a sound rehabilitation programme, geared at reducing the rate of recharge to around 5% of MAP. This was confirmed in previous detailed studies on the risk of decant from the pits (iLEH, 2017). In order to achieve this rate, each pit must be completely backfilled, rehabilitated surfaces must be made free draining and final surfaces must be re-vegetated to create near-natural recharge conditions. This is the current planned rehabilitation option for the project. If the rate of recharge to the pits cannot be reduced and remain above 5% of MAP in future, the risk of decant will increase. In this case, groundwater levels would rise to above the surface elevation due to higher recharge and decant will take place, resulting in long-term residual negative impacts. The final rehabilitation plan for the opencast pits – i.e. backfilling or the leaving of a void/management of decant should be finalised within 24 months of the completion of the reworking activities. However, for the purposes of the EIA the recommendation is the backfilling of the opencast pits. This is also the current rehabilitation strategy as included into the financial provision and approved quantum of the mine.
2	The total footprint of the proposed development should be indicated.	The project comprises of an overall area of 2.4ha of existing backfill opencast pits (South Backfill Opencast Pit: 1.2ha; North Backfill Opencast Pit: 1.2ha), and reworking of the Old TSF, comprising of an area of 9.5ha. This project does not require any clearance activities, as the activities involve the reworking of existing disturbed areas.
3	Should a Water Use License be required, proof of application for a licence needs to be submitted.	The water use activity of backfilling of the opencast pits was further approved in the Water Use Licence (WUL) Reference 16/2/7/B400/C83, dated 21 January 2008. The following water uses are already approved for the two opencast pit areas in terms of the WUL, 2008: - Appendix IV: Section 21 (c) impeding or diverting the flow of water in a watercourse; Section 21 (i): Altering the bed, banks, course or characteristics of a watercourse – Condition 1.2: Alter the course of the Springkaanspruit as well as the unnamed tributaries of the Groot Dwarsrivier at the locations of Mining of the South Pit and mining of the North pit. - Appendix V: Section 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource – the licensee may dispose an average quantity of 309m3 of tailings per day into the North and South open pit areas. Depending on the outcomes of the final rehabilitation option for the Opencast Pits, once reworked, the necessary engagements will be made with the DMRE and DWS depending on the potential amendments to the original rehabilitation strategy if any.
4	Possible impacts and effects for the development on the vegetation ecology with regard to low land-highland interface in the locality should be indicated.	The project comprises of an overall area of 2.4ha of existing backfill opencast pits (South Backfill Opencast Pit: 1.2ha; North Backfill Opencast Pit: 1.2ha), and reworking of the Old TSF, comprising of an area of 9.5ha. This project does not require any clearance activities, as the activities involve the reworking of existing disturbed areas.

#	Comment	Response
		Based on the above there will be no impact on vegetation as only existing disturbed areas form part of this application.
5	The impacts of the proposed facility on avifauna and must be assessed in the EIA phase.	The project will not involve the clearance of indigenous vegetation, the implementation of blasting activities or the erection of high infrastructure or equipment. In addition to this no additional powerlines will be required for this project. Based on the scope and extent of this project, and the fact that the project is located within the existing mine layout, no new or additional impact on the avifauna is anticipated. The activities in question involve the reworking of existing disturbed areas (please refer to Table 20).
6	Possible impacts and effects of the development on the surrounding industrial area.	It is not foreseen that the project will have a negative impact on the surrounding industrial area. The mine is located within an existing mining area, and is zoned for such intent. Mining is important for this area and a key component of the IDP and municipal strategies. The IDP states that amongst others, opportunities offered by the local municipality include: (a) mining investment opportunity; (b) land availability opportunity; (c) tourism opportunity; (d) funding source opportunity from private sector; and (e) job creation opportunity from infrastructure investment. The IDP states clearly that, with the exception of the creativity of people, mining still presents the largest opportunity in the area to a sustainable economic base whereby the local economy and the area is growing at a higher pace. Mining is regarded as an opportunity offered by the municipality, with the IDP stating that the mining activities and natural resources available in the area have created a definite potential to develop tourism and thereby to diversify the economic base of the municipality. The municipality will be able to develop sector plans, policies and by-laws which will be utilised for the planning of the area and regulate both the internal and external affairs. The only concern raised in terms of impact beyond the mine, is that of the increase in traffic. It is planned that tailings material will be recovered at a rate of approximately 40,000 tonnes per month. The South Backfill Pit contains approximately 431,426 tons of tailings while the North Backfill Pit contains approximately 635,630 tons of tailings. The recovery process is expected to last between 28 and 35 months. At the anticipated rate of recovery, approximately 23 trucks will be dispatched from the site daily containing tailings material. In order to manage this impact, the following mitigation measures have been included into the EMPr: - The mine will ensure an open channel of communication with the surrounding mines to address any potential concerns in terms of road access or usage. - Trucks will be parked in the designated truck parking areas to avoid congestion on the roads. In order to ensure compliance with the NEMWA, the mine will further ensure that prior to awarding a contract to a third party for the removal of the tailings the mine must ensure that the third party and facility where the beneficiation will be undertaken in legally authorised to conduct these activities. The mine will also commit to where possible support local labour and third party contractors.
7	A construction and operational phase EMP to include mitigation and monitoring measures.	Please refer to Part B of the report, Section 1.i, Table 40 for a detailed list of management measures for the planning, construction, and operational phase. Section 1.h further provides a detailed description of the monitoring requirements.
8	Should blasting be required, appropriate mitigation measures should be provided.	No blasting is required for this project. The process will entail dry removal of the tailings material using the truck and shovel method at a rate of 40,000 tonnes per month. The material will be loaded onto trucks and transported off site. It is estimated that 23 trucks will be dispatched from site on a daily basis during the project.
9	A3 size maps are required of the locality and vegetation types.	Noted, and included as figures under Annexure 8.
10	Should the project be subjected to any permits or authorisations in terms of the provision of any Specific Environmental Management Acts, proof of such applications will be required.	Based on the above there will be no impact on vegetation as only existing disturbed areas form part of this application. For this reason, no tree, shrub or protected plant removal permits will be required. The water use activity of backfilling of the opencast pits was further approved in the WUL, Reference 16/2/7/B400/C83, dated 21 January 2008. The following water uses are already approved for the two opencast pit areas in terms of the WUL, 2008: - Appendix IV: Section 21 (c) impeding or diverting the flow of water in a watercourse; Section 21 (i): Altering the bed, banks, course or characteristics of a watercourse – Condition 1.2: Alter the course of the Springkaanspruit as well as the unnamed tributaries of the Groot Dwarsrivier at the locations of Mining of the South Pit and mining of the North pit. - Appendix V: Section 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource – the licensee may dispose an average quantity of 309m3 of tailings per day into the North and South open pit areas. Depending on the outcomes of the final rehabilitation option for the Opencast Pits, once reworked, the necessary engagements will be made with the DMRE and DWS depending on the potential amendments to the original rehabilitation strategy if any.

The application for the Environmental Authorisation Process for the EIA was submitted to the DMRE on 12 April 2021. A letter of acknowledgement from the DMRE was received on 15 April 2021. The ESR was submitted to the DMRE on 20 April 2021 and was acknowledged by the DMRE on 3 May 2021. Comments on the ESR was provided by the DMRE on 27 May 2021.

This consultation was reinitiated for the purposes of the EIA process and to inform stakeholders of the change in the initial application process from BAR to EIA:

- Newspaper advertisement in the Steelburger/ Lydenburg News, was placed on 22 April 2021.
- Site Notices erected at the Main Plant entrance, North Mine entrance, Main Offices entrance, as well as the Burgersfort Municipality planned on 22 April 2021.
- Direct Notifications through a Background Information Document (BID) were distributed to all stakeholders on the registered I&AP database on 22 April 2021.
- As the draft BAR was made available for stakeholder review, the final Scoping Report was submitted with all the comments received from Stakeholders to the DMRE. An electronic copy of the final ESR was made available to all registered Stakeholders from 23 April 2021 to 24 May 2021.
- The draft EIA and EMPr report is made available to all stakeholders from 22 June 2021 to 23 July 2021 to all stakeholders for consideration and input.

The draft EIA and EMP Report was made available to all Commenting Authorities and Registered Stakeholders. Up until end of business 23 July 2021 no further comments were received from stakeholders.

Impact Statement

It should be noted that impacts associated with the proposed project will be significantly lower than that of a greenfields project, as the proposed activities are located within the existing Mining Right Area and mostly within already disturbed or impacted environments.

This project is more associated with a rehabilitation project as part of ongoing groundwater plume migration mitigation than a new mining development. The December 2020 Hydrogeological Study indicated that the removal of the tailings material from North Pit is anticipated to result in the most significant positive impact on groundwater quality in the long-term. In South Pit, the waste rock backfilled is expected to control groundwater quality to a greater extent and the removal of the tailings material is not expected to result in significant impacts on the aquifers.

The removal of tailings backfill from North Pit should therefore be considered a priority, as it is expected to significantly reduce the source to groundwater contamination in this area, especially since the Northern RWD is lined with HDPE.

<u>Positive Impacts</u>

The following key positive impacts are identified:

- Regulation 23 of the MPRDA states in Section 1(a), that subject to subsection 4, the Minister must grant a mining right if the mineral can be mined optimally in accordance with the mining work programme. The mine has been awarded a Mining Right by the DMR (now DMRE) and therefore has an obligation to give effect to the following:
    - The ongoing development and improvement of the Mining Work Programme which details the planned mining activities to be followed in order to mine the mineral resource optimally; and
    - Optimal mining of minerals must be undertaken, as the Minerals and Petroleum Board may recommend to the Minister to direct the holder of a mining right to take corrective measures if the Board establishes that the minerals are not being mined optimally in accordance with the Mining Work Programme. The Minister may, on the recommendation of the Board, suspend or cancel a mining right if the Minister is convinced that any act or omission by the holder justifies the suspension or cancellation of the right.
- DCM is actively investigating opportunities for the continued and sustainable mining of chrome reserves and for the purposes of this project, has identified the historic opencast pits as sources for further re-mining of previously deposited chrome resources, which could not be beneficiated by prior technologies but is now viable through the current plant.
- The project will allow for improved supply of material required to optimally operate the mine.
- No additional infrastructure development will be required, only existing roads and stockpiles will be utilised.

- The project will give effect to the recommendations by a specialist hydrogeological report from 2016 and follow-up study in 2020, which specifically recommends the reworking of the material, as well as the effective rehabilitation of the pits, which will result in a long-term positive impact.
- The project is rather regarded as an ongoing rehabilitation project than a new operational project, however no additional capital expenditure will be required for rehabilitation purposes, as this will be managed as part of the ongoing operational processes:
    - Reworking as part of an economic activity; and
    - Backfilling in terms of the approved EMPr, 2010 and WUL, 2008 with waste rock upon the completion of mining, thereby further potentially reducing waste rock deposition on the Waste Rock Dump (WRD) on surface.

Negative Impacts

It should be noted that impacts associated with the proposed project will be significantly lower than that of a greenfields project, as activities are located within the existing Mining Right Area and within an already disturbed or impacted environment.

The December 2020 Hydrogeological Study indicated that the removal of the tailings material from North Pit is anticipated to result in the most significant impact on groundwater quality in the long-term. In South Pit, the waste rock backfilled is expected to control groundwater quality to a greater extent and the removal of the tailings material is not expected to result in significant impacts on the aquifers.

The removal of tailings backfill from North Pit should therefore be considered a priority, as it is expected to significantly reduce the source to groundwater contamination in this area, especially since the Northern RWD is lined with HDPE.

The activities proposed by the applicant have not indicated any significant negative impacts in the long term. No new areas will be cleared, and no new construction will be required. Short term environmental impacts could include the temporary increase in traffic on the regional roads for the collection and dispatch of material. The only potential long-term impacts are linked to the status quo situation and the rehabilitation options. Two rehabilitation options were considered for this assessment. The first entails backfilling the areas from which tailings will be excavated with waste rock only as part of final pit rehabilitation and the second is to leave each excavated area as a final void. The current financial provision for the mine, including the available financial quantum allows for backfilling of both voids.

If a final void is left, groundwater levels would recover and stabilise with time. The volume of groundwater inflow to the pits will reduce to near zero at this point, as the gradients towards the pits would be low once groundwater levels have recovered. Under this scenario, groundwater levels inside the final void will be controlled by rainfall and evaporation. Since the rate of evaporation in the area is 1,500mm/a, which is at least twice as high as the Mean Annual Precipitation (MAP), the rate of evaporation is expected to prevent groundwater levels from recovering to surface. This in effect will control the water level inside the final void. It is concluded that if a final void is left, the risk of decant will be controlled and groundwater levels inside the void are unlikely to rise to surface.

Backfilling of the reclaimed pits with waste rock may increase the risk of decant. This can however be controlled through implementing a sound rehabilitation programme, geared at reducing the rate of recharge to around 5% of MAP. This was confirmed in previous detailed studies on the risk of decant from the pits (iLEH, 2017). In order to achieve this rate, each pit must be completely backfilled, rehabilitated surfaces must be made free draining and final surfaces must be re-vegetated to create near-natural recharge conditions. This is the current planned rehabilitation option for the project.

If the rate of recharge to the pits cannot be reduced and remain above 5% of MAP in future, the risk of decant will increase. In this case, groundwater levels would rise to above the surface elevation due to higher recharge and decant will take place, resulting in long-term residual negative impacts.

Gaps

The following assumptions, uncertainties and gaps are applicable to this project:

- This EIA and EMP Report is based on existing available environmental information and those presented by the specialists and is considered as true and correct;

- The rehabilitation plan as presented in this report is open for the purposes of either backfilling to a 5% recharge of the opencast voids, or the leaving of the voids, however in this instance the management of decant. Financial provision has not been made for the long-term management of decant at this stage, as this will be subjected to the 24-month assessment of the final rehabilitation plan, which will be based on the implementation of the groundwater investigations identified in the Numerical Model, 2020. At this time, it is assumed that no additional financial rehabilitation will be required for this project as the backfilling of the voids will be an operational component and the rehabilitation of the Old TSF is already accounted for in the financial provision calculations; and
- The project description is based on the information presented by the applicant and is considered as true and correct.

Concluding Statement

The activities proposed by the applicant have not indicated any significant negative impacts in the long term. In effect, the reworking of the pits will rather lead to a positive management of an existing impact, which if not sufficiently managed may result in a residual impact on groundwater.

Based on the outcomes of the study it is the opinion of the EAP that the Environmental Authorisation should be awarded. The following conditions should be included in the authorisation in addition to the general conditions included in the Environmental Authorisation:

- Prior to awarding a contract to a third party for the removal of the tailings the mine must ensure that the third party and facility where the beneficiation will be undertaken is legally authorised to conduct these activities.
- The rehabilitation strategy for the remaining voids should involve only one of the following two options – leaving the voids open with the inclusion of the necessary safety measures to control unauthorised access; or secondly the backfilling of the remaining voids with discard and/or waste rock and rehabilitate these areas to ensure the required 5% or less recharge. The recommendation of this EIA is the allowance for backfilling as is currently provided for in the financial provision by the mine.
- The final rehabilitation plan for the opencast pits – i.e. backfilling or the leaving of a void/management of decant should be finalised within 24 months of the completion of the reclamation of the material.

Should the final rehabilitation plan indicate the need to leave voids, the required decant measures must be identified and the suitable financial provision for this instance should be calculated and submitted as part of the overall rehabilitation fund for the mine. In this instance enviroberms should be placed around the voids.

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mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

PART A

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

DMR REFERENCE NUMBER MP: LP 30/5/1/3/2/1(179) EM

SUBMITTED FOR ENVIRONMENTAL AUTHORISATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED).

NAME OF APPLICANT:	**Dwarsrivier Chrome Mine (Pty) Ltd**
TEL NO:	**+27 (0) 13 230 5300**
FAX NO:	**+27 (0) 13) 230 5318**
POSTAL ADDRESS:	**PO Box 567, Lydenburg, 1120**
PHYSICAL ADDRESS:	**Dwarsrivier Farm 372KT, Sekhukhune Road, Steelpoort Area, 1133**
FILE REFERENCE NUMBER SAMRAD:	**Mining Right Reference Number: LP 30//2/3/2/1(179) EM**

IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002 as amended), the Minister must grant a prospecting or mining right if among others the mining "will not result in unacceptable pollution, ecological degradation or damage to the environment".

Unless an Environmental Authorisation can be granted following the valuation of an Environmental Impact Assessment and an Environmental Management Programme report in terms of the National Environmental management Act (Act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of section 16(3)(b) of the EIA Regulations, 2014, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of section 17 (1) (c) the competent Authority must check whether the application has taken into account any minimum requirements applicable or instructions or guidance provided by the competent authority to the submission of applications.

It is therefore an instruction that the prescribed reports required in respect of applications for an environmental authorisation for listed activities triggered by an application for a right or permit are submitted in the exact format of and provide all the information required in terms of, this template. Furthermore please be advised that failure to submit the information required in the format provided in this template will be regarded as failure to meet the requirements of the Regulation and will lead to the Environmental Authorisation being refused.

It is furthermore an instruction that the Environmental Assessment Practitioner must process and interpret his/her research and analysis and use the findings thereof to compile the information required herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the Report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The objective of the environmental impact assessment process is to, through a consultative process—

(a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;

(b) Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;

(c) identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;

(d) Determine the—-

(i) Nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and

(ii) Degree to which these impacts—

(aa) can be reversed;

(bb) may cause irreplaceable loss of resources, and (cc) can be avoided, managed or mitigated;

(e) Identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;

(f) Identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;

(g) Identify suitable measures to manage, avoid or mitigate identified impacts; and

(h) identify residual risks that need to be managed and monitored.

(i) identify suitable measures to avoid, manage, or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored. _____

PART A

SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

The application for the Environmental Authorisation Process for the EIA was submitted to the Department of Mineral Resources and Energy (DMRE) on 12 April 2021. A letter of acknowledgement from the DMRE was received on 15 April 2021. The ESR was submitted to the DMRE on 20 April 2021 and was acknowledged by the DMRE on 3 May 2021.

All comments received during the Stakeholder Consultation Phase were submitted into the final ESR submitted to the DMRE on 20 April 2021 and acknowledged by the Department on 3 May 2021. Comments on the ESR was provided by the DMRE on 27 May 2021.

Please refer to Annexure 1 for the submitted application form and proof of submission.

1 CONTACT PERSON AND CORRESPONDENCE ADDRESS

1.a Contact Person and Correspondence Address

1.a.i Details of the Environmental Assessment Practitioner (EAP)

Table 1: Details of EAP

Name	Tanja Bekker
Designation	Environmental Assessment Practitioner
Postal Address	PO Box 22014, Helderkruin, 1733
Physical Address	21 Gladiolus Street, Roodekrans, 1724
Telephone Number	+27 (0) 82 412 1799
Cell Phone Number	+27 (0) 82 412 1799
Fax Number:	+ 27 (0) 86 551 5233
Email Address	tanja@envirogistics.co.za

1.a.ii Expertise of the EAP

The following table presents a summary of the EAP's experience:

Table 2: Experience of EAP

Name	Position	Qualification	Professional Registrations	Experience
Tanja Bekker	Principal Practitioner	M.Sc. Environmental Management (RAU; now Johannesburg University)	Registered member of the Environmental Assessment Practitioners Association of South Africa (EAPASA; Ref 306/2019) Registered with the South African Council for National Scientific Professions (SACNASP: Pr.Sci.Nat. Reg No. 400198/09) Member of International Association of Impact Assessors (IAIA) Member of the Environmental Law Association of South Africa (ELA)	19 Years

Please refer to Annexure 2 for the EAPs Curriculum Vitae.

Education

M.Sc. Environmental Management - RAU (University of Johannesburg)
B.Sc. Geography Honours - RAU (University of Johannesburg)
B.Sc. Earth Sciences (Geography & Geology) – RAU (University of Johannesburg)

Career Enhancing Courses

ISO 14000 Lead Auditors Course (WTH Management)
Certificate in Project Management (Pretoria University)
Management Advance Programme (MAP 81) (Wits Business School)

Professional Affiliations

Certified member of Environmental Assessment Practitioners Association of South Africa
Certified ISO 14001 Environmental Management System Auditor
Registered as a Professional Natural Scientist,

Member of the South African affiliate of the International Association for Impact Assessment
Member of the Environmental Law Association of South Africa (ELA).

Summary of the EAP's past experience

Ms. Bekker is registered as a Professional Natural Scientist in the field of Environmental Science with the South African Council for Natural Scientific Professions (SACNASP) and is also a Registered Environmental Assessment Practitioner (EAP) with the Environmental Assessment Practitioners Association of South Africa (EAPASA), a legal requirement stipulated by NEMA. She is further certified as an ISO 14001 Lead Auditor. Her qualifications include BSc. Earth Sciences (Geology and Geography), BSc. (Hons.) Geography, and MSc. Environmental Management. In addition to these tertiary qualifications, she obtained a Certificate in Project Management, and completed the Management Advancement Programme at Wits Business School.

With more than 19 years' working experience in environmental management and the consulting industry and managing various Large Account Clients, she understands the South African Regulatory System, and can advise clients with due diligence on their environmental regulatory requirements and offer a solution driven service to their project life cycle. She is equipped with exceptional project management and coordination skills, which especially enhances the service she offers clients within the environmental permitting system.

Her key focus is environmental management and compliance with extensive experience in the mining industry. Project Management and Coordination of projects form a critical component of her duties, which include project planning, initiation of projects, client, authority and stakeholder consultation, specialist coordination, budget control, process control, quality control and timeframe management. Her interest lies in a client advisory capacity, being involved during due diligence investigations, pre-project development and assisting the client and engineering team in adding value to develop the project in an environmentally sustainable manner, considering client costs and liabilities, as well as considering the implication of environmental authorisation conditions and requirements on project deliverables. Her involvement in projects has spanned over the project life cycle from Due Diligence Investigations, Pre-Feasibility Investigations, Prospecting Right Applications, Mining Right Applications, Environmental Reporting and implementation and auditing of Environmental Management Plans and Authorisations.

1.a.iii Details of the Applicant

Dwarsrivier Chrome Mine (Pty) Ltd (hereafter referred to as "DCM" or "the mine") is wholly owned by Assore Ltd ("Assore").

According to information obtained from the official DCM Web Page, the mine originated as a result of neighbouring properties to the north and south thereof, which had existing chrome mining operations at the time of purchase in 1998. The owners of DCM, therefore invested in a feasibility study for the Plant, old Tailings Storage Facility (hereafter referred to as the "Old TSF") and the mining of chrome. The designs for the opencast and underground mines then commenced. Approval to proceed with the final design and construction of work was given in July 1999 (http://www.assmang.co.za/chrome.asp). The mine ceased opencast operations in 2006 and is currently operating as an underground (trackless, board and pillar operation) mine, producing chromite ore, with a Dense Medium Separation and Spiral Beneficiation Plant. DCM currently produces approximately 200 000 tons of chromite ore per month.

The mine was previously owned by Assmang (Pty) Ltd ("Assmang") with a 50% share. This results from the approval by the Department of Mineral Resources (DMR) (now the Department of Mineral Resources and Energy (DMRE)) of the Section 11 Transfer in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) of DCM from African Rainbow Minerals (ARM) to Assore. The change of ownership officially came into effect on 1 August 2016.

Table 3: Details of Applicant

Project applicant:	Dwarsrivier Chrome Mine (Pty) Ltd
Registration no (if any):	2011/105280/07
Trading name (if any):	N/A
Responsible Person, (e.g. Director, CEO, etc.):	Environmental Representative
Contact person:	Mr Pieter Schoeman
Physical address:	The mine is situated 25km outside of Steelpoort on Portion 1 (Remaining Extent) and Portion 0 (Remaining Extent) of the farm Dwarsrivier 372KT and Portion 4 (a Portion of Portion 3) of the Farm De Grootteboom 373KT
Postal address:	PO Box 567, Lydenburg

Postal code:	1120	Cell:	+27 (0) 76 028 7680
Telephone:	+27 (0) 13 230 5300	Fax:	+27 (0) 13 230 5318
E-mail:	pieters@dwarsrivier.co.za		

1.a.iv Environmental Authorisations

The mine is operating with all required environmental authorisations in terms of the following (The two authorisations highlighted are applicable to the current application):

Table 4: List of Environmental Authorisations

#	Legislation	Licence	Reference	Date
1	Minerals Act, 1991 (Act No. 50 of 1991)	Approval for Dwarsrivier Phase II Chrome Project	OT6/2/2/426A	14 December 1999
2	National Water Act, 1998 (Act No. 36 of 1998) (NWA)	Regulation 4b (GN704) Exemption for undermining 2006	16/2/7/B400/C83/1	12 September 2006
3	NWA	Overall Water Use Licence (WUL)	16/2/7/B400/C83	21 January 2008
4	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA)	Environmental Management Programme (EMPr)	-	December 2010
5	NWA	WUL – Tailings Dam	04/B41G/G/792	8 July 2011
6	National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)	Environmental Authorisation for the proposed construction of a new Tailings Storage Facility	12/1/9-7/1e/GS4	9 July 2011
7	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEMWA)	Waste Licence – Hazardous Waste Temporary Storage Facilities[1]	12/9/11/L290/5	21 July 2011
8	MPRDA	Dwarsrivier Mine Tailings Storage Facility Environmental Management Programme	LP30/5/1/3/2/1(179)EM	22 August 2011
9	MPRDA	Approval for Three Plants	LP30/5/1/3/2/1 (179)EM	11 January 2012
10	NEMWA	Waste Licence – Temporary General Waste Storage Facilities	12/4/10-A/1/GS3	29 March 2012
11	NEMA	Construction of a Low-Level Bridge over the Groot Dwarsrivier	12/1/9/1-GS22	11 June 2012
12	NEMA	Environmental Permission for Construction of a Bridge over the Springkaanspruit River	12/1/9/1-GS62	19 September 2013
13	NWA	WUL – River Crossings	04/B41G/CI/2240	4 October 2013
14	NEMA	Section 24G Rectification	12/1/9-7/S24G/7-GS1	26 August 2014
15	NEMWA & NEMA	Integrated Environmental Authorisation	179EM	15 February 2018
16	NEMA	Integrated Environmental Authorisation	179EM	29 May 2019

1.b Description of the Property

1.b.i Location of the Mine

DCM is situated approximately 60km northwest of Lydenburg, 25km south of Steelpoort and 63km northeast of Roossenekal in the Limpopo Province. The mine currently holds the surface rights for the Remainder of Portion 1 (RE of Portion 1) and the Remainder Portion (Portion 0) of the farm Dwarsrivier 372KT, as well as Portion 4 (a portion of Portion 3) of the farm De Grooteboom 373KT.

The operation is located in the Fetakgomo Tubatse Local Municipality, within the boundaries of the Sekhukhune District Municipality.

The R577 roadway that connects to the R555 (Lydenburg-Roossenekal road), is situated to the north of the plant and mine offices. The overall area is characterised by intensive mining development. Various servitudes

[1] Note that the Licence Holder has not and will not be commissioning the activity. The Environmental Authorisation has therefore not been implemented on site. The Licence Holder is not in contravention with the Environmental Authorisation.

traversing the site are present, which include gravel roads, telephone lines and electricity lines. Please refer Figure 1 and Figure 2 illustrating the location and cadastral setting of the mine.

DCM falls in the quaternary catchments B41G and B41H in the Olifants Water Management Area (WMA B4). All surface water draining from the properties ultimately flows into the Groot Dwarsrivier and the Klein Dwarsrivier, the confluence of which is located on the north-western portion of the property. From the confluence, the Dwarsrivier flows northwards into the Steelpoort River. DCM has an exemption (Reference Number 16/2/7/B400/C83/1) from the then Department of Water Affairs (DWA), now the Department of Water and Sanitation (DWS), which allows the operation to undermine the Groot Dwarsrivier.

Several of the neighbouring farms, namely Tweefontein 380JT, Thorncliffe 374KT, portions of De Grooteboom 373KT and portions of Dwarsrivier 372KT are owned by mining houses with existing and operational chrome and platinum mines. On the remainder of the neighbouring farms, agricultural activities take place, in the form of stock grazing and the production of vegetables, lucerne and cotton.

Please refer to the following table for the registered name, administrative jurisdiction and summary of location of the land.

Table 5: Property Information

Farm Name:	Farm Dwarsrivier 372KT Remainder of Portion 1 (RE of Portion 1) Farm Dwarsrivier 372KT Remainder Portion (Portion 0)
Magisterial district:	The mine falls within the Fetakgomo Tubatse Local Municipality, within the boundaries of the Sekhukhune District Municipality.
Distance and direction from nearest town:	DCM is situated approximately 25km southwest of Steelpoort and 60km from Lydenburg on the border between Limpopo and Mpumalanga Provinces. The mine itself falls under the jurisdiction of the Limpopo Province.
21 digit Surveyor General Code for each farm portion:	Farm Dwarsrivier 372KT Remainder of Portion 1 (RE of Portion 1) - T0KT00000000037200001 Farm Dwarsrivier 372KT Remainder Portion (Portion 0) - T0KT00000000037200000

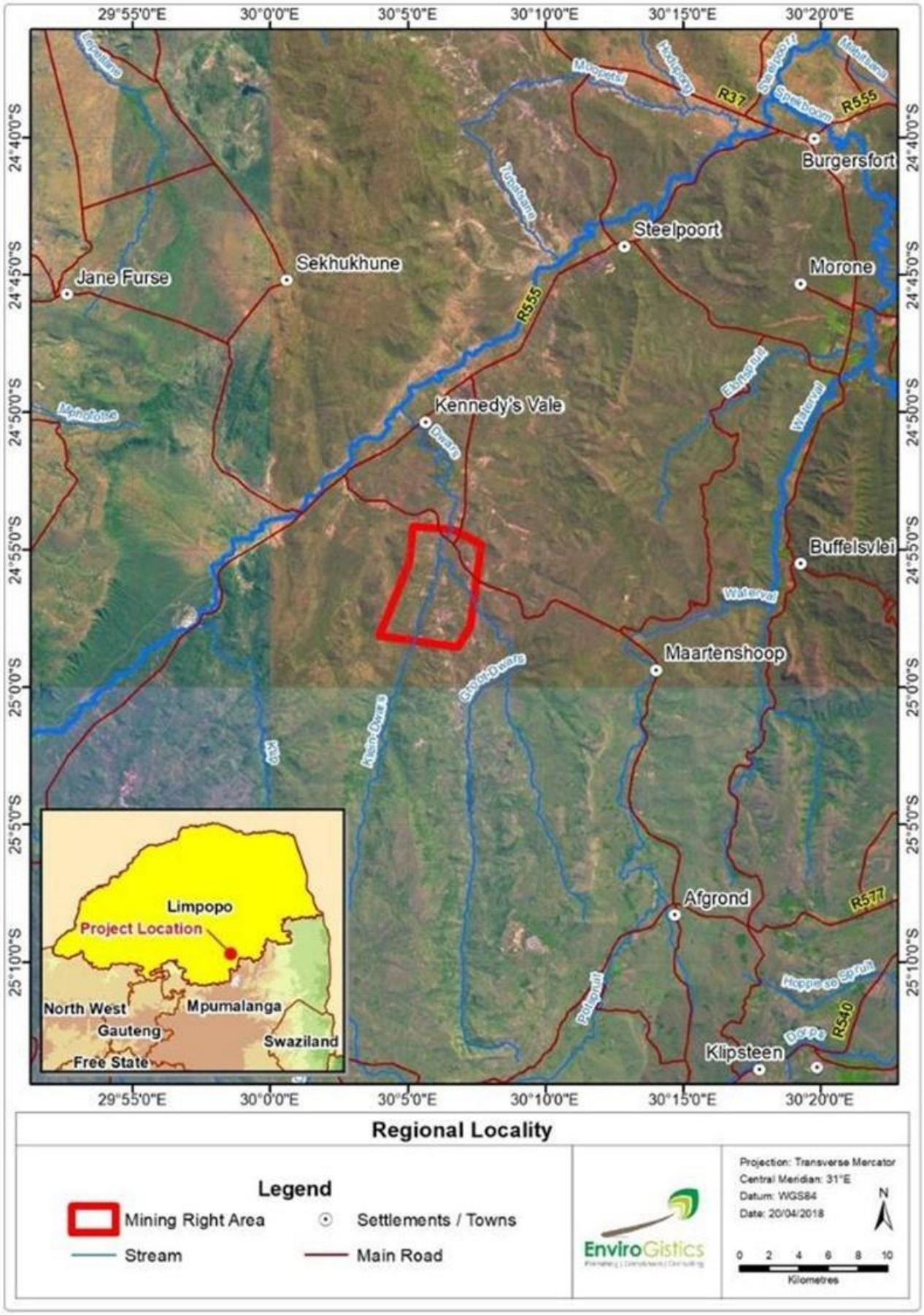


Figure 1: Local and Regional Setting of the Dwarsrivier Chrome Mine surface operations

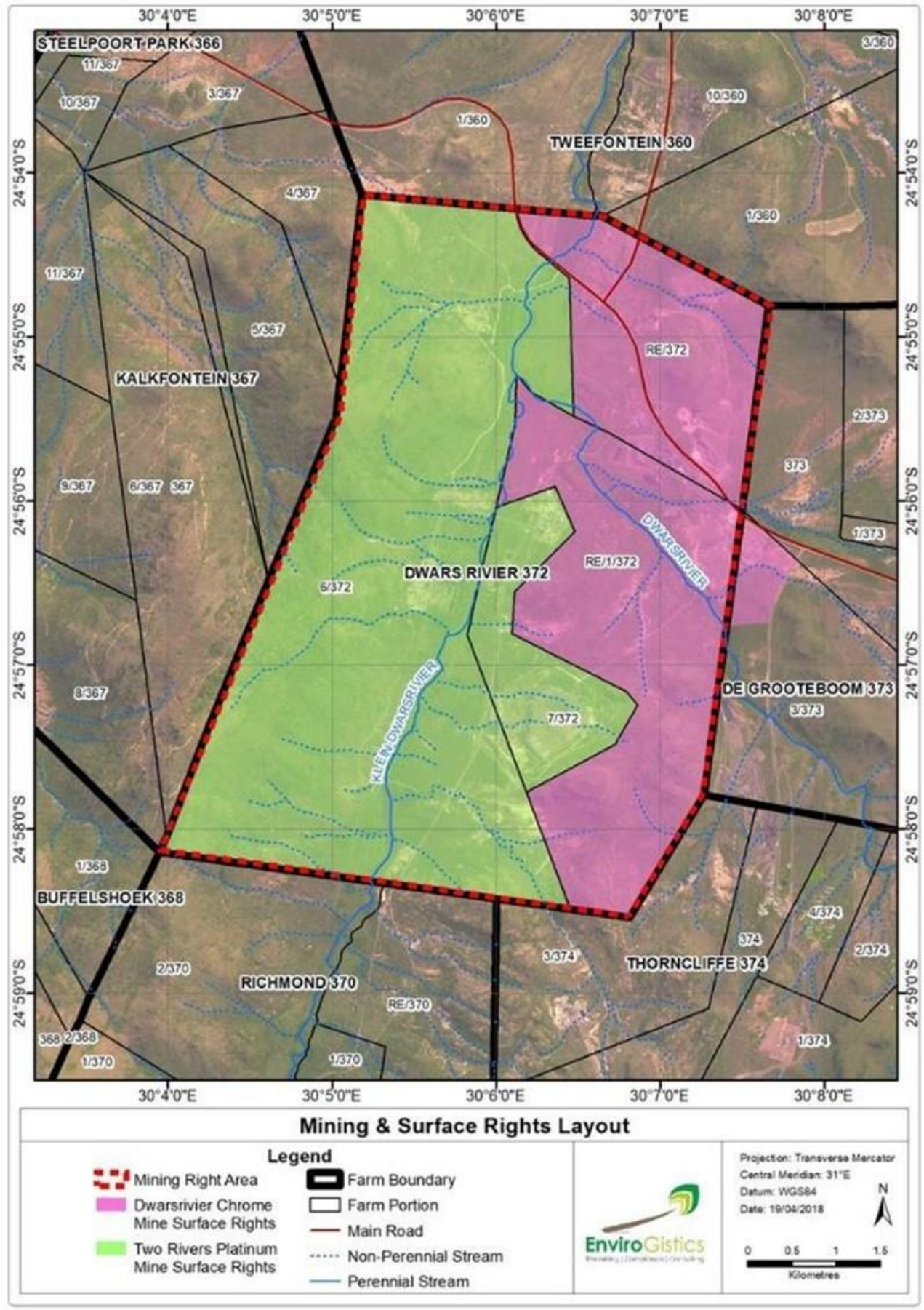


Figure 2: Cadastral Information

1.b.ii Ownership of Land

DCM has been mining chromite ore from the LG6 seam since 1999. Between 1999 and 2005, ore was mined using opencast methods. The six (6) pits have subsequently been mined out and backfilled with the exception of the South and North Pit portals from which access is gained to the underground workings. The current mine plan extends the life of the operations to the year 2042.

Assmang bought the farm Dwarsrivier 372KT (Portions 1 and the Remaining Extent), including all surface and mineral rights, in October 1998 for R163 million. In 2002, the mine purchased a portion of the farm De Grooteboom 373KT, subdividing this portion into Portion 4 (a portion of Portion 3).

The mine holds the surface rights on Portion 1 (Remaining Extent), Portion 0 (Remaining Extent) of the farm Dwarsrivier 372KT and Portion 4 (a Portion of Portion 3) of the farm De Grooteboom 373KT. The mining rights are held over Portion 1 (Remaining Extent), Portion 0 (Remaining Extent), Portion 6 and Portion 7 of the farm Dwarsrivier 372KT. The surface rights of Portions 6 and 7 of the farm Dwarsrivier 372KT are owned by Two Rivers Platinum Mine.

The property details are presented in the following table:

Table 6: Landownership

Farm Name	Portion	Title Deed Number	Property Size	Ownership	Mining Rights
Dwarsrivier 372KT	0	T24/2021	489ha	Assore Ltd	Assore Ltd
Dwarsrivier 372KT	1	T24/2021	843ha	Assore Ltd	Assore Ltd
De Grooteboom 373KT	Portion 4 (a Portion of Portion 3)	T24/2021	52ha	Assore Ltd	Assore Ltd
Dwarsrivier 372KT	6	48140/2005PTA	1879ha	Two Rivers Platinum (Pty) Ltd	Assore Ltd
Dwarsrivier 372KT	7	T9520/2008PTA	261ha	Two Rivers Platinum (Pty) Ltd	Assore Ltd

A Section 11 transfer in terms of the MPRDA has been applied for whereby Assore takes over all administrative and technical services, as well as the sales and marketing function. This application has been successful and therefore Assore is now 100% owners of DCM in terms of the mineral and surface rights. Refer to Figure 2Figure 2 for the cadastral setting of the mine.

1.c Locality Map

The activities in question and a brief location description are presented in the following table:

Table 7: Property Location

Farm Name:	Farm Dwarsrivier 372KT Remaining Extent of Portion 1 (RE of Portion 1) Farm Dwarsrivier 372KT Remainder Portion (Portion 0)
Application area (Ha)	Overall Area: 4ha of existing backfilled opencast pit • Farm Dwarsrivier 372KT RE of Portion 1: South Backfill Opencast Pit: 1.2a • Farm Dwarsrivier 372KT Portion 0 (RE): North Backfill Opencast Pit: 1.2ha
Magisterial district:	The mine falls within the Fetakgomo Tubatse Local Municipality, within the boundaries of the Sekhukhune District Municipality.
Distance and direction from nearest town	DCM is situated approximately 25km southwest of Steelpoort and 60km from Lydenburg on the border between Limpopo and Mpumalanga Provinces. The mine itself falls under the jurisdiction of the Limpopo Province.
21 digit Surveyor General Code for each farm portion	Farm Dwarsrivier 372KT Portion 0 (Remainder) - T0KT00000000037200000 Farm Dwarsrivier 372KT Remainder of Portion 1 - T0KT00000000037200001

The following table presents the coordinates for the proposed activity involved in this application:

Table 8: Coordinates

Activity	Farm Portion	Coordinate	Size (ha approx.)
South Pit Re-mining	Dwarsrivier 372KT RE of Portion 1	24°56'3.89"S 30° 7'15.92"E	1.2ha (no clearance required)
North Pit Re-mining	Dwarsrivier 372KT Portion RE	24°55'30.48"S 30° 7'14.74"E	1.2ha (no clearance required)
Approved reworking of the Old TSF	Dwarsrivier 372KT RE of Portion 1 Dwarsrivier 372KT Portion RE	24°55'42.71"S 30° 6'553.02"E	9.5ha (no clearance required)

The following figure presents the location of the listed activities within the approved mine surface rights.

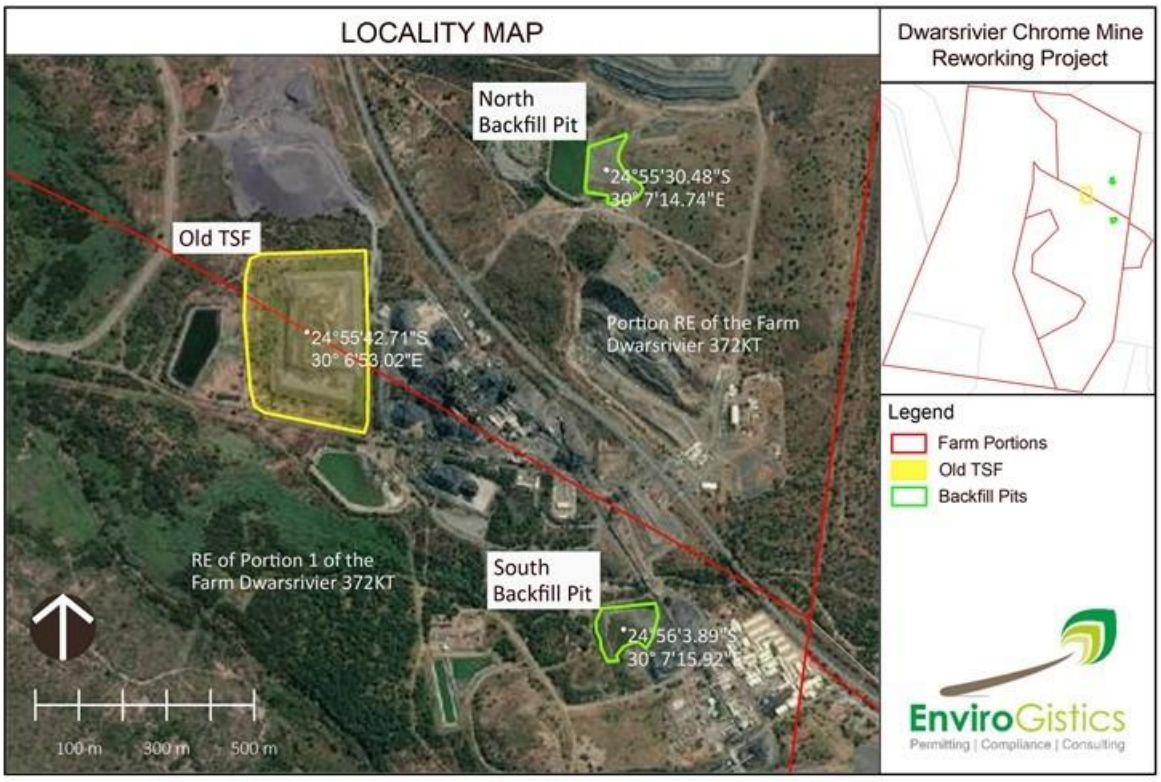


Figure 3: Location of Activities with coordinates

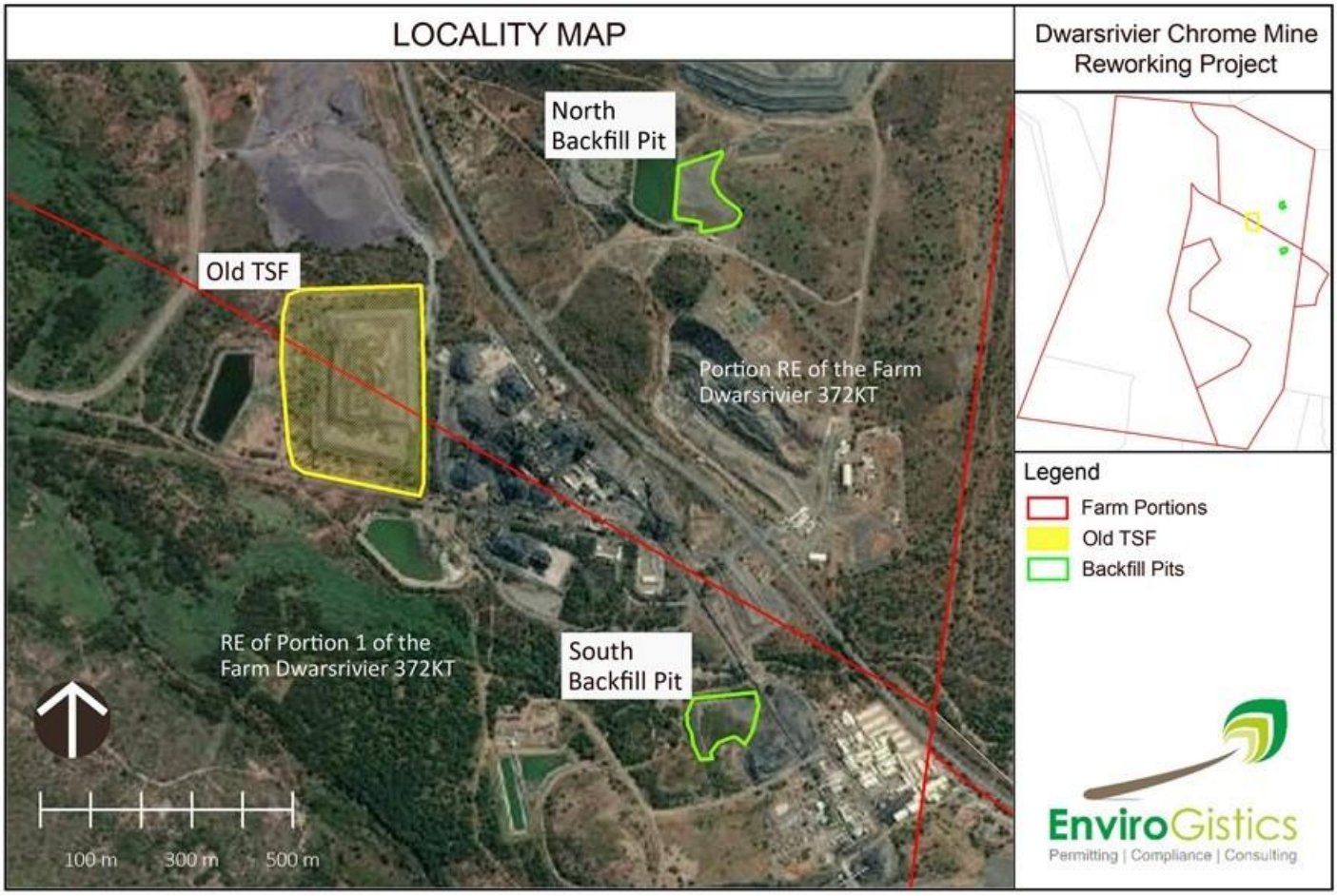


Figure 4: Location of all activities

1.d Description of the Scope of the Proposed Activity

1.d.i Listed and Specific Activities

1.d.i.1 National Environmental Management Act, 1998 (NEMA)

In terms of the NEMA, there are three (3) listing notices which should be considered for this application. These listing notices were amended during April 2017. Listing Notice 1 (Regulation 983) activities require a Basic Assessment Process, whereas Listing Notice 2 (Regulation 984) activities require a full Environmental Impact Assessment (EIA) Process. Listing Notice 3 (Regulation 985) activities require a Basic Assessment Process if the area falls within certain geographic zones. The majority of DCM is located in a Critical Biodiversity Area 1 (CBA1) with small portions thereof falling within Ecological Support Areas 2 (ESA2), while certain areas are also located within a threatened ecosystem, namely the Sekhukhuneland Mountainlands ecosystem, which is listed as being Endangered. The mine is also located within 10 of the De Hoop Dam, a protected environment (2019). Therefore, Listing Notice 3 is applicable when considering infrastructure and activities planned on site.

1.d.i.2 National Heritage Resources Act, 1999 (NHRA)

According to Regulation 38 of the NHRA, any development or other activity which will change the character of a site exceeding 5 000m^2 in extent requires notification to the South African Heritage Resources Agency (SAHRA). No change in the character of the site or clearance of undisturbed areas are applicable to this application. For this reason, the NHRA is not applicable to this project.

1.d.i.3 National Environmental Management: Waste Act, 2008 (NEMWA)

The NEMWA, Regulation 921, dated 29 November 2013 and as amended, makes provision for lists of waste management activities that have, or are likely to have, a detrimental effect on the environment.

The establishment or reclamation of a Mine Residue Deposit forms part of activities for which a Waste Management Licence (WML) is required.

1.d.i.4 National Water Act, 1998 (NWA)

Chapter 4 of the NWA specifically addresses the use of water and is a tool for an authority to ensure the implementation of the principle that National Government has overall responsibility over water resource management, including the equitable allocation and beneficial use of water in the public interest, including that a person can only be entitled to use water if the use is permissible under the Act. In general, a water use must be licensed unless it is listed in Schedule I, is an existing lawful use, is permissible under a general authorisation, or if a responsible authority waives the need for a licence. Section 21 of the NWA identifies eleven (11) consumptive and non-consumptive water uses which must be authorised.

No WUL activities are triggered by the proposed reworking activity specifically.

The activities in question and a brief location description are presented in the following table:

Table 9: Listed Activities

Name of Activity	Aerial extent of the Activity (Ha or m²)	NEMA EIA Listed Activity (Yes/No)	Applicable NEMA EIA Listing Notice (*GNR 983, GNR 984 or GNR 985)*	NEMWA Activity (Yes/No)	Applicable Waste Activity for the purposes of a Waste Management Licence
Reworking of Backfill Pits (North and South) through mechanical reworking activities	No additional clearance or disturbance is planned.	No	None	**Yes**	**Category B, Activity 11**. "Residue stockpiles or residue deposits" (11) The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002). Note that the reworking of the Old TSF is an approved activity in terms of the EMPr, 2010.
Potential Clearance Activities	The NEMA EIA Regulations 544, 2010 defines indigenous vegetation as follows: "**"indigenous vegetation"** refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years." Rehabilitation practices of the backfilled pits have been ongoing. The full establishment of vegetation has however not yet been achieved, and that established is not considered to be indigenous vegetation. For this reason, no clearance of vegetation in excess of 300m² is triggered, as such vegetation has not yet been established.	No	None		None

1.d.ii Description of the Projects to be undertaken

DCM has been mining chromite ore from the LG6 seam since 1999. Between 1999 and 2005, ore was mined using opencast methods. The six (6) opencast pits have subsequently been mined out and backfilled, with the exception of the South and North Pit portals from which access is gained to the underground workings. The current mine plan extends the life of the operations to the year 2042.

Assmang initially bought the farm Dwarsrivier 372KT (RE of Portion 1 and Portion 0 (RE)), including all surface and mineral rights, in October 1998. In 2002, the mine purchased a portion of the farm De Grooteboom 373KT, subdividing this portion into Portion 4 (a portion of Portion 3). In addition to the above, the mine also owns mining rights on Portions 6 and 7 of the farm Dwarsrivier 372KT, of which the surface rights are owned by Two Rivers Platinum Mine.

The mine is originally approved in terms of the Minerals Act, 1991 under Mine Licence No. 21/99, which was supported by an Environmental Management Programme (EMPr), approved on 14 December 1999. An amendment to the EMPr (now the EMPr, 2010) was commissioned by the mine in order to improve overall environmental management on the mine site in line with recognised Environmental Management Best Practice, stemming from improved understanding of on-site environmental system functioning and potential mining impacts, through a review of significant additional specialist assessments for the mine site. This Amended EMPr (EMPr, 2010) specifically made provision for the reworking of the Old TSF in Section 4.5.2. This section in the EMPr further made provision for the backfilling of the North and South Opencast Pits stating:

1. "Tailings – fine reject from the plant in slurry form, at the end of the plant process, is deposited in various authorised facilities, such as the North Pit…"

and

2. "The South Pit has since reached its capacity to accommodate backfilling with the aforementioned tailings. Tailings is presently diverted to backfill the so-called 'North Pit', until such time as the Mine's proposed new tailings facility has gone through all appropriate authorisation, licensing and approval processes."

Subsequent to the EMPr, 2010, an approval for the Northern TSF was secured by the mine in the Environmental Authorisation Reference: 12/1/9-7/1e/GS4, 9 July 2011 and no further backfilling was undertaken.

The backfilling of the opencast pits was further approved in the Water Use Licence (WUL) Reference 16/2/7/B400/C83, dated 21 January 2008.

DCM plans to sell its historic chrome tailings from the Old TSF (an approved reworking activity in the EMPr, 2010) as well as the backfilled tailings from the two (2) backfilled pits (North and South Pits).

The re-mining of the Old TSF is an approved activity in terms of the EMPr, 2010. The project will entail the dry removal of the tailings material from the Old TSF and transporting it off site for sale to a third party over a period of 15 – 24 months.

According to DCM (2020), the mine plans to sell its historical chrome tailings, which were deposited on the historical (Old) TSF, to a third party. The Old TSF has a maximum height of 13m and covers an area of 9.5ha. The facility stores approximately 269,939m³ of tailings.

The tailings removal process is included in the approved EMPr, 2010 for the operations. The process will entail dry removal of the tailings material using the truck and shovel method at a rate of 40,000 tonnes per month. The material will be loaded onto trucks and transported off site. It is estimated that 23 trucks will be dispatched from site on a daily basis during the project.

No water will be used or generated during the tailings recovery process. It is however reported that the optimum dry density for the tailings material will contain approximately 7% moisture. The porosity of the TSF is estimated to be 41 – 42%. The permeability of the tailings material is estimated to be 2.35 x 10-4cm/s (0.2m/d), which is considered to be comparatively high and within the mid semi-pervious permeability range, but typical of an unconsolidated fine sand soil type.

Surface water impacts will be managed according to the conditions of the approved EMPr. The existing structures that will be used to contain any potential runoff from the project include paddocks, stormwater

collection trenches and a pollution control dam. All activities will be conducted within the footprint of the Old TSF. No additional stockpiles will be required during the reclamation process.

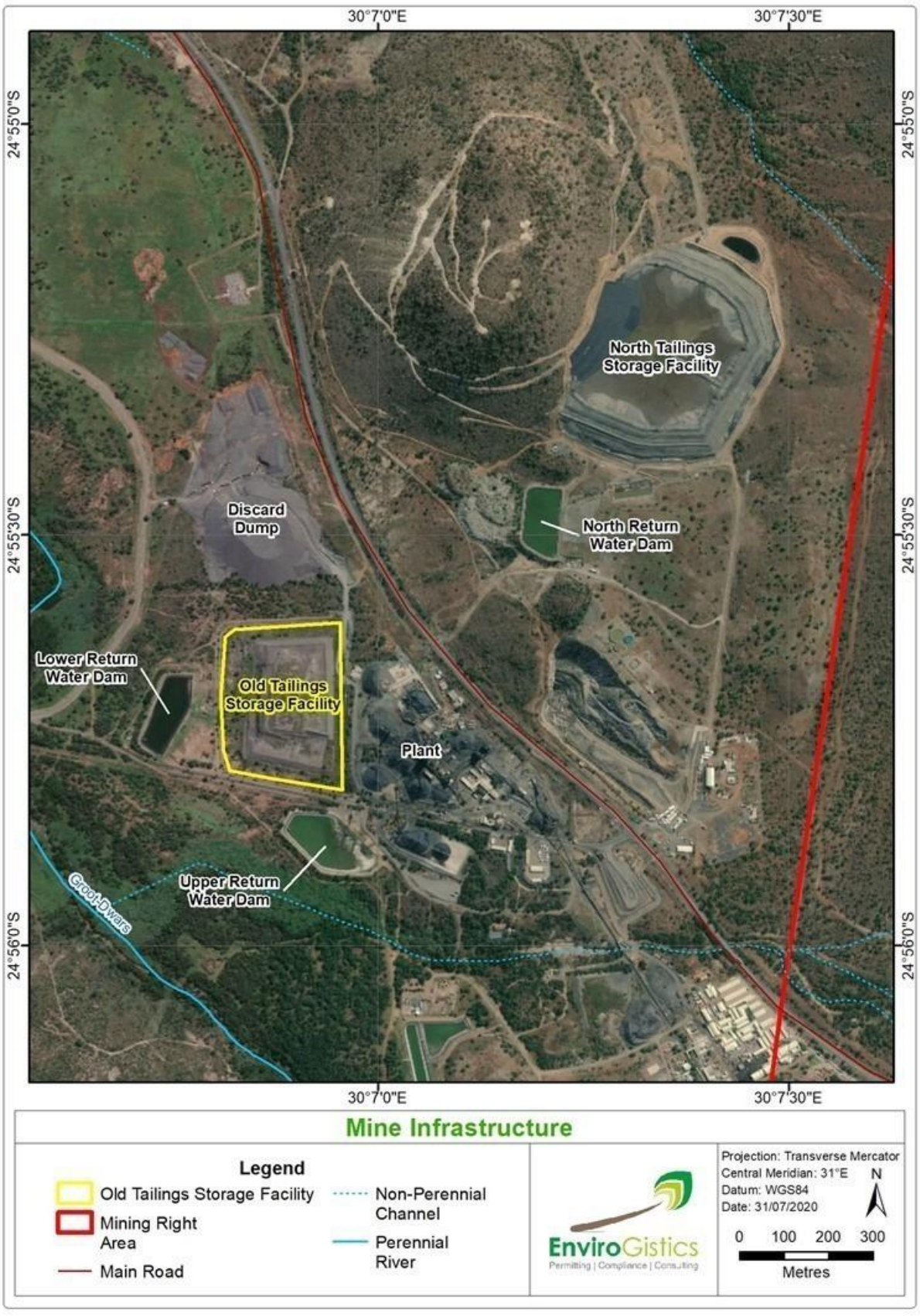


Figure 5: Location of the Old TSF approved in terms of the EMPr, 2010 for reworking

For the purposes of this Waste Management Licence (WML) Application, dry tailings will be recovered from the historic tailings backfill pits situated at the North and South Shafts - please refer to the following figure). The mine anticipates that material will be sold from the last quarter of 2021 pending the approval of the WML.

Tailings will be 'mined' by a contractor or DCM-owned excavator. The mined tailings will then be loaded by a contractor or DCM-owned Front-End Loader (FEL) onto transport trucks (tipper trucks) for transport to third party buyers. Tipper trucks typically have 30-60 tonnes capacity.

Once the tipper trucks are loaded, they will proceed to the existing weighbridge at the Beneficiation Plant. Once the weight of the load has been confirmed, the trucks will proceed to the 'tarpaulin area'. The truck driver will then cover the load with a tarpaulin before proceeding to the public road.

DCM currently conducts similar activities at the mine and will therefore make use of existing infrastructure, machinery and methods. Similar 'loading' methods are used at the mine Run of Mine (ROM) stockpiles.

No water will be used or generated during the recovery and all activities (excluding transport) will be conducted within the current TSF footprint. It is also not anticipated that any additional or temporary stockpiles will be required during the reclamation process.

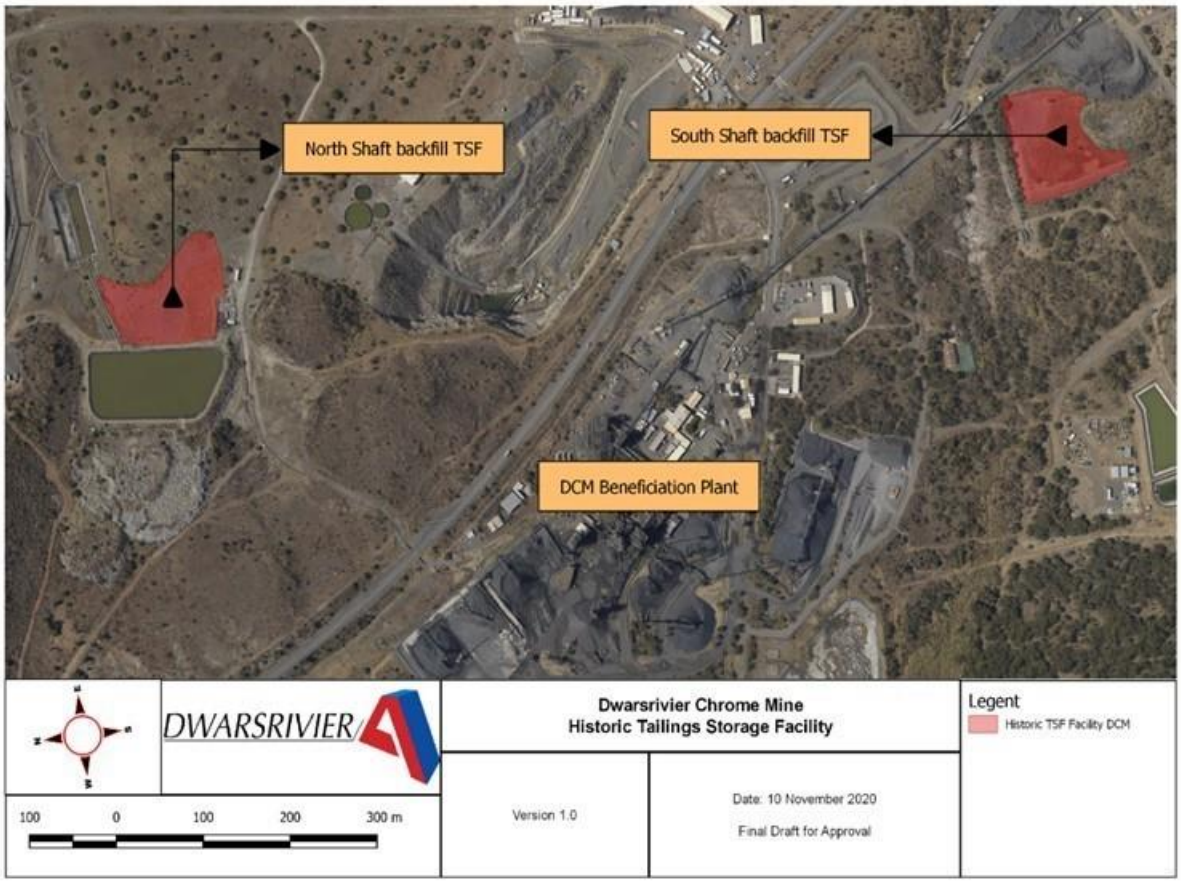


Figure 6: Location of the Backfill Pits

It is planned that tailings material will be recovered at a rate of approximately 40,000 tonnes per month. The South Backfill Pit contains approximately 431,426 tonnes of tailings while the North Backfill Pit contains approximately 635,630 tonnes of tailings. The recovery process is expected to last between 28 and 35 months. At the anticipated rate of recovery, approximately 23 trucks will be dispatched from the site daily containing tailings material.

The typical process will be as follows:

TSF Pit → Interlink Truck → Weighbridge → Transport to buyer (public road) → Offload at buyer stockpile → Process at buyer plant → Disposal of final tails at buyer facility → Sale of material by buyer.

1.d.iii Description of the Activities to be undertaken

The infrastructure and activities that will form part of the proposed project will include the following:

- Planning Phase:
  - Ensure the implementation of Legal Requirements (Environmental Permits and Authorisations).
- Construction Phase:
  - No construction activities will be required.
- Operational Phase:
  - Removal of placed topsoil from backfilled pits;
  - Management of vehicle movement on site;
  - Stockpiling of ROM on designated and licensed stockpiles if required;
  - Domestic waste management and minimal hazardous waste management; and
  - Transportation of product to third parties.
- Closure Phase:
  - Ensure the implementation of Legal Requirements (Environmental and Closure Authorisations/Permits);
  - Backfilling of pits with waste rock and/or making pits safe; and
  - Domestic, hazardous and demolition waste management.

1.e Policy and Legislative Context

South Africa has a comprehensive environmental governance framework underpinned by an extensive array of environmental laws. The past years have evidenced the wholesale reform of South Africa's environmental legal framework under the guidance of the Constitution.

Historically, the mining industry in South Africa has not been subjected to comprehensive environmental regulation. However, in recent years, this has changed significantly and the industry is now required to comply with a multifaceted network of mining and environmental legislation. There are no shortages of policy and legal frameworks to ensure "responsible" mining in South Africa. The Minerals and Mining Policy for South Africa, 1998 affirmed that the State, as custodian of the nation's natural resources, will support mining development while maintaining and enhancing environmental awareness of the mining industry in accordance with national environmental policy, norms and standards.

The following table presents the key policy and legislative considerations as part of this application.

Table 10: Policy and Legislative Context

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied	How Does this Development Comply with and Respond to the Legislation and Policy Context
The Constitution of South Africa (Act No. 108 of 1996)	Sustainable development is relevant to all projects.	The Constitution reigns supreme and the advancement of human rights is one of the foundations of South Africa's democracy. Furthermore, the Bill of Rights plays a central role in the democratic regime because it embodies a set of fundamental values which should be promoted at all times. An environmental right is contained in Section 24 and is, arguably, the cornerstone for environmental governance in South Africa, which includes the mining industry. Section 24(a) proclaims the right of everyone "to an environment that is not harmful to their health or well-being". Mining companies are thus duty-bound to constitutional, legislative, and other measures to prevent pollution and ecological degradation, promote conservation and to develop in a sustainable manner. The Constitution cannot manage environmental resources as a stand-alone piece of legislation, hence additional legislation has been promulgated in order to manage the various spheres of both the social and natural environment. Each promulgated Act and associated Regulations is designed to focus on various industries or components of the environment to ensure that the objectives of the Constitution are effectively implemented and upheld on an on-going basis throughout the country. In terms of Section 7, a positive obligation is placed on the State to give effect to the environmental rights.
Environmental Legislation Considered		
The Hazardous Substances Act, 1973 (Act No. 15 of 1973) (HSA)	Management of Chemicals	All chemicals transported to and stored on site will be handled in accordance with the HSA and the applicable Material Safety Data Sheets (MSDSs). A chemical log will be kept, and all the necessary signage erected on site.
National Forests Act, 1998 (Act No. 84 of 1998) (NFA) Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003) (LEMA)	Relevant for the removal of Protected Tree Species in terms of the Notice of the List of Protected Tree Species - Department of Agriculture, Forestry and Fisheries (DAFF) Notice 635 of 2019. Relevant for the removal of protected plants (LEDET).	Should protected species be identified, the necessary tree or plant removal permits will be required, from either the Department of Environment, Forestry and Fisheries DEFF; previously DAFF) or the Limpopo Department of Economic Development, Environment and Tourism (LEDET). This is however unlikely, as the proposed areas are backfilled areas and have not undergone final rehabilitation.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA)	Relevant to threatened plant species removals, as well as to development within the Critical Biodiversity Area (CBA) and listed threatened ecosystem areas. Note the removal of Red Data Listed (threatened) species in categories: Critically Endangered (CR), Endangered (EN) and Vulnerable (VU) will require removal approvals which are the responsibility of the Department of Environment, Forestry and Fisheries (DEFF).	The NEMBA addresses a number of issues related to biodiversity and how it should be protected and managed in undertaking development activities. The purpose of the NEMBA is to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA and the protection of species and ecosystems that warrant national protection. As part of its implementation strategy, the National Spatial Biodiversity Assessment and the more recent National Biodiversity Assessment (NBA; 2018) were developed. Should protected/ threatened species be identified, the necessary plant removal permits will be required. This is however unlikely, as the proposed areas are backfilled areas and have not undergone final rehabilitation, with re-establishing through self-succession still in process.
National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA)	Potential presence of heritage sites during construction and excavation studies.	According to Regulation 38 of the NHRA, any development or other activity which will change the character of a site exceeding 5,000m^2 in extent requires notification to the South African Heritage Resources Agency (SAHRA). No change in the character of the site or clearance of undisturbed areas are applicable to this application. For this reason, the NHRA is not applicable to this project.

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied	How Does this Development Comply with and Respond to the Legislation and Policy Context
National Water Act, 1998 (Act No. 36 of 1998) (NWA)	Establishment of facilities containing waste or water containing waste.	One of the main and ever-continuing concerns in South Africa is the sustainability of water management, and the costs associated with the prevention and remediation of pollution. The NWA is one of the government's answers to some of these challenges and functions as sectoral legislation within the framework of NEMA. Section 19 of the NWA echoes the duty of care envisaged in Section 28 of NEMA and addresses the prevention and remediation of the effects of pollution. The NWA provides for a broad duty of care in that: ***"(1) an owner of land, a person in control of land or a person who occupies or uses the land on which-*** ***a) any activity or process is or was performed or undertaken; or*** ***b) Any other situation exists, which causes, has caused or is likely to cause pollution of a water resource must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring."*** The words "likely to cause pollution" broadens the scope of the duty, which enables an activity, or situation that is land-based, to trigger the application of the duty. The "reasonable measures" are not prescribed, but may include measures intended to: ***"Cease, modify or control any act or process causing the pollution; comply with any prescribed waste standard or management practice; contain or prevent the movement of pollutants; eliminate any source of pollution; remedy the effects of pollution; and remedy the effects of any disturbance to the bed and banks of a watercourse."*** The NWA, furthermore, provides for water use authorisations which a mine will have to apply for, before commencing with its primary activity of mining. Water uses that need to be licensed under Section 21 of the NWA include: a) Taking water from a water resource; b) Storing water; c) Impeding or diverting the flow of water in a watercourse; d) Engaging in a stream flow reduction activity; e) Engaging in a controlled activity; f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit; g) Disposing of waste in a manner which may detrimentally impact on a water resource; h) Disposing in any manner of waste which contains waste from, or which has been heated in, any industrial or power generation process; i) Altering the bed, banks, course or characteristics of a watercourse; j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and k) Using water for recreational purposes. The backfilling of the opencast pits as a rehabilitation measure has been approved by the WUL, 2008 and therefore no WUL is required.
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEMWA)	The NEMWA waste management activities are triggered as part of this project. This legislation is considered in the development of waste management measures and assessing potential impacts.	The NEMWA fundamentally reformed the law regulating waste management, and for the first time provides a coherent and integrated legislative framework addressing all the steps in the waste management hierarchy. The objectives of the NEM:WA are to protect health, well-being and the environment by providing reasonable measures for, *inter alia*, remediating land where contamination presents, or may present, a significant risk of harm to health or the environment. The objectives of the NEMWA are structured around the steps in the waste management hierarchy, which is the overall approach that informs waste management in South Africa. The waste management hierarchy consists of options for waste management during the lifecycle of waste, arranged in descending order of priority; i.e.: waste avoidance, reduction, re-use, recycling, recovery, treatment, and safe disposal as a last resort. NEMA introduced a number of additional guiding principles into South African environmental legislation, including the life-cycle approach to waste management, producer responsibility, the precautionary principle and the polluter pays principle (i.e. the sustainability principles as contained in Section 2 of NEMA). Section 5(2) of the NEMWA stipulates that the Act should be interpreted and guided in accordance with these sustainability principles. The NEMWA, furthermore, echoes the duty of care provision in terms of Section 28 of NEMA, by obliging holders of waste to take reasonable measures to implement the waste management hierarchy. Section 16(1) of the NEMWA provides that: ***"A holder of waste must, within the holder's power, take all reasonable measures to –***

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied	How Does this Development Comply with and Respond to the Legislation and Policy Context
		c) avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated; ***d) reduce, re-use, recycle and recover waste;*** ***e) where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner;*** ***f) manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour or visual impacts;*** ***g) prevent any employee or any person under his or her supervision from contravening this Act; and*** ***h) prevent the waste from being used for an unauthorised purpose."*** When considering whether a "substance" is considered a "waste" or not, the definition of the NEMWA must be considered. The NEM:WA defines "waste" as: ***"Any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 of this Act; or*** ***Any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister by notice in the Gazette."*** For the purpose of this application, Category B, Activity 11. "Residue stockpiles or residue deposits" is triggered: (11) The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).
National Environmental Management Act, 1998 (Act. No 107 0f 1998) (NEMA) and the NEMWA	The initial Basic Assessment Report & EMPr and current EIA process	In respect of the Listed Activities in terms NEMA, Section 24F(1)(a) of NEMA stipulates the following: "no person may- commence an activity listed or specified in terms of section 24(2)(a) or (b) unless the competent authority or the Minister of Minerals and Energy, as the case may be, has granted an environmental authorisation for the activity..." Section 24F is clear in its prohibition that only those "listed or specified" activities may not commence without prior Environmental Authorisation. Consequently, the activities to be conducted by the mine will only trigger Environmental Authorisation requirements when these said activities trigger a listed or specified activity referred to in Section 24F. Furthermore, note that the law is clear in that NEMA and its Regulations do not have retrospective working. Accordingly, in terms of the various Listing Notices promulgated since 1997, it is paramount to link the commencement date of the specific activities with the corresponding Listed Activities. There are currently five sets of EIA Regulations which govern potential Listed Activities. The focus should be on if and when a Listed Activity was commenced with in terms of the specific Regulations; i.e.: Environment Conservation Act, 1989 (Act No. 37 of 1989) (ECA) Listed Activities, promulgated in terms of the ECA (effective between 08 September 1997 and end of day 09 May 2002); • ECA Listed Activities, promulgated in terms of the ECA (effective between 10 May 2002 and before end of day 02 July 2006); • The 2006 EIA Regulations, 2006 Listing Notice 1 and 2006 Listing Notice 2 (effective between 03 July 2006 and end of day 01 August 2010); • The 2010 EIA Regulations, 2010 Listing Notice 1, 2010 Listing Notice 2 and 2010 Listing Notice 3 (effective between 02 August 2010 and end of day 07 December 2014); and • The 2014 EIA Regulations, 2014 Listing Notice 1, 2014 Listing Notice 2 and 2014 Listing Notice 3 (commencement date 08 December 2014, as amended in April 2017). Accordingly, an activity must be assessed in terms of the specific Regulations applicable at the time of commencement of the specific activity. EnviroGistics (Pty) Ltd undertook a detailed review of the listed activities according to the proposed project description to assess the listed activities that are considered applicable. Section 4 of the NEMWA Listing Notice stipulates that a person who wishes to commence, undertake or conduct a waste management activity, must follow the processes as prescribed in terms of the Environmental Impact Assessment Regulations (EIA Regulations) made under Section 24(5) of the National Environmental Management Act, 1998 (NEMA) as part of a WML application contemplated in Section 45 read with section 20(b) of the NEMWA.

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied	How Does this Development Comply with and Respond to the Legislation and Policy Context
		Section 19 of the NEMWA states that the Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have a detrimental effect on the environment. In terms of section 45 of the NEMWA, a person who requires a WML must apply for the license by lodging an application with the licensing authority. Regulation 921, 2013 of the NEMWA details the various waste management activities, and was further amended by Regulation 633, 2015 to include the following waste management activity applicable to this process: Category B, Activity 11. "Residue stockpiles or residue deposits" (11) The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002). **Project Application Background** *An Application was submitted to the DMRE on 19 January 2021. The application was for the purposes of a Basic Assessment Process, based on the following legal considerations:* *Section 4 of the NEMWA Listing Notice stipulates that a person who wishes to commence, undertake or conduct a waste management activity, must follow the processes as prescribed in terms of the Environmental Impact Assessment Regulations (EIA Regulations) made under Section 24(5) of the National Environmental Management Act, 1998 (NEMA) as part of a waste management licence application contemplated in Section 45 read with section 20(b) of the NEMWA.* *NEMA and Regulation 15 of the EIA Regulations empowers an Environmental Assessment Practitioner (EAP) to identify the exact authorisation process [EIA or Basic Assessment (BA)] for a proposed project. Therefore, in terms of Regulation 15(3) (read with Regulation 8) of the EIA Regulations, the EAP identified that this project only triggers a BA Process.* *The above decision is based on Regulation 8 of the EIA Regulations stipulates that a Competent Authority (in this case the Department of Mineral Resources and Energy (DMRE), Polokwane) may advise or instruct the proponent or applicant of the nature and extent of any of the processes that may or must be followed.* *Significantly, and in terms of Regulation 15(3), a full Scoping & EIA process is only mandatory "…if the application is for two (2) or more activities as part of the same development for which S&EIR must already be applied in respect of any of the activities".* *Due to the fact that this project only triggers one (1) NEMWA Category B activity and considering the limited additional environmental impact, it was recommended by the registered EAP, that this project not involve a full EIA, and that a BA Process should be allowed. The project will not result in any additional clearance or construction of additional infrastructure, and only involves the reworking of backfill pits via mechanical removal and processing through the existing (approved) Beneficiation Plant.* *Ongoing consultation with the DMRE has been undertaken regarding feedback on the application, which included:* • *A letter was submitted with the Environmental Authorisation application to the DMRE – proof of delivery 19 January 2021. In this letter guidance from the Department was requested.* • *Various emails to follow up on this request were submitted for clarification.* • *An email from the DMRE was received on 3 February 2021 to allow the EAP to proceed with the stakeholder consultation. Based on this the process was commenced with the consultation which included the full NEMA Stakeholder Consultation process as well as providing the BAR for Stakeholder review. The DMRE was also issued with this draft report on 22 February 2021.* • *Various emails to follow up on this process was sent to the Department and a meeting was held on 26 March 2021.* **Current Application** The DMRE confirmed that a full EIA should be undertaken. Based on the outcomes of the consultation with the DMRE, and due to importance of this project to the applicant, the applicant has therefore decided to withdraw the BAR application submitted on 19 January 2021 and submit an application for a full EIA process.

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied	How Does this Development Comply with and Respond to the Legislation and Policy Context
		The EIA Application fee of R 10 000 was paid to the DMRE on 8 April 2021. An Application for Environmental Authorisation was couriered to the DMRE on 12 April 2021. The DMRE has acknowledged receipt of the application on 14 April 2021 (Refer to Annexure 1). As the BAR was made available to all stakeholders the comments received was included into the final Environmental Scoping Report (ESR). Stakeholders was again informed of this final submission and was be afforded the opportunity to comment on the final ESR, where comments will be included into the draft EIA and EMPr. The draft EIA and EMP Report was made available to all Commenting Authorities and Registered Stakeholders. Up until end of business 23 July 2021 no further comments were received from stakeholders.
	Financial Provision	Section 41 (1) of the MPRDA has been repealed and in terms of Section 24P in the NEMA as amended, which provides that the holder of a mining right must make financial provision for rehabilitation of negative environmental impacts. Section 24P of the NEMA, as amended, provides that the holder of a mining right must make financial provision for rehabilitation of negative environmental impacts. The financial provision must guarantee the availability of sufficient funds to undertake the following: • Rehabilitation of the adverse environmental impacts of the listed or specified activities; • Rehabilitation of the impacts of the prospecting, exploration, mining or production activities, including the pumping and treatment of polluted or extraneous water; • Decommissioning and closure of the operations; • Remediation of latent or residual environmental impacts which become known in the future; • Removal of building structures and other objects; and/or • Remediation of any other negative environmental impacts. In addition to Section 24P, the Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations were promulgated on the 20 November 2015 (Government Notice No. 1147 published in GG 39425) (GN R1147). For the purposes of this Scoping and EIA Assessment Report, the financial provision estimates, and respective reports are in line with the requirements of the Financial Provision Regulations. Regulation 11 of GN R1147 requires a holder of a mining right to determine the quantum of the financial provision through detailed itemisation of all activities and costs, calculated based on the actual costs of implementation of the measures required for: • Annual rehabilitation as reflected in the Annual Rehabilitation Plan (ARP) as per the minimum content prescribed by Appendix 3 of GN R1147; • Final rehabilitation, decommissioning and closure as reflected in the RCP as per the minimum content prescribed by Appendix 4 of GN R1147; and • The remediation of latent or residual environmental impacts including but not limited to the pumping and treatment of polluted or extraneous water, as reflected in an Environmental Risk Report (ERR), as per the requirements of Appendix 5 of GN R1147.
Mineral and Petroleum Resources Development Act, 2002 (Act No 28 of 2002) MPRDA	Existing Right	Since 2004, the MPRDA has been the principal piece of legislation that regulates the South African mineral and petroleum sector. The MPRDA was enacted with the objectives of promoting local and rural development, ensuring equal access to minerals, and eradicating discriminatory practices in the industry, while still guaranteeing security of tenure to participants in the industry and increasing the industry's international competitiveness. Recent amendments to NEMA and the MPRDA have been published with the objective to align NEMA and the MPRDA authorisation processes as well as to provide for cooperative governance between the DMRE and the DEFF. The governing provisions in respect of EMPr's were removed from the MPRDA and incorporated into Sections 24N, 24O, 24P, 24Q, 24R and 24S of NEMA. The project does not entail any additional authorisations for mining rights in terms of the MPRDA. The surface infrastructure will be located within the approved mining area within the DCM as the surface right owners. For the purposes of this project, the mine will also submit an updated Mine Works Programme.

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied	How Does this Development Comply with and Respond to the Legislation and Policy Context
		As presented in this document, due to the nature of the activities, and the fact that these activities will not result in the significant alteration of the environment, the rehabilitation plan will be implemented with the aim of returning the site to the mine's overall closure objective and end land use. Infrastructure will only be removed once the mine enters the closure phase. All of these infrastructure components are included into the mine's existing financial provision. However, provision has been made for the inclusion of enviroberms around the opencast voids in the event of premature closure and should voids remain.
Municipal Plans		
Integrated Development Plan (IDP) (Final IDP/Budget 2016/2017-2018/2021) Consolidated IDP for Greater Tubatse Local Municipality – adopted 27 October 2016)	Economic Development IDP Vision 2030: "A developed platinum city for the benefit of all"	The IDP states that in the medium to long term it is intended to create a more prosperous Greater Tubatse Local Municipality through provision of services, social cohesion and nation building, local economy and job creation, help to adapt to the changing climatic conditions, integrated communities, public participation and accountability, education, health, fighting against fraud and corruption. The IDP makes a number of statements, which include: • Develop and Strengthen Local Economies for Job Creation; • Improving Health in Rural Communities; • Education; • Building Spatially Integrated Communities; and • Improving Public Participation and Accountability. The Municipal Mission Statements are: • Accountable through active community participation; • Economic enhancement to fight poverty and unemployment; • Render accessible, sustainable and affordable service; • Municipal transformation and institutional development; and • Sustainable livelihoods through environmental management. The IDP states that amongst others, opportunities offered by the local municipality include: (a) mining investment opportunity; (b) land availability opportunity; (c) tourism opportunity; (d) funding source opportunity from private sector; and (e) job creation opportunity from infrastructure investment. The IDP states clearly that, with the exception of the creativity of people, mining still presents the largest opportunity in the area to a sustainable economic base whereby the local economy and the area is growing at a higher pace. Mining is regarded as an opportunity offered by the municipality, with the IDP stating that the mining activities and natural resources available in the area have created a definite potential to develop tourism and thereby to diversify the economic base of the municipality. The municipality will be able to develop sector plans, policies and by-laws which will be utilised for the planning of the area and regulate both the internal and external affairs.

1.f Need and Desirability of the Proposed Activities

1.f.i Economic Benefit:

Regulation 23 of the MPRDA states in Section 1(a), that subject to subsection 4, the Minister must grant a mining right if the mineral can be mined optimally in accordance with the mining work programme. The mine has been awarded a Mining Right by the Department of Mineral Resources (DMR; now DMRE) and therefore has an obligation to give effect to the following:

- The ongoing development and improvement of the Mining Work Programme which details the planned mining activities to be followed in order to mine the mineral resource optimally; and
- Optimal mining of minerals must be undertaken, as the Minerals and Petroleum Board may recommend to the Minister to direct the holder of a mining right to take corrective measures if the Board establishes that the minerals are not being mined optimally in accordance with the Mining Work Programme. The Minister may, on the recommendation of the Board, suspend or cancel a mining right if the Minister is convinced that any act or omission by the holder justifies the suspension or cancellation of the right.

DCM is actively investigating opportunities for the continued and sustainable mining of chrome reserves and for the purposes of this project, has identified the historic opencast pits as sources for further re-mining of previously deposited chrome resources, which could not be beneficiated by prior technologies but is now viable through the current plant.

Currently DCM is serviced by 1,200 permanent and 800 contractor employees. The majority of the employees are locals drawn from Lydenburg and villages around the mine, including Steelpoort Park, Kalkfontein and Buffelshoek.

1.f.ii Giving effect to Waste Reduction:

The reworking of the mineral waste gives effect to the Waste Management Hierarchy as presented in the National Waste Management Strategy, November 2011 and also the National Waste Management Strategy of 2020. This 2011 Strategy states the following:

- A challenge experienced is the lack of a policy and regulatory environment that does not actively promote the Waste Management Hierarchy.
- The report states that while the elimination of waste in its entirety may not be feasible, it is possible through the systematic application of the Waste Management Hierarchy to reach a point within the next few decades where re-use, recycling, recovery and treatment overtake landfills as preferred options for waste management.
- The first goal presented in this strategy as a strategic goal is to “promote waste minimisation, reuse, recycling and the recovering of waste” by focusing on implementing the Waste Management Hierarchy, and with the ultimate aim of diverting waste from landfill.

The following is an extract of Section 2.3 of the National Waste Management Strategy:

The Waste Management Hierarchy in the National Waste Management Strategy is summarised as follows:

- *Waste avoidance and reduction;*
- *Re-use;*
- *Recycling;*
- *Recovery; and*
- *Treatment and disposal.*

The foundation of the hierarchy, and the first choice of measures in waste management, is avoidance and reduction. This step aims for goods to be designed in a manner that minimises their waste components. Also, the reduction of the quantity and toxicity of waste generated during the production process is important.

The next stage of the hierarchy is re-using waste. Re-using an article removes it from the waste stream for use in a similar or different purpose without changing its form or properties.

After re-use comes the recycling of waste, which involves separating articles from the waste stream and processing them as products or raw materials.

These first four stages of the waste management hierarchy are the foundation of cradle-to-cradle waste management. This approach seeks to re-use or recycle a product when it reaches the end of its life span. In this way, it becomes input for new products and materials. This cycle repeats itself until as small a portion as possible of the original product eventually enters the next level of the waste management hierarchy: recovery.

As a last resort, waste enters the lowest level of the hierarchy to be treated and/or disposed of, depending on the safest manner for its final disposal.

The current National Waste Management Strategy of 2020 takes this strategy further by also focussing on the Circular Economy. A circular economy redefines economic growth by moving away from a take-make-waste industrial model to one that decouples economic activity from the environment and supports a just transition to renewable energy sources. The three key principles of a circular economy are: design out waste and pollution, keep products and materials in use and regenerate natural systems. The two (2) strategic entry points of the waste sector into waste minimisation and the circular economy is waste prevention and waste as a resource, as briefly explained below.

- Waste Prevention (as highlighted in the 2011 National Waste Management Strategy) – this emphasises avoiding and reducing waste before substances, materials and products are discarded.
- Waste as a Resource (key focus in the draft Strategy) – this focuses on stimulating a secondary resources economy based on recycling and recovery of materials and energy from waste i.e. interventions that take place after a product or material has become waste. Circularity can deliver substantial material savings throughout value chains and production processes, generate extra value, transformation of industry towards climate-neutrality, long-term competitiveness and unlock economic opportunities. In terms of the waste management hierarchy practices, recycling of waste for reuse and recovery of materials is prioritised over recovery of energy from waste. The main economic driver lies in exploiting the full potential value of waste.

1.f.iii Giving effect to an approved Environmental Activity as part of Environmental Management and Impact Reduction:

The mine is originally approved in terms of the Minerals Act, 1991 under Mine Licence No. 21/99, which was supported by an EMPr (approved on 14 December 1999). An amendment was, furthermore, commissioned by the mine in 2010 in order to improve overall environmental management on the mine site in line with recognised Environmental Management Best Practice, stemming from improved understanding of on-site environmental system functioning and potential mining impacts, through a review of significant additional specialist assessments for the mine site. This EMPr specifically made provision for the reworking of the Old TSF (Section 4.5.2 of the EMPr, 2010).

Tailings Dam Reworking

Based on a legal assessment conducted for the mine by Adv. Lana van Der Westhuizen of Environmental Law Group, no NEMA Listed Activities or NEMWA Waste Activities are triggered for the reworking of the tailings, but it was recommended that an Addendum be obtained in terms of Section 102 of the MPRDA to extend this operational activity for the purposes of selling of material and state that tailings can be reworked on site, or moved off site to be beneficiated by third parties and to ensure that the management measures are still relevant to the operational procedures.

Notification of the project, for the purposes of a Section 102 amendment was initially initiated on 13 July 2020. The DMRE indicated that a Section 102 amendment would not be required as there are no new uses to approved (verbal communication, 4 August 2020). After numerous discussions with the DMRE, the Section 102 process was withdrawn and a letter of notification of this project was submitted to the DMRE on 20 August 2020. It is however still important that the mine must ensure to obtain written consent from the DMRE for the change in their EMPr which was not included in the consideration of these documents when they were drafted.

Accordingly, the mine has a duty to ensure that the Buyer of the tailings is authorised to store and/or process the tailings. Therefore, a WML is required by the Buyer to store/ establish and/or reclaim/ process the tailings.

For this reason, a notification was submitted to the DMRE as mentioned before, and an Operational EMPr is developed for the purposed of ensuring duty of care and the implementation of best environmental management practices.

The EMPr, 2010 specifically stated the following: The processing plant produces significant volumes of waste tailings. The existing tailings dam contains approximately 1.6Mt of material of which an estimated 40% is chromite. This dump will be totally reworked at a rate of 16kt/month, giving the tailings dump a life of approximately 8 years.

Opencast Pit Reworking

In terms of the opencast pits, the EMPr, 2010 states the following:

"The waste rock has been shown to be a viable aggregate, and as such, waste rock may potentially be removed from site through sale to suitable third parties. Sufficient waste rock will remain at surface for backfilling of surface voids upon final mine closure and rehabilitation. The upgraded spirals plant will be used to recover the chromite from the tailings. To date, tailings were pumped into the so-called 'South Pit' on site. The South Pit has since reached its capacity to accommodate backfilling with the aforementioned tailings. Tailings is presently diverted to backfill the so-called 'North Pit', until such time as the mine's proposed new tailings facility has gone through all appropriate authorisation, licensing and approval processes."

Based on the above, the South Pit reworking is an approved EMPr activity, however the reworking of the North Pit specifically requires a new Waste Management Licence. To ensure an overall management approach, all three activities, Old TSF, South Pit and North Pit reworking are therefore presented in this report.

1.f.iv Giving effect to sound Environmental Management and the NEMA Duty of Care Principles:

In addition to the above motivation, the 2017 Integrated Water and Waste Management Plan (IWWMP), which was based on the 2016 Numerical Groundwater Model conducted by Irene Leah Environmental and Geohydrology cc (iLEH) indicated that the re-mining of the North and South Opencast Pits is highly recommended to manage the migration of the groundwater plume. This project therefore further gives effect to this specialist recommendation.

1.g Motivation for the preferred development footprint within the approved side including a full description of the process followed to reach the proposed development footprint within the approved site

1.g.i Details of the Development Footprint Alternatives Considered

1.g.i.1 Details of all alternatives considered

1.g.i.1.a The property on which or location where it is proposed to undertake the activity

The projects presented are located within the existing Mining Right Area.

No location alternatives were investigated for this project as the project are linked to the existing opencast pits. The only alternative is the Go-Go alternative where the status quo remains.

Aim of the Project

Regulation 23 of the MPRDA states in Section 1(a), that subject to subsection 4, the Minister must grant a mining right if the mineral can be mined optimally in accordance with the mining work programme. The mine has been awarded a Mining Right by the DMR (now DMRE) and therefore has an obligation to give effect to the following:

- The ongoing development and improvement of the Mining Work Programme which details the planned mining activities to be followed in order to mine the mineral resource optimally; and
- Optimal mining of minerals must be undertaken, as the Minerals and Petroleum Board may recommend to the Minister to direct the holder of a mining right to take corrective measures if the Board establishes that the minerals are not being mined optimally in accordance with the Mining Work Programme. The Minister may, on the recommendation of the Board, suspend or cancel a mining right if the Minister is convinced that any act or omission by the holder justifies the suspension or cancellation of the right.

DCM is actively investigating opportunities for the continued and sustainable mining of chrome reserves and for the purposes of this project, has identified the historic opencast pits as sources for further re-mining of

previously deposited chrome resources, which could not be beneficiated by prior technologies and now viable through the current plant.

Currently DCM is serviced by 1,200 permanent and 800 contractor employees. The majority of the employees are locals drawn from Lydenburg and villages around the mine, including Steelpoort Park, Kalkfontein and Buffelshoek.

In addition to the above motivation, the 2017 IWMMP, which was based on the 2016 Numerical Groundwater Model conducted by iLEH, indicated that the re-mining of the North and South Opencast Pits is highly recommended to avoid future dewatering. This project therefore further gives effect to this specialist recommendation.

Alternatives Considered:

No location alternatives were investigated for this project as the project are linked to the existing opencast pits. The only alternative is the No-Go alternative where the status quo remains.

The key motivations for this project are: 1. Economic benefit of optimally mining available resources; and 2. The removal of the material from the opencast pits will result in the management of long-term groundwater impacts.

Impacts:

The project should be considered as a rehabilitation project, with significant economic benefits. The December 2020 Hydrogeological Study indicated that the removal of the tailings material from North Pit is anticipated to result in the most significant impact on groundwater quality in the long-term. In South Pit, the waste rock backfilled is expected to control groundwater quality to a greater extent and the removal of the tailings material is not expected to result in significant impacts on the aquifers.

The removal of tailings backfill from North Pit should therefore be considered a priority, as it is expected to significantly reduce the source to groundwater contamination in this area, especially since the Northern RWD is lined with HDPE.

1.g.i.1.b The type of activity to be undertaken

No location alternatives were investigated for this project as the project are linked to the existing opencast pits. The only alternative is the Go-Go alternative where the status quo remains.

1.g.i.1.c The design or layout of the activity

No design or layout alternatives were investigated for this project as the project are linked to the existing opencast pits. No additional infrastructure is required for the purposes of this project as existing infrastructure will be utilised.

The only alternative is the No-Go alternative where the status quo remains.

1.g.i.1.d The technology to be used in the activity

Tailings will be 'mined' by a contractor or DCM-owned excavator. The mined tailings will then be loaded by a contractor or DCM-owned Front-End Loader (FEL) onto transport trucks (tipper trucks) for transport to third party buyers. Tipper trucks typically have 30-60 tonnes capacity.

Once the tipper trucks are loaded, they will proceed to the existing weighbridge at the Beneficiation Plant. Once the weight of the load has been confirmed, the trucks will proceed to the 'tarpaulin area'. The truck driver will then cover the load with a tarpaulin before proceeding to the public road.

No technological alternatives have been considered other that those proposed in this report, as DCM currently conducts similar activities at the mine and will therefore make use of existing infrastructure, machinery and methods. Similar 'loading' methods are used at the mine Run of Mine (ROM) stockpiles.

1.g.i.1.e The operational aspects of the activity

As per the above discussion. Tailings will be 'mined' by a contractor or DCM-owned excavator. The mined tailings will then be loaded by a contractor or DCM-owned Front-End Loader (FEL) onto transport trucks (tipper trucks) for transport to third party buyers. Tipper trucks typically have 30-60 tonnes capacity.

Once the tipper trucks are loaded, they will proceed to the existing weighbridge at the Beneficiation Plant. Once the weight of the load has been confirmed, the trucks will proceed to the 'tarpaulin area'. The truck driver will then cover the load with a tarpaulin before proceeding to the public road.

The only alternative is the No-Go alternative where the status quo remains and the tailings are not reworked.

1.g.i.1.f Rehabilitation Alternative

The mine has approval to backfill the opencast pits in terms of the approved EMPr, 2010 and the WUL, 2008. The WUL also allows for the backfilling of the opencast pits with tailings. Depending on the needs of the mine this backfilled material will likely be waste rock, also a Mine Residue on site. The backfilling with waste rock is deemed a suitable material for the backfilling options based on the outcomes of the groundwater report. Please see the conclusions listed below.

If a final void is left, groundwater levels would recover and stabilise with time. The volume of groundwater inflow to the pits will reduce to near zero at this point, as the gradients towards the pits would be low once groundwater levels have recovered. Under this scenario, groundwater levels inside the final void will be controlled by rainfall and evaporation. Since the rate of evaporation in the area is 1,500mm/a, which is at least twice as high as the Mean Annual Precipitation (MAP), the rate of evaporation is expected to prevent groundwater levels from recovering to surface. This in effect will control the water level inside the final void. It is concluded that if a final void is left, the risk of decant will be controlled and groundwater levels inside the void are unlikely to rise to surface.

Backfilling of the reclaimed pits with waste rock may increase the risk of decant. This can however be controlled through implementing a sound rehabilitation programme, geared at reducing the rate of recharge to around 5% of MAP. This was confirmed in previous detailed studies on the risk of decant from the pits (iLEH, 2017). In order to achieve this rate, each pit must be completely backfilled, rehabilitated surfaces must be made free draining and final surfaces must be re-vegetated to create near-natural recharge conditions. This is the current planned rehabilitation option for the project.

If the rate of recharge to the pits cannot be reduced and remain above 5% of MAP in future, the risk of decant will increase. In this case, groundwater levels would rise to above the surface elevation due to higher recharge and decant will take place, resulting in long-term residual negative impacts.

The final rehabilitation plan for the opencast pits – i.e. backfilling or the leaving of a void/management of decant should be finalised within 24 months of the completion of the reworking activities. However, for the purposes of the EIA the recommendation is the backfilling of the opencast pits. This is also the current rehabilitation strategy as included into the financial provision and approved quantum of the mine.

1.g.i.1.g The option of not implementing the activity

The only alternative is the No-Go alternative where the status quo remains.

The key motivations for this project are: 1. Economic benefit of optimally mining available resources; and 2. The removal of the material from the opencast pits will result in the management of long-term groundwater impacts.

The project should be considered as a rehabilitation project, with significant economic benefits. The December 2020 Hydrogeological Study indicated that the removal of the tailings material from North Pit is anticipated to result in the most significant impact on groundwater quality in the long-term. In South Pit, the waste rock backfilled is expected to control groundwater quality to a greater extent and the removal of the tailings material is not expected to result in significant impacts on the aquifers.

The removal of tailings backfill from North Pit should therefore be considered a priority, as it is expected to significantly reduce the source to groundwater contamination in this area, especially since the Northern RWD is lined with HDPE.

1.g.ii Details of the Public Participation Process Followed

This section includes the comments received during the Public Participation Process undertaken to date. The Comments and Responses Section has the following objectives:

1. To provide a formal and integrated record of all the issues raised by Interested and Affected Parties (I&APs) to date, and the responses provided by the EAP;

2. To provide a mechanism that allows all parties participating in the process (including the Competent Authorities) to verify whether the issues raised have been considered and where appropriate, adequately addressed by the EAP.

Issues raised throughout the consultation process will be recorded through a variety of mechanisms. These include:

- Comments sheets received by fax, and/or e-mail;
- Comments sent to the public participation office via e-mails;
- Comments received telephonically; and
- Comments received during the announcement phase when interested Communities were met on site.

The Public Participation Process during the Basic Assessment Application of the project consisted of the following activities:

- Communication with regulatory authorities and municipal authorities;
- Communication with surrounding landowners;
- The identification and engagement with the general public;
- Placement of notifications and advertisements in local newspapers;
- Placement of posters and notifications on site and in close proximity to the site;
- The Public Participation Process will be an ongoing activity and will only be concluded once the decision for the Environmental Authorisation has been issued. All I&APs will be informed as to the final decision taken by the Department.

An additional consultation process through adverts, site notifications and information provision to registered stakeholders has been reinitiated for the purposes of the process change from Basic Assessment to full EIA process.

1.g.ii.1 Stakeholder Identification

The current Stakeholder Database on the mine was utilised as a basis for the development of the consultation register for this project. In addition, relevant government departments, municipalities and affected ward councillors were contacted to inform them of the proposed project and to obtain their issues and comments in this regard. The following stakeholders were consulted as part of the project:

- DWS;
- DMRE;
- LEDET;
- DEFF;
- Local Municipality;
- District Municipality;
- Surrounding Landowners; and
- Other Identified Stakeholders.

The latest stakeholder database is included within this report as Appendix 5.

All registered I&APs, which have a direct affect/effect on the proposed project or are directly or indirectly impacted by the proposed project, have the right to lodge a comment/question on the project (until such time that the appeals process comes to a close).

1.g.ii.2 Stakeholder Identification and Notification

Please refer to Appendix 5 for copies of these notifications. Proof of email submissions can be requested from the EAP.

1.g.ii.3 Site Notices

In order to inform surrounding communities and adjacent landowners of the proposed project, four (4) site notices were erected on site (on 18 February 2021) and at visible locations close to the site.

Site Notices were place at the following locations:

- Main Office Entrance;

- North Mine Entrance;
- Plant Entrance; and
- Burgersfort Municipality.

Main Office Entrance

Plant Entrance (close to project area)

North Mine Entrance

Burgersfort Municipality

Figure 7: Proof of Site Notices

Site Notices were placed on 22 April 2021 at the following locations to advertise the EIA process:

- Main Office Entrance;
- North Mine Entrance;
- Plant Entrance; and
- Burgersfort Municipality.

Main Office Entrance

Plant Entrance (close to project area)

North Mine Entrance

Burgersfort Municipality

Figure 8: Proof of Site Notices

1.g.ii.4 Background Information Documents

Key stakeholders, who included the following sectors, were directly informed of the proposed development by e-mail and fax through the submission of the Background Information Document (BID) and Registration Sheet:

- Authorities;
- Municipalities;
- Residential Associations;
- Non-governmental organisations;
- General Public;
- Parastatals / Service providers, and
- Adjacent Landowners.

The BIDs were distributed via email to all parties on the database on 22 February 2021 (with a copy of the BAR provided on 24 February 2021).

A second round of BIDs was submitted to all registered Stakeholders on 22 April 2021.

Please refer to Appendix 5 for a copy of this document.

1.g.ii.5 Advertisements

The formal announcement of the proposed project was done by placing an advert in the Steelburger News on 19 February 2021 to invite all I&APs to register on the project database. The objective of this newspaper advertisement was to:

- Inform I&APs of the proposed project;

- Inform I&APs of the Basic Assessment procedure and the way in which I&APs could lodge any objections to the proposed development and provide comments; and

Invite I&APs to become involved in the proposed project by registering as I&APs.

A second round of advertising for the purposes of the Scoping and EIA phase was placed in the Steelburger News on 2 April 2021.

Please refer to Annexure 5 for a copy of this advert.

1.g.ii.6 Document Review

All registered stakeholders were informed of the availability of the initial draft BAR on 24 February 2021 for review. A period of 30 days was provided. As the draft BAR has been reviewed, this review period was regarded sufficient for inclusion into the final ESR as there is no change in the content of information provided to stakeholders. The final ESR was provided to all stakeholders for comment between 23 April 2021 and 24 May 2021. The draft EIA and EMP Report was made available to all Commenting Authorities and Registered Stakeholders. Up until end of business 23 July 2021 no further comments were received from stakeholders.

1.g.ii.7 Stakeholder Meetings

Due to the nature of the project, and no requests by stakeholders for meetings, no stakeholder meeting has been proposed.

1.g.ii.8 Summary of Issues raised by the I&APs

The Issues and Responses Register includes the comments received during the Stakeholder Consultation Process undertaken for the proposed project. This includes responses to the advertisements, response sheets, individual discussions with key stakeholders, and any other comments received during the project timeframe for the draft BAR up until 26 March 2021.

Comments reported within this Issues and Response Register were updated during the project. This document can therefore be considered as an active document up until the final reports are submitted. To date the following comments have been received.

Table 11: Stakeholder Comments received

Stakeholder	Representative	Means of consultation	Issue and Response
Eskom	Sebenzile Mhlongo	Via Email 10 March 2021	Request for the applicant to submit a letter of consent. Response: This was submitted to Eskom on 18 March 2021, also refer to Annexure 5.
Neighbouring Mine	Solome Beeslaer	Via Email 26 February 2021	Requested all reporting on the project, including water related information. Response: This was submitted on 6 March 2021, also refer to Annexure 6.
Neighbouring Mine	David Paila	Via Email 2 March 2021	Impacts on traffic and dust in the area – to be included into EIA and EMPr. Response: Please also refer to Table 40 and Section 1.g.iv.4 discussing the recommendation for local labour considerations where possible.
Stakeholder	Mokadi	SMS	Potential job opportunities. Response: Please also refer to Table 40 and Section 1.g.iv.4 discussing the recommendation for local labour considerations where possible. Please refer to Section 1.d.i and 1.e for the legal considerations.
Stakeholder	Luambo Sengani	Email, 19 February 2021	Potential job opportunities. Response: Please also refer to Table 40 and Section 1.g.iv.4 discussing the recommendation for local labour considerations where possible. Please refer to Section 1.d.i and 1.e for the legal considerations.
Stakeholder	Phillmon Ngobeni	Email, 19 February 2021	Potential job opportunities. Response: Please also refer to Table 40 and Section 1.g.iv.4 discussing the recommendation for local labour considerations where possible. Please refer to Section 1.d.i and 1.e for the legal considerations.
DEFF	Ms Ndina	Letter dated 2 March 2021	The mine should do everything in their power to stop the spread of veld fires in their land – to be included into EIA and EMPr. Response: Please also refer to Table 40.
Totolo Makola	Stakeholder in Ga Phasha Village, Steelpoort	Email 24 April 2021	Registering to be included on database. BID provided. Requested information regarding potential job opportunities. Response: Please also refer to Table 40 and Section 1.g.iv.4 discussing the recommendation for local labour considerations where possible. Please refer to Section 1.d.i and 1.e for the legal considerations.
Lancelot Phahledi	Stakeholder interest	Email 29 April 2021	Requested to participate in waste collection programmes in the future. Submitted registration form requesting: Provision of tools needed to assist backfilling the two opencast pits. Collecting the waste (all types) or remains after backfilling. Provision of engineering or civil works that will be needed since this seems to be a long term project. All steps involved in the acquisition of the WML. Physical meetings and contents to be covered presently and in the future. Response: "The Licence is question is a Waste Management Licence. The reworking of the backfilled materials in the old opencast pits necessitates a Waste Management Licence from the Department of Mineral Resources and Energy (DMRE) as it constitutes a Waste Management Activity in terms of the National Environmental Management: Waste Act, 2008 (NEMWA). The NEMWA identified various Waste Management Activities which an applicant must first get authorisation for before such activity can commence.

Stakeholder	Representative	Means of consultation	Issue and Response
			EnviroGistics has been appointed by the applicant (Dwarsrivier Chrome Mine) as the independent Environmental Consultant to investigate the potential environmental impact of the proposed project on the environment. This is a legal process that must be undertaken before the mine can commence with any reworking activities of the identified opencast pits. Should the DMRE issue the Waste Management Licence to the mine pending the outcomes of the environmental impacts assessment, it means that the mine can conduct this activity (therefore excavate the backfilled material) with various environmental management measures to consider. This will either be done by the mine themselves or by third party contracts. The project undertaken by EnviroGistics only involves the impact assessment process for the project in order to either obtain or be rejected a Waste Management Licence by the Department of Mineral Resources and Energy. I have attached the Background Information Document, which should provide you with more information on the process being conducted for the mine. Should you consider to obtain a Waste Management Licence for any potential activities, I can provide you with a copy of the legislation you can consider. Your registration document will be included into the Environmental Impact Assessment Report. EnviroGistics forms an independent part in this process and may therefore not form part of the procurement of resources, third parties or employment after the Waste Management Licence is received by the mine. These discussions will be undertaken by the mine themselves should the Waste Management Licence be awarded to them and will follow their procurement processes and rules." Please also refer to Table 40 and Section 1.g.iv.4 discussing the recommendation for local labour considerations where possible. Please refer to Section 1.d.i and 1.e for the legal considerations. In terms of the timeframes of the Project, Please refer to Section 1.q, The recovery process is expected to last between 28 and 35 months.

Table 12: Comments received from the DMRE on the final ESR

#	Comment	Response
1	Details of the future land use for the site and infrastructure after decommissioning in 20-30 years.	The life of mine for DCM is currently in excess of 27 years, although the recovery process of the two opencast pits is expected to last between 28 and 35 months. The re-mining of the Old TSF is an approved activity in terms of the EMPr, 2010. The project will entail the dry removal of the tailings material from the Old TSF and transporting it off site for sale to a third party over a period of 15 – 24 months. With the ongoing exploration activities undertaken this life of mine may continue for beyond this period. For this reason, it is reasonably accurate to state the future land uses will still be mining. Various alternatives are being investigated for the future rehabilitation of the opencast pits, which may include backfilling as approved in terms of the 2008 WUL. In this case the life of mine will revert to the planned post closure land use which is wilderness. The current closure plan makes provision for the demolishing of surface infrastructure and the promotion of the growth of the surrounding Sekhukhune Mountain Bushveld species. As mentioned in Table 10 of this report, the IDP states that amongst others, opportunities offered by the local municipality include: (a) mining investment opportunity; (b) land availability opportunity; (c) tourism opportunity; (d) funding source opportunity from private sector; and (e) job creation opportunity from infrastructure investment. The IDP states clearly that, with the exception of the creativity of people, mining still presents the largest opportunity in the area to a sustainable economic base whereby the local economy and the area is growing at a higher pace. Mining is regarded as an opportunity offered by the municipality, with the IDP stating that the mining activities and natural resources available in the area have created a definite potential to develop tourism and thereby to diversify the economic base of the municipality. The municipality will be able to develop sector plans, policies and by-laws which will be utilised for the planning of the area and regulate both the internal and external affairs. For this reason the opportunity for ongoing mining within the Mining Rights area are in line with the municipality IDP. If a final void is left, groundwater levels would recover and stabilise with time. The volume of groundwater inflow to the pits will reduce to near zero at this point, as the gradients towards the pits would be low once groundwater levels have recovered. Under this scenario, groundwater levels inside the final void will be controlled by rainfall and evaporation. Since the rate of evaporation in the area is 1,500mm/a, which is at least twice as high as the Mean Annual Precipitation (MAP), the rate of evaporation is expected to prevent groundwater levels from recovering to surface. This in effect will control the water level inside the final void. It is concluded that if a final void is left, the risk of decant will be controlled and groundwater levels inside the void are unlikely to rise to surface. Backfilling of the reclaimed pits with waste rock may increase the risk of decant. This can however be controlled through implementing a sound rehabilitation programme, geared at reducing the rate of recharge to around 5% of MAP. This was confirmed in previous detailed studies on the risk of decant from the pits (iLEH, 2017). In order to achieve this rate, each pit must be completely backfilled, rehabilitated surfaces must be made free draining and final surfaces must be re-vegetated to create near-natural recharge conditions. This is the current planned rehabilitation option for the project. If the rate of recharge to the pits cannot be reduced and remain above 5% of MAP in future, the risk of decant will increase. In this case, groundwater levels would rise to above the surface elevation due to higher recharge and decant will take place, resulting in long-term residual negative impacts. The final rehabilitation plan for the opencast pits – i.e. backfilling or the leaving of a void/management of decant should be finalised within 24 months of the completion of the reworking activities. However, for the purposes of the EIA the recommendation is the backfilling of the opencast pits. This is also the current rehabilitation strategy as included into the financial provision and approved quantum of the mine.
2	The total footprint of the proposed development should be indicated.	The project comprises of an overall area of 2.4ha of existing backfill opencast pits (South Backfill Opencast Pit: 1.2ha; North Backfill Opencast Pit: 1.2ha), and reworking of the Old TSF, comprising of an area of 9.5ha. This project does not require any clearance activities, as the activities involve the reworking of existing disturbed areas.
3	Should a Water Use License be required, proof of application for a licence needs to be submitted.	The water use activity of backfilling of the opencast pits was further approved in the Water Use Licence (WUL) Reference 16/2/7/B400/C83, dated 21 January 2008. The following water uses are already approved for the two opencast pit areas in terms of the WUL, 2008: - Appendix IV: Section 21 (c) impeding or diverting the flow of water in a watercourse; Section 21 (i): Altering the bed, banks, course or characteristics of a watercourse – Condition 1.2: Alter the course of the Springkaanspruit as well as the unnamed tributaries of the Groot Dwarsrivier at the locations of Mining of the South Pit and mining of the North pit.

#	Comment	Response
		• Appendix V: Section 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource – the licensee may dispose an average quantity of 309m3 of tailings per day into the North and South open pit areas. Depending on the outcomes of the final rehabilitation option for the Opencast Pits, once reworked, the necessary engagements will be made with the DMRE and DWS depending on the potential amendments to the original rehabilitation strategy if any.
4	Possible impacts and effects for the development on the vegetation ecology with regard to low land-highland interface in the locality should be indicated.	The project comprises of an overall area of 2.4ha of existing backfill opencast pits (South Backfill Opencast Pit: 1.2ha; North Backfill Opencast Pit: 1.2ha), and reworking of the Old TSF, comprising of an area of 9.5ha. This project does not require any clearance activities, as the activities involve the reworking of existing disturbed areas. Based on the above there will be no impact on vegetation as only existing disturbed areas form part of this application.
5	The impacts of the proposed facility on avifauna and must be assessed in the EIA phase.	The project will not involve the clearance of indigenous vegetation, the implementation of blasting activities or the erection of high infrastructure or equipment. In addition to this no additional powerlines will be required for this project. Based on the scope and extent of this project, and the fact that the project is located within the existing mine layout, no new or additional impact on the avifauna is anticipated. The activities in question involve the reworking of existing disturbed areas (please refer to Table 20).
6	Possible impacts and effects of the development on the surrounding industrial area.	It is not foreseen that the project will have a negative impact on the surrounding industrial area. The mine is located within an existing mining area, and is zoned for such intent. Mining is important for this area and a key component of the IDP and municipal strategies. The IDP states that amongst others, opportunities offered by the local municipality include: (a) mining investment opportunity; (b) land availability opportunity; (c) tourism opportunity; (d) funding source opportunity from private sector; and (e) job creation opportunity from infrastructure investment. The IDP states clearly that, with the exception of the creativity of people, mining still presents the largest opportunity in the area to a sustainable economic base whereby the local economy and the area is growing at a higher pace. Mining is regarded as an opportunity offered by the municipality, with the IDP stating that the mining activities and natural resources available in the area have created a definite potential to develop tourism and thereby to diversify the economic base of the municipality. The municipality will be able to develop sector plans, policies and by-laws which will be utilised for the planning of the area and regulate both the internal and external affairs. The only concern raised in terms of impact beyond the mine, is that of the increase in traffic. It is planned that tailings material will be recovered at a rate of approximately 40,000 tonnes per month. The South Backfill Pit contains approximately 431,426 tons of tailings while the North Backfill Pit contains approximately 635,630 tons of tailings. The recovery process is expected to last between 28 and 35 months. At the anticipated rate of recovery, approximately 23 trucks will be dispatched from the site daily containing tailings material. In order to manage this impact, the following mitigation measures have been included into the EMPr: • The mine will ensure an open channel of communication with the surrounding mines to address any potential concerns in terms of road access or usage. • Trucks will be parked in the designated truck parking areas to avoid congestion on the roads. In order to ensure compliance with the NEMWA, the mine will further ensure that prior to awarding a contract to a third party for the removal of the tailings the mine must ensure that the third party and facility where the beneficiation will be undertaken in legally authorised to conduct these activities. The mine will also commit to where possible support local labour and third party contractors.
7	A construction and operational phase EMP to include mitigation and monitoring measures.	Please refer to Part B of the report, Section 1.i, Table 40 for a detailed list of management measures for the planning, construction, and operational phase. Section 1.h further provides a detailed description of the monitoring requirements.
8	Should blasting be required, appropriate mitigation measures should be provided.	No blasting is required for this project. The process will entail dry removal of the tailings material using the truck and shovel method at a rate of 40,000 tonnes per month. The material will be loaded onto trucks and transported off site. It is estimated that 23 trucks will be dispatched from site on a daily basis during the project.
9	A3 size maps are required of the locality and vegetation types.	Noted, and included as figures under Annexure 8.

#	Comment	Response
10	Should the project be subjected to any permits or authorisations in terms of the provision of any Specific Environmental Management Acts, proof of such applications will be required.	Based on the above there will be no impact on vegetation as only existing disturbed areas form part of this application. For this reason, no tree, shrub or protected plant removal permits will be required. The water use activity of backfilling of the opencast pits was further approved in the WUL, Reference 16/2/7/B400/C83, dated 21 January 2008. The following water uses are already approved for the two opencast pit areas in terms of the WUL, 2008: • Appendix IV: Section 21 (c) impeding or diverting the flow of water in a watercourse; Section 21 (i): Altering the bed, banks, course or characteristics of a watercourse – Condition 1.2: Alter the course of the Springkaanspruit as well as the unnamed tributaries of the Groot Dwarsrivier at the locations of Mining of the South Pit and mining of the North pit. • Appendix V: Section 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource – the licensee may dispose an average quantity of 309m3 of tailings per day into the North and South open pit areas. Depending on the outcomes of the final rehabilitation option for the Opencast Pits, once reworked, the necessary engagements will be made with the DMRE and DWS depending on the potential amendments to the original rehabilitation strategy if any.

The draft EIA and EMP Report was made available to all Commenting Authorities and Registered Stakeholders. Up until end of business 23 July 2021 no further comments were received from stakeholders.

1.g.iii The Environmental Attributes associated with the Alternatives

As no significant changes in the location of infrastructure have been required based on the alternative discussions to date, the environmental attributes associated with the current site locations are presented.

1.g.iii.1 Baseline Information

The baseline specialist studies prepared for the 2018 EIA process, which broadly involved resource and reserve drilling, various Capital Projects throughout the Mining Right Area, and the establishment of diesel storage tanks, together with the impact findings were considered as part of this Scoping and EIA process and incorporated into the assessment of impacts and the ranking of these. No additional specialist studies were undertaken as the specialist studies already undertaken were considered adequate in including the proposed project site, with the exception of the 2020 Hydrogeological Study.

1.g.iii.1.a Climate

The following information is sourced from the 2018 EIA Report, whereby the Environmental Authorisation was issued in May 2019.

1.g.iii.1.a.1 Temperature

DCM is situated in the Highveld Climate Region of South Africa. The average daily maximum temperature for summer (January) is 27 degrees Celsius (°C) and for winter 17°C. The average daily minimum temperatures vary between 13°C in January and 0°C in July.

1.g.iii.1.a.2 Rainfall

The proposed project falls within quaternary catchment B41G. The monthly rainfall for this catchment was obtained from the Water Resources of South Africa Study 2012 and is indicated Table 13. The Mean Annual Precipitation (MAP) for the area is 650mm, with the wettest months occurring from November to January, and the driest months from June to August.

Table 13: Monthly rainfall for quaternary catchment B41G (green highlights driest months)

Month	Monthly Rainfall (mm)
January	111.5
February	88.3
March	75.5
April	41.8
May	14.8
June	6.2
July	5.2
August	5.8
September	20.6
October	60.0
November	111.7
December	108.7
TOTAL	**650**

1.g.iii.1.a.3 Evaporation

The table hereafter summarises all the different evaporation figures for the site.

Table 14: Evaporation Summary

Month	Symonds Pan Evaporation (mm)	Evaporation Factor	Open Water Evaporation (mm)
January	165.0	0.84	138.6
February	137.6	0.88	121.0
March	135.8	0.88	119.5
April	104.4	0.88	91.9
May	87.9	0.87	76.5
June	71.4	0.85	60.7
July	78.2	0.83	64.9
August	103.5	0.81	83.8
September	134.1	0.81	108.6
October	161.7	0.81	131.0
November	152.6	0.82	125.1
December	168.0	0.83	139.4
TOTAL	**1500**	**N/A**	**1261**

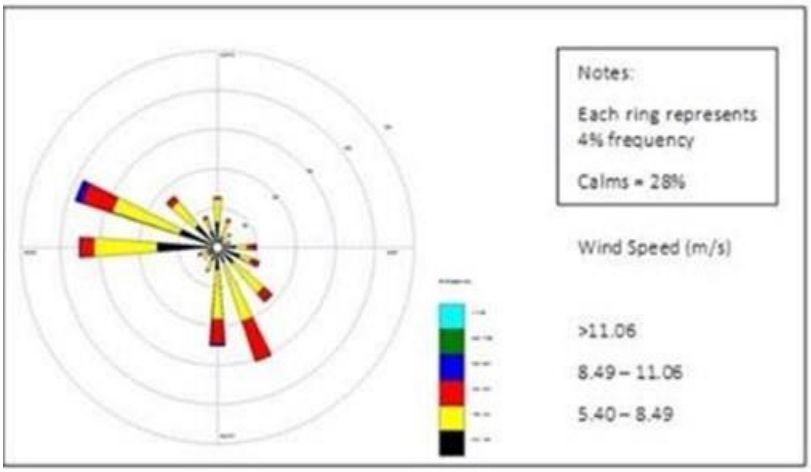
The MAP is less than the Mean Annual Evaporation (MAE) and therefore the site is classified as a water deficit site, when considering the following table:

Table 15: Natural Water Balance (rainfall vs. evaporation)

Month	Rainfall	Open Water Evaporation (mm)	Difference
January	111,50	138,60	-27,1
February	88,30	121,00	-32,7
March	75,50	119,50	-44
April	41,80	91,90	-50,1
May	14,80	76,50	-61,7
June	6,20	60,70	-54,5
July	5,20	64,90	-59,7
August	5,80	83,80	-78
September	20,60	108,60	-88
October	60,00	131,00	-71
November	111,70	125,10	-13,4
December	108,70	139,40	-30,7
TOTAL	**650,00**	**1261,00**	-611

1.g.iii.1.a.4 Wind

Wind can play an important role in the potential distribution of fugitive dust resulting from the site. As the mine is situated in the Dwarsrivier valley, this factor gives rise to winds that are variable in terms of both speed and direction. The wind rose of the closest weather station recording wind is Lydenburg (W0554816) is presented in the figure hereafter. According to this information the dominant winds are south-easterly and north-westerly winds.



Graph 1: Wind data.

1.g.iii.1.a.5 Extreme Weather Conditions

The incidents of extreme weather conditions for this area are included in the following table.

Table 16: Extreme Weather Conditions.

# of Days With	Jan	Feb	March	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Days Per Year
Thunder	6.	4.4	3.7	2.7	0.9	0.5	0.4	1.1	1.4	4.1	7.1	5.1	37.6
Hail	0.3	0.1	0.2	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.5	0.2	1.9
Fog	1.9	1.3	1.1	0.9	0.4	1.1	0.8	1.1	0.8	2.6	1.6	1.6	15.2
Snow	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.6

1.g.iii.1.b Topography

The farm Dwarsrivier 372KT, on which the mine is located, is traversed by both the Groot Dwarsrivier and the Klein Dwarsrivier. The Klein Dwarsrivier and Groot Dwarsrivier confluences approximately 1.8m south of the northern boundary of the Mining Rights Area to form the Dwarsrivier.

The eastern portion of the property, where the chrome reserves outcrop, generally slopes in a westerly to south-westerly direction, towards the Dwarsrivier. Adjacent to the river, slopes are gentle, in the order of 3°. Further upslope from the river, slope angles increase to as much as 40°.

However, the slopes are not always gradual with frequent small to relatively large koppies or hills formed from more resistant materials. Elevations on the farm Dwarsrivier 372KT vary from 900 – 1,200m. The area generally drains in a northerly direction, via the Dwarsrivier and Klein Dwarsrivier. There are, however, a number of small westerly flowing, non-perennial tributaries of the Dwarsrivier in the vicinity of the old open cast sections. There is approximately 40m elevation change across the mine site, with elevations between 940 – 975 metres above mean sea level (mamsl).

The areas where the backfill opencast pits are located are backfilled areas, are fairly gradual in nature.

1.g.iii.1.c Geology

DCM is situated in the Eastern Limb of the Bushveld Igneous Complex and the chrome deposits form part of the Critical Zone. The Dwarsrivier ore body represents an open-ended structural synform with a north-south orientated axis that plunges gently to the south (iLEH, 2015). The Steelpoort Chromite Seam (SCS) seam is mined. The geology overlying the chromite comprises norite, pyroxenite and anorthosite, as indicated on the following figure. Along the eastern, western and southern boundaries of the sub-catchment in which the project is situated, Critical and Marginal Zone anorthosites, pyroxenites and norites outcrop. These have a general

northerly strike and a dip of 7 – 10° west (Gap Geophysics, 2018). The igneous rocks form steep sloping mountain land and hills. From east to west, the DCM mineral rights area hosts Lower (LG) and Middle Group (MG) chromitite seams and higher up the stratigraphic sequence, the UG2 and Merensky Reefs. The LG6 (or Steelpoort) seam is the economic ore body mined by DCM. Differential weathering rates of the igneous rocks give rise to the topography. The geological setting within which the mine is located is indicated in Figure 9.

The peaks of the Dwarsriver mountain appear to be marked by outcropping dykes and replacement pegmatoids, both of which area weathering resistant.

The slopes, their directions and the breaks in their curvature are controlled by the presence or lack of faults and shear zones. Where discrete fault zones exist, weathering channels are apparent.

Large-scale alluvial aquifers occur in the floodplains of the Groot and Klein Dwarsrivier in the central part of the mine. These aquifers are exploited for groundwater supply to the mining operations.

The mining operations are situated approximately 10km southeast of the Steelpoort lineament that affects the general area of Kennedy's Vale. Splays from this regionally dominant feature include the Dwarsrivier Fault, which defines the flow of the Klein Dwarsrivier. This fault resulted in increased joint densities and associated alteration and therefore increased weathering rates.

Numerous fault zones are known and intersected in the DCM underground workings, as indicated on the following figure. The positions of these faults were confirmed through a study completed by Gap Geophysics (2018) as well as information provided by DCM. It is thought that these major regional fault lines are associated with enhanced aquifer conditions and would therefore act as preferential flow paths to groundwater. It is known that faults intersected in the underground workings in South Mine yield groundwater that is captured for reuse in the mine water balance. This water is pumped from underground to a dedicated tank on surface for redistribution.

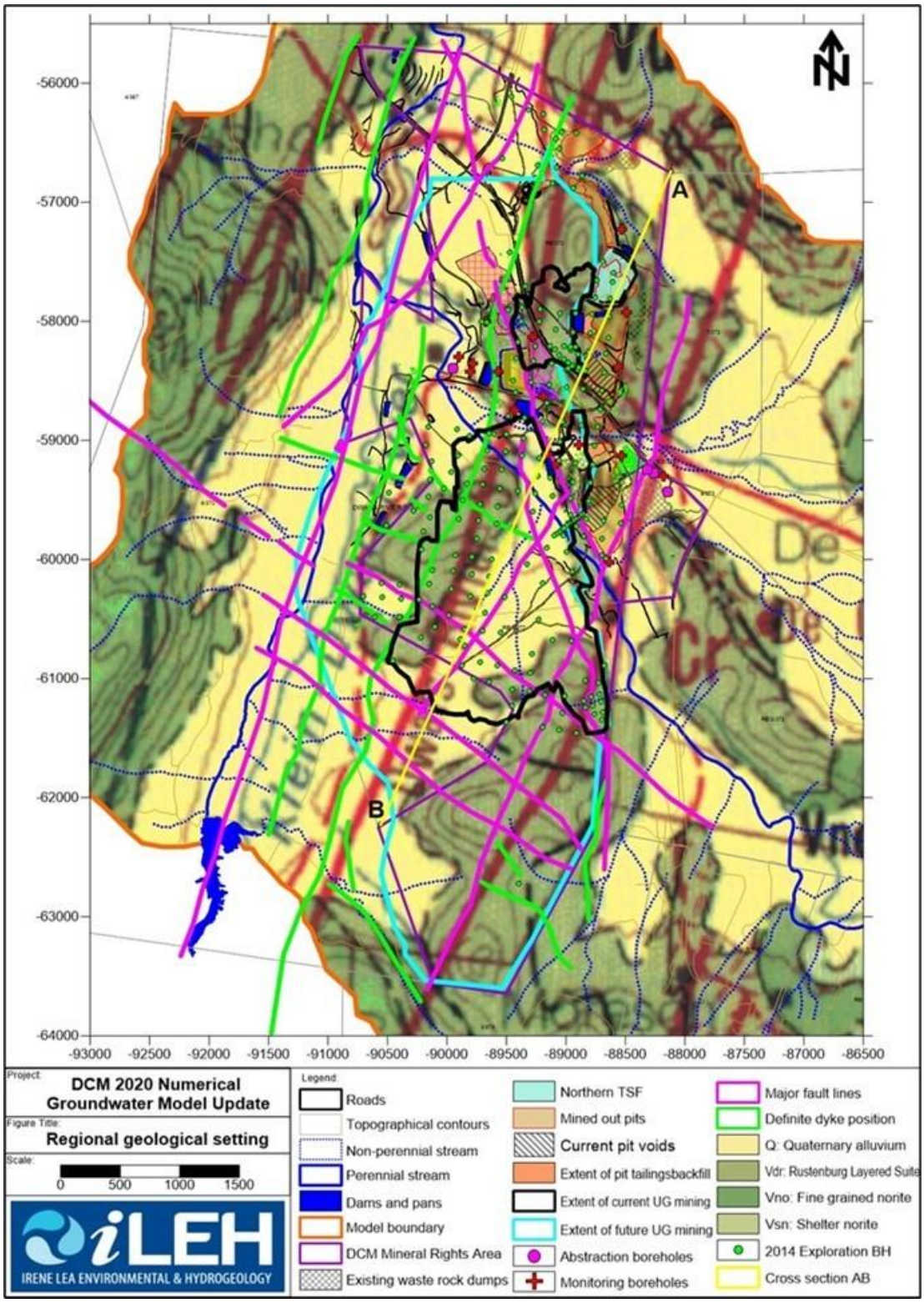


Figure 9: Geological Setting

A number of north-northeast striking dolerite dykes are present in the area, as indicated on the figure above. These dykes are associated with the Dwarsrivier Fault and are of late-Bushveld age. The strike orientation of these dykes is the result of the regional stress tensional system. For this reason, significant faults are aligned along or in close proximity to individual dykes. It is estimated that regionally approximately 10% of dykes infill faults. Cross-cut WNW trending dykes also seem to correlate with faulting (Gap Geophysics, 2018). Based on the close relationship between faults and dykes, it is likely that the dykes would also be associated with enhanced aquifer conditions and hence act as preferential flow paths to groundwater.

The pegmatoid replacement bodies and marker horizons identified within the mining area are stratigraphic of nature and not associated with geological structures. As such, it is unlikely that they would be associated with enhanced aquifer conditions.

1.g.iii.1.d Soils

No natural soils occur in the area of opencast mining. Rehabilitation by means of backfilling and topsoil placement has been undertaken. The topsoil in this regard will again be removed and placed on the existing topsoil stockpiles for future rehabilitation activities when the backfilled opencast pits are reworked.

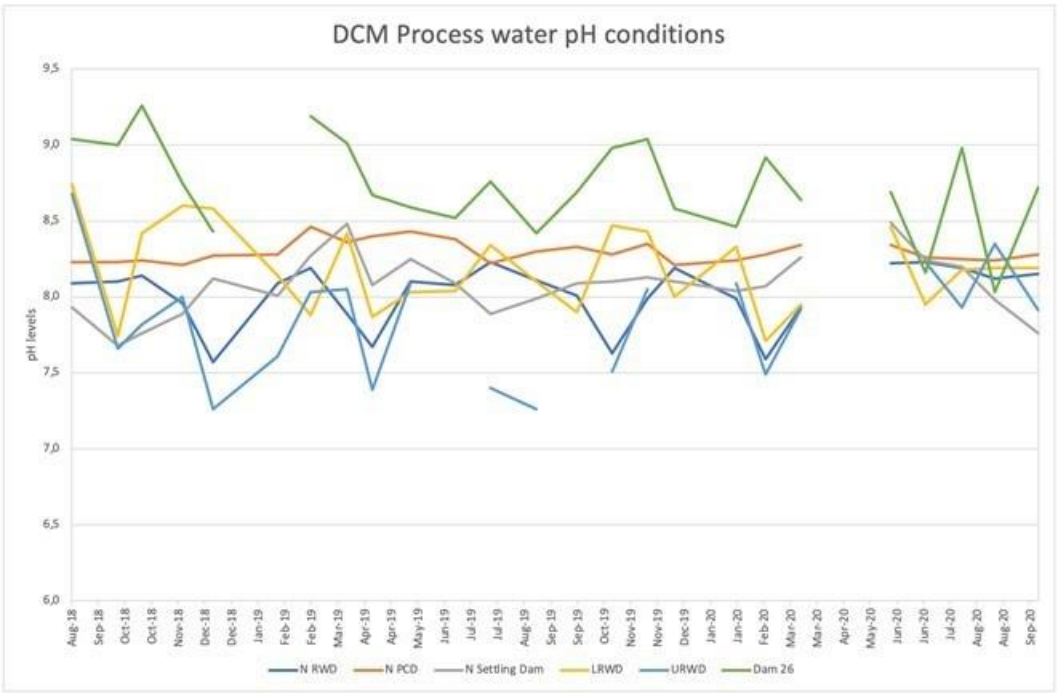
1.g.iii.1.e Characteristics of Waste Rock Used to Backfill Opencast Pits

An Acid Base Accounting study was not completed as part of this assessment.

Leach tests were however completed with distilled water as part of a waste classification study completed on mine residue deposits (iLEH, 2018). The pH of the water-soluble leach tests completed is neutral (above 7) with the exception of three discard samples taken from the South Residue Dump East, as indicated in Table 17.

The DCM monitoring programme furthermore confirm that both groundwater and process water have neutral to alkaline pH conditions, as indicated in the following figure. The risk of acidification of the mine water circuit is therefore considered to be low.

Information presented by EScience Associates (2010) confirms the fact that the mine is unlikely to acidify. Acid-base accounting undertaken as part of this study indicates that the tailings and waste rock is relatively inert and has low levels of potential acid generation. Sulphides are present, but in extremely minor quantities and in highly competent and impermeable rock. Sulphate concentrations in in groundwater is therefore also expected to remain low. The neutralising potential exceeds the acid generating potential in all cases. In the long-term, neutral pH conditions are expected. Under these conditions, low dissolved metal concentrations are expected.



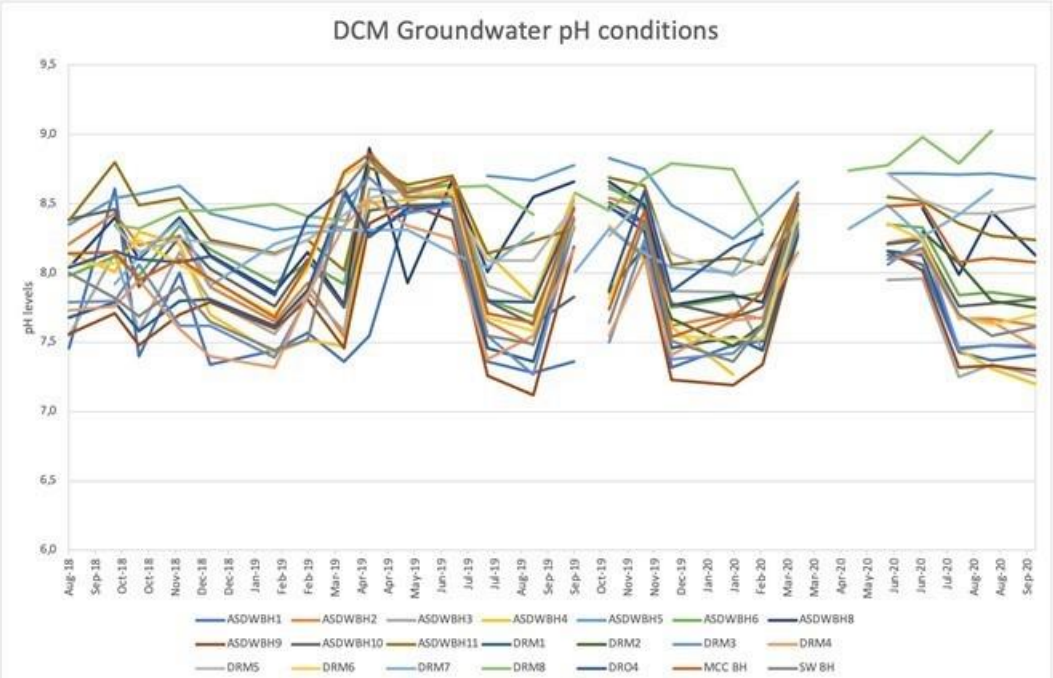


Figure 10: DCM process water and groundwater pH conditions

Table 17: Results of the Leachable Concentration Test

Elements	DISCARD	DISCARD S	OLD TAILINGS	WRD SOUTH	WRD NORTH	WRD SOUTH REH	DISCARD Sample 1	DISCARD Sample 2	DISCARD Sample 3	LCT0 (mg/l)	LCT1 (mg/l)	LCT2 (mg/)l	LCT3 (mg/l)
As, Arsenic	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0,010	<0,010	<0,010	0,01	0,5	1	4
B, Boron	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0,025	<0,025	<0,025	0,5	25	50	200
Ba, Barium	<0.025	<0.025	0,04	<0.025	<0.025	<0.025	0,062	0,081	0,057	0,7	35	70	280
Cd, Cadmium	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0,003	<0,003	<0,003	0,003	0,15	0,3	1,2
Co, Cobalt	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0,025	<0,025	<0,025	0,5	25	50	200
Cr (Total)l, Chromium Total	0,028	0,066	0,39	0,082	0,032	0,025	<0,025	0,041	<0,025	0,1	5	10	40
Cr(VI), Chromium (VI)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0,010	<0,010	<0,010	0,05	2,5	5	20
Cu, Copper	<0.010	<0.010	0,047	<0.010	<0.010	<0.010	<0,025	<0,025	<0,025	2	100	200	800
Hg, Mercury	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-				
Mn, Manganese	<0.025	<0.025	0,235	0,053	0,063	0,055	0,925	1,07	0,868	0,5	25	50	200
Mo, Molybdenum	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0,025	<0,025	<0,025	0,07	3,5	7	28
Ni, Nickel	<0.025	<0.025	0,114	<0.025	<0.025	<0.025	0,071	0,035	0,026	0,07	3,5	7	28
Pb, Lead	<0.010	<0.010	0,012	<0.010	<0.010	<0.010	0,021	<0,010	0,020	0,01	0,5	1	4
Sb, Antimony	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0,020	0,023	0,034	0,02	1	2	8
Se, Selenium	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0,010	<0,010	<0,010	0,01	0,5	1	4
V, Vanadium	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0,025	0,047	<0,025	0,2	10	20	80
Zn, Zinc	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0,025	<0,025	<0,025	5	250	500	2000
Total Dissolved Solids	30	40	130	56	50	58	280	270	232	1000	12500	25000	100000
Chloride as Cl	<2	<2	4	2	<2	<2	<2	<2	<2	300	15000	30000	120000
Sulphate as SO_4	<2	<2	6	<2	2	<2	2	<2	<2	250	12500	25000	100000
Nitrate as N	<0.1	<0.1	1	<0.1	<0.1	<0.1	<0,1	<0,1	<0,1	11	550	1100	4400
Fluoride as F	<0.2	<0.2	0,3	0,2	0,2	<0.2	<0,2	<0,2	<0,2	1,5	75	150	600
pH	7	7	7,3	7	6,6	7,1	4,8	4,8	4,8				

WRD Waste Rock Dump;

LCT Leachable Concentration Threshold, in terms of the NEMWA and the Waste Classification and Management Regulations (R635)

1.g.iii.1.f Ecological Footprint

The project area is located in the Savanna Biome, within the Central Bushveld Bioregion (please refer to Figure 11 for the high-level habitat units of the area) and is also situated within the Sekhukhuneland Centre of Plant Endemism. The DCM Mining Right Area is located within an area that is not currently protected. The project area is however located within the Sekhukhune Mountainlands threatened ecosystem, which is indicated as Endangered (Figure 12), although the vegetation type, Sekhukhune Mountain Bushveld (Mucina & Rutherford, 2006) is considered a Least Threatened vegetation type.

Broadly, the vegetation and landscape features associated with DCM are considered to comprise dry, open to closed microphyllous and broad-leaved savanna on hills and mountain slopes that form concentric belts parallel to the north-eastern escarpment. Open bushveld within the region is often associated with ultramafic soils on southern aspects, with bushveld vegetation on these soils typically containing a high diversity of edaphic specialists, while Bushveld vegetation on mountain slopes tend to be generally taller than in the valleys, with a well-developed herb layer. Bushveld within valleys and located on dry northern aspects usually form dense thicket, with an herb layer comprising many short-lived perennials. Dry habitats contain a number of species with xerophytic adaptations, such as succulence and underground storage organs. Both man-made and natural erosion dongas occur on foot slopes of clays rich in heavy metals.

According to the South African Protected Area Database (SAPAD, 2020) the mine is located approximately 9.7km east of the De Hoop Private Nature Reserve (PNR) and 11.6km of the Steelpoort PNR (Figure 13). The De Hoop Dam Protected Environment, proclaimed in 2019, is located approximately 4km east of the mine. The National Protected Areas Expansion Strategy (NPAES, 2009) database does not indicate any formally or informally protected areas to be situated within 10km of the Mining Right Area, however it does indicate the Mpumalanga Mesic Grasslands Focus Area to be situated within the south-eastern corner of the Mining Right Area (Figure 13).

In terms of the Mining and Biodiversity Guidelines (2013), it should be noted that the majority of the Mining Right Area, with the exception of a small area within the northern portion of the mine falls within an area considered to be of Highest Biodiversity Importance (Figure 14), which includes the proposed reworking areas. Highest Biodiversity Importance areas include areas where mining is not legally prohibited, but where there is a very high risk, that due to the potential biodiversity significance and importance of these areas to ecosystem services (e.g. water flow regulation and water provisioning), that mining projects will be significantly constrained or may not receive necessary authorisations.

The majority of the area, with the exception of two small areas in the eastern portion of the Mining Right Area falls within a CBA1 site (Figure 15) (including the South Backfill Pit) as regulated in the Limpopo Conservation Plan (2013). These are Irreplaceable areas, which are required to meet biodiversity patterns and/or ecological processes targets; and with no alternative sites available to meet targets. The North Pit is located in an ESA2. This is according to the published documents, however, based on the Biodiversity Action Plan, both areas are regarded as transformed habitats as these have been mined and backfilled before.

It should be noted that the NEMA EIA Regulations 544, 2010 defines indigenous vegetation as follows: ""indigenous vegetation" refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years". Rehabilitation practices of the backfill pits have been ongoing, but the full establishment of vegetation has however not yet been achieved, with that established not considered as indigenous vegetation. For this reason, no clearance of indigenous vegetation is triggered, due to such vegetation having as of yet not been fully established. Both opencast pits are considered disturbed areas.

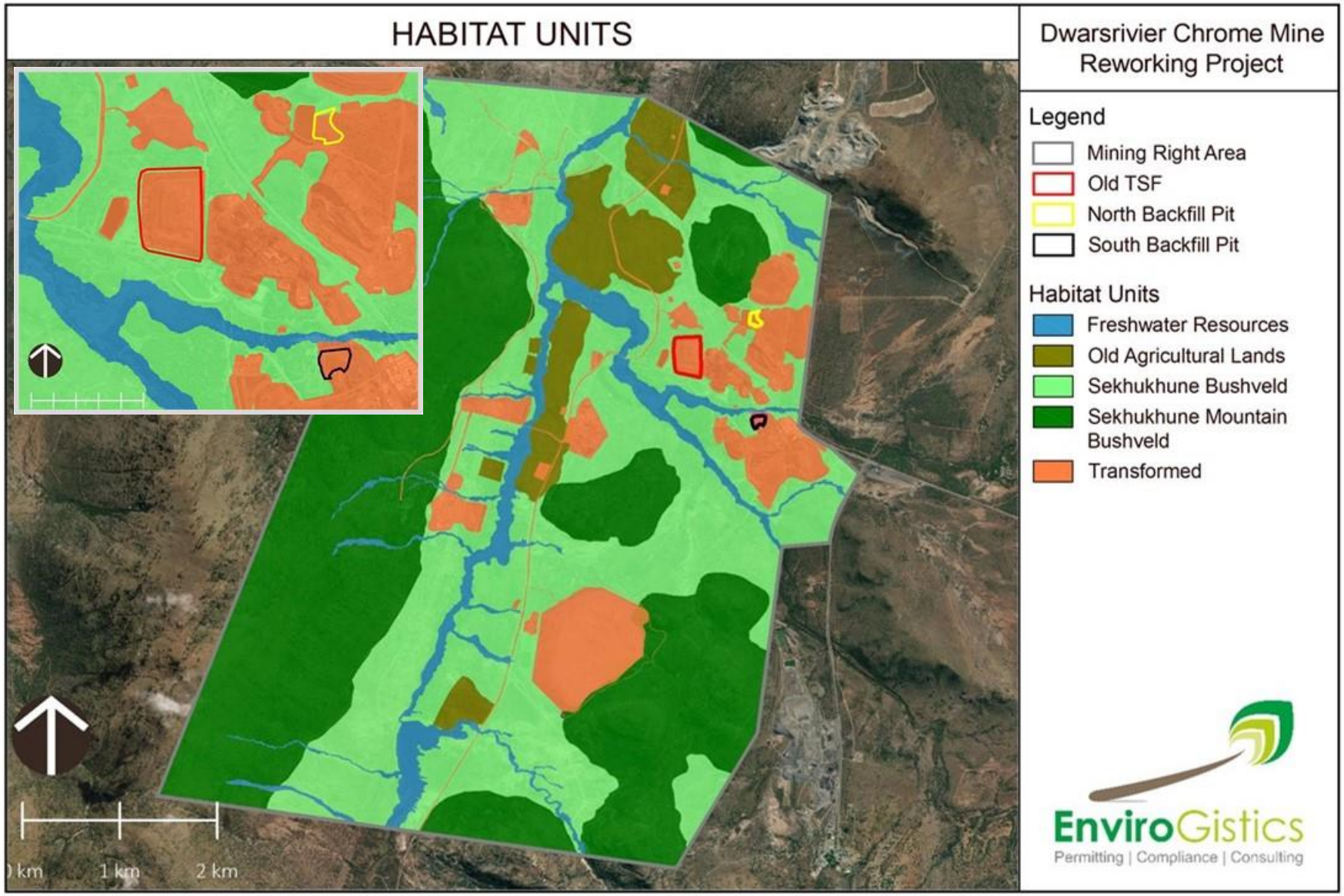


Figure 11: Illustrative representation of high-level habitat units associated with DCM

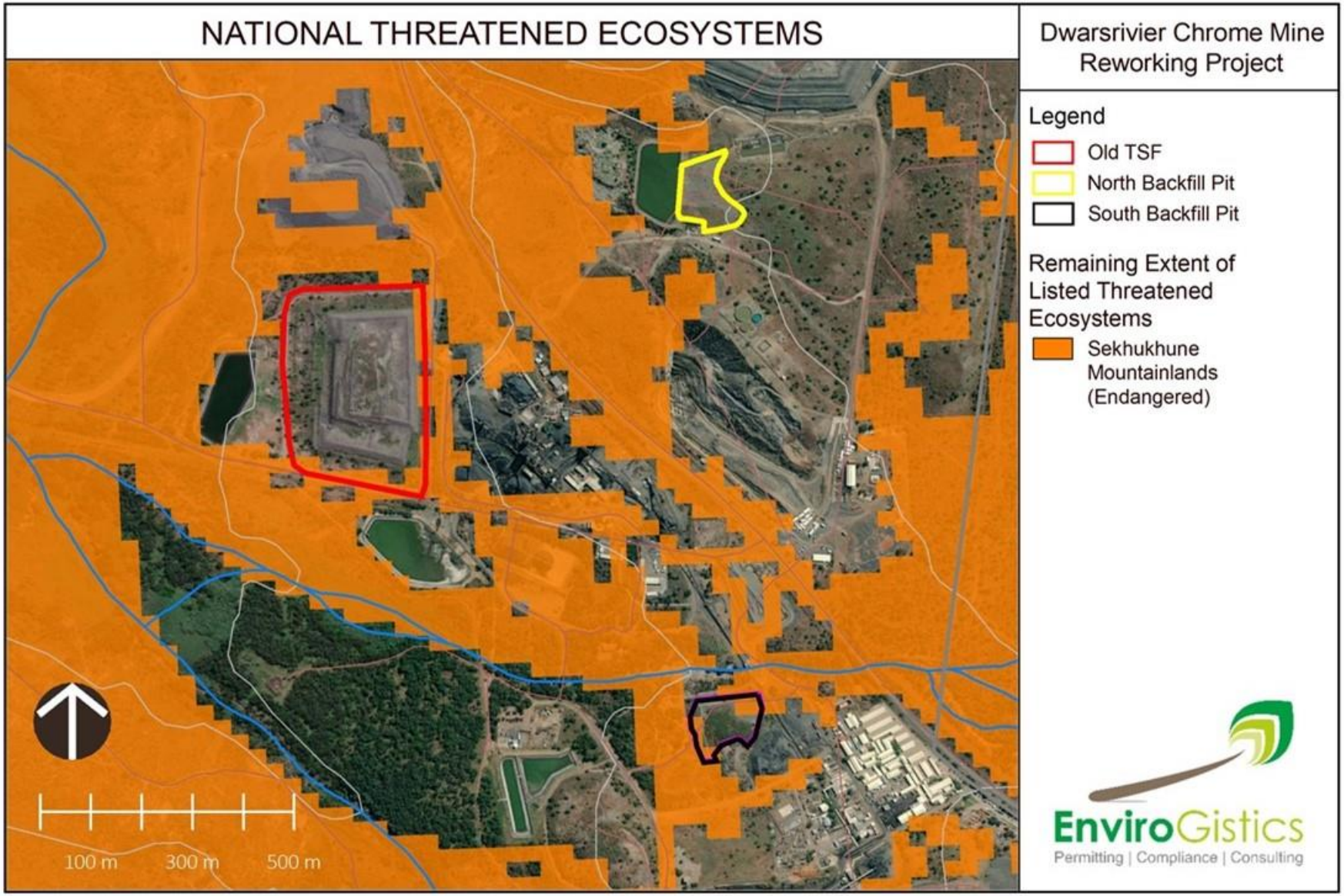


Figure 12: Remaining extent of the Endangered Sekhukhune Mountainlands Ecosystem associated with the DCM Mining Right Area (National Threatened Ecosystems, 2011)

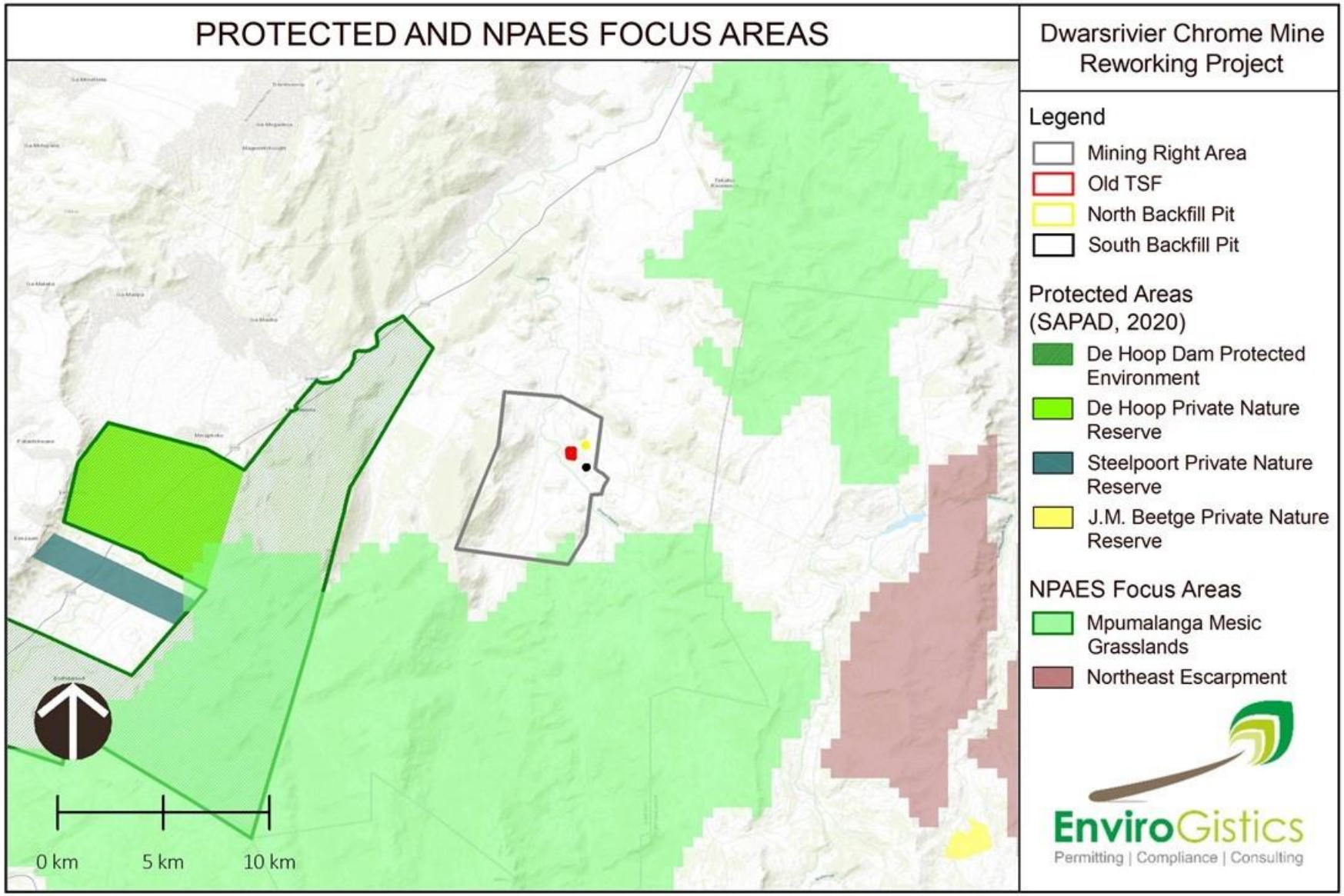


Figure 13: NPAES Focus Areas associated with the DCM Mining Right Area, as well as Protected Areas and protected area expansion areas in close proximity (SAPAD, 2020 and NPAES, 2009)

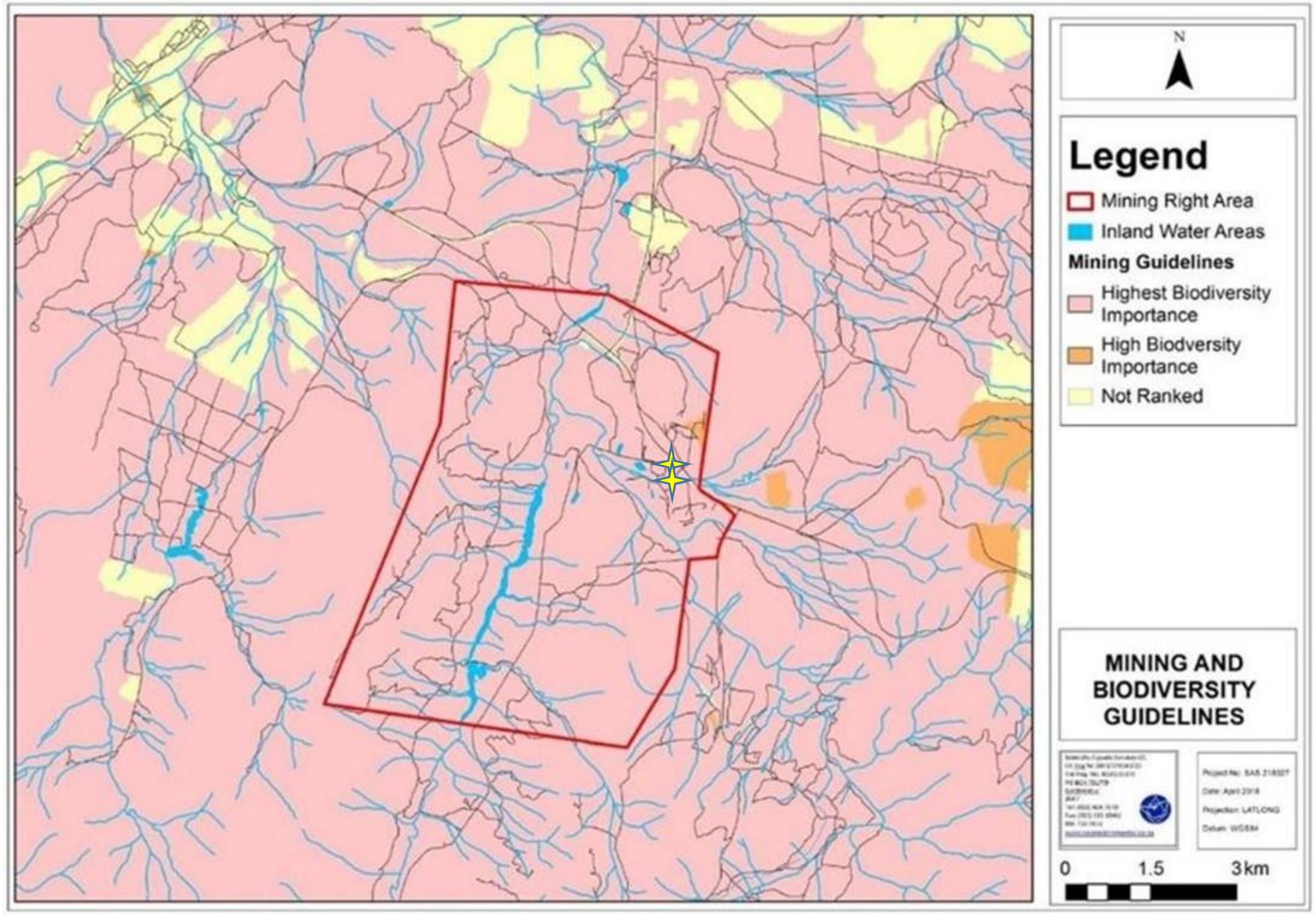


Figure 14: Importance of the area according to the Mining and Biodiversity Guidelines (2013) (SAS, 2018)

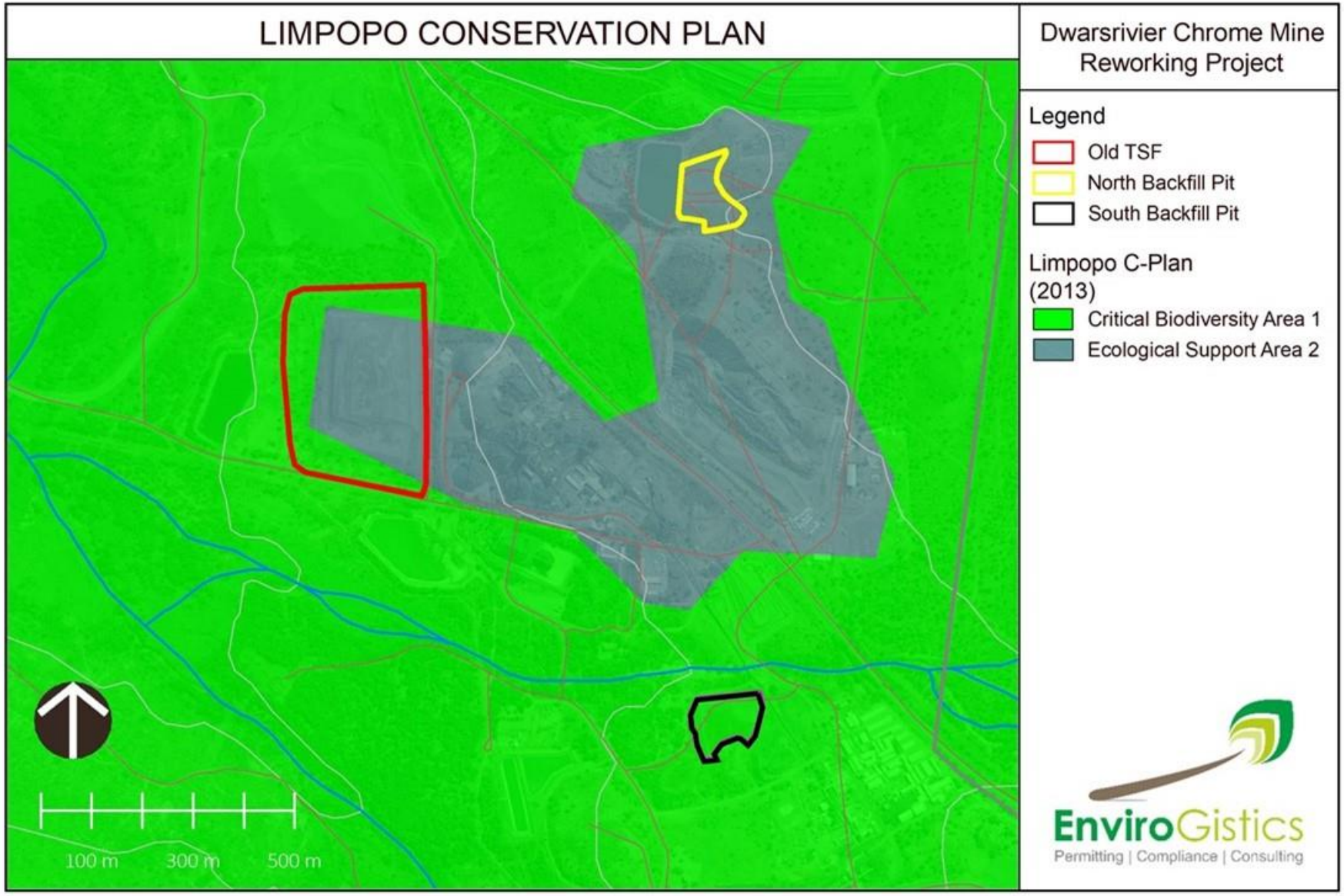


Figure 15: CBA 1 and ESA 2 sites associated with the area

1.g.iii.1.f.1 Habitat Units

Five habitat units have been identified within the DCM Mining Right Area (please refer to Figure 11):

- Sekhukhune Mountain Bushveld;
- Sekhukhune Bushveld;
- Freshwater Habitat Unit;
- Old Agricultural Lands; and
- Transformed Habitat (in which the proposed projects are located).

The Transformed Habitat Unit, in which the proposed project is located is considered to have a low floral habitat sensitivity.

No floral Species of Conservation Concern (SCC) were encountered in this habitat unit and it is highly unlikely that any such species will occur within these areas. Floral diversity was moderately low and dominated by floral species that are indicators of disturbed veld such as *Melinis repens*, *Aristida congesta* subsp. *congesta* and *Dichrostachys cinerea*.

No vegetation representative of the expected vegetation type remains, and the habitat unit is dominated by pioneer species and alien and invasive plant species. Habitat is transformed and dominated by species that are indicative of disturbance.

No unique landscapes important in terms of floral conservation are present.

1.g.iii.1.g Animal Life

The project area in question, has been subjected to mining activities for many years and therefore the animal life has adapted to this setting. The proposed project only includes the reworking of backfill opencast pits and the use of existing operational facilities and supporting infrastructure and should not pose a significant impact on the animal life.

1.g.iii.1.h Hydrological Setting

The mine is located in WMA 4: Olifants and the greater part of the mine, including the proposed reworking areas, fall within Quaternary Catchment B41G.

Three primary drainage systems, along with their respective tributaries and smaller ephemeral drainage lines, were identified within the Mining Right Area, namely, the Klein Dwarsrivier and Groot Dwarsrivier, which confluence approximately 1.8km south of the northern boundary of the Mining Right Area to form the Dwarsrivier. In addition to these primary systems, several tributaries of each of these systems were identified: the Springkaanspruit and an unnamed tributary draining into the Groot Dwarsrivier from the northeast and southeast respectively, an unnamed tributary of the Dwarsrivier in the north, and a non-perennial unnamed tributary of the Klein Dwarsrivier in the south. Numerous ephemeral drainage lines with riparian vegetation were also identified draining into the Klein Dwarsrivier.

Water drainage on site is in different directions as follows:

- Water drains mostly toward the Springkaanspruit, specifically in the case with the easterly portion of the site.

The non-perennial stream which has been diverted in the past for the purposes of the opencast operations, drains into the Klein Dwarsrivier, which has its confluence with the Tubatse (Steelpoort) River about 10km downstream of the mine. The Steelpoort River joins the Olifants River approximately 60km to the north.

The Groot Dwarsrivier has its origin on the farm De Berg 71JT some 33.75km (measured in a straight line) to the south of the confluence of the Groot Dwarsrivier with the Klein Dwarsrivier. The Klein Dwarsrivier has its origin on the farm, Uysedoorns 47JT, approximately 25.3km (measured in a straight line) to the south of this river's confluence with the Groot Dwarsrivier. The Springkaanspruit enters the Groot Dwarsrivier from the east some 1.6km upstream from the confluence of the Groot and Klein Dwarsrivier, and has its origin on the watershed between the farms Zwakwater 377KT and Schuins 378KT, some 15.4km (measured along its longest collector) to the east of its confluence with the Groot Dwarsrivier.

The closest river systems to the project in question are the:

- Springkaanspruit: about 80m to the north of the South Pit and 850 south of the North Pit;

- Groot Dwarsrivier: about 540m to the west of the South Pit and 1 200m west of the North Pit.

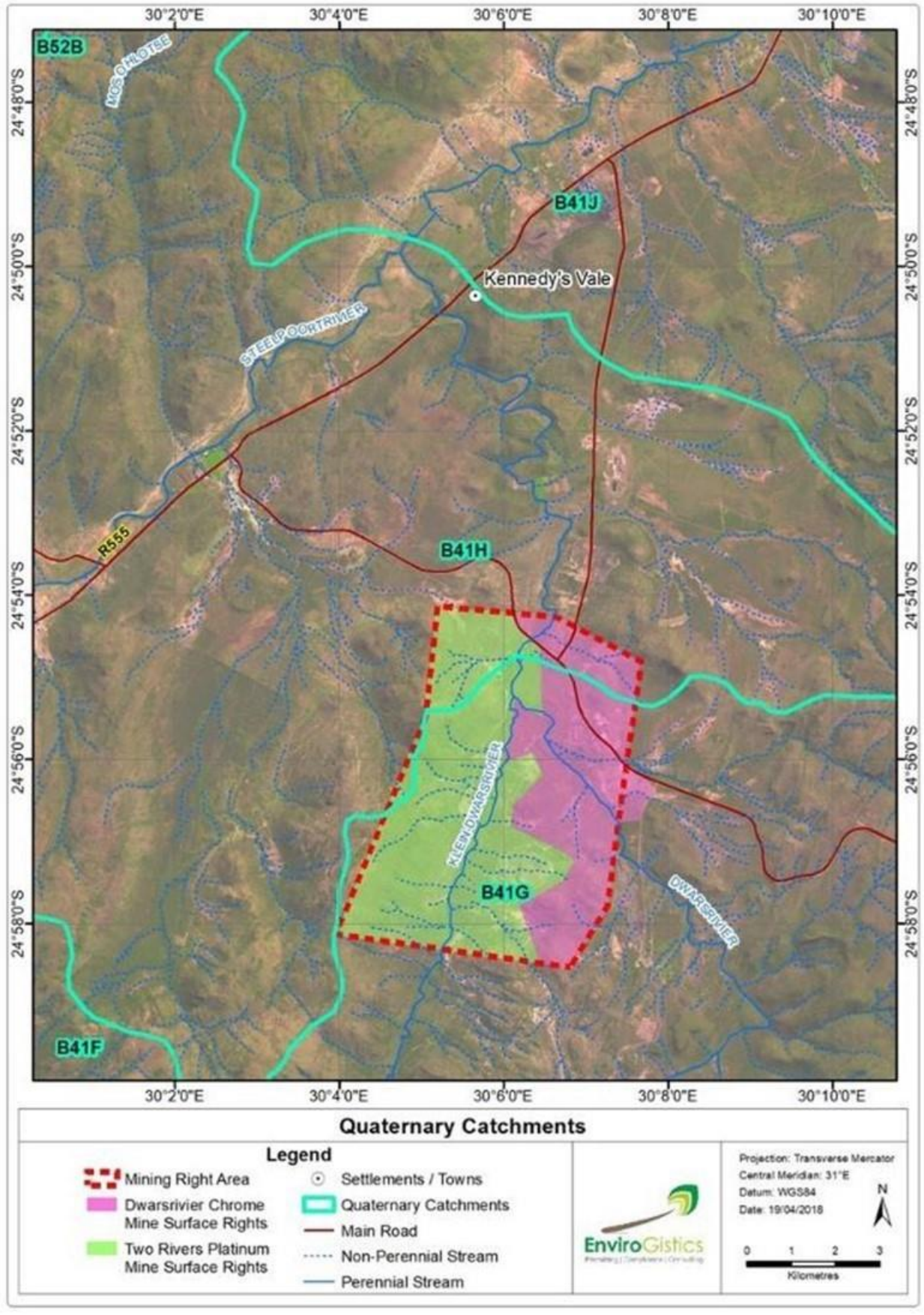


Figure 16: Quaternary Catchments

1.g.iii.1.i Reserve

The then DWA published a reserve for the Dwarsrivier in quaternary catchment B41H in 2010 (Ref. 26/8/3/3/310, 550/7). The reserve was prepared for the Richmond Dam, which is situated upstream of DCM. The study entailed an intermediate surface water and a rapid groundwater (quantity) reserve determination. The outcome of the assessment indicates that the present ecological state of the Dwars River is rates B/C. The ecological importance and sensitivity were rated as high and the recommended ecological category was rated as B/C.

The groundwater reserve, defined as the amount of groundwater that is required to contribute to the surface water requirements of a water resource in order to achieve the recommended ecological category (baseflow contribution), was calculated as part of this study. The catchment wide of rate recharge of rainwater to the aquifers present in the Dwarsrivier catchment is estimated to be 3% of MAP. Thirty eight percent of this recharge volume was determined as the required contribution to baseflow necessary to achieve the recommended ecological category of B/C. Groundwater is therefore thought to contribute significantly to surface water requirements in the catchment. The groundwater component of baseflow over the 442km^2 area of the catchment, was calculated to be 4,67 million m^3/a.

Surface water quality specifications (quality ecospecs) for the intermediate reserve for the Dwarsrivier, as published in the reserve determination, is presented in the following table.

Table 18: Dwars River Reserve Water Quality Specifications

Parameter	Ecological Requirements	Basic Human Needs Requirement	Reserve requirement: water quality
$MgSO_4$ (mg/l)	<16	N/A	<16
Na_2SO_4 (mg/l)	<20	N/A	<20
$MgCl_2$ (mg/l)	<15	N/A	<15
$CaCl_2$ (mg/l)	<21	N/A	<21
NaCl (mg/l)	<45	N/A	<45
$CaSO_4$ (mg/l)	<351	N/A	<351
Na (mg/l)	N/A	<200	<200
Mg (mg/l)	N/A	<100	<100
Cl (mg/l)	N/A	<200	<200
Ca (mg/l)	N/A	<80	<80
SO_4 (mg/l)	N/A	<400	<400
PO_4 (mg/l)	<0,02	N/A	<0,02
T Nitrogen (mg/l)	<4	N/A	<4
pH	6,5 – 8,8	5 – 9,5	6,5 – 8,8
Dissolved Oxygen (mg/l)	>7	N/A	>7
Electrical Conductivity (mS/m)	<55	0 - 70	<55

1.g.iii.1.j Hydrogeological Setting

Saturated Zone

There are three main aquifers found in the area (iLEH, 2017). These include:

- A shallow weathered aquifer present in the upper 20m of the geological succession.
- A fractured rock aquifer consisting of fractured pyroxenites, anorthosites and norites. The depth to weathering in this aquifer varies from 0 – 32m, but is on average 8 – 10m below surface. Pockets of deeper weathering are associated with faulting and/or jointing. The intersection of fractures in exploration boreholes suggests that the majority of fractures occur within the upper 60m of the geological succession. Deeper fracturing is however found to a depth of 200m. Information from monitoring boreholes suggests that water-bearing fractures typically occur to a depth of 40m. For the purpose of this study, the floor of the LG6 chromitite seam will be assumed as the depth of the fractured rock aquifer.
- An alluvial aquifer present in the floodplains of the Groot- and Klein Dwarsrivier. In this aquifer, the lithology varies from large boulders to fine silty material. Monitoring boreholes drilled into this aquifer suggests that it is 20m thick on average.

The localised fractured aquifers in the rocks are thought to be restricted to contact zones between intrusions and the host rock as well as with joints, faults and fractures. Groundwater in the fractured aquifer system is drained from storage in the overlying weathered aquifer as well as through recharge of rainwater and from

watercourses. This aquifer is reported to have a low groundwater potential, especially in the host rock. Flow paths may however be controlled by the orientation of fractures and faults.

DCM monitors 19 boreholes around the operations. Groundwater monitoring is undertaken on a monthly basis according to the DCM monitoring protocol (Aquatico, 2018). Both groundwater level and quality monitoring are undertaken.

The September 2020 groundwater level measurements are provided in the following table for the monitoring boreholes. No groundwater level measurements are undertaken in the abstraction boreholes as they are fitted with pumps and not accessible.

Unsaturated Zone

Information regarding the soils present was sourced from EScience (2010). The results of a soil study completed on a 200 – 300m grid at the time indicates that the indicates the predominant soil include Glenrosa and Mispah Forms with small pockets of Hutton soil forms. On lower slopes associated with the streams, the soil forms include Hutton, Clovely, Augrabies and Katspruit. Valsrivier soils were found exposed in erosion gullies.

The Glenrosa and Mispah soil forms are generally present to depths of 0,3 – 0,6m and showed no signs of wetness. The Clovely and Hutton forms have a marked increase in clay content with depth and extend to depths of more than 0,6m and in places as deep as 1,5m. The Katspruit and Valsrivier form soils associated with the streams indicate signs of prolonged saturation.

The alluvial material associated with the rivers and streams is unconsolidated sand, possibly with lenses of clay, slit or calcrete.

Groundwater levels

Groundwater level measurements suggest that the average depth to the water table for the September 2020 monitoring round is 12,6m. In comparison, boreholes drilled into the alluvium has groundwater levels shallower than 5m.

Table 19: Summary of groundwater monitoring borehole information

BH ID	Elevation (mamsl)	BH Depth (m)	Purpose	Depth to water strike (mbgl)	SWL Sep 2020 (mbgl)	SWL Sep 2020 (mamsl)	Transmissivity (m^2/d)
ASDW BH1	967	60	Monitoring: North Pit	31	24,42	991,42	0,69
ASDW BH2	963	41	Monitoring: Northern TSF, possibly on a fault	19, 21	16,12	0,00	59,24
ASDW BH3	937	30	Monitoring: North Pit	19, 24	10,01	952,48	2,31
ASDW BH4	974	40	Monitoring: North Pit	21, 26	21,45	989,51	2,7
ASDW BH5	936	50	Monitoring: Dam 26, associated with fault	26	12,19	951,54	0,9
ASDW BH6	939	20	Monitoring: Dam 26, associated with fault	12	16,73	954,61	33,82
ASDW BH8/7	968	30	Monitoring: WRD, associated with fault	16, 19	10,95	984,10	196,6
ASDW BH9	926	40	Monitoring: Old TSF, associated with dyke	2, 4	2,55	941,73	128,7
ASDW BH10	935	35	Monitoring: Discard Dump	21, 23	4,45	950,75	2,87
ASDW BH11	958		Monitoring: South Pit	21, 22, 25	18,32	973,77	13,62
DRM1	916		Monitoring: Lower RWD	0,3	4,4	931,81	112
DRM2	911		Monitoring: Lower RWD	0,2	4,63	926,85	6,34
DRM3	920		Monitoring: Discard dump (old quarry), associated with dyke	0,6	4,53	935,91	0,29
DRM4	941		Monitoring: Plant		11,5	956,47	
DRM5	935		Monitoring: Upper RWD		2,5	951,62	
DRM6	940		Monitoring: Up-gradient South Pit		9,03	955,80	
DRM7	959,15	30	Monitoring: North Pit backfill		26,8	974,99	
DRM8	948,2	39	Monitoring: South Pit backfill		26,9	964,11	
DRO4	941		Monitoring: Alluvial aquifer				
MCC Borehole	937		Monitoring: Main Contractors' Camp		9,1	954,05	
SW Borehole	943		Monitoring Sewage Plant and South Pit tailings backfill area		16,11	959,26	27,59
BH D1	914,6		Groundwater abstraction				
BH D2	914,6		Groundwater abstraction				
BH A	966,4		Groundwater abstraction (not in use)				
BH B	964,9		Groundwater abstraction (not in use)				
BH C	969,1		Groundwater abstraction (not in use)				
BH E	969,1		Groundwater abstraction				

Hydrographs for the monitoring boreholes are presented in the following table. The contours indicate that groundwater flow is in a westerly direction on a regional scale towards the Klein Dwarsrivier at a gradient of

0,022 (1:45). Some local variations in groundwater flow patterns are however indicated in the figure. These include:

- Groundwater levels measured in the two boreholes drilled into the backfilled North and South Pits suggest a localised cone of depression with groundwater flow reversed towards the pits. It is likely that this impact extends over the footprint area of the pits, but as there are only these two monitoring positions available, the contours do not reflect that. At North Pit, the cone of depression extends between DRM7 and ASDWBH3, drilled down gradient of the Northern RWD.
- A mound in groundwater levels is reported around the Upper RWD. This is demonstrated by the radial flow patterns from this dam into the aquifers. Similar conditions seem to prevail around Dam 26. The recharge calculations presented earlier in this report confirm that recharge rates in borehole DRM5, situated down-gradient of the Upper RWD, are above average conditions. This is also applicable to borehole ASDWBH6, situated down gradient of Dam 26.
- The effect of groundwater abstraction from boreholes D1 and D2 from the alluvial aquifer is demonstrated in the groundwater flow contours around boreholes DRM1 and DRM2. In this area, a cone of depression in groundwater levels is notable (please refer to the figure overleaf).

Groundwater is used as water supply to the operations. No additional water supply will be required for this project.

1.g.iii.1.k Sensitive Sites or Wetlands

The Mining Right Area falls within the Central Bushveld Group 1 Wetland Vegetation Type, considered to be Critically Endangered (CR).

According to the Limpopo Conservation Plan version 2 (2013) (please refer to Figure 15) the majority of the DCM Mining Right Area is classified as CBA 1. CBA 1 areas are considered irreplaceable areas required to meet biodiversity pattern and/or ecological processes targets, and no alternative sites available to meet targets. The greater part of the proposed project is located in a CBA (including the South Backfill Pit and a portion of the Old TSF) as regulated in the Limpopo Conservation Plan (2013). These are Irreplaceable areas, which are required to meet biodiversity patterns and/or ecological processes targets; and with no alternative sites available to meet targets. The North Pit and a portion of the Old TSF are located in an ESA2. This is according to the published documents, however, based on the Biodiversity Action Plan, both areas are regarded as transformed habitats as these have been mined and backfilled before.

Figure 18 conceptually illustrates the areas considered to be of increased floral ecological sensitivity, and clearly illustrates that the proposed project is located in transformed habitat with low ecological sensitivity. The areas are depicted according to their sensitivity in terms of the presence or potential for floral SCC, habitat integrity, levels of disturbance and overall levels of diversity. The table below presents the sensitivity of each habitat area (Figure 11) along with an associated conservation objective and implications for proposed project.

Table 20: A summary of the sensitivity of each habitat unit and implications for the prposed project

Habitat Unit	Sensitivity	Conservation Objective	Development Implications
Transformed Habitat	Low	Conserve and enhance biodiversity of the habitat unit and surrounds while optimising development potential.	Activities in this habitat unit are unlikely to pose a significant threat to floral species or SCC, however the development footprint should nonetheless be kept as small as possible. Care must be taken to limit edge effects on the surrounding natural areas. All areas must be rehabilitated post activities.

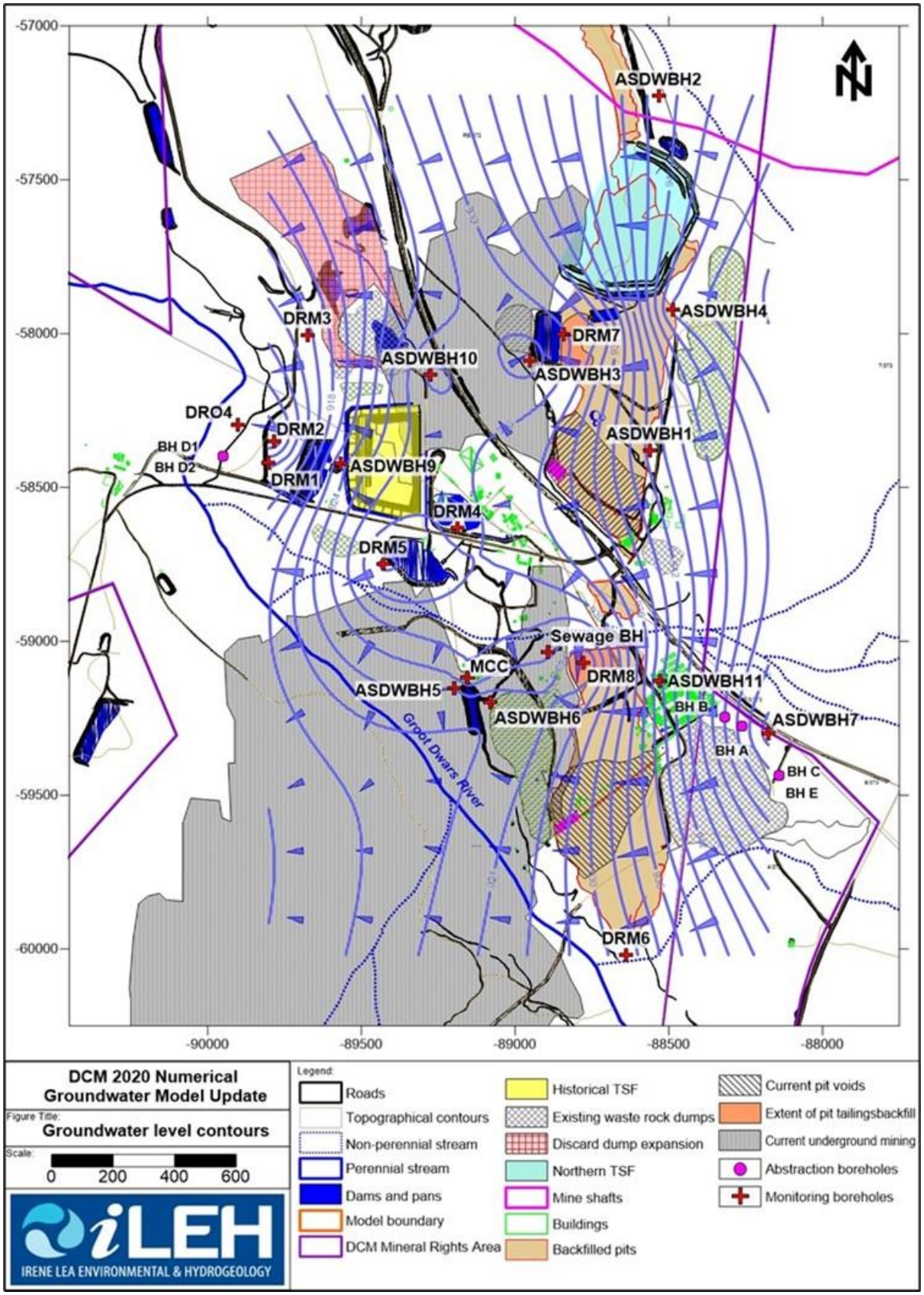


Figure 17: Groundwater flow contours (September 2020 dataset)

1.g.iii.1.k.1 Freshwater and Aquatic Assessment

The majority of the mine falls within an area defined as a Freshwater Ecosystem Priority Area (FEPA) (which includes the current project), with the northern portion of the mine considered a Fish Support Area, and a small portion in the north also considered a Phase 2 FEPA. River FEPAs are important to achieve biodiversity targets

for river ecosystems and threatened fish species and include rivers that are currently in a good condition (A or B ecological category). Although the FEPA status applies to the actual river reach, shading of the whole sub-quaternary catchment indicate that that the surrounding land and smaller stream network need to be managed in a way that maintains the good condition of the river reach.

Table 21: Characterisation of the watercourses associated with the Mining Right Area according to the Classification System (Ollis et. al., 2013)

Watercourse	Level 3: Landscape unit	Level 4: HGM Type
• Groot Dwarsrivier • Springkaanspruit • Klein Dwarsrivier • Dwarsrivier • Northern and Southern Unnamed tributaries • Western and Eastern Ephemeral Drainage Lines	**Valley floor:** The base of a valley, situated between two distinct valley side-slopes**.**	**River:** a linear landform with clearly discernible bed and banks, which permanently or periodically carries a concentrated flow of water.
• Klein Dwarsrivier • Lower reaches of the Groot Dwarsrivier • Springkaanspruit	**Valley floor:** The base of a valley, situated between two distinct valley side-slopes**.**	**Floodplain wetland:** the mostly flat or gently sloping land adjacent to and formed by an alluvial river channel, under its present climate and sediment load, which is subject to periodic inundation by over-topping of the channel bank.

The South Pit will be located within the 500m riparian zone buffer of the Groot Dwarsrivier, as well as that of the Springkaanspruit. In addition to this the existing road between the main offices and the proposed site is crossing the Springkaanspruit, resulting in the activity within 32m of a watercourse. It is not foreseen that any significant construction activities will be associated in a watercourse.

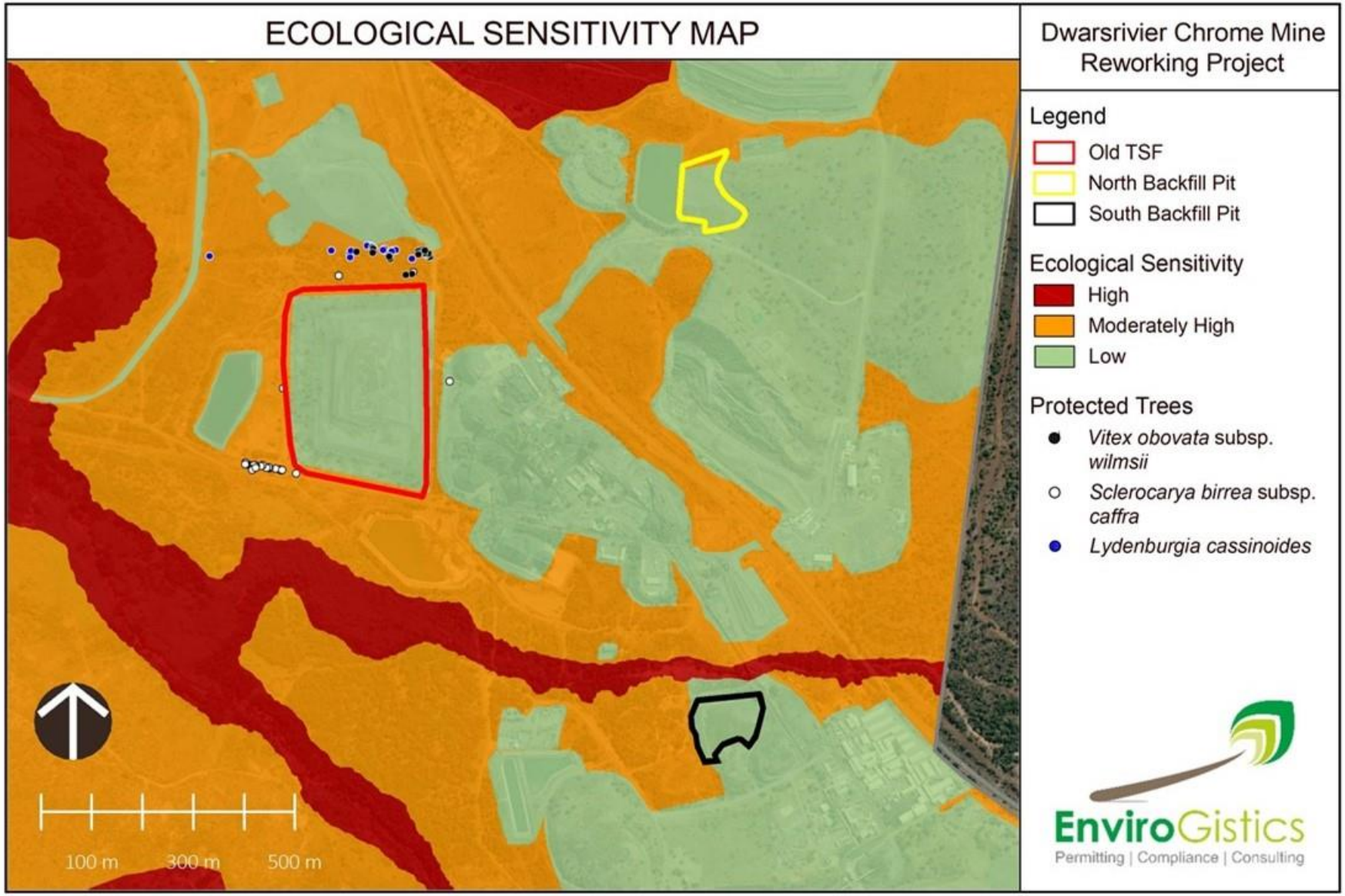


Figure 18: Sensitivity map as identified in the 2018 EIA study by SAS. Only protected trees mapped during the 2018 study area indicated.

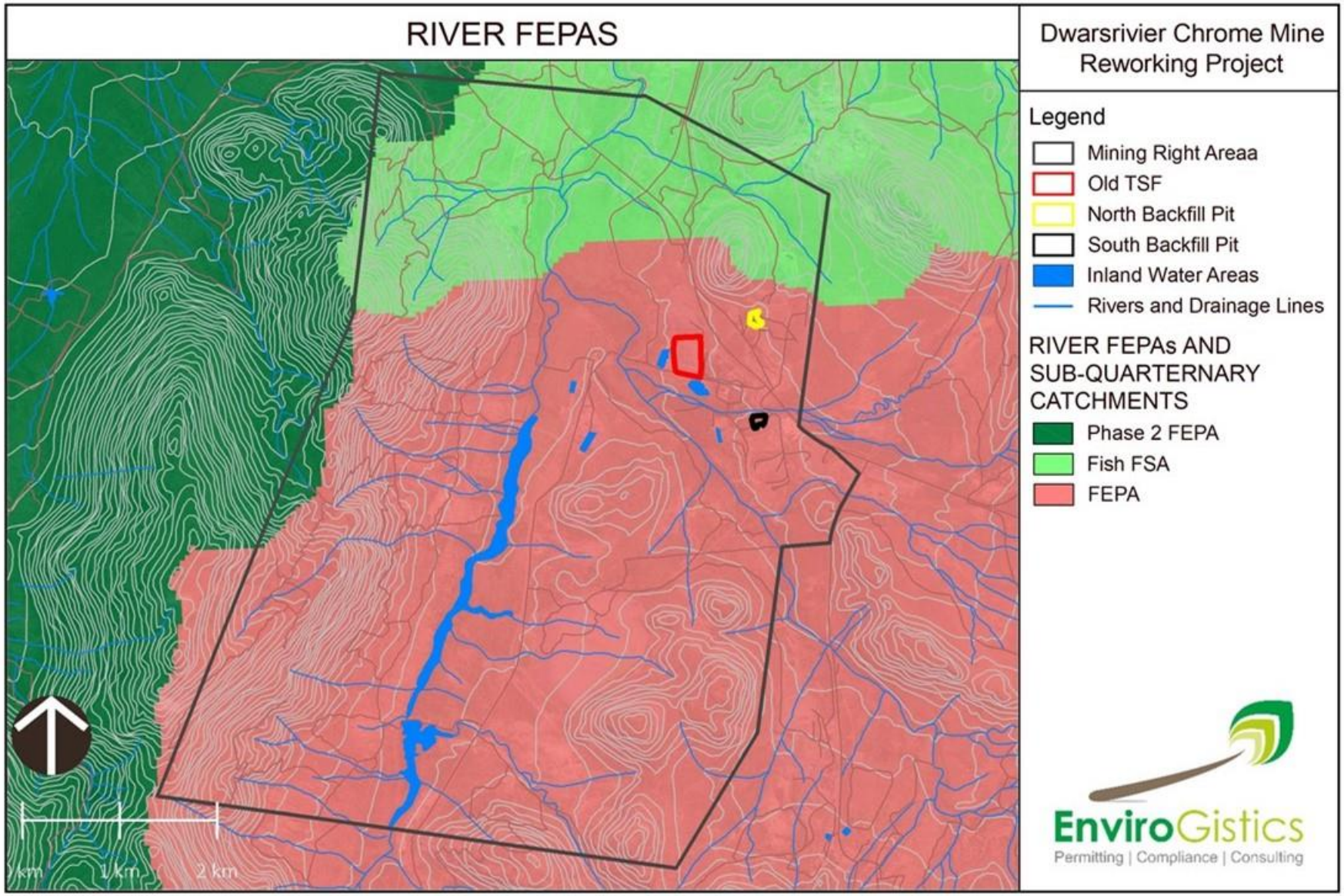


Figure 19: River FEPAs and associated sub-quaternary catchments associated with the Mining Right Area, according to the NFEPA database (2011)

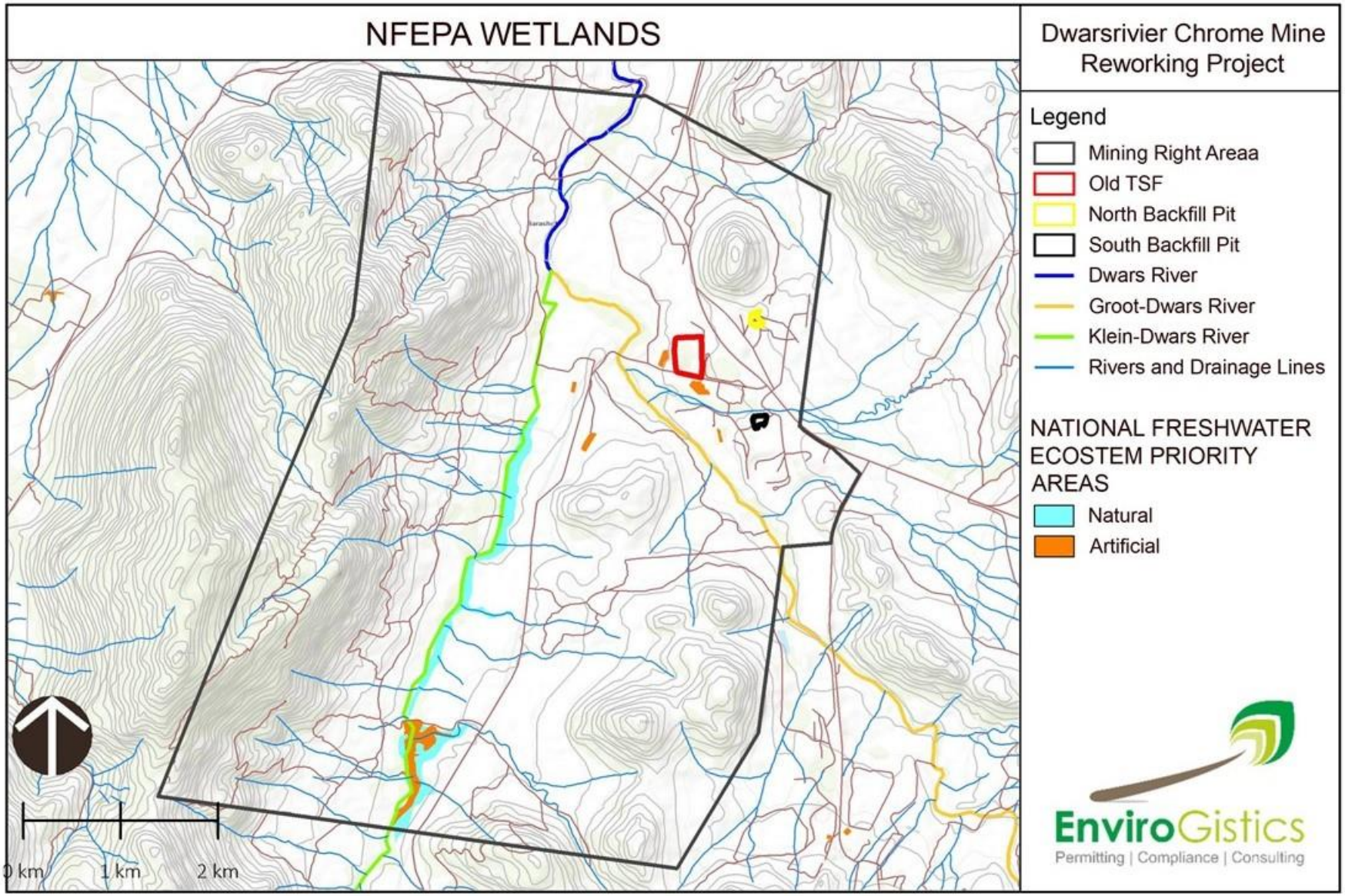


Figure 20: The natural and artificial wetland features and rivers associated with the Mining Right Area, according to the NFEPA database (2011) (SAS, 2018)

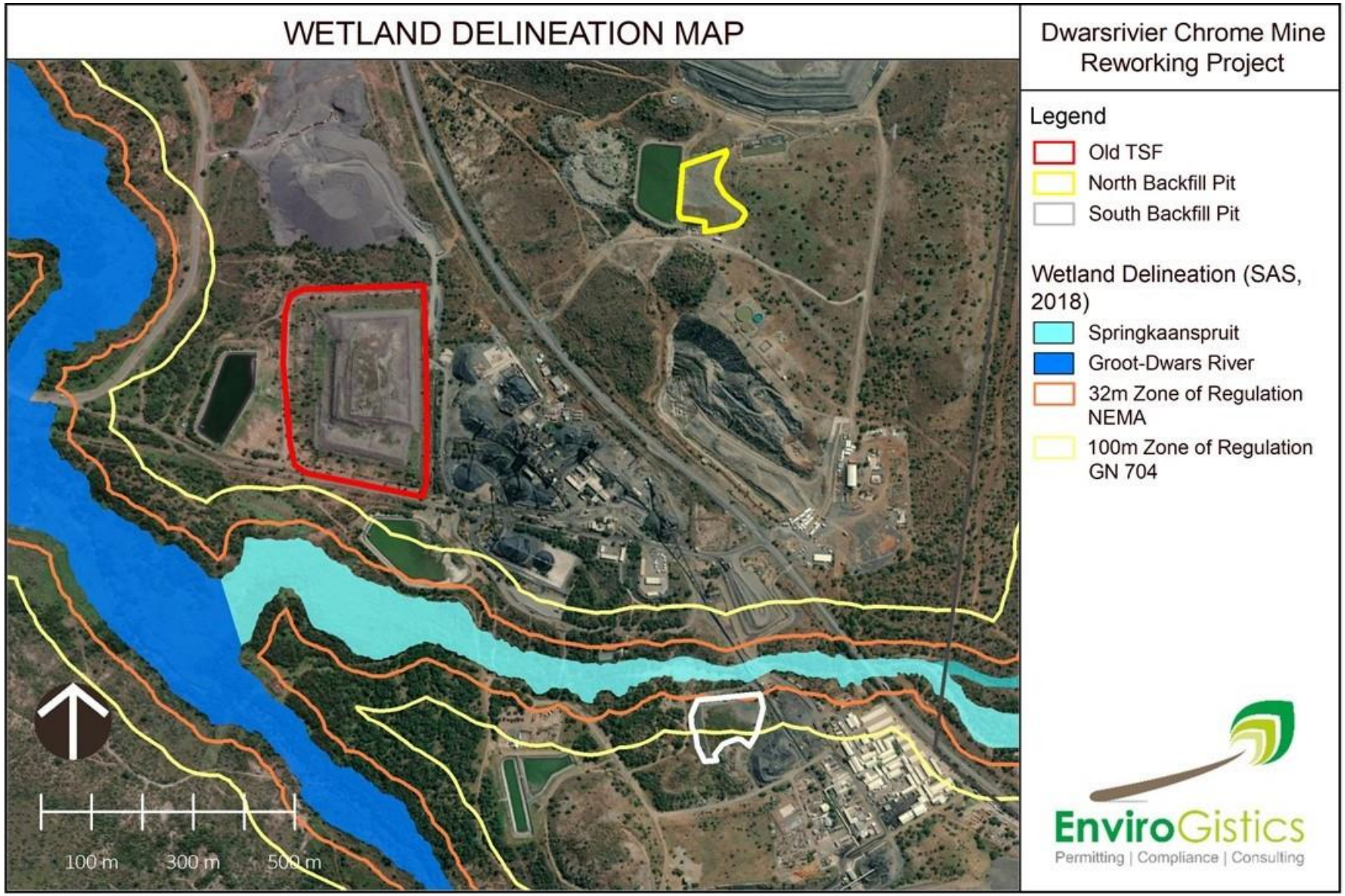


Figure 21: The location of the various drainage systems identified within the Mining Right Area (SAS, 2018)

Groot Dwarsrivier and Springkaanspruit

PES Category: Instream Index of Habitat Integrity (IHI) PES Category B, Riparian IHI PES Category C

The Groot Dwarsrivier has been subjected to a variety of impacts over several decades, most notably impoundment (i.e. the Der Brochen Dam – also known as the Richmond Dam, located approximately 12km upstream of where the Groot Dwarsrivier enters the Mining Right Area). In addition, channel straightening, weirs, and bridge crossings are present at various points along the river, including within the DCM Mining Right Area. These modifications will have an impact on the flow regime, although the Der Brochen Dam and other smaller impoundments will also play a significant role in sediment trapping. Mining activities, including the movement of heavy mining vehicles along gravel roads in the catchment, particularly those which traverse the river, contribute to increased sedimentation of the system. The riparian vegetation community composition remains largely natural, although localised alterations to species composition were also noted within the more disturbed areas (for example, around road crossings). Increased sedimentation and increased nutrient loads are apparent in the floodplain area where the Groot Dwars confluences with the Klein Dwars, as indicated by the monotypic stands of *Phragmites autralis*. The lower reaches of the Springkaanspruit, which enters the Mining Right Area in the north-east, confluencing with the Groot Dwarsrivier in the vicinity of the mine's Return Water Dams have been impacted by road and conveyor crossings, increased sedimentation due to mining activities and altered vegetation communities. However, the upper reaches located outside of the Mining Right Area are unlikely to have been significantly impacted since few disturbances occur in that vicinity.

In Government Gazette Number 39943 issued 22 April 2016, it is indicated that the Klein Dwarsrivier at the confluence with the Groot Dwarsrivier (quaternary catchment B41G), should be maintained at Ecological Category D. For the overall Steelpoort River (quaternary catchment B41K), it is also stated that an Ecological Category D should be maintained. It is thus clear that catchment wide impacts have occurred, and that the system is recognised as being a "working river" (SAS, 2018).

The Groot Dwarsrivier and the Springkaanspruit are considered to provide **intermediate** levels of ecological service provision, although due to the reduced ecological integrity, ecoservice provisioning by the Springkaanspruit is likely to be lower than that of the Groot Dwarsrivier. Both systems are considered important in terms of benefits such as flood attenuation, streamflow regulation, and assimilation of nutrients and toxicants. Whilst the DCM Mining Right Area, and other mining properties adjacent to the mine, are largely restricted access areas, when assessing socio-cultural benefits provided by these systems, consideration was given to portions of the rivers which are accessible to local communities. Thus, benefits such as harvestable resources (e.g. fish) and tourism are considered possible, if not directly within the DCM property.

EIS Category: **Groot Dwars - Very High**
Springkaanspruit - High

Although the Groot Dwarsrivier has been impacted by various activities such as agriculture and mining, it is nevertheless considered to be ecologically important from the perspective that it provides faunal migratory corridors, breeding and foraging habitat, and contributes to the functioning of downstream systems, as well as maintenance of key hydraulic processes within the assessment area (such as flood attenuation). Furthermore, as a "working system" it is considered important for the provision of water for economic use.

The Springkaanspruit, having undergone a slightly greater degree of modification, is nevertheless considered important in terms of service provision to downstream systems, as well as from a biodiversity maintenance perspective, however, due to its reduced ecological integrity, is not deemed to be as ecologically important as the Groot Dwarsrivier.

Recommended Ecological Category: Category B/C

Whilst the Government Gazette Number 39943 indicates that an Ecological Category D should be maintained for the Groot Dwarsrivier/ Klein Dwarsrivier confluence, those sections of the Groot Dwarsrivier which remain in a higher ecological category (such as the reach within the Mining Right Area) should nevertheless be maintained as such. Therefore, no further impacts on the section of the Groot Dwarsrivier within the Mining Right Area should be permitted.

The Springkaanspruit too, should be managed and maintained appropriately, i.e. no further impacts should be permitted, and efforts should be made to rehabilitate those areas which have been affected by current mining operations. The Springkaanspruit should be managed as a REC C.

Please refer to Figure 22 and Figure 23.

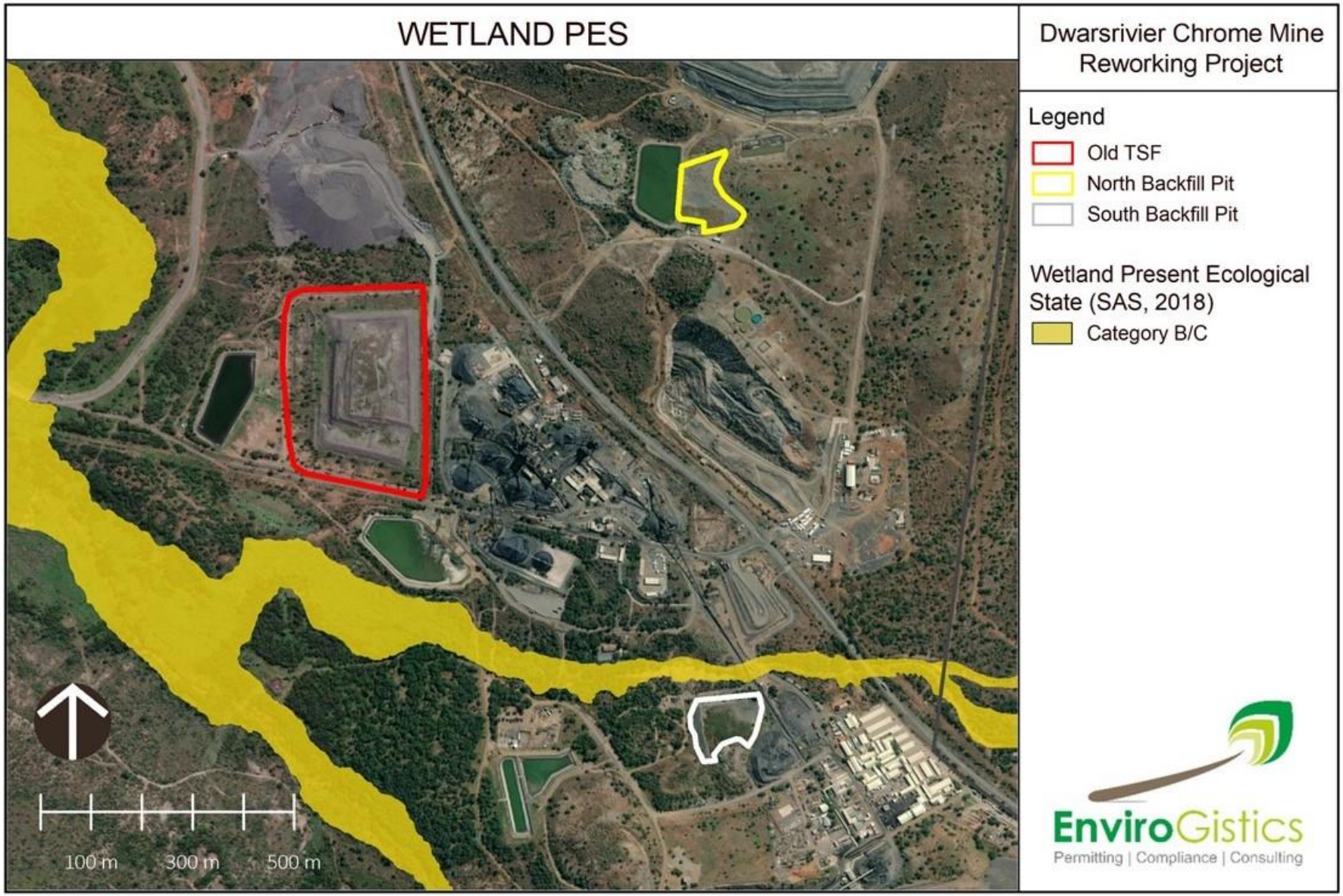


Figure 22: Conceptual presentation of the Present Ecological State (PES) categories applicable to the assessed freshwater resources (SAS, 2018)

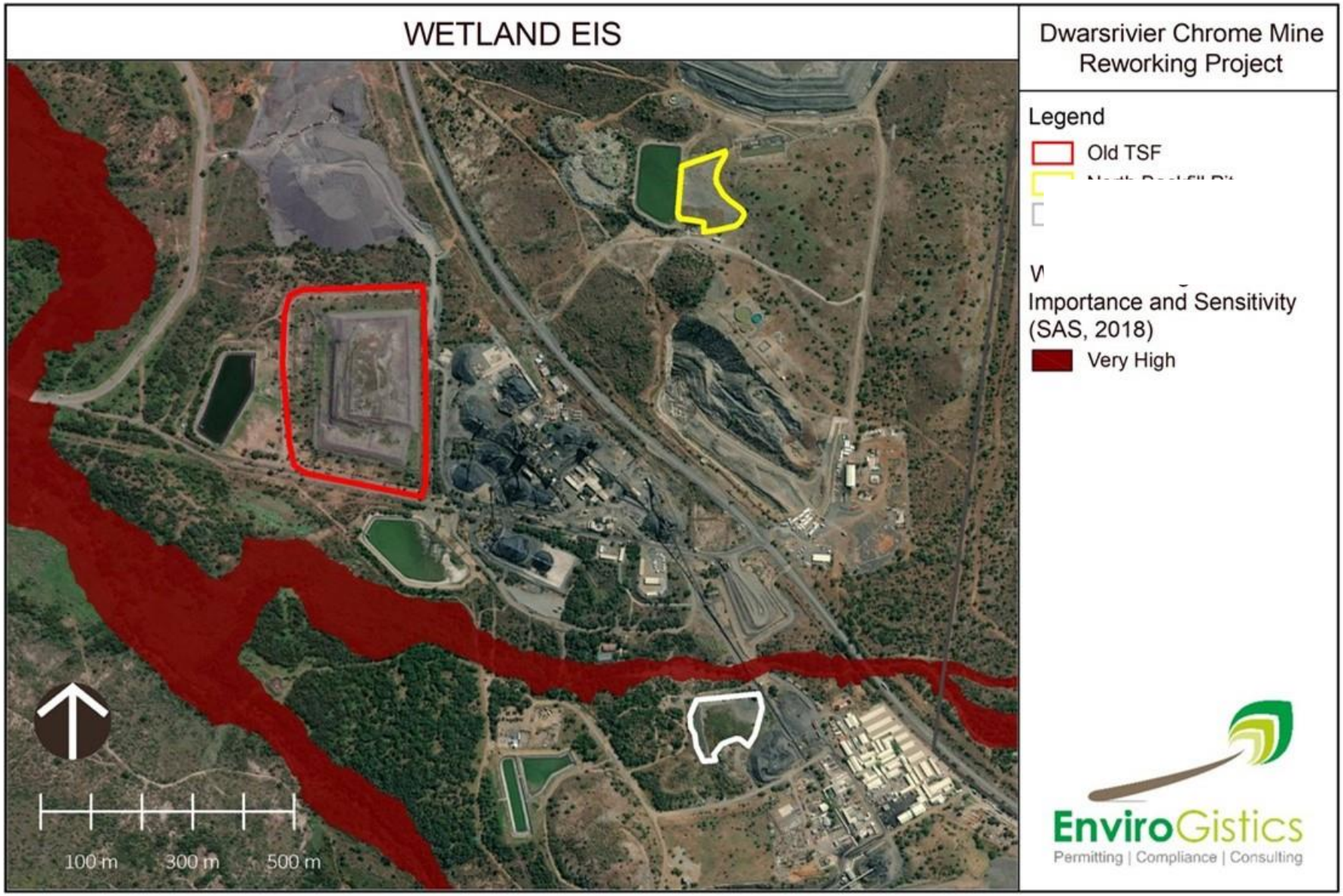


Figure 23: Conceptual presentation of the Ecological Importance and Sensitivity (EIS) of the assessed freshwater resources (SAS, 2018)

1.g.iii.1.l Air Quality

Sources of potential air emissions and/or pollution significance for the overall mine include:

- Transfer of ore from underground to ROM stockpiles by belt conveyor (wind entrained particulate matter);
- Vehicle exhaust gasses – both on and off site;
- Dust generated from vehicles driving on unpaved roads within mine boundary; and
- The reclamation of the tailings dam and the rock dump may produce dust.

It is unlikely that the proposed reworking activities would have any additional impacts or contribution to air quality directly, with the exception of potential sporadic dust emissions during operational periods. The mine has monitoring points for dust fallout which are monitored monthly.

1.g.iii.1.m Noise

A noise impact assessment was conducted by dBAcoustics in May 2009 and this revealed the following sources of noise along the boundaries of the mine:

- Traffic noise – both light motor vehicles and heavy-duty trucks;
- distant mine noise;
- mine activity noise;
- industrial noise; and
- Ventilation noise.

No additional noise assessment was undertaken as the activities in question is located within the existing mining footprint.

Of particular significance is the presence of the R577 regional road from Sekhukhuneland to Lydenburg that transects the mine property and is adjacent to the main mining activities on DCM, most importantly the processing plant, conveyor and workshops. Also important is the presence of four other mining operations in the vicinity of DCM.

These contribute noise directly to the ambient noise levels, but also indirectly through the presence of heavy duty and other traffic on the R577 and minor access roads to the mines. The area cannot be classified as rural according to Table 2 of SANS 10103 due to the above factors.

The following conclusions were drawn from the results of the noise impact assessment:

- The prevailing ambient noise levels along the boundary of the mining area are lower than the recommended noise level for an industrial area;
- The prevailing ambient noise levels are largely caused by emissions from a combination of noise sources;
- The significance of the noise impact from the activities at the proposed mine on the existing immediate environment will be medium according to the standardised risk matrix; and
- According to Table 5 of SANS 10103 of 2008, the community response to the industrial type noise will be medium due to the higher prevailing ambient noise levels already experienced in this area from other mining activities.

No changes to the ambient noise levels are foreseen to be contributed by the proposed project – the additional truck on road, should not contribute to the existing sense of place, with road traffic remaining within the current operational times.

1.g.iii.1.n Cultural and Heritage Setting

According to the 2010 EMPr, a heritage investigation was done by the Department of Archaeology from the University of the Witwatersrand (Wits). Wits recorded two archaeological sites on the mining area. These consisted of a historic mine and a Middle Stone Age scatter.

Site 1: This site consists of an abandoned chrome mine and associated building foundations located at the south-eastern base of the koppie in the far north-eastern corner of the mining area. One mineshaft had been sealed with stone and mortar. This area will be mined through by the open cast mine. The remains of at least 20 circular

hut platform foundations and three sub-rectangular room block foundations stood to the east of the sealed mineshaft. No additional cultural material, such as refuse deposits, was located.

Site 2: A light concentration of Middle Stone Age material lay scattered in a deflated ploughed field, just south of the gravel track to the farmhouse on Dwarsrivier. Cultural material included lithic blades, points and flakes fashioned from dolerite. The material was rolled and weathered, indicating that it is not in primary context. None of these sites are located in proximity to the proposed project.

Two graves have been demarcated on site. Neither of these sites are located in proximity to the proposed activities, with the closest grave located on South Mine more than 500m from the proposed reworking sites. Refer to Figure 24 overleaf.

According to Regulation 38 of the NHRA, any development or other activity which will change the character of a site exceeding 5 000m^2 in extent requires notification to the SAHRA. The area of proposed activity does not trigger this threshold and in addition to this, due to the fact that the site has been subjected to heritage studies, no impacts on identified heritage sites are foreseen. For the purposes of this project, a new clearance in excess of 5,000m² will not be triggered.

1.g.iii.1.o Socio-Economic Setting

According to the 2011 Statistics of South Africa (Stats SA) information; the total population of the former Fetakgomo and Greater Tubatse municipalities combined is approximately 429,471 with 106,050 households; this makes the Fetakgomo Tubatse Local Municipality the municipality with the highest population in the District. It also appears from the current 2016 Community Survey as compared to the 2011 Stats SA results that within the Fetakgomo Tubatse Local Municipality that there has been a population increase to 490,381 with a household increase of 125,454. As per the recent 2016 Community Survey, the population of the former Greater Tubatse Local Municipality increased with 0.037% and the former Fetakgomo Local Municipality increased slightly with 0.007. The total percentages of Fetakgomo Tubatse Local Municipality as combined, therefore increased with 0.043%.

The following information has been obtained from the Final 2016 IDP for the municipality:

<u>Households</u>

The total number of Households for Fetakgomo Tubatse Local Municipality in 2011 as combined was 106.050 and 125.454 in 2016; which makes the municipality the biggest municipality in the District. The municipality has shown a growth of 8% growth in 2016. This might be due to the mining activities taking place in the area.

<u>People and Age</u>

Prior to 2011, the Fetakgomo Tubatse Local Municipality's population decreased by 16.4% just in four years, between 2007 and 2011 according to the IDP. The municipality's population was presented as 93 814 people, which presented an increase of 16.4% since the previous census (StatsSA census 2011). The decrease during this period is explained largely by migration i.e. there is out-migration of people from rural to the urban areas for various reasons including, but not limited, to better job opportunities, access to social amenities and facilities in urban areas (water, good roads, hospitals, schools, higher educational facilities etc.). Demographic factors such as mortality and fertility factors appear to also play a role.

The 2011 Census demographic research presented that median age for the Fetakgomo Tubatse Local Municipality's population is around 15-19 years.

Figure 24: Grave Locations in relation to the proposed mining areas (stars indicating current project areas)

Economic Development Sectors

Tourism

Tourism in the Fetakgomo Tubatse Local Municipality is underdeveloped as most tourist attraction places are found beyond the boundaries of the municipality, particularly the world famous Blyde River Canyon and a couple of game farms e.g. Kruger National Park, Malamala Game Reserve, etc. are found to the east of the municipal area.

Agriculture

Farming is an important economic resource as a wide range of products are cultivated owing to good soil conditions, the sub-tropical climate and reasonable access to water. The following type of products is produced: fruit, vegetables, grain, cotton, citrus, maize, tobacco and meat. The main resources that encourage agricultural production are the Olifants, Steelpoort and Spekboom Rivers, which provide water to the region. These sources of natural water are essential for present and long-term irrigation of crops.

The table below indicates agricultural production areas in the municipality.

Table 22: Agricultural Production (Departmental Report 2013)

Production	Total Tons	Total (ha)
Maize (ha)	3 022.9	30 144.59
Sorghum	2 575	8 638
Wheat	2 464	13 945
Sunflower	59	728.1
Groundnuts	13.6	14.9
Soya beans	152.4	3 060.9
Canola	0	50
Bambara nuts	0	633.6
Dry beans	1 560.2	3 092.2
Potatoes	107.7	1 975.3
Cabbage	104	957.6
Butternuts	21.9	200.1
Tomatoes	135.7	340.3
Citrus	1 430.5	10 073
Cotton	0	901.1
Tobacco	21	2222.7
Lucerne	515.8	1760.9
Table grapes	7.1	1390.2

Potential land for agricultural purposes is found on the riverbanks of three above mentioned rivers, however some of the land is not used optimally e.g. the land at Penge on the riverbank of Olifants River and others.

Good agricultural land (Tswelopelo agricultural land) near Praktiseer and Bothashoek is invaded by illegal squatters leaving agricultural activities with not enough land for cultivation. The Tswelopele agricultural scheme in Praktiseer was a very good initiative but has been abandoned by the department of agriculture leaving the entire infrastructure vulnerable to theft.

No other region in the Fetakgomo Tubatse Local Municipality reveals a higher potential for desertion, resultant from overgrazing over a prolonged period by a highly impoverished rural population that struggles to plan and control their area. Their lack of skills prevents them from managing their resource for long-term production. This type of farming makes the region vulnerable to periodic droughts that affect both the regional resources and the potential to generate work opportunities for the unemployed.

Mining

The intrusion of the Volcanic Bushveld Igneous Complex into the sedimentary rock of the Transvaal system resulted in great metamorphism, which caused the introduction of many minerals including chrome, vanadium, platinum, asbestos and magnetite in the area.

- Chrome is mined extensively at Dilokong, Dwars-river, Dooringbosch, Tweefontein, Lannex Mine, Magareng, Thorncliffe, Helena, and Mooihoek, and the product is exported by rail and sea to overseas destinations.
- The following chrome mine is still under prospection: Lwala Mine.
- Vanadium is mined and smelted at only one mine and this product caters for most of the demand in the country.

- Platinum is found in the well-known Merensky Ridge and this resource accounts for more than 50% of all platinum resources on earth and is mined at Mototolo (Xstrata), Marula Mine, Twickenham Mine, Modikwa Mine, Two Rivers Platinum Mine and Phokathaba Mine.
- The following platinum mines are still under prospection or at project stage: Spitzkop Mine, Grooteboom Mine, Nkwe Platinum Mine, Booysendal, Der Brochen and Tjate Mine.
- Two Andalusite mines exist in the areas of Segororng and Modubeng, which are Rhino minerals and Annesley Havecroft Mines.
- Granite is mined at Elephant's River Mine near Tjate village.
- Clay is mined at Atta Clay Mine and most of the product is used in the process of platinum production.
- Asbestos was mined at Penge and Taung, but because asbestos products have been banned worldwide, the mines were closed down and areas are to be rehabilitated.
- Slate is mined at Saringa Mine near Kgautswane village and is used to manufacture roof and floor tiles.
- Silica is mined for the production of sand and stone aggregate, and serves as a flux in the chrome smelting process.
- Magnetite is an iron-ore mined at Goede Hoop and transported to Emalahleni for the production of steel in the Highveld Steel Plant.
- Magnesite was mined extensively in the Burgersfort area, but as it does not meet the required standard anymore, mining operations were ceased.
- There are currently three chrome smelters operating in the area, Lion Ferrochrome (Xstrata), ASA Metals at Ga-Maroga village and Tubatse Ferrochrome in Steelpoort.

Although there are several mines in the area, the existing resources remain unexploited. Investment in this sector is important as it brings with it investment in infrastructure, results in the creation of job opportunities and generates many other economic spin-offs. The lack of economic growth in the region warrants special attention and support to optimize the available opportunities. However, cognisance should be taken of the outflow of money from the mines in Greater Tubatse to other regions.

There are currently three chrome smelters operating in the area surrounding the DCM, namely Lion Ferrochrome (Xstrata), ASA Metals at Ga-Maroga village and Tubatse Ferrochrome in Steelpoort.

1.g.iii.2 Type of Environment Affected by the Proposed Activity

Please refer to the preceding section detailing the environmental setting in which the mine is located. Please refer to the preceding section detailing the environmental setting in which the mine is located. The proposed activities will be located in already disturbed areas but will still necessitate the following:

- Limited removal and stockpiling of placed topsoil.

These activities may therefore impact on the following:

- Groundwater setting, depending on the rehabilitation option;
- Air quality in terms of the removal of material and transportation thereof;
- Increase traffic due to third party removal and transport to markets; and
- Topography (shaping).

1.g.iii.3 Description of the Current Land Uses

DCM has been mining chromite ore from the LG6 seam since 1999. Between 1999 and 2005, ore was mined using opencast methods. The six pits have subsequently been mined out and backfilled with the exception of the South and North Pit portals from which access is gained to the underground workings. The current mine plan extends the life of the operations to the year 2042 (21 years).

All opencast mining has ceased, and the pits have been backfilled and partially rehabilitated. These areas were delineated as part of the annual rehabilitation plan, completed by GCS in 2016. Access to the underground workings is gained from both North and South Pits. The two decline shafts are constructed in the high walls of the pits.

Tailings material was backfilled into both North and South Pits. The majority of the tailings material was backfilled into North Pit while the construction of the Northern TSF was completed. A Return Water Dam (RWD) was constructed in the north-western part of North Pit during this period. The RWD was excavated into backfilled tailings and lined with HDPE.

The Old TSF situated west of the Plant is partially reprocessed. Tailings are currently deposited in the Northern TSF, which was commissioned in 2012. The remaining life of the Northern TSF is estimated to be around 12 years.

Several dams are used on site to contain and transfer dirty water around the operations. These include two Pollution Control Dams, the Upper RWD and the Lower RWD, situated adjacent to the Old TSF. Both dams are lined with HDPE. Extraneous water is pumped from the underground workings to the Clarifier. From here, water is transferred to Dam 26. Approximately half of the extraneous water is pumped back underground for reuse.

Several Waste Rock Dumps (WRDs) are situated around the operations. Some of these dumps have been rehabilitated. The operational WRDs are situated to the north of the Old TSF (the northern Discard Storage Facility).

To the west of the mine, Two Rivers Platinum Mine is located. This mine mines platinum via underground mining operations. Various mining infrastructure, a TSF and water management structures are present in this area.

Current land use activities associated with the area and surrounding region are largely dominated by wildlife and wilderness, including extensive mining operations. Fallow lands/ old agricultural field were also identified on the north central portion of the area and are occasionally used for grazing. No current agricultural activities were observed within the Mining Right Area and the surrounding areas. Please refer to the following figure.

Figure 25: Photographic presentation of the dominant land uses within the area

Pre-Mining Land Use

Prior to the sale of the land for mining purposes, a portion of the property was used for agriculture under irrigation, the dominant crops being maize, lucerne, cotton and vegetables. The remainder of the property was used for grazing and wilderness land.

Historical Potential

The estimated dryland production potential of the area is 4 tons per hectare (t/ha). The grazing capacity is approximately 6 large stock units per hectare. The irrigated land potential is in the order of 6 - 10 t/ha for maize.

Evidence of Misuse

The only evidence of misuse is erosion gullies in some areas and the presence of borrow pits where the soils and underlying soft rock materials have been removed.

Current Land Use

The current land use for the area is for mining operations, with the Two Rivers Platinum and Glencore Thorncliffe Mines operating in the adjacent farm portions.

1.g.iii.4 Description of Specific Environmental Features and Infrastructure on Site

The following specific environmental features are present on site specifically of reference to the proposed project:

- According to the Limpopo Conservation Plan version 2 (2013) (please refer to Figure 15) the majority of the DCM Mining Right Area is classified as CBA 1. CBA 1 areas are considered irreplaceable areas required to meet biodiversity pattern and/or ecological processes targets, and no alternative sites available to meet targets. The greater part of the proposed project is located in a CBA (including the South Backfill Pit and a portion of the Old TSF) as regulated in the Limpopo Conservation Plan (2013). These are Irreplaceable areas, which are required to meet biodiversity patterns and/or ecological processes targets; and with no alternative sites available to meet targets. The North Backfill Pit and a portion of the Old TSF are located in an ESA2. This is according to the published documents, however, based on the Biodiversity Action Plan, both areas are regarded as transformed habitats as these have been mined and backfilled Figure 11 to Figure 14.
- The Dwarsrivier is considered a Flagship River in terms of the NFEPA. The proposed activities will be located outside of the 1:100 year flood line (more than 1km from this river), as well as the 1:100 year floodline of the Springkaanspruit, a tributary of the Dwarsrivier. The South Pit falls within the 100m buffer of the Springkaanspruit, this is however an approved water use in terms of the WUL 2008 with an approved GN704 exemption as well as a Section 21c&i approval.

1.g.iii.5 Environmental and Current Land Use Map

Please refer to Figure 26.

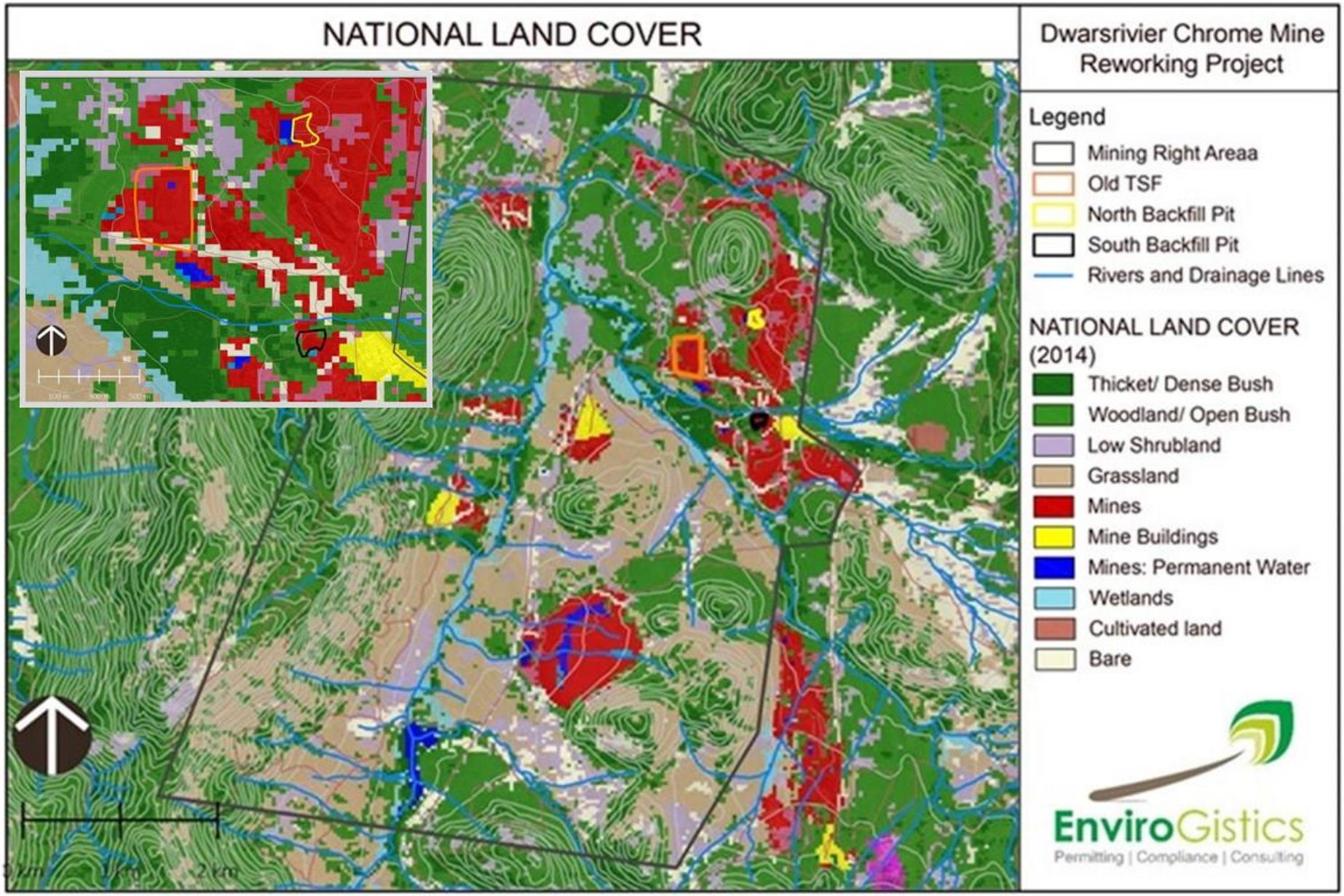


Figure 26: Land use map

1.g.iv Impacts and Risks identified, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts can be mitigated

1.g.iv.1 Typical Activities to be undertaken

Before the impact assessment can be done, the different activities must be identified, mapped and understood. The activities directly related to this impact assessment are listed in Table 9 presented in the first section of the report. Each of these activities were assessed in detail as part of the specialist investigations.

The activities that will form part of the proposed project will include the following:

- Planning Phase:
  - Ensure the implementation of Legal Requirements (Environmental Permits and Authorisations).
- Construction Phase:
  - No construction activities will be required.
- Operational Phase:
  - Removal of placed topsoil from backfilled pits;
  - Management of vehicle movement on site;
  - Stockpiling of ROM on designated and licensed stockpiles if required;
  - Domestic waste management and minimal hazardous waste management; and
  - Transportation of product to third parties.
- Closure Phase:
  - Ensure the implementation of Legal Requirements (Environmental and Closure Authorisations/Permits);
  - Backfilling of pits with waste rock and/or making pits safe; and
  - Domestic, hazardous and demolition waste management.

1.g.iv.2 Methodology used in determining and ranking the Nature, Significance, Consequences, Extent, Duration and Probability of potential Environmental Impacts and Risks

In order to adequately assess and evaluate the impacts and benefits associated with the project it is necessary to use a methodology that could scientifically achieve this and to reduce the subjectivity involved in making such evaluations. For proper decision-making it is necessary to assess all legal requirements and clearly defined criteria in order to accurately determine the significance of the predicted impacts or benefits on the surrounding natural and social environment.

This section will aim to discuss the methodology to be followed to determine, assess and describe possible impacts as a result of project implementation. Impacts will be discussed in terms of the construction, operational and decommissioning/closure phases of the project. The evaluation of impacts is conducted in terms of the criteria discussed below. The various environmental impacts and benefits of this project will be discussed in terms of the nature of the impact, as well as the status, certainty, duration, magnitude, extent, intensity, frequency and significance. The significance rating of each impact will determine whether or not mitigation will be required.

The EIA will also aim to achieve the following:

- Provide an overall assessment of the social and biophysical environments affected by the proposed project;
- Assess the study area in terms of environmental criteria;
- Identify and recommend appropriate mitigation measures for potentially significant environmental impacts;
- Successfully analyse all public issues raised to date in order to recommend appropriate mitigation measures for all social and environmental related concerns; and
- Impacts and benefits are assessed before and after the application of mitigation measures.

The following section presents the criteria used to assess the potential impacts presented in the previous section.

1.g.iv.2.a Criteria of assigning significance to potential impacts

The evaluation of impacts is conducted in terms of the criteria detailed in Table 23 to Table 28. The various environmental impacts and benefits of this project are discussed in terms of impact status, extent, duration, probability, and intensity. Impact significance is regarded as the sum of the impact extent, duration, probability and intensity and a numerical rating system has been applied to evaluate impact significance. Therefore, an impact magnitude and significance rating is applied to rate each identified impact in terms of its overall magnitude and significance (Table 28).

In order to adequately assess and evaluate the impacts and benefits associated with the project, it was necessary to develop a methodology that would scientifically achieve this and to reduce the subjectivity involved in making such evaluations. To enable informed decision-making it is necessary to assess all legal requirements and clearly defined criteria in order to accurately determine the significance of the predicted impact or benefit on the surrounding natural and social environment.

1.g.iv.2.b Impact Status

The nature or status of the impact is determined by the conditions of the environment prior to construction and operation. A discussion on the nature of the impact will include a description of what causes the effect, what will be affected and how it will be affected. The nature of the impact can be described as negative, positive or neutral.

Table 23: Status of Impact

Rating	Description	Quantitative rating
Positive	A benefit to the receiving environment.	P
Neutral	No cost or benefit to the receiving environment.	-
Negative	A cost to the receiving environment.	N

1.g.iv.2.c Impact Extent

The extent of an impact is considered as to whether impacts are either limited in extent or if it affects a wide area or group of people. Impact extent can be site specific (within the boundaries of the development area), local, regional or national and/or international.

Table 24: Extent of Impact

Rating	Description	Quantitative rating
Low	Site Specific; Occurs within the site boundary.	1
Medium	Local; Extends beyond the site boundary; Affects the immediate surrounding environment (i.e. up to 5 km from the Project Site boundary).	2
High	Regional; Extends far beyond the site boundary; Widespread effect (i.e. 5 km and more from the Project Site boundary).	3
Very High	National and/or international; Extends far beyond the site boundary; Widespread effect.	4

1.g.iv.2.d Impact Duration

The duration of the impact refers to the time scale of the impact or benefit.

Table 25: Duration of Impact

Rating	Description	Quantitative rating
Low	Short term; Quickly reversible; Less than the project lifespan; 0 – 5 years.	1
Medium	Medium term; Reversible over time; Approximate lifespan of the project; 5 – 17 years.	2
High	Long term; Permanent; Extends beyond the decommissioning phase; >17 years.	3

1.g.iv.2.e Impact Probability

The probability of the impact describes the likelihood of the impact actually occurring.

Table 26: Probability of Impact

Rating	Description	Quantitative rating
Improbable	Possibility of the impact materializing is negligible; Chance of occurrence <10%.	1
Probable	Possibility that the impact will materialize is likely; Chance of occurrence 10 – 49.9%.	2
Highly Probable	It is expected that the impact will occur; Chance of occurrence 50 – 90%.	3

Definite	Impact will occur regardless of any prevention measures; Chance of occurrence >90%.	4
Definite and Cumulative	Impact will occur regardless of any prevention measures; Chance of occurrence >90% and is likely to result in in cumulative impacts	5

1.g.iv.2.f Impact Intensity

The intensity of the impact is determined to quantify the magnitude of the impacts and benefits associated with the proposed project.

Table 27: Intensity of Impact

Rating	Description	Quantitative rating
Maximum Benefit	Where natural, cultural and / or social functions or processes are positively affected resulting in the maximum possible and permanent benefit.	+ 5
Significant Benefit	Where natural, cultural and / or social functions or processes are altered to the extent that it will result in temporary but significant benefit.	+ 4
Beneficial	Where the affected environment is altered but natural, cultural and / or social functions or processes continue, albeit in a modified, beneficial way.	+ 3
Minor Benefit	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are only marginally benefited.	+ 2
Negligible Benefit	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are negligibly benefited.	+ 1
Neutral	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are not affected.	0
Negligible	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are negligibly affected	- 1
Minor	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are only marginally affected.	- 2
Average	Where the affected environment is altered but natural, cultural and / or social functions or processes continue, albeit in a modified way.	- 3
Severe	Where natural, cultural and / or social functions or processes are altered to the extent that it will temporarily cease.	- 4
Very Severe	Where natural, cultural and / or social functions or processes are altered to the extent that it will permanently cease.	- 5

1.g.iv.2.g Impact Significance

The impact magnitude and significance rating is utilised to rate each identified impact in terms of its overall magnitude and significance.

Table 28: Impact Magnitude and Significance Rating

Impact	Rating	Description	Quantitative rating
Positive	High	Of the highest positive order possible within the bounds of impacts that could occur.	+ 12 – 17
	Medium	Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. Other means of achieving this benefit are approximately equal in time, cost and effort.	+ 6 – 11
	Low	Impacts is of a low order and therefore likely to have a limited effect. Alternative means of achieving this benefit are likely to be easier, cheaper, more effective and less time-consuming.	+ 1 – 5
No Impact	No Impact	Zero impact.	0
Negative	Low	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts, mitigation is either easily achieved or little will be required, or both. Social, cultural, and economic activities of communities can continue unchanged.	- 1 – 5
	Medium	Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. In the case of adverse impacts, mitigation is both feasible and fairly possible. Social cultural and economic activities of communities are changed but can be continued (albeit in a different form). Modification of the project design or alternative action may be required.	- 6 – 11
	High	Of the highest order possible within the bounds of impacts that could occur. In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time-consuming or a combination of these. Social, cultural and economic activities of communities are disrupted to such an extent that these come to a halt.	- 12 - 17

1.g.iv.3 Impacts and Risks identified

1.g.iv.3.a The Positive and Negative Impacts that the Proposed Activity (in terms of the Initial Site Layout) and Alternatives will have on the Environment and the Community that may be affected

The following positive impacts are foreseen:

- The project will allow for the optimal mining of chrome resources; and
- The project will allow for the removal of past tailings material which may have resulted in the increase in of the groundwater pollution plume.

It should be noted that impacts associated with the proposed project will be significantly lower than that of a greenfields project and can be rather regarded as a rehabilitation project.

The activities proposed by the applicant have not indicated any significant impact in the long term. In effect, the reworking of the pits will rather lead to a positive management of an existing impact, which if not sufficiently managed may result in a residual impact on groundwater. Refer to the following key areas which were considered.

1.g.iv.3.b Groundwater Impacts

The Numerical Groundwater Model, 2020 (please refer to Annexure 6**Error! Reference source not found.**) updated the sources to groundwater contamination present within the mining area. This includes monitoring data and leach test data sourced from several reports.

The updated source term used during simulations is presented in the following table and figure.

Table 29: Updated source term (see areas in green being addressed in the project)

Source area	Conceptual nitrate concentration (mg/l)	Flow path to groundwater	Comments
Plant area	1200	Infiltration from surface: 5% of MAP	Inferred from DRM4 2019/2020 data
North Pit tailings backfill	1200	Source located in aquifer: seepage	Inferred from ASDWBH3 2019/2020 data
Northern RWD	1200	Infiltration from source with liner	2019/2020 monitoring data
Northern Pollution Control Dam	1200	Infiltration from source with liner	2019/2020 monitoring data
Northern TSF	900	Infiltration from source with liner	2019/2020 monitoring data
Old TSF	900	Infiltration from surface: 10% of MAP	Inferred from ASDWBH9 2019/2020 data
Upper RWD	900	Infiltration from source with liner	2019/2020 monitoring data
Lower RWD	900	Infiltration from source with liner	2019/2020 monitoring data
Norther WRD	400	Infiltration from surface: 6% of MAP	Inferred from DRM3 2019/2020 data
Underground	180	Source located in aquifer: seepage	Inferred from Dam 26 2019/2020 data
Dam 26	180	Infiltration from source with liner	2019/2020 monitoring data
Pit backfill areas	90	Source located in aquifer: seepage	Inferred from ASDWBH1 2019/2020 data
South Pit tailings backfill	90	Source located in aquifer: seepage	Inferred from SW BH 2019/2020 data
WRD and Discard	20	Infiltration from surface: 10% of MAP	Leach tests (NettZero, 2018)

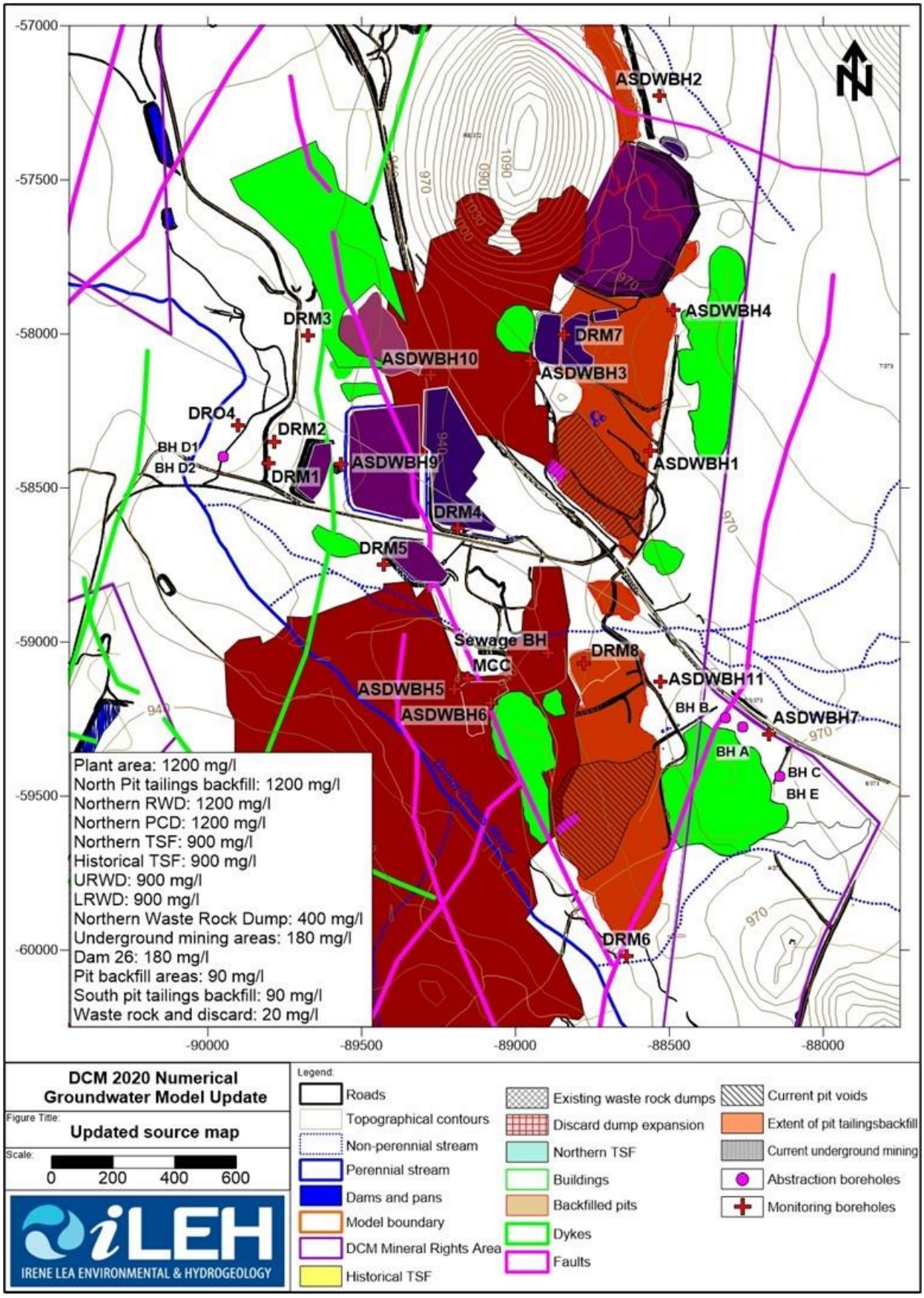


Figure 27: Map showing updated source term

Groundwater down gradient of the Northern RWD has been impacted by historical tailings deposition into the North Pit void, which is now one of the two areas planned for reworking. DCM monitored the quality of the water in North Pit from May 2009 up to June 2016. Nitrate concentrations for this period exceeded 2000 mg/l up to March 2010 after which it gradually decreased to between 500 and 700mg/l in 2016. NettZero (2018)

reports that DCM changed the type of explosives it used during this time. A comparison between nitrate concentrations in North Pit to that measured in borehole ASDWBH3 (in the following figure) indicates that a sharp increase in nitrates were measured in the groundwater around May 2013, which is about 4 years after nitrate concentrations started exceeding 2,000mg/l in North Pit. Significantly elevated nitrate concentrations persisted in ASDWBH3 until around March 2018, after which concentrations decreased to around 500 mg/l. This could provide an indication of plume dilution through the throughflow of rainwater recharged to the aquifers as well as through source reduction in North Pit. Nitrate concentrations in borehole DRM7, drilled into the backfilled North Pit, fluctuated between 2 and 30 mg/l since monitoring began in October 2018. At present, nitrate concentrations in DRM7 are consistently below 6 mg/l. Similar observations are reported for borehole DRM8 drilled into the tailings backfill area in South Pit. This monitoring information suggests that the nitrate contamination in borehole ASDWBH3 is associated with historical tailings deposition in North Pit and that groundwater quality is likely to improve in this borehole with time, as the source of nitrate contamination has been reduced.

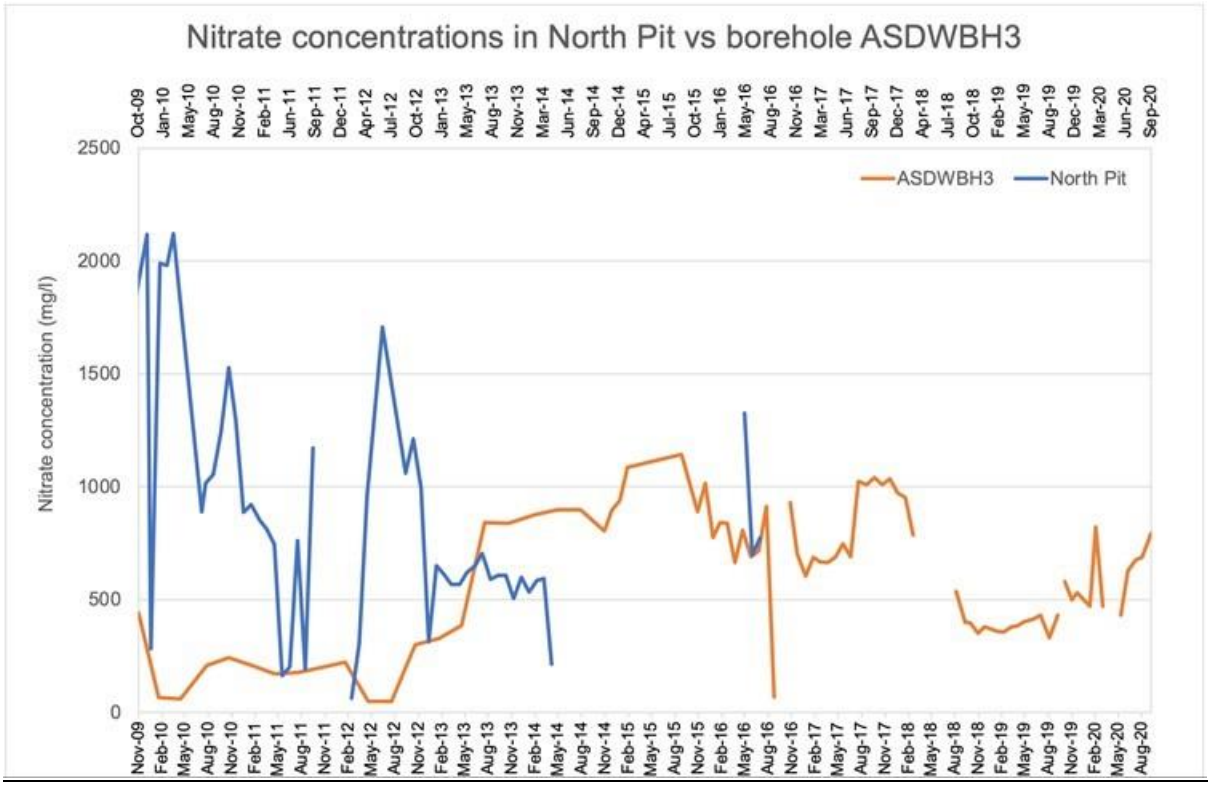


Figure 28: Nitrate concentration in North Pit vs borehole ASDWBH3

Groundwater in the alluvial aquifer down gradient of the plant area is also affected by elevated nitrate concentrations, as indicated by the data for DRM1 and DRM2 (refer to the following figure). Nitrate concentrations in both boreholes were below 1 mg/l in 2000 when monitoring started and increased to above 800mg/l in DRM1 and above 300mg/l in DRM2 by September 2020. When compared to nitrate concentrations in DRM4 in the plant area, some similarities in nitrate concentration trends can be observed albeit with a 1 – 2 month lag period. This is demonstrated in the following figure. Although nitrate concentrations in DRM1 and DRM2 are lower compared to DRM4, the shape of the concentration-time series plot suggest a sharp increase in nitrate concentrations in the alluvial aquifer in March 2012, which co-insides with an increase in nitrate concentrations in DRM4 from February 2012 onwards. This information suggests that the impact of activities at the plant and possibly at the Old TSF down impacts on groundwater quality in the alluvial aquifer in a comparatively short period, resulting in contamination of the aquifer.

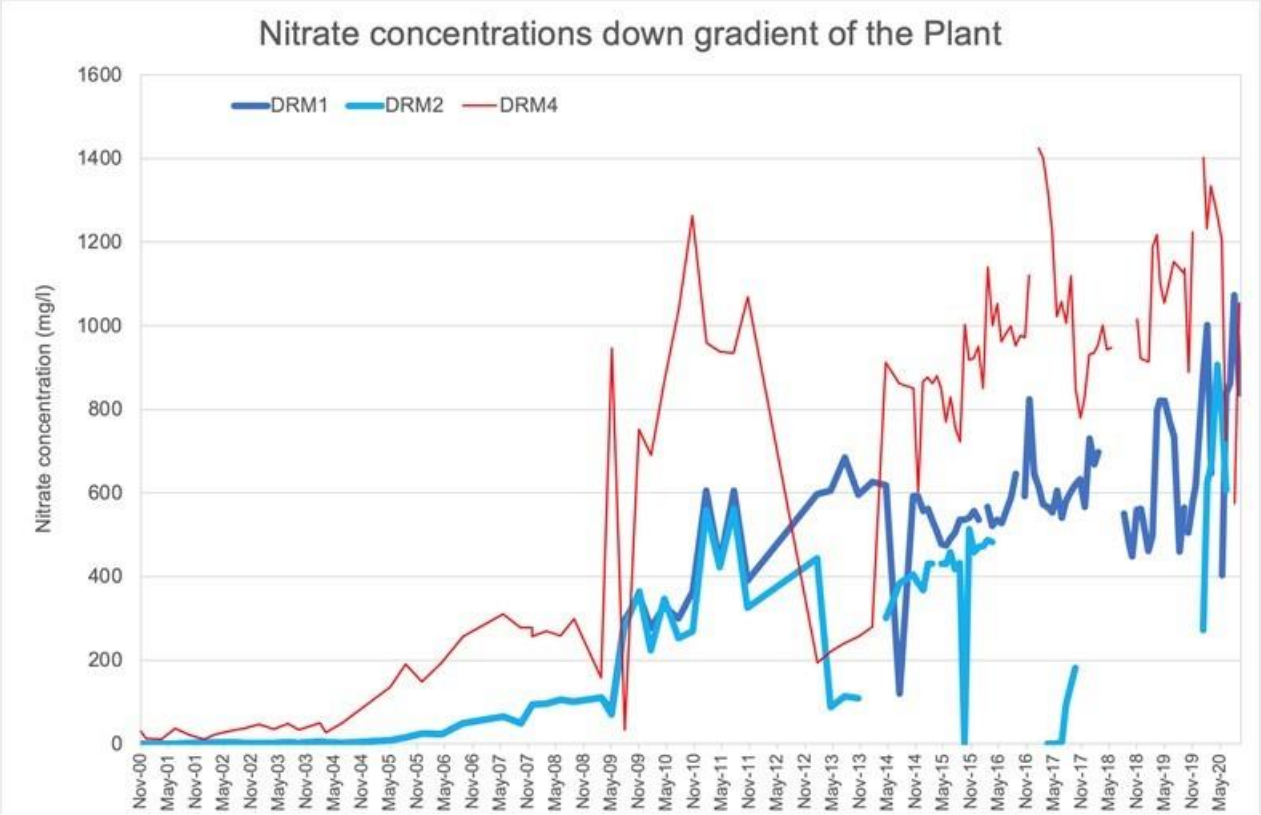


Figure 29: Nitrate concentrations in the alluvial aquifer down gradient of the plant

1.g.iv.3.b.1 Impact on groundwater quality if pit tailings backfill is reclaimed

DCM is in the process of evaluating the re-mining of tailings that were historically deposited in North and South Pits as discussed in the preceding sections.

The available dataset was used to assess the likely nitrate leachate quality that is associated with the tailings backfilled material into North and South Pits, which is presented in the section before and also in more detail hereafter.

DCM drilled monitoring boreholes into the tailings backfill areas during 2018 (Digby Wells Environmental, 2018) the results of which were incorporated into this assessment. The depth to the groundwater strike recorded during drilling of these two boreholes (DRM7 and DRM8) was around 25m below surface. Subsequent groundwater level monitoring confirms that the average depth to groundwater in DRM7 is 26,8m and DRM8 25,8m. This is comparable to the depth of groundwater in monitoring boreholes drilled adjacent to North Pit (ASDWBH1 and 4) and to South Pit (ASDWBH11). This information suggests that groundwater levels are approximately 10m below regional trends in the pits, which confirms the effect of pit dewatering and that water levels have not yet fully recovered.

Hydrographs for boreholes DRM7 and DRM8 are presented in the following figure. These indicate that groundwater levels in the pits fluctuate seasonally, thus confirming that recharge affects water levels inside the pits.

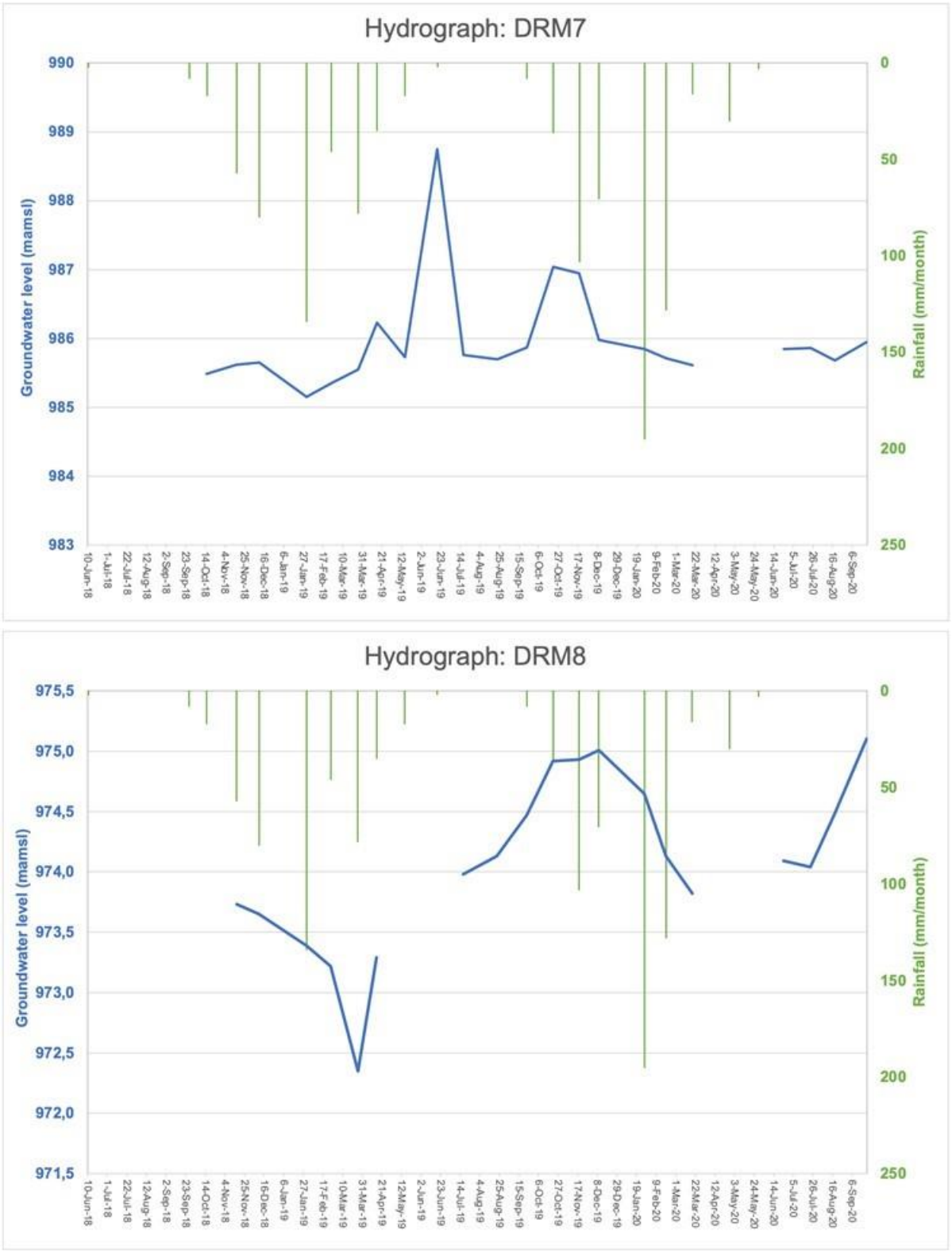


Figure 30: Hydrographs for boreholes DRM7 and DRM8

Nitrate monitoring data for DRM7 and DRM8 are presented in Figure 29. An initial spike of around 30mg/l nitrate was measured in DRM7 during the start of the monitoring programme, but concentrations have decreased to below 5mg/l in subsequent months. The latest monitoring from this borehole suggests an increase to 5 - 10mg/l.

Nitrate concentrations in DRM8 have remained constantly below 5mg/l.

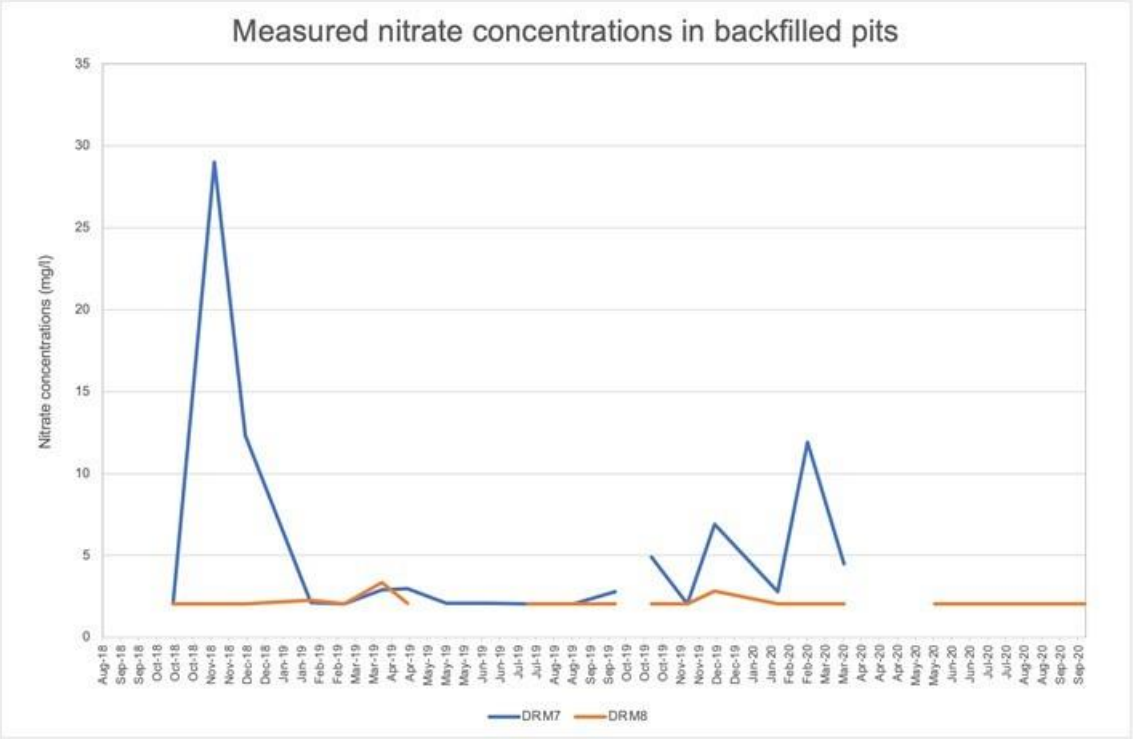


Figure 31: Nitrate concentrations in backfilled pits

Despite the comparatively low concentrations from DRM7 and DRM8, nitrate concentrations measured in groundwater down gradient of the North and South Pits indicate significantly elevated nitrate concentrations. If the work completed by NettZero (2018) is considered, it is shown that nitrate concentrations of up to 20mg/l can be associated with waste rock material, but that there is uncertainty as to the range of nitrate concentrations associated with the material.

Measured nitrate concentrations in groundwater down gradient of the tailings backfill in North Pit (ASDWBH3) is however elevated above 1,000mg/l. This is most probably attributed to the historical handling of tailings in the pit (see photographic evidence in Appendix 3 of Annexure 6**Error! Reference source not found.**). With time, nitrate concentrations in groundwater down gradient of the pit backfill area are expected to improve, as the source quality is better than that monitored in groundwater.

Elevated nitrate concentrations are also monitored down gradient of the tailings backfill area in South Pit. Nitrate concentrations of around 90mg/l is observed in SW BH, situated approximately 85m down gradient of the area where tailings were backfilled in South Pit.

It is evident that nitrate concentrations currently measured in boreholes DRM7 and 8 cannot be used to account for the elevated nitrate concentrations in groundwater down gradient of both North and South Pit. For this reason, the source term in the pits were adjusted based on the groundwater monitoring data in down gradient boreholes. The source areas were however adjusted from previous assessments to reflect the tailings backfill areas in each pit in comparison to the rest of the backfilled pit areas. This means that the area over which elevated nitrate concentrations occur especially in North Pit is limited to the extent of tailings backfill and not the entire pit as was previously thought.

Based on the discussion above, the source term allocated for the North Pit tailings backfill area is different to that for South Pit. At North Pit, the tailings backfill area is considered a source of contamination with nitrate concentrations exceeding 1,000mg/l. In South Pit, the tailings backfill area is assigned the same concentration as that for the backfilled waste rock material. Nitrate concentrations of 90mg/l are assigned to the tailings backfill area in South Pit for this reason.

The removal of the tailings material from North Pit is therefore anticipated to result in the most significant impact on groundwater quality in the long-term. In South Pit, the waste rock backfilled is expected to control groundwater quality to a greater extent and the removal of the tailings material is not expected to result in significant impacts on the aquifers.

The removal of tailings backfill from North Pit should therefore be considered a priority, as it is expected to significantly reduce the source to groundwater contamination in this area, especially since the Northern RWD is lined with HDPE.

Please refer to Section 1.g.iv.4.a.1.1 for the specific model outcomes where the impacts of the removal of the material from the pits are considered.

1.g.iv.3.b.2 Risk of decant

Decant from mining areas refers to the daylighting of mine water on surface which most often takes place in the long-term. At mine closure, active mine dewatering ceases and groundwater levels start to recover, which could be linked to decant on surface if not carefully managed. The risk of decant depends on the volume of water that enters the mining areas post closure. Inflow to the mining areas will take place from two main sources, namely the recharge of rainwater and natural groundwater through flow. If this combined volume is significantly higher than natural rates, it is likely that the mining area would decant. If the inflow volume is less than or equal to natural rates, it is unlikely that decant would take place.

The rate of groundwater inflow to the mining areas will be determined by the flow gradients, the permeability of the rock formations intersected and the area over which groundwater seepage will take place. Initially the inflow to the underground workings will be fast, post closure, due to steep flow gradients towards the mining area. As the mines start to flood, the gradients will become shallower as groundwater levels rise, which will reduce the volume of groundwater inflow to near natural conditions. The volume that groundwater inflow contributes post closure is lower than the volume of water added through recharged of rainwater. The rate of recharge to the mining areas is therefore considered the main driving force behind decant. Decant is also governed by the chromitite seam floor contours and the shape of the topography around the pits.

Leaving of Void

If a final void is left, groundwater levels would recover and stabilise with time. The volume of groundwater inflow to the pits will reduce to near zero at this point, as the gradients towards the pits would be low once groundwater levels have recovered. Under this scenario, groundwater levels inside the final void will be controlled by rainfall and evaporation. Since the rate of evaporation in the area is 1,500mm/a, which is at least twice as high as the MAP, the rate of evaporation is expected to prevent groundwater levels from recovering to surface. This in effect will control the water level inside the final void. It is concluded that if a final void is left, the risk of decant will be controlled and groundwater levels inside the void are unlikely to rise to surface.

Backfilling Voids

Simulations indicate that decant will occur if the rate of recharge to the pits (as the lowest open sources) remain high post closure. If the rate of recharge to the pits can be reduced to 5% of MAP or lower, simulations indicate that the risk of decant is significantly lowered. With lower recharge rates, the groundwater levels are expected to stabilise at pre-mining levels and will not rise to surface.

Post closure, groundwater levels are expected to recover inside the pits. The timing to flood the pits depends on the depth of the chromitite seam and the size of the pit as well as the regional impact of mine dewatering and the rate of recovery in the underground workings. The recovery of water levels in North and South Pits are however linked directly to the rate of groundwater level recovery in the underground workings, as the pits are connected to the underground mining area through the portals. In these pits water levels will probably recover 80 years after mining stops, as the flooding of the underground workings are linked to groundwater level recovery in these pits.

If the rate of recharge to the pits cannot be reduced to 5% of MAP or lower during rehabilitation, simulations suggest that the risk of decant will increase. In this event, the decant locations for North and South Pits are presented in Figure 32 and Table 30.

The most likely decant point at each pit is associated with the lowest topographical elevation. Depending on the head that may build up inside the pits, decant may also occur diffusely in the sub-soil horizon.

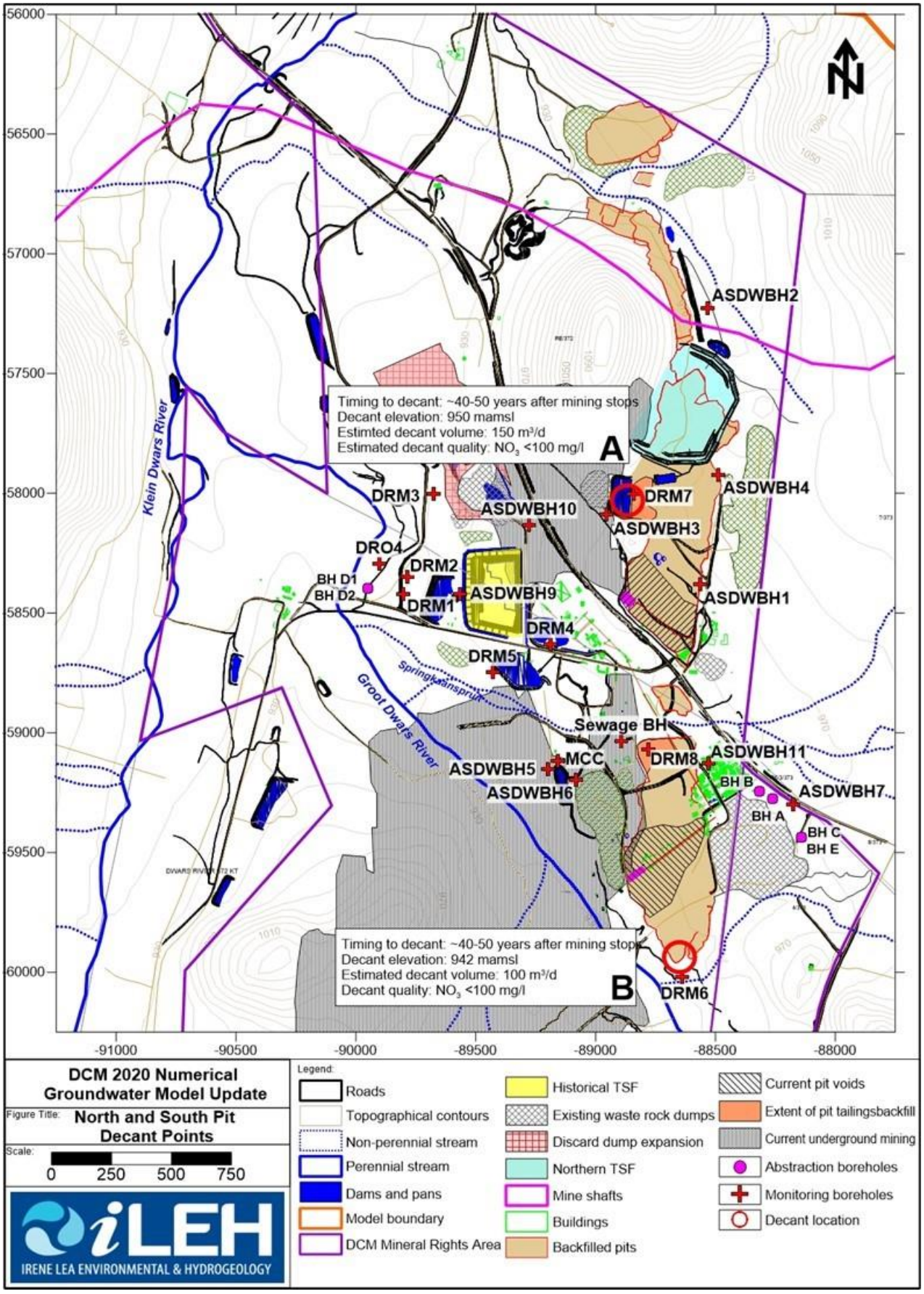


Figure 32: Estimated decant assessment

Table 30: Possible decant locations

Decant No	Pit	X Coordinate	Y Coordinate	Decant elevation (mamsl)	Time to possible decant (yrs.)	Estimated decant volume (m^3/a)	Estimated nitrate concentration (mg/l)
A	North Pit	-88860	-58029	950	40 – 50 years	<150	<100
B	South Pit	-88657	-599967	942	40 – 50 years	<100	<100

1.g.iv.3.b.3 Impact mine rehabilitation options on groundwater quality

The effect of the proposed mine rehabilitation measures recommended in the latest rehabilitation plan (Digby Wells Environmental, 2020) as well as those discussed for the reclamation of the Old TSF and removal of tailings backfill from North and South Pits were assessed at the hand of the model.

Also assessed was the expected impact of successfully rehabilitation of the remaining voids at North and South Pits. In order to achieve this, it was assumed that recharge rates are successfully reduced to around 5% of MAP over backfilled pits. This is considered the best rehabilitation option to minimise long-term impacts. The effect of leaving a final void is discussed above under the decant assessment. Although a final void is likely to reduce the risk of decant from the pits, it is not the preferred rehabilitation option for the pits.

It is unlikely that total source removal will be achieved at rehabilitation. DCM should strive to achieve this, but in practical terms nitrate concentrations are unlikely to be reduced across the mining operation to within the operations' WUL conditions. This is partly due to the fact that historical impacts on groundwater quality will prevail in both aquifers in the long-term. Furthermore, at some sources, like backfilled pits and the underground workings cannot, source removal cannot be achieved. In order to assess the long-term impact on nitrate concentrations, it was assumed that nitrate concentrations can be reduced by 50% during rehabilitation through a combination of source removal and source reduction.

The results of the simulations are presented in Figure 33 and Figure 34. The modelling suggests the following at a period 100 years after mine closure:

- Elevated nitrate concentrations will prevail in the weathered pyroxenite and alluvial aquifers. Nitrate concentrations are likely to vary between 11 and 50 mg/l in these aquifer, but could exceed 50mg/l at the Northern TSF, the Northern RWD and possibly in the plant and at the discard dump.
- Nitrate concentrations in the zone of impact along the Groot Dwarsrivier is likely to remain below 50mg/l in the long-term if all rehabilitation is implemented as stated. Simulation results suggests that nitrate concentrations are most likely to remain below 20mg/l along the river.
- Based on the current understanding of underground water quality, it was assumed that nitrate concentrations inside the underground workings will remain above 100mg/l in the long-term.
- Preferential flow of contamination in the fractured rock aquifer is likely to take place along the major faults and dykes from the underground workings. On average, the nitrate plume is expected to migrate less than 500m from the underground workings in the long-term. The migration distance can increase along the preferential flow paths to more than 800m from the underground workings.

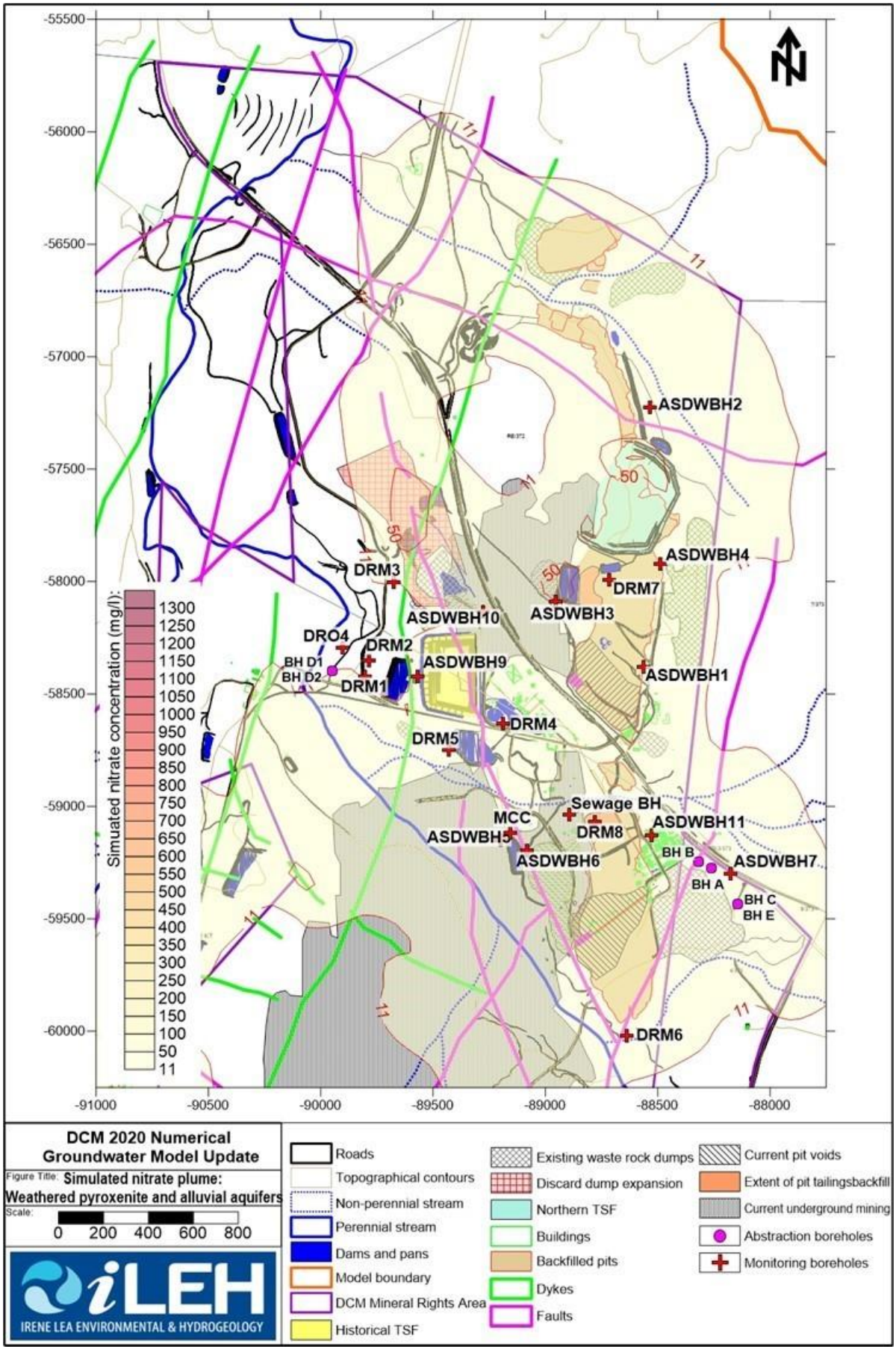


Figure 33: Long-term impact of mine rehabilitation on the weathered aquifer

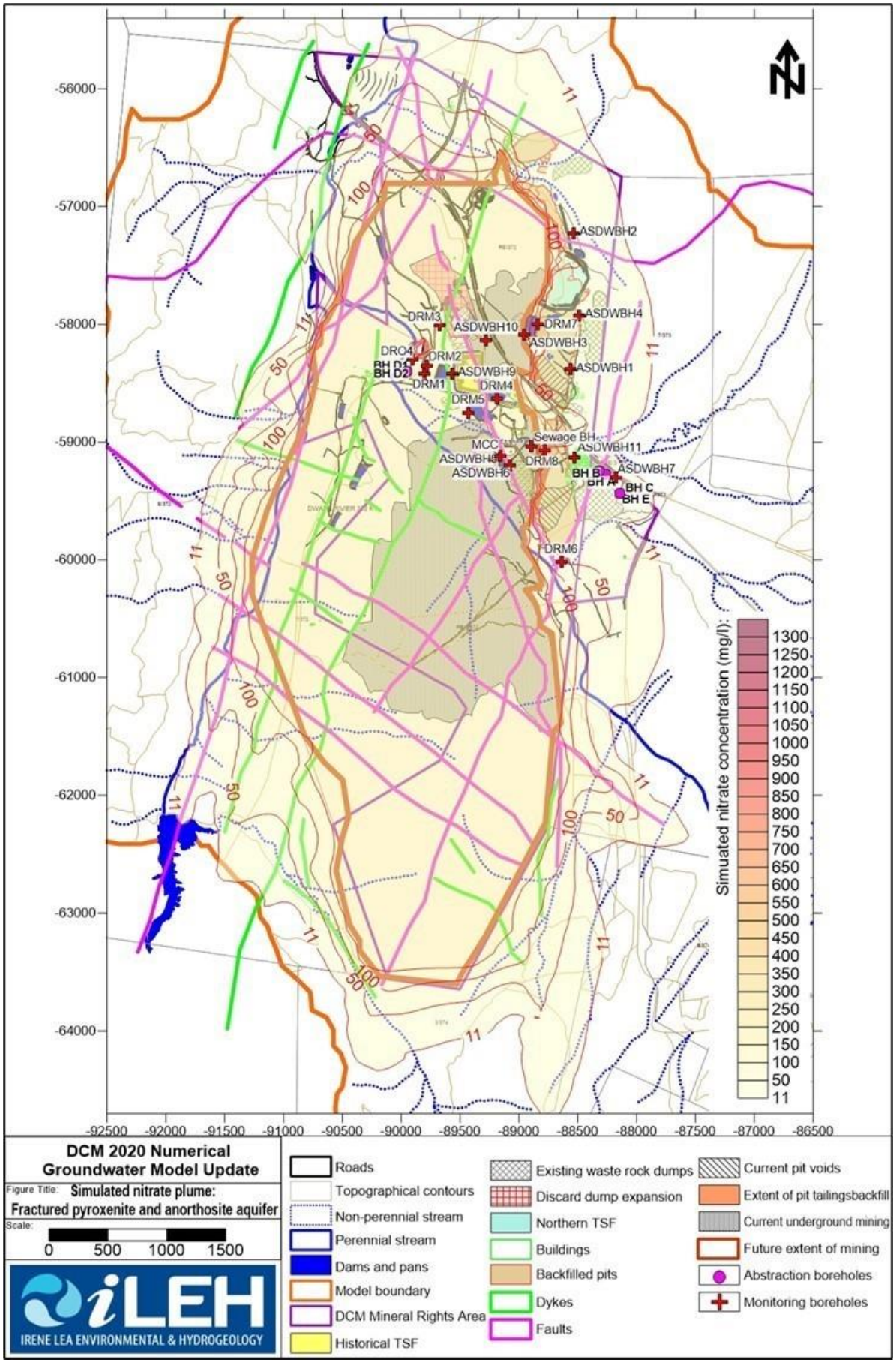


Figure 34: Long-term impact of mine rehabilitation on the fractured aquifer

As part of the proposed projects, various potential impacts have been identified in Table 28.

1.g.iv.4 The possible mitigation measures that could be applied and the level of risk

Specialist studies have been undertaken in the past and all information utilised in the assessment of the impacts. In addition to this an updated hydrogeological model was undertaken to assess each of the project areas in detail, in order to determine the possible impacts and associated management measures required. Detailed mitigation measures and recommendations have been included into this EIA report. Please refer Table 40 for management measures which will be further assessed and confirmed by the specialist investigations. Some of the key management measures currently foreseen include:

Various general management measures are proposed for this project, which include:

- Planning Phase:
  - Regularly assess enviro-legal compliance in terms of the activities undertaken; and
  - Where possible source local labour and involve local third party contractors.
- Operational Phase:
  - A legal assessment of all activities and future planned activities must be undertaken annually to ensure that all activities are authorised;
  - All workers must undergo an induction which includes environmental awareness training to make them aware of the environmental incident management procedures as well as the importance of complying with environmental management measures;
  - Formulate a detailed training plan as part of induction to ensure that all parties are aware of the environmental characteristics in which the mine is located and the important management commitment, and liabilities;
  - Vehicles may not traverse natural areas and must remain on existing disturbed areas as far as practically possible;
  - Project laydown areas should be located on disturbed soils (anthrosols) to avoid compaction of natural soils;
  - Operational areas must be clearly demarcated to control movement of personnel and vehicles, providing clear boundaries for construction sites in order to limit the spread of impacts. Markers and pegs will be erected and maintained along the boundaries of the working areas, access roads, and paths before commencing any work. If proved insufficient for control, these shall be replaced by fencing.
  - Ensure that maximum topsoil is stripped and stockpiled where available, in terms of the mine's Topsoil Management Plan;
  - Remove hydrocarbon contaminated soils through licensed waste removal companies and to licensed disposal sites;
  - Temporary erosion control measures may be used to protect the disturbed soils during the construction phase until adequate vegetation has established;
  - A spill prevention and emergency spill response plan should be compiled to guide the construction works;
  - Any significant spills must be captured in the incident reports and must be reported to the relevant department (LEDET/ Catchment Management Agency (CMA)/ DWS);
  - An emergency response contingency plan should be put in place to address clean-up measures should a spill and/or a leak occur;
  - Truck transporting material must be covered by a tarpaulin;
  - Trucks must be parked in designated areas, no impacting on other road users;
  - Develop and implement a sound surface runoff management plan for the project. This plan must focus on containing all dirty water that could be generated during the project and preventing clean runoff from entering the footprint area. Specific focus must be placed on understanding the possible impacts of surface runoff at the plant;
  - Ensure that sufficient capacity is available to all contain dirty water within mining area. This management measure must consider the effects and impacts of siltation during the project. If the capacity of the dirty water containment measures is compromised through siltation or other impacts, these structures must be desilted to free up capacity.
  - Complete regular inspections of all dirty water management systems, including toe drains, cut-off trenches and berms, pollution control dams and stormwater diversion structures, specifically noting incidences of overflow and leakage. If the latter is identified, measures must be taken to rectify non-compliances immediately;

- Maintain sound house-keeping measures to prevent spills and leaks. If spills and/or leaks occur, they must be addressed and remediated as a matter of urgency;
- Maintain the groundwater monitoring programme in existing monitoring boreholes. Some amendments to the current monitoring programme are proposed; and
- Measure and record rainfall daily on site.

- Closure Phase
  - Formulate a detailed Closure Plan;
  - Complete all rehabilitation to a satisfactory level, focussing specifically on maintaining dirty water and runoff in designated areas. Effective rehabilitation of these areas must aim to reduce the rate of recharge of rainwater as far as possible. No ponding must be allowed over rehabilitated areas. All rehabilitated surfaces must be free draining;
  - Plan for and budget to continue with the groundwater monitoring period for a minimum of two years after mine closure. The continued need for groundwater monitoring will depend on the outcome of the final mine closure groundwater impact assessment.
  - Maintain storm water management systems up until rehabilitation has been successful;
  - Implement the vegetation programme as prescribed by a registered ecologist, should self-succession not be successful; and
  - Continue with water and rehabilitation monitoring for at least 3 years after closure.

The key area to manage is however groundwater. Please refer to the following section.

1.g.iv.4.a Groundwater Management

1.g.iv.4.a.1 Pit rehabilitation options considered

Two rehabilitation options are under consideration in this assessment. The first entails backfilling the areas from which tailings will be excavated with waste rock as part of final pit rehabilitation and the second is to leave each excavated area as a final void.

If a final void is left, groundwater levels would recover and stabilise with time. The volume of groundwater inflow to the pits will reduce to near zero at this point, as the gradients towards the pits would be low once groundwater levels have recovered. Under this scenario, groundwater levels inside the final void will be controlled by rainfall and evaporation. Since the rate of evaporation in the area is 1,500mm/a, which is at least twice as high as the MAP, the rate of evaporation is expected to prevent groundwater levels from recovering to surface. This in effect will control the water level inside the final void. It is concluded that if a final void is left, the risk of decant will be controlled and groundwater levels inside the void are unlikely to rise to surface.

Backfilling of the tailings reclamation areas may increase the risk of decant. This can however be controlled through implementing a sound rehabilitation programme, geared at reducing the rate of recharge to around 5% of MAP. This was confirmed in previous detailed studies on the risk of decant from the pits (iLEH, 2017). In order to achieve this rate, each pit must be completely backfilled, rehabilitated surfaces must be made free draining and final surfaces must be re-vegetated to create near-natural recharge conditions.

If the rate of recharge to the pits cannot be reduced and remain above 5% of MAP in future, the risk of decant will increase. In this case, groundwater levels would rise to above the surface elevation due to higher recharge and decant will take place.

The risk of decant from the proposed final voids a groundwater perspective is thus closely related to the rate of recharge to the pits. If the recharge rate can be controlled and brought to near natural rates, the risk of decant is minimised. Under higher than natural rates, the risk of decant is increased, as the inflow volume to the pits will increase to above natural rates, resulting in a rise in groundwater levels to surface or into the sub-surface where diffused decant will take place.

1.g.iv.4.a.1.1 Project being applied for: Removal of Tailings

The project being applied for, in effect is the management measure for impacts currently experienced by past backfilling activities.

The results of simulations to test the removal of tailings backfill from North and South Pits are presented in Figure 35 to Figure 37.

As discussed in this report, monitoring information suggests that tailings backfilled into North Pit has impacted significantly on groundwater quality down gradient of the pit. Nitrate concentrations in this area range between 500 – 900mg/l. Model simulations suggest that the nitrate plume does not extend more than 300m from North

Pit in the weathered aquifer and is contained within the tailings backfill area and the Northern RWD in the fractured rock aquifer.

At South Pit, nitrate concentrations in the tailings backfill area are likely to be similar to that collecting in the rest of the backfilled pit. The model does not suggest any significant plume movement from South Pit other than that associated with pit backfill, Dam 26 and the underground workings.

If the tailing backfill is removed from North Pit, nitrate concentrations are expected to reduce to below 100mg/l in the weathered aquifer and to around 125mg/l in the fractured rock aquifer within the remaining 31 operational years. The throughflow in the weathered aquifer is likely higher compared to that in the deeper fractured rock aquifer and for this reason plume depletion will take place at a faster rate in the shallow aquifer. It is likely that groundwater contamination in borehole ASDWBH3 would significantly reduce during this time and that nitrate concentrations will decrease to below 200mg/l during this period.

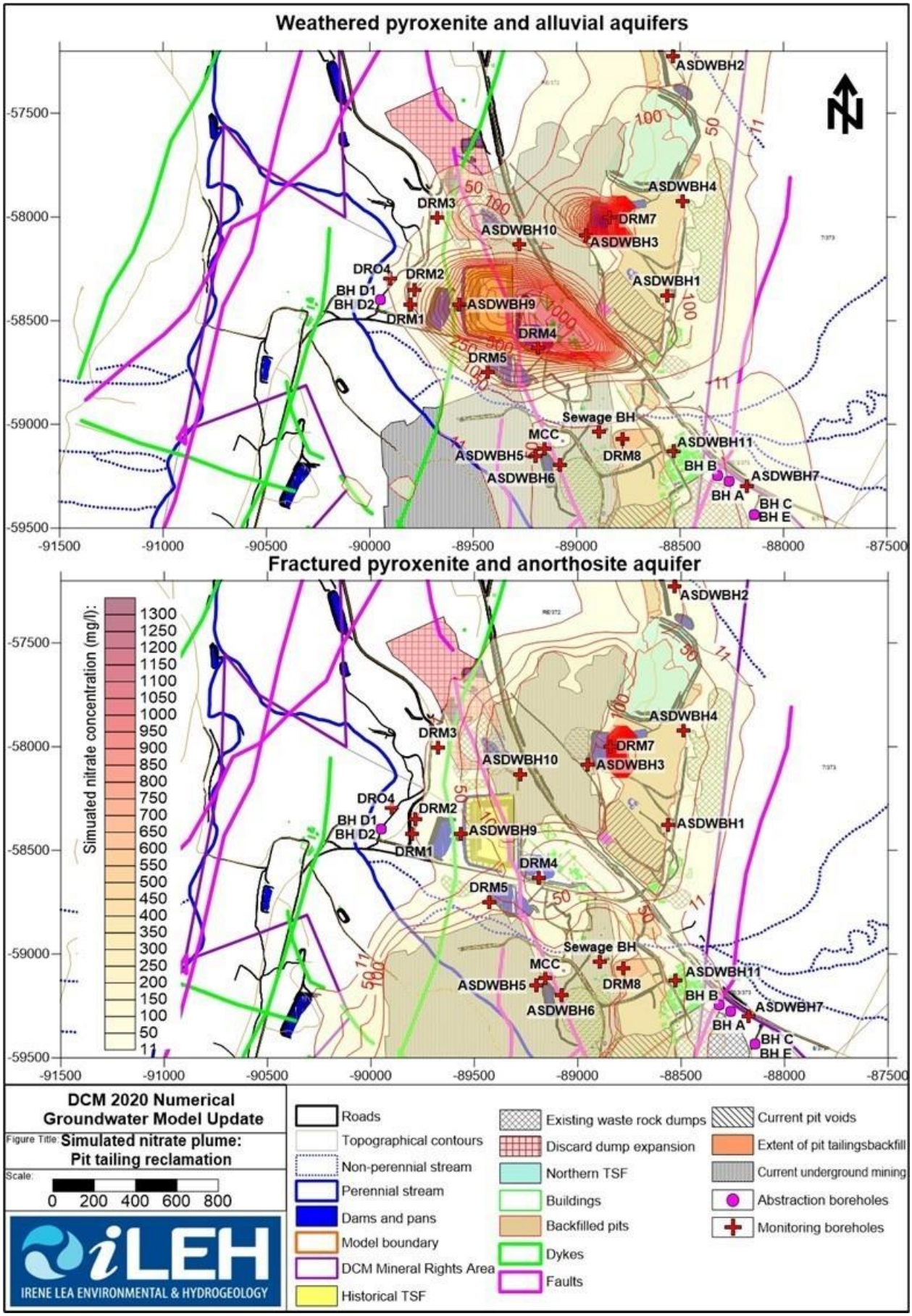


Figure 35: Current estimated impact of the tailings backfill to pits

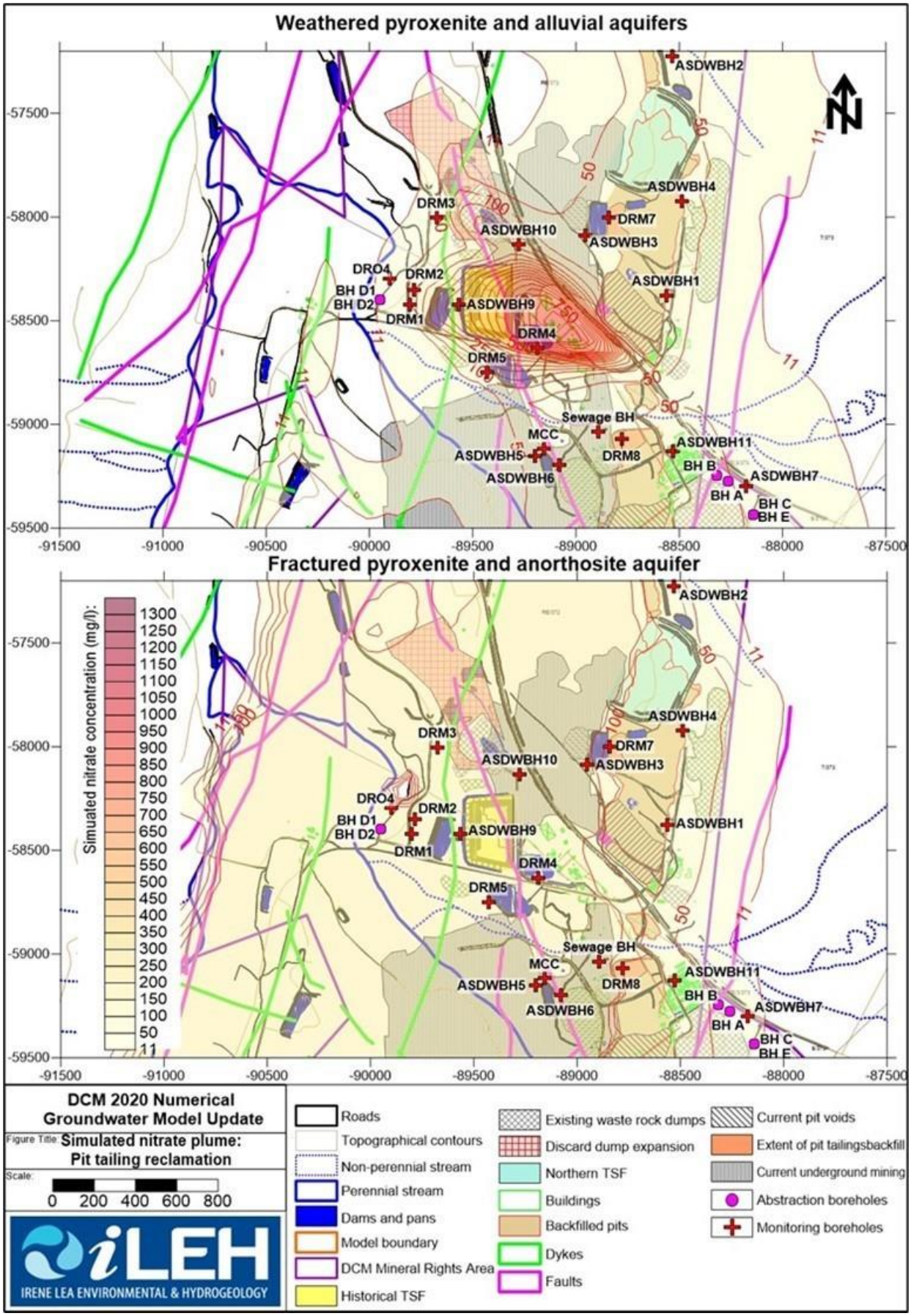


Figure 36: Estimated impact of pit tailings reclamation at the end of the operational phase

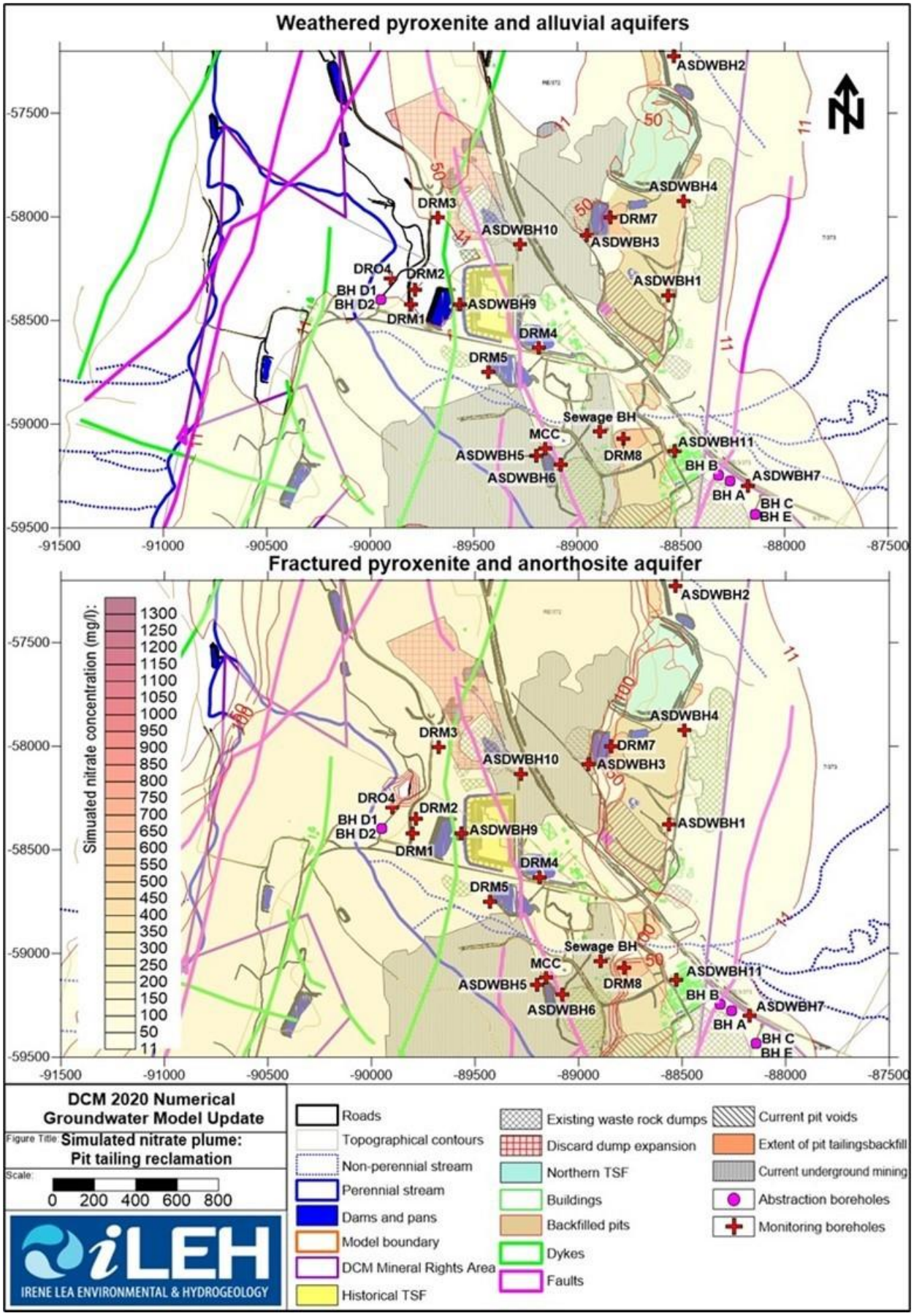


Figure 37: Estimated impact of pit tailings reclamation 100 years after mine closure

Removal of tailings backfilled to North and South Pits will result in a significant reduction in nitrate concentrations in the long-term. At North Pit, nitrate concentrations are expected to reduce to around 50mg/l in the weathered aquifer and to less than 100mg/l in the fractured aquifer. At South Pit nitrate concentrations are expected to reduce to below 40mg/l in the weathered aquifer and to below 80mg/l in the fractured rock aquifer.

It is unlikely that tailings reclamation from the pits would reduce nitrate concentrations to within the DCM WUL limit.

1.g.iv.4.a.1.2 Decant Management

The timing of decant from North and South Pits is linked to the rate of flooding of the underground workings post-closure due to the fact that the pits are linked to the underground workings through the portals in the highwalls. For this reason, it is recommended that the portals are not completely sealed at closure to allow pit water to continue to seep into the underground workings. The boreholes drilled into the backfilled pits (DRM7 and DRM8) will provide valuable information on the quality of pit water as well as the extent to which groundwater levels have recovered. Current monitoring information suggests groundwater levels are below regional trends, confirming that water levels have not yet recovered.

In order to minimise the risk of decant from the pits, it is recommended that the pits are backfilled and shaped to create free draining surfaces. The pits should be re-vegetated to reduce the risk of erosion as well as the rate of recharge to near natural conditions. Stormwater should be diverted around the rehabilitated pits to keep runoff away from the rehabilitated areas. The rate of recharge to the pits post-closure will determine whether or not the pits will decant. Available information suggests if the rate of recharge can be reduced to around 5% of MAP, that the risk of decant will be significantly reduced.

However, when decant must be managed due to recharge objectives not achieved the following must be considered:

- The necessary WUL must be applied for decant management – i.e. construction of Section 21g dams and/or discharges.
- The Northern RWD constructed on the western side of North Pit could be used to contain decant from the pit in the long-term, as the decant position is located in this area. This dam is lined with HDPE and would therefore comply with industry standards to contain decant. The following should be given consideration regarding the use of the dam to contain decant:
    - The dam must be able to contain the volume of decant as well as comply with the requirements of GN704 in terms of freeboard if decant is unavoidable.
    - A mechanism should be put in place below the decant elevation of the pit (950 mamsl) that will drain the pit water into the RWD if water levels inside the pit rise above the decant elevation. A perforated pipe connecting the pit and the dam, can be considered. The options available should however be confirmed by an engineer, who should modify the existing designs to meet post-closure decant management requirements.
- Similarly, at South Pit the existing portal can be shaped and modified upon closure to act as a final void and to control decant, if required. As for the RWD at North Pit, the final void must be designed to ensure that water levels inside the pit would be kept below the decant elevation (942 mamsl). This is typically achieved through evaporation from the final void.

The following specific measures are recommended to minimise and/or eliminate the impacts associated with decant:

- If subsidence over underground workings is identified as a possibility, a geotechnical study must be completed to delineate areas of possible subsidence. This information must be used to re-assess the risk of decant and to quantify the associated impacts. Current simulations assume that no subsidence will take place. Subsidence was however identified as one of the possible environmental risks associated with the DCM operations (Digby Wells Environmental, 2020).
- If water-bearing structures are intersected during mining that contribute significant volumes of seepage to the pits and underground workings, they must be characterised and quantified. The risk and timing of decant must be re-assessed taking this information into consideration.
- The quality of decant will be assessed through ongoing monitoring in boreholes DRM7 and DRM8.
- Surface and underground rehabilitation measures must be designed to minimise the risk of decant. Opencast mining areas must be backfilled, shaped and made free draining to limit the rate of recharge of rainwater to the absolute minimum.

1.g.iv.4.a.1.3 Post-closure management plan

The following is recommended to manage impacts on groundwater quality:

- All rehabilitation must be completed during the decommissioning phase. In terms of groundwater, the rehabilitation must focus on containing dirty water and leachate, preventing the ingress of clean runoff and rainfall to the rehabilitated footprint areas and avoid ponding over rehabilitated areas.
- The outcome of the scavenger borehole optimisation project, as detailed above, will govern how long after closure abstraction of contaminated groundwater should continue. Current estimation is that the abstraction will be required for at least 17 years after closure, during which period the Water Treatment Plant must remain operational.
- In order to minimise negative long-term impacts associated with the operations, it is important to complete tailings reclamation at the Old TSF to soil level over the entire footprint. All tailings must be removed during the project. Soil testing and remediation, as mentioned above, must form part of the rehabilitation phase.
- The groundwater monitoring programme must be maintained for the duration of the life of the operations as well as for a period of at least two years after mine closure. This information must be used to confirm the effect of rehabilitation at mine closure.
- At the end of the two-year monitoring programme, the post-closure groundwater impact assessment must be re-evaluated and adjusted, as necessary, based on the results of the monitoring programme.

Once the monitoring data and the re-assessment of post-closure groundwater impacts are available, DCM must discuss these with the authorities and determine the need of additional monitoring through consultation.

1.g.iv.5 Motivation where no alternatives sites exist

Please refer to Section 1.g.i.1 of this report.

1.g.v Statement motivating the preferred site

Please refer to Section 1.g.i.1 of this report.

1.h Full Description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred site

In order to identify the potential impacts associated with the proposed activities the following steps were undertaken:

- The stakeholder consultation process is undertaken in a manner to be interactive, providing landowners and identified stakeholders with the opportunity to provide input into the project. This is a key focus, as the local residents have the capability to provide site specific information, which may not be available in desktop research material. Stakeholders are requested (as part of the BID) to provide their views on the project and any potential concerns which they may have. All comments and concerns received to date, have been captured and formulated into the impact assessment.
- Various environmental studies have been undertaken in the past for a number of projects at the mine. These include the MPRDA EMPr, EMPr Amendment, various Environmental Authorisation Processes, etc. on the portions of land applicable to this project. The baseline specialist studies prepared for the 2018 EIA process, which broadly involved resource and reserve drilling, various Capital Projects throughout the Mining Right Area, and the establishment of diesel storage tanks, together with the impact findings were considered as part of this Basic Assessment process and incorporated into the assessment of impacts and the ranking of these. A detailed overarching groundwater study for the entire mine, considering this project has been conducted to determine the key identified impact, which is groundwater and how this project could be implemented to address certain concerns raised in preceding studies, as well as the 2020 iLEH report.
- In addition to information obtained from existing specialist studies, a detailed desktop investigation was undertaken to determine the environmental setting in which the project is located. Based on the desktop investigations, various resources were used to determine the significance and sensitivity of the various environmental considerations. The desktop investigation involved the use of:
    - South African National Biodiversity Institute (SANBI) Biodiversity Geographic Database Land Use Decision Support (LUDS) system;
    - Geographic Information System (GIS) base maps;

- DWS information documents such as the Internal Strategic Perspective (ISP) and Groundwater Vulnerability Reports;
- Agricultural GIS database;
- Municipal IDPs; etc.

- The rating of the identified impacts was undertaken in a quantitative manner as provided in Section 1.g.iv.2.a (Impact Ratings). The ratings are undertaken in a manner to calculate the significance of each of the impacts. The EAP also assessed the outcomes of the calculation to determine whether the outcome reflects the perceived and actual views.
- The identification of management measures is done based on the significance of the impacts and measures that have been considered appropriate and successful, specifically as Best Practical and Economical Options.

1.i Assessment of each identified potentially significant impact and risk

The following tables present the impacts assessed based on the Sections before. Please take note of the following abbreviations when assessing the tables:

- SbM: Significance before Mitigation
- SaM: Significance after Mitigation
- CbA: Can be Avoided
- R: Reversible
- Ir: Irreplaceable

Table 31: Planning Impact Assessment and Management Measures (Significance before Mitigation –SbM; Significance after Mitigation – SaM; Can be avoided – CbA; R – Reversible; Ir – Irreversible; ST: 1-12 months; MT: 1-5 yrs.; LT: 5 years and more; LOM: Life of Mine)

Name of Activity		Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures						Significance	
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
Planning Phase																	
Legal Requirements (Environmental Permits)	Legal Compliance	Unlawful water and waste activities, which could lead to NWA Directives and Section 24G Rectification fines.	N	-4	-3	-2	-5	-14	A legal assessment of all activities and future planned activities must be undertaken annually to ensure that all activities are authorised. All legally appointed personnel responsible or involved in water use activities and activities associated in the Environmental Authorisations on site must receive training on the requirements of the Environmental Authorisations and relevant Environmental Legislation. Biannual internal audits should be undertaken during the construction phase, on the lawful implementation of the Environmental Authorisation. A copy of the WUL must be available on site at all times. The following buffers should be maintained: No activities, unless authorised, within the 1:100 year floodline. It should be noted that the opencast pits, especially South Opencast Pit is approved in the 2008 WUL as a Section 21 c&i, and also have exemption from GN704 for the purposes of backfilling. Prior to awarding a contract to a third party for the removal of the tailings the mine must ensure that the third party and facility where the beneficiation will be undertaken in legally authorised to conduct these activities The legal register must be updated to indicate all activities associated with Environmental Authorisations. The mine must ensure to have a veld fire management plan in place, with a detailed implementation programme. This should be regularly assessed as part of a Biodiversity Management Plan.	P	4	3	5	5	17	CbA

Table 32: Operational Phase Impact Assessment and Management Measures (Significance before Mitigation –SbM; Significance after Mitigation – SaM; Can be avoided – CbA; R – Reversible; Ir - Irreversible)

Name of Activity		Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
Operational Phase																
Operation of the Reworking area and the transportation of the product to the plant and truck parking areas.	Geology	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Natural Topography	The ongoing removal of the material will result in a recreation of the open void, up until rehabilitation will be undertaken.	N	-1	-2	-4	-4	-11	All tailings must be removed from the opencast pits to result in the benefit of the project on the groundwater plume migration. The area will be landscaped to follow natural contours, upon completion of mining operations and in line with the numerical model requirements or as determined in the final rehabilitation strategy.	P	2	3	5	5	15	-
		The ongoing removal of the TSF will result in a positive impact with the reinstatement of the natural topography.	P	-1	-2	-3	-1	-7	All tailings must be removed from the project footprint areas. The area will be landscaped to follow natural contours, upon completion of mining operations and in line with the numerical model requirements or as determined in the final rehabilitation strategy.	P	2	3	5	5	15	-
	Soil	The removal and stockpiling of topsoil, which has been placed during the prior rehabilitation practices may lead to a loss of soil resource previously used in rehabilitation of the opencast pits through erosion of the stockpiles and chemical and physical degradation. This impact is considered important due to the fact that the mine may be operating on a negative topsoil balance and therefore the retaining of suitable topsoil is important for successful rehabilitation	N	-1	-3	-5	-4	-13	Adhere to Soil Stripping, Soil Stockpiling and Soil Management Plan as part of the original EMPr (Soil Utilisation Guideline). Prior to construction of the road the soil will be stripped and placed on a soil stockpile. Remove topsoils previous placed as part of rehabilitation. Topsoil should be stockpiled on designated topsoil stockpiles, unless around linear infrastructure, where the topsoil could be stockpiled next to the linear structure. The Topsoil Management Plan, 2016 should be implemented on all topsoils immediately to ensure that the integrity of the soils are maintained. Any new topsoil stockpiles should not exceed the recommended heigh in terms of the Topsoil Management Plan, 2016 of 2-4m. Where exceedance is present on existing facilities, erosion control measures should be implemented and vegetation establishment should be encouraged to assist in maintaining the structure of the soils for rehabilitation.	N	-1	-1	-2	-1	-5	CbA
		Contamination of Soil due to hydrocarbon spills due to the presence of vehicles	N	-1	-2	-4	-4	-11	Vehicles and machinery will be regularly maintained. Maintenance programmes will be established and implemented. All refuelling of vehicles and equipment maintenance must be done within designated and demarcated areas. Spill and absorption kits must be available and readily accessible at the parking and offloading areas. There should always be a spare kit available at any given time.	N	-1	-1	-2	-1	-2	CbA

Name of Activity	Potential Impacts		Rating Prior to Measures						Mitigation Type	Rating Post Measures						Significance	
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity		SaM	CbA/R/Ir
									If necessary, the polluted soils will be remediated and affected areas rehabilitated.								
		Contamination of soils, due to unmanaged runoff from the facility is highly improbable as the area is contained within a closed storm water circuit. The overall removal of the site will however have a beneficial impact on the specific site soil conditions.	N	-1	-1	-2	-1	-5	Ongoing maintenance of the storm water management systems must be undertaken. Any spills of tailings into the concrete channels should be removed and disposed of back onto the site or on a licenced facility. Trucks must be loaded within the demarcated dirty water system. Any spills of tailings into the concrete channels should be removed and disposed of back onto the site or on a licenced facility. Remain within demarcated areas. Once footprints are available these should be graded and topsoil should be placed to allow for re-vegetation.	P	2	3	5	5	15	CbA
	Ecology	The establishment of weeds and invasive species.	N	-2	-3	-4	-4	-13	A weed eradication programme will be developed and implemented to eradicate weeds and invader plants and to prevent new invasions during the ongoing mining operation. If natural succession of vegetation is not established within one rainy season, after rehabilitation, the disturbed areas and areas adjacent to the infrastructural areas must be re-vegetated with an indigenous grass mix, if necessary, to re-establish a protective cover, to minimise soil erosion and dust emission.	N	-1	-1	-2	-1	-2	R
		Uncontrolled fires could impact on the surrounding ecological setting should the necessary measures not be implemented.	N	-2	-3	-4	-4	-13	The mine must ensure to have a veld fire management plan in place, with a detailed implementation programme. This should be regularly assessed as part of a Biodiversity Management Plan. No open fires will be allowed on the mine and all parties will be subjected to induction, which should address the risk of fires and specific management measures in this regard (this should address the disposal of cigarettes as well).	N	-1	-1	-2	-1	-2	CbA
		Accidental death of animals on the existing roads.	N	-2	-3	-2	-5	-13	Clearly marked signs will be erected along the transportation routes to create awareness of animal crossings. A clearly marked and enforced vehicle speed will be implemented on the internal mine and transportation routes. A detailed induction programme will be in place to ensure that all parties are aware of the rules and regulations on site in terms of the use of roads. Vehicles may only travel on demarcated roads on site.	N	-1	-3	-1	-3	-1	CbA
	Riparian and Wetland Habitats	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Surface Water	Contamination of surface water resources. There are no surface water resources	N	-1	-2	-3	-3	-9	Clean and dirty water separation systems should be maintained. Manage storm water flow with temporary erosion control measures where possible (cut-off trenches or berms)	N	-1	-1	-2	-1	-2	CbA

Name of Activity	Potential Impacts		Rating Prior to Measures						Mitigation Type	Rating Post Measures						Significance	
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
		in the area where the infrastructure is proposed, however, the natural runoff, which must be managed internally on site could become impacted. At the Old TSF reworking area, contamination of soils, due to unmanaged runoff from the facility is highly improbable as the area is contained within a closed storm water circuit. The overall removal of the site will however have a beneficial impact on the specific site soil conditions.							Vehicles and machinery will be regularly monitored and maintained. Maintenance programmes will be established and implemented. All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site Any spills occurring during the collection process must be cleaned up immediately. Trucks must be loaded within the demarcated dirty water system. Any spills of tailings into the concrete channels should be removed and disposed of back onto the site or on a licenced facility. Remain within demarcated areas. Soil that has been contaminated by spillages, seepages and leachates will be sampled and analysed. If necessary, the soils will be treated, ameliorated or removed for safe disposal. Any significant spills must be captured in the incident reports and must be reported to the relevant department. In this event a remediation strategy should be developed and enforced. A clean up procedure (i.e. Works Instruction) must be in place.							
	Groundwater	Groundwater down-gradient of the Northern RWD has been impacted by historical tailings deposition into the North Pit void. DCM monitored the quality of the water in North Pit from May 2009 up to June 2016. Nitrate concentrations for this period exceeded 2000 mg/l up to March 2010 after which it gradually decreased to between 500 and 700 mg/l in 2016. NettZero (2018) reports that DCM changed the type of explosives it used during this time. A comparison between nitrate concentrations in North Pit to that measured in borehole ASDWBH3	N	-3	-3	-5	-4	-15	Develop and implement a sound surface runoff management plan for the project. This plan must focus on containing all dirty water that could be generated during the project and preventing clean runoff from entering the footprint area. Measure the depths of all groundwater monitoring boreholes. This can be achieved with the dip meter used to measure groundwater levels and can thus be complied with during the next monitoring run. Measure groundwater levels in all monitoring boreholes as per the Groundwater Monitoring Strategy and analyse these against on-site rainfall data to improve the estimation of the rate of recharge of rainwater. This activity will be undertaken during the next model update with the latest monitoring dataset. Ensure that sufficient capacity is available to all contain dirty water within mining area. This management measure must consider the effects and impacts of siltation during the project. If the capacity of the dirty water containment measures is compromised through siltation or other impacts, these structures must be desilted to free up capacity. Complete regular inspections of all dirty water management systems, including toe drains, cut-off trenches and berms, pollution control dams and stormwater diversion structures, specifically noting incidences of overflow and leakage. If the latter is identified, measures must be taken to rectify non-compliances immediately.	N	-2	-2	-3	-3	-10	R

Name of Activity	Potential Impacts		Rating Prior to Measures						Mitigation Type	Rating Post Measures						Significance	
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
		indicates that a sharp increase in nitrates were measured in the groundwater around May 2013, which is about 4 years after nitrate concentrations started exceeding 2000 mg/l in North Pit. Significantly elevated nitrate concentrations persisted in ASDWBH3 until around March 2018, after which concentrations decreased to around 500 mg/l. This could provide an indication of plume dilution through the throughflow of rainwater recharged to the aquifers as well as through source reduction in North Pit. Nitrate concentrations in borehole DRM7, drilled into the backfilled North Pit, fluctuated between 2 and 30 mg/l since monitoring began in October 2018. At present, nitrate concentrations in DRM7 are consistently below 6 mg/l. Similar observations are reported for borehole DRM8 drilled into the tailings backfill area in South Pit. This monitoring information suggests that the nitrate contamination in borehole ASDWBH3 is associated with historical tailings deposition in North Pit and that groundwater quality is likely to improve in this borehole with time, as the source of							Maintain sound house-keeping measures to prevent spills and leaks. If spills and/or leaks occur, they must be addressed and remediated as a matter of urgency. Maintain the groundwater monitoring programme in existing monitoring boreholes. Some amendments to the current monitoring programme are proposed. These are detailed below. Measure and record rainfall daily on site.							

Name of Activity	Potential Impacts		Rating Prior to Measures						Mitigation Type	Rating Post Measures						Significance	
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
		nitrate contamination has been reduced.														
	Air Quality	Increase in dust-fallout from opencast reworking and the reworking of the Old TSF. DCM currently conducts similar activities at the mine and will therefore make use of existing infrastructure, machinery and methods. Similar 'loading' methods are used at the mine Run of Mine (ROM) stockpiles. The mine has not experienced any concerns in compliance with dust fallout limits in terms of the NEMAQA.	N	-2	-2	-3	-2	-9	Ongoing air quality monitoring must be undertaken in terms of the National Environment Management: Air Quality Act 39 of 2004 (NEM:AQA). Strictly enforced speed limits on all roads. Ensure that the necessary dust suppression is implemented on the internal haul roads. All trucks must be covered with a tarpaulin when transporting product off site.	N	-1	-1	-2	-1	-5	CbA
	Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Visual	Fugitive dust emissions during reworking activities may have a negative impact on the visual characteristics of the area. This will be a temporary impact and will cease once the material has been removed.	N	-2	-1	-1	-1	-5	Ongoing air quality monitoring must be undertaken in terms of the NEM:AQA. Ensure that the necessary dust suppression is implemented on the internal haul roads. All trucks removing tailings must make use of tarpaulins to cover the material.	N	2	3	5	5	15	CbA
	Social	The demand for chrome has increased globally due to the increase in China Markets. Not allowing the reworking of the opencast pits will result in a loss of an economic activity to the regional area. In addition to this, the reworking of the of the pit is a commitment made by the mine in the EMPr, 2010.	N	-4	-3	-5	-4	-16	The approval of the WML will allow the mine to commence with the reworking of the opencast pits, which will give effect to the National Waste Management Strategy and the EMPr, 2010 commitments. The project will also allow for the proactive management of the potential groundwater plume migration identified in the numerical models. Where possible local labour should be sourced and third party contractors supported.	P	3	3	5	4	15	CbA

Name of Activity	Potential Impacts		Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
		It is planned that tailings material will be recovered at a rate of approximately 40,000 tonnes per month. The South Backfill Pit contains approximately 431,426 tons of tailings while the North Backfill Pit contains approximately 635,630 tons of tailings. The recovery process is expected to last between 28 and 35 months. At the anticipated rate of recovery, approximately 23 trucks will be dispatched from the site daily containing tailings material.	N	-2	-1	-3	-3	-9	The mine will ensure an open channel of communication with the surrounding mines to address any potential concerns in terms of road access or usage. Trucks will be parked in the designated truck parking areas to avoid congestion on the roads.	N	-2	-1	-2	-2	-7	CbA
Waste Management and Handling Hydrocarbon spills within the Mining Area and the management of Domestic and Hazardous Waste	Geology	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Topography	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Soils	Contamination of soil resources due to hydrocarbon spills.	N	-1	-2	-4	-4	-11	Storage of fuels and oils, the refuelling of vehicles and equipment maintenance must be limited to designated, bunded (bunds to be 110% of volume of the materials stored) areas. All fuels and soils must be stored in appropriate containers. Chemicals and hazardous material must be stored in suitable containers, fit for purpose and in line with Safety Data Sheet (SDS) requirements. Where drip trays are too small, specially prepared, non-pervious bunds with solution trenches must be used to capture spillages. Oils and potentially hazardous materials must be disposed of at a licensed facility and waste certificates obtained. A spill kit must be provided to be used in the event of a spill. If a spill occurs, the contaminated soil must be removed immediately. Contaminated soil must be stored according to best practices until it can be disposed of at a suitably licensed facility. Safety signage must be used at designated storage areas. All workers must undergo an induction which includes environmental awareness training to make them aware of the environmental incident management procedures as well as the importance of complying with management measures.	N	-1	-2	-1	-1	-5	R
	Ecology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Name of Activity	Potential Impacts		Rating Prior to Measures						Mitigation Type	Rating Post Measures						Significance	
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity		SaM	CbA/R/Ir
	Riparian Habitat and Wetlands	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-		-	-
	Surface Water	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-		-	-
	Groundwater	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-		-	-
	Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-		-	-
	Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-		-	-
	Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-		-	-
	Visual	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-		-	-
	Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-		-	-

Table 33: Decommissioning Phase Impact Assessment and Management Measures (Significance before Mitigation –SbM; Significance after Mitigation – SaM; Can be avoided – CbA; R – Reversible; Ir - Irreversible)

Name of Activity		Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures						Significance	
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
Decommissioning and Closure Phase																	
Legal Requirements (Environmental Permits)	Legal Compliance	Unlawful activities could lead to NWA Directives and Section 24G Rectification fines.	N	-4	-3	-2	-5	-14	A legal assessment of all activities must be undertaken annually to ensure that all are licensed. A detailed closure plan must be developed and submitted to the relevant departments for approval. All legally appointed personnel responsible or involved in activities on site must receive training on the requirements of the Environmental Authorisations and EMPr's. Quarterly decommissioning audits must be undertaken, on the lawful implementation of the Environmental Authorisation Environmental Authorisations must be available on site at all times. The legal register must be updated to indicate all updated activities.	P	4	3	5	5	17	CbA
Earth Moving, shaping and ripping of ground	Geology	No direct impact	-	0	0	0	0	0	-	-	-	-	-	-	-	-
	Topography	The shaping of the site should be undertaken in such a manner that it improves the overall topography of the site.	P	1	3	4	5	13	Pre-mining topography should be reasonably restored through shaping and landscaping, such that the topography of rehabilitated areas will ultimately be commensurate with that of adjacent, non-disturbed areas. The final shaping should be viable to allow for potential agricultural activities and grazing opportunities post mining. If possible, ensure a continuation of the pre-mining surface drainage pattern.	-	1	3	5	5	14	-
	Soils	Soil erosion	N	-1	-3	-4	-3	-11	Re-vegetate as soon as possible.	N	-2	-1	-3	1	-5	CbA
		Ripping and topsoil replacement will restore the soil physical characteristics prior to re-vegetation.	P	1	3	4	5	13	Compacted soils will be ripped, and topsoil will be replaced. After the topsoil has been replaced the area should be ameliorated and seeded, should self-succession of vegetation not take place. Only species indigenous to the area will be included. The soil fertility status should be determined by soil chemical analysis after levelling (before seeding/re-vegetation). Soil amelioration should be done according to soil analyses as recommended by a soil specialist, to correct the pH and nutrition status before revegetation. Where sites have been alienated of vegetation or where soils have been compacted or covered with concretes, these sites will be ripped and ploughed. The topsoil and sub-soils with the appropriate seedbed as stripped during the construction and operational phases will be placed over these areas to a depth as specified by a qualified specialist. The topsoil shall be appropriately ameliorated to allow vegetation to grow rapidly if required – it should be noted that the mine will encourage self-succession of vegetation, if this does not take place effectively a re-vegetation project will be implemented.	P	1	3	5	5	14	CbA

Name of Activity	Potential Impacts		Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
	Terrestrial Ecology (Fauna & Flora)	The rehabilitation of the site will allow reestablishment of natural vegetation.	P	1	2	3	4	10	Compacted soils will be ripped, and topsoil will be replaced. After the topsoil has been replaced the area should be ameliorated and seeded, should self-succession of vegetation not take place. Only species indigenous to the area will be included. Remove alien vegetation post decommissioning, with long term follow-up afterwards. On-going alien and invasive floral species control are required through all phases of rehabilitation. If a reasonable assessment indicates that the re-establishment of vegetation is unacceptable slow, the soil needs to be analysed and any deleterious effects must be corrected, and the area be seeded with a seed mix to specification. Access to rehabilitated areas should be restricted to vehicles/machinery specifically required for the implementation of the closure plan.	P	3	3	3	4	13	CbA
	Wetland	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Hydrology	Runoff from rehabilitated areas will impact on watercourses especially during intensive rainstorms especially if the area is not free draining.	N	-2	-1	-3	1	-5	The areas will be landscaped to be free draining in line with the approved storm water management plan. Berms, should they be necessary, must remain upstream and downstream of the areas to ensure that clean water is kept separate from dirty water until the area is free draining and re-vegetation has occurred.	P	3	3	3	4	13	CbA
	Geohydrology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	- - -	-
	Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Visual	The rehabilitation (ripping, topsoil replacement and landscaping) will remove the visual incongruity.	P	2	4	4	1	11	An overall visual improvement will be noticed once all mining related infrastructure has been demolished and the area has been landscaped and re-vegetated. Demarcate the decommissioning area and limit the decommissioning activities as far as possible. Final shaping will be implemented such that the final profile of the rehabilitated areas is formed to emulate natural contours of the area. Linear infrastructure constructed by the mine (i.e. roads, conveyors and power lines) will be removed if it proves to inhibit land use at decommissioning. All fences erected around the mine will be dismantled and disposed of at a permitted disposal site.	P	2	4	4	3	13	CbA
	Air Quality	All activities associated with the removal of infrastructure has the potential to release dust.	N	-2	-2	-4	1	-7	Dust sampling will be undertaken on a monthly basis. Monthly monitoring reports will be generated by the mine or through a suitably qualified air quality specialist. In the event that air quality or dust issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.	N	-2	-1	-3	1	-5	CbA

Name of Activity	Potential Impacts		Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
	Noise	All activities associated with the removal of infrastructure and rehabilitation has the potential to generate noise.	N	-2	-1	-4	3	-4	The removal of all infrastructure is to take place during daytime periods only. Where noise becomes a nuisance, management measures will be investigated and implemented to address these. Machinery with low noise levels and maintained in a good order to be used and to comply with the International Finance corporation's (IFC) Health and Safety Regulations. Speed control measures will be implemented by the mine through the placement of adequate signage. Implement a penalty system for non-compliance to speed control measures and ensure that all workers are made aware of the penalty systems. Gravel roads to be maintained in as good and smooth a condition as possible.	N	-2	-1	-3	1	-5	CbA
	Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Decant Management	Decant and associated water resource pollution	Simulations indicate that decant will occur if the rate of recharge to the pits remain at 15% of MAP post closure.	N	-3	-3	-5	-4	-15	The mine should plan towards closure by implementing the following: • All rehabilitation must be completed during the decommissioning phase. In terms of groundwater, the rehabilitation must focus on containing dirty water and leachate, preventing the ingress of clean runoff and rainfall to the rehabilitated footprint areas and avoid ponding over rehabilitated areas. • The outcome of the scavenger borehole optimisation project, as detailed in the operational phase management measures, will govern how long after closure abstraction of contaminated groundwater should continue. Current estimation is that the abstraction will be required for at least 17 years after closure, during which the water treatment plant must remain operational. • In order to minimise negative long-term impacts associated with the operations, it is important to complete tailings reclamation at the Old TSF to soil level over the entire footprint. All tailings must be removed during the project. Soil testing and remediation, as mentioned above, must form part of the rehabilitation phase. • The groundwater monitoring programme must be maintained for the duration of the life of the operations as well as for a period of at least two years after mine closure. This information must be used to confirm the effect of rehabilitation at mine closure. • At the end of the two-year monitoring programme, the post-closure groundwater impact assessment must be re-evaluated and adjusted, as necessary, based on the results of the monitoring programme. • Once the monitoring data and the re-assessment of post-closure groundwater impacts are available, DCM must discuss these with the authorities and determine the need of additional monitoring through consultation. Opencast pits must be rehabilitated to ensure a recharge of 5% or less. The reason for this is the findings from the groundwater model: If the rate of recharge to the pits cannot be reduced to 5% of MAP or lower during rehabilitation, simulations suggest that the risk of decant will increase.	P	3	3	4	4	14	R

Name of Activity	Potential Impacts		Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
									Simulations suggest that the water level in the North Pit will not reach the decant point if the rate of recharge to the pit can be reduced to 5% of MAP or lower. There is a small possibility that the South Pit may decant if the rate of recharge can be reduced to 5% of MAP through additional rehabilitation. The pit is unlikely to decant if all rainfall to the pit can be eliminated in future. Historic Opencast Pits 1-4 to the north of the NTSF are not expected to decant if the rate of recharge can be reduced to 5% of MAP and less.							
									Complete all rehabilitation to a satisfactory level, focussing specifically on maintaining dirty water and runoff in designated areas. Effective rehabilitation of these areas must aim to reduce the rate of recharge of rainwater as far as possible. No ponding must be allowed over rehabilitated areas. All rehabilitated surfaces must be free draining.							
									Plan for and budget to continue with the groundwater monitoring period for a minimum of two years after mine closure. The continued need for groundwater monitoring will depend on the outcome of the final mine closure groundwater impact assessment.							
									The re-mining of the North and South Opencast Pits is highly recommended as the proposed voids which should remain will have the potential to eliminate decant. The groundwater models suggests that: If a final void is left, groundwater levels would recover and stabilise with time. The volume of groundwater inflow to the pits will reduce to near zero at this point, as the gradients towards the pits would be zero once groundwater levels have recovered. Under this scenario, the inflow and outflow to the final voids would be rainfall and evaporation.							
									In the event of decant, the following should be considered: The Northern RWD constructed on the western side of North Pit could be used to contain decant from the pit in the long-term, as the decant position is located in this area. This dam is lined with HDPE and would therefore comply with industry standards to contain decant. The following should be given consideration regarding the use of the dam to contain decant: • The dam must be able to contain the volume of decant as well as comply with the requirements of GN704 in terms of freeboard if decant is unavoidable. • A mechanism should be put in place below the decant elevation of the pit (950 mamsl) that will drain the pit water into the RWD if water levels inside the pit rise above the decant elevation. A perforated pipe connecting the pit and the dam, can be considered. The options available should however be confirmed by an engineer, who should modify the existing designs to meet post-closure decant management requirements. Similarly, at South Pit the existing portal can be shaped and modified upon closure to act as a final void and to control decant, if required. As for the RWD at North Pit, the final void must be designed to ensure that water levels inside the pit would be kept below the decant elevation (942 mamsl). This is							

Name of Activity	Potential Impacts		Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
									typically achieved through evaporation from the final void. The following specific measures are recommended to minimise and/or eliminate the impacts associated with decant: • If subsidence over underground workings is identified as a possibility, a geotechnical study must be completed to delineate areas of possible subsidence. This information must be used to re-assess the risk of decant and to quantify the associated impacts. Current simulations assume that no subsidence will take place. Subsidence was however identified as one of the possible environmental risks associated with the DCM operations (Digby Wells Environmental, 2020). • If water-bearing structures are intersected during mining that contribute significant volumes of seepage to the pits and underground workings, they must be characterised and quantified. The risk and timing of decant must be re-assessed taking this information into consideration. • The quality of decant will be assessed through ongoing monitoring in boreholes DRM7 and DRM8. • Surface and underground rehabilitation measures must be designed to minimise the risk of decant. Opencast mining areas must be backfilled, shaped and made free draining to limit the rate of recharge of rainwater to the absolute minimum.							
Waste Management and decommissioning of hazardous (also fuels) substances	Geology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Topography	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Soil, Land Use and Land Capability	Spills from vehicles (diesel) and product may result in the contamination of soils.	N	-1	-2	-4	-4	-11	Any hydrocarbon, effluent or other contaminants should be collected and the soils remediated immediately. A contaminated land assessment should be undertaken at all areas where diesel was stored, as well as where fuel pipelines were placed.	N	-1	-2	-1	-1	-5	R
	Terrestrial Ecology (Fauna & Flora)	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wetland	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Groundwater	Handling of hazardous waste within workshops and general mine area.	N	-2	-2	-2	-4	-10	Clean and dirty water separation systems should be incorporated in terms of the 2016 Storm Water Management Plan (SWMP) or any approved update thereafter. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. Hazardous waste handling should only take place within bunded and/or lined areas. Hazardous waste should be removed by a licensed removal company and taken to a suitable and licensed landfill site. Documentation of removal and safe disposal must be available on site.	N	-1	-1	-2	-2	-6	CbA

Name of Activity		Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
		Handling of building rubble	N	-2	-2	-2	-3	-9	All infrastructure will be removed and rehabilitated, should no alternative use be found for the structures. All building rubble will follow the waste hierarchy and will therefore either be sold for reuse where possible and as a last option be disposed of at a licensed facility suitable for such waste.	N	-1	-1	-2	-2	-6	CbA
		Handling and storing of domestic waste	N	-3	-3	-3	-3	-12	Clean and dirty water separation systems should be maintained. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the site can be detected. Recycling practices must be investigated and implemented on site.	N	-2	-3	-2	-2	-9	CbA
	Surface Water	Handling of hazardous waste within workshops and general mine area could contaminate the dirty water storage areas. The water is then reused in the system and could have impacts on the integrity of the storm water system and also the production.	N	-3	-2	-2	-4	-11	Clean and dirty water separation systems should be maintained up until closure. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. Hazardous waste handling should only take place within bunded and/or lined areas. Hazardous waste and contaminated materials should be removed by a licenced removal company and taken to a suitable and licensed landfill site. Documentation of removal and safe disposal must be available on site. Weekly inspections of storm water management systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.	N	-1	-1	-2	-2	-6	CbA
		Handling and storing of domestic waste should have no impact on the surface water resources due to the location of the facility. However, incorrect disposal of waste could hamper the integrity of the storm water system.	N/A	-1	-2	-3	-3	-9	Clean and dirty water separation systems should be maintained up until closure. Waste management training must be implemented on site. Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed. Clear signs informing staff of waste management practices must be implemented on site. Recycling practices must be investigated and implemented on site. Building rubble must be disposed of in line with the requirements of the NEMWA. Access control must be strictly enforced.	N	-1	-1	-2	-1	-5	CbA
	Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Visual	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Name of Activity	Potential Impacts		Rating Prior to Measures						Mitigation Type	Rating Post Measures						Significance	
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
	Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1.j Summary of Specialist Reports

The project in question is located in an existing disturbed area. The removal of deposited material will not result in additional impacts, except for groundwater, where, if correctly implemented the project could be regarded as an overarching management measure for existing groundwater concerns. The 2020 Groundwater Study stated the following:

The 2020 Annual Rehabilitation Plan (Digby Wells Environmental, 2020) was used to assess rehabilitation measures that will be considered as part of simulations.

Both North and South Pits have been partially backfilled, mainly with waste rock. A portion of the pit void at each pit was however used for tailings backfill prior to the construction of the Northern TSF. A section of each pit is also opened to facilitate access to the North and South Mine underground workings via portal declines in pit highwalls.

At the time of inspection of the 2020 assessment of the status of rehabilitation on site, the majority of surface mining activities have ceased and the impacted areas were rehabilitated. No concurrent rehabilitation is currently taking place. The main surface activity is tailings deposition on the Northern TSF and discard disposal on the discard dump north of the plant area. No rehabilitation is currently undertaken in these areas. DCM is committed to monitor the effectiveness of the measures implemented on areas already rehabilitated. Monitoring of these areas will be carried out to ensure rehabilitation is successful and does not contribute to water contamination. This includes biodiversity, erosion, surface and groundwater, subsidence and dust monitoring.

The impact of reprocessing the Old TSF was assessed with the Numerical Groundwater Model in 2020 (iLEH, 2020). The following key findings were reported for this planned activity:

- The impact of tailings reclamation is expected to be most significant on the shallow weathered pyroxenite and alluvial aquifers. The impact on the deeper fractured rock aquifer is less pronounced. Groundwater quality in the fractured rock aquifer will most likely be affected by underground mining rather than tailings reclamation.
- This project is not expected to have an impact on groundwater levels and/or quantity, as no groundwater will be abstracted for use during tailings reclamation.
- If the tailings reclamation project is completed successfully, nitrate concentrations in the footprint area of the TSF are expected to reduce by 20% by the end of the life of the DCM operations and by 40% in the long-term, post mine closure.
- The nitrate salt load on the Groot Dwarsrivier is furthermore expected to reduce by 40% as a result of the removal of the TSF.
- Nitrate concentrations in the two abstraction boreholes are furthermore expected to reduce by around 5% as a result of the removal of the TSF.
- If tailings reclamation is not implemented and the TSF is rehabilitated *in situ*, it is likely that negative impacts on groundwater with a high significance would prevail, especially in the long-term.

The study further recommended that all rehabilitation of the reclaimed Old TSF footprint area must be completed during the decommissioning phase. In terms of groundwater, the rehabilitation must focus on containing dirty water and leachate, preventing the ingress of clean runoff and rainfall to the rehabilitated footprint and avoid ponding over rehabilitated areas. In order to minimise negative long-term impacts associated with the project, it is important to complete tailings reclamation to soil level over the entire footprint. All tailings must be removed during the project. Soil testing and remediation must form part of the rehabilitation phase. Groundwater monitoring must continue post closure to measure the effectiveness of the rehabilitation measures.

Mine-wide, DCM is committed to complete rehabilitation to a level that will ensure restoration of the physical, chemical and biological quality of land and water regimes disturbed by mining (Digby Wells Environmental, 2020). This is geared at creating self-sustaining natural ecosystems or alternate land use based on an agreed set of objectives. The short-term rehabilitation objectives include monitoring and maintenance of areas already rehabilitated.

The DCM Rehabilitation and Closure Plan (Digby Wells Environmental, 2020) makes provision for the following activities:

- DCM should undertake concurrent rehabilitation during its operational phase when and where possible;
- Further trials should be conducted during the operational phase to determine other rehabilitation options that could be considered, for example potential alternate grow media and vegetation types;
- Implementation of the groundwater remediation strategy developed by Digby Wells Environmental (2019). The strategy's main focus is the implementation of scavenger boreholes to abstract contaminated groundwater and thus reduce impacts on the receiving environment;
- Implementation of water treatment measures. It is estimated that water treatment will be required for a period of 17 years post closure to accommodate the abstraction of contaminated groundwater from the scavenger boreholes (still to be confirmed based on future numerical models);
- Continuation of the monitoring programme implemented at the operations; and
- Monitoring and maintenance of rehabilitated areas to be undertaken on an annual basis at least 5 years post mine closure.

1.k Environmental Impact Statement

1.k.i Summary of the Key Findings of the Environmental Impact Assessment

It should be noted that impacts associated with the proposed project will be significantly lower than that of a greenfields project, as the proposed activities are located within the existing Mining Right Area and within already disturbed or impacted environments.

This project is more associated with a rehabilitation project as part of ongoing groundwater plume migration mitigation than a new mining development. The December 2020 Hydrogeological Study indicated that the removal of the tailings material from North Pit is anticipated to result in the most significant impact on groundwater quality in the long-term. In South Pit, the waste rock backfilled is expected to control groundwater quality to a greater extent and the removal of the tailings material is not expected to result in significant impacts on the aquifers.

The removal of tailings backfill from North Pit should therefore be considered a priority, as it is expected to significantly reduce the source to groundwater contamination in this area, especially since the Northern RWD is lined with HDPE.

1.k.ii Final Site Map

Refer to Figure 3 for the final site map indicating the proposed re-mining footprints.

1.k.iii Summary of the Positive and Negative implication and risk of the proposed activity and identified alternatives

<u>Positive Impacts</u>

The following key positive impacts are identified:

- Regulation 23 of the MPRDA states in Section 1(a), that subject to subsection 4, the Minister must grant a mining right if the mineral can be mined optimally in accordance with the mining work programme. The mine has been awarded a Mining Right by the DMR (now DMRE) and therefore has an obligation to give effect to the following:
    - The ongoing development and improvement of the Mining Work Programme which details the planned mining activities to be followed in order to mine the mineral resource optimally; and
    - Optimal mining of minerals must be undertaken, as the Minerals and Petroleum Board may recommend to the Minister to direct the holder of a mining right to take corrective measures if the Board establishes that the minerals are not being mined optimally in accordance with

the Mining Work Programme. The Minister may, on the recommendation of the Board, suspend or cancel a mining right if the Minister is convinced that any act or omission by the holder justifies the suspension or cancellation of the right.

- DCM is actively investigating opportunities for the continued and sustainable mining of chrome reserves and for the purposes of this project, has identified the historic opencast pits as sources for further re-mining of previously deposited chrome resources, which could not be beneficiated by prior technologies but is now viable through the current plant.

- The project will allow for improved supply of material required to optimally operate the mine.
- No additional infrastructure development will be required, only existing roads and stockpiles will be utilised.
- The project will give effect to the recommendations included in a specialist hydrogeological report from 2016 and follow-up study in 2020 (see Annexure 6), which specifically recommends the reworking of the material, as well as the effective rehabilitation of the pits.
- The project is regarded as an ongoing rehabilitation project rather than a new operational project, however no additional capital expenditure will be required for rehabilitation purposes, as this will be managed as part of the ongoing operational processes:
  - Reworking as part of an economic activity; and
  - Backfilling in terms of the approved EMPr, 2010 and WUL, 2008 with waste rock upon the completion of mining, thereby further potentially reducing waste rock deposition on the Waste Rock Dump on surface.

Negative Impacts

It should be noted that impacts associated with the proposed project will be significantly lower than that of a greenfields project, as activities are located within the existing Mining Right Area and within an already disturbed or impacted environment.

The December 2020 Hydrogeological Study indicated that the removal of the tailings material from North Pit is anticipated to result in the most significant impact on groundwater quality in the long-term. In South Pit, the waste rock backfilled is expected to control groundwater quality to a greater extent and the removal of the tailings material is not expected to result in significant impacts on the aquifers.

The removal of tailings backfill from North Pit should therefore be considered a priority, as it is expected to significantly reduce the source to groundwater contamination in this area, especially since the Northern RWD is lined with HDPE.

The activities proposed by the applicant have not indicated any significant negative impacts in the long term. No new areas will be cleared, and no new construction will be required. Short term environmental impacts could include the temporary increase in traffic on the regional roads for the collection and dispatch of material. The only potential long-term impacts are linked to the status quo situation and the rehabilitation options. Two rehabilitation options were considered for this assessment. The first entails backfilling the areas from which tailings will be excavated with waste rock only as part of final pit rehabilitation and the second is to leave each excavated area as a final void. The current financial provision for the mine, including the available financial quantum allows for backfilling of both voids.

If a final void is left, groundwater levels would recover and stabilise with time. The volume of groundwater inflow to the pits will reduce to near zero at this point, as the gradients towards the pits would be low once groundwater levels have recovered. Under this scenario, groundwater levels inside the final void will be controlled by rainfall and evaporation. Since the rate of evaporation in the area is 1,500mm/a, which is at least twice as high as the Mean Annual Precipitation (MAP), the rate of evaporation is expected to prevent groundwater levels from recovering to surface. This in effect will control the water level inside the final void. It is concluded that if a final void is left, the risk of decant will be controlled and groundwater levels inside the void are unlikely to rise to surface.

Backfilling of the reclaimed pits with waste rock may increase the risk of decant. This can however be controlled through implementing a sound rehabilitation programme, geared at reducing the rate of recharge to around 5% of MAP. This was confirmed in previous detailed studies on the risk of decant from the pits (iLEH, 2017). In

order to achieve this rate, each pit must be completely backfilled, rehabilitated surfaces must be made free draining and final surfaces must be re-vegetated to create near-natural recharge conditions. This is the current planned rehabilitation option for the project.

If the rate of recharge to the pits cannot be reduced and remain above 5% of MAP in future, the risk of decant will increase. In this case, groundwater levels would rise to above the surface elevation due to higher recharge and decant will take place, resulting in long-term residual negative impacts.

1.k.iii.1 Direct Impacts during Construction

- There will be no construction activities, the project will immediately enter the operational phase, as no new infrastructure is required.

1.k.iii.2 Direct Impacts during the Operational Phase

Topography

- The removal of the Old TSF will result in a positive impact on the topography, whilst the re-mining of the opencast pits will result in the re-creation of the opencast void until rehabilitation is undertaken.

Soils, Land Use and Land Capability

- The removal and stockpiling of topsoil, which has been placed during the prior rehabilitation practices may lead to a loss of soil resources previously used in rehabilitation of the opencast pits through erosion of the stockpiles, and resulting chemical and physical degradation thereof. This impact is considered important due to the fact that the mine may be operating on a negative topsoil balance and therefore the retaining of suitable topsoil is important for successful rehabilitation;
- Contamination of soils, due to unmanaged runoff from the facility is highly improbable as the area is contained within a closed storm water circuit. The overall removal of the site will however have a beneficial impact on the specific site soil conditions;
- Contamination of soil due to hydrocarbon spills due to the presence of vehicles; and.
- Soil contamination due to operational vehicles and equipment possibly spilling hydrocarbons, waste and product beyond contained areas.

Ecology

- The establishment of weeds and invasive species.
- Accidental death of animals on the existing roads.

Hydrology

- Contamination of surface water resources. There are no surface water resources in the area where the infrastructure is proposed, however, the natural runoff, which must be managed internally on site could become impacted. At the Old TSF reworking area, contamination of soils due to unmanaged runoff from the facility is highly improbable as the area is contained within a closed storm water circuit. The overall removal of the site will however have a beneficial impact on the specific site soil conditions.

Geohydrology

- Groundwater down gradient of the Northern RWD has been impacted by historical tailings deposition into the North Pit void. DCM monitored the quality of the water in North Pit from May 2009 up to June 2016. Nitrate concentrations for this period exceeded 2,000mg/l up to March 2010 after which it gradually decreased to between 500 and 700mg/l in 2016. NettZero (2018) reports that DCM changed the type of explosives it used during this time. A comparison between nitrate concentrations in North Pit to that measured in borehole ASDWBH3 indicates that a sharp increase in nitrates were measured in the groundwater around May 2013, which is about 4 years after nitrate concentrations started exceeding 2,000mg/l in North Pit. Significantly elevated nitrate concentrations persisted in ASDWBH3 until around March 2018, after which concentrations decreased to around 500mg/l. This could provide an indication of plume dilution through the throughflow of rainwater recharged to the aquifers as well as through source reduction in North Pit. Nitrate concentrations in borehole DRM7, drilled into the backfilled North Pit, fluctuated between 2 and 30 mg/l since monitoring began in October 2018. At

present, nitrate concentrations in DRM7 are consistently below 6mg/l. Similar observations are reported for borehole DRM8 drilled into the tailings backfill area in South Pit. This monitoring information suggests that the nitrate contamination in borehole ASDWBH3 is associated with historical tailings deposition in North Pit and that groundwater quality is likely to improve in this borehole with time, as the source of nitrate contamination has been reduced.

Biodiversity

- No further impacts are foreseen, with the exception of potential impacts on the establishment of alien and invasive plant species if not managed and accidental road killings due to the presence of mine vehicles in the area.

Air Quality

- Increase in dust-fallout from opencast reworking and the reworking of the Old TSF.

Visual

- Fugitive dust emissions during reworking activities may have a negative impact on the visual characteristics of the area. This will be a temporary impact and will cease once the material has been removed.

Noise

- No further impact is foreseen as part of the operational phase.

Heritage:

- No impact on heritage resources is foreseen.

Traffic

- It is planned that tailings material will be recovered at a rate of approximately 40,000 tonnes per month. The South Backfill Pit contains approximately 431,426 tonness of tailings while the North Backfill Pit contains approximately 635,630 tonness of tailings. The recovery process is expected to last between 28 and 35 months. At the anticipated rate of recovery, approximately 23 trucks will be dispatched from the site daily containing tailings material.

1.k.iii.3 Direct Impacts during Decommissioning and Closure

The nature of the waste management activity applied for, is that this activity is required as part of the long-term mining strategy. Therefore, the decommissioning and rehabilitation of this infrastructure will only be required at the end of the Life of Mine (LOM). This specific project will tie into the overall financial provision and rehabilitation project as approved for DCM. No additional impacts are therefore considered as part of the decommissioning phase, with the exception of the positive impacts on the groundwater.

In terms of groundwater, the December 2020 Hydrogeological Study indicated that the removal of the tailings material from North Pit is anticipated to result in the most significant impact on groundwater quality in the long-term. In South Pit, the waste rock backfilled is expected to control groundwater quality to a greater extent and the removal of the tailings material is not expected to result in significant impacts on the aquifers.

The removal of tailings backfill from North Pit should therefore be considered a priority, as it is expected to significantly reduce the source to groundwater contamination in this area, especially since the Northern RWD is lined with HDPE.

Should backfilling not be achieved, the management of decant will be important to ensure that uncontrolled runoff into the natural systems is avoided.

1.k.iv Direct Cumulative Impacts

The current re-mining and rehabilitation in terms of the recommendations of the EMPr will result in as a positive impact on the groundwater resources and cumulatively the surface water resources of the area.

1.l Proposed Impact Management Objectives and the Impact Management Outcomes for inclusion in the EMPr

Please refer to PART B: EMPr (Table 40 to Table 8 for the discussion on the sizes of disturbance.

Table 40) for the detailed assessment of impacts and recommended objectives. The key objectives to consider will include:

- The EMPr must be utilised to:
  - Provide sufficient information to strategically plan the activities as to avoid unnecessary social and environmental impacts.
  - Provide sufficient information and guidance to plan activities in a manner that would reduce impacts (both social and environmental) as far as practically possible.
  - Ensure an approach that will provide the necessary confidence in terms of environmental compliance.
  - Provide a management plan that is effective and practical for implementation.

The proposed impact management objectives as referred to in the Table 40 includes:

- To operate within the enviro-legal ambits of South Africa.
- To be aware of the latest environmental legal requirements.
- Limit the impact of the activities on the ecological setting of the area.
- Operate the water management circuit on site to increase mining efficiency and reduce the need for maintenance of these facilities.
- Limit the loss of soils as far as possible and ensure that the integrity remains during stockpiling for the purposes of successful rehabilitation.
- Remain within the designated area demarcated for activities.
- Remain within the NEM:AQA Dust Regulation guidelines for rural communities.
- Protect heritage resources for future generations.
- Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the proposed activities.
- Follow the waste hierarchy approach.
- Protect the integrity of the clean and dirty water management system.
- Return the area to its intended final land use.

The following objectives and targets are proposed for groundwater management at the operations:

- Implement a management plan aimed at reducing and/or eliminating adverse impacts on the receptors, including the Groot Dwarsrivier. This management plan must be aligned with the Groundwater Remediation Strategy (Digby Wells Environmental, 2018).
- Track and record the progress of implementation of all groundwater management measures. This process must be geared at optimising the measures earmarked for implementation from the Groundwater Remediation Strategy.
- Implement sufficient monitoring procedures to measure the effectiveness of groundwater management measures within the delineated zones of influence.
- Analyse the information obtained from all monitoring programmes against compliance targets to establish trends as well as the objectives of the Groundwater Remediation Strategy.
- Should the trends indicate adverse impacts on groundwater levels and/or quality, implement suitable measures within the shortest possible time to remediate and/or eliminate such adverse impacts identified.

Through the implementation of the proposed mitigation measures, it is anticipated that the identified impacts can be managed and mitigated effectively, and the objectives set can be met. Through the implementation of the mitigation and management measures it is expected that:

- The pollution of soil and water resources can be effectively managed through containment.
- Impact on unknown heritage sites can be effectively managed to the implementation of a management protocol in the event that such facilities are encountered.

- Ecological impacts can be managed through the implementation of pollution prevention measures, minimising land clearing, restricting working hours (faunal disturbance), maintaining speed limits on roads and rehabilitation (including control of weeds and invasive species).

1.m Final Proposed Alternatives

Please refer to section 1.g for the alternatives considered.

1.n Aspects for inclusion as conditions of the Environmental Authorisation

The following conditions should be included in the authorisation in addition to the general conditions included in the Environmental Authorisations:

- Prior to awarding a contract to a third party for the removal of the tailings the mine must ensure that the third party and facility where the beneficiation will be undertaken in legally authorised to conduct these activities.
- The work completed by Digby Wells Environmental (2019) needs to be confirmed through the completion a more detailed fieldwork study in order to ensure that the scavenger borehole system is efficiently implemented as identified in the 2020 Numerical Model compiled by iLEH.
- The rehabilitation strategy for the remaining voids should involve only one of the following two options – leaving the voids open with the inclusion of the necessary safety measures to control unauthorised access; or secondly the backfilling of the remaining voids with waste rock and rehabilitate these areas to ensure the required 5% or less recharge to avoid decant.
- The final rehabilitation plan for the opencast pits – i.e. backfilling or the leaving of a void/management of decant should be finalised within 24 months of the completion of the reworking activities.
- Should the final rehabilitation plan indicate the need to leave voids, the required decant measures must be identified and the suitable financial provision for this instance should be calculated and submitted as part of the overall rehabilitation fund for the mine.

1.o Description of any Assumptions, Uncertainties and Gaps in Knowledge

The following assumptions, uncertainties and gaps are applicable to this project:

- The report is based on existing available environmental information and those presented by the specialists and is considered as true and correct; and
- The rehabilitation plan as presented in this report is open for the purposes of either backfilling to a 5% recharge of the opencast voids, or the leaving of the voids, however in this instance the management of decant. Financial provision has not been made for the long-term management of decant at this stage as this will be subjected to the 24-month assessment of the final rehabilitation plan, which will be based on the implementation of the groundwater investigations identified in the Numerical Model, 2020. At this time, it is assumed that no additional financial rehabilitation will be required for this project as the backfilling of the voids will be an operational component and the rehabilitation of the Old TSF is already accounted for in the financial provision calculations.
- The project description is based on the information presented by the applicant and is considered as true and correct.

1.p Reasoned opinion as to whether the proposed activity should or should not be authorised

1.p.i Reasons why the activity should be authorised or not

It is the opinion of the EAP that the activity should regarded favourable and be authorised.

<u>Aim of the Project</u>

Regulation 23 of the MPRDA states in Section 1(a), that subject to subsection 4, the Minister must grant a mining right if the mineral can be mined optimally in accordance with the mining work programme. The mine has been awarded a Mining Right by the DMR (now DMRE) and therefore has an obligation to give effect to the following:

- The ongoing development and improvement of the Mining Work Programme which details the planned mining activities to be followed in order to mine the mineral resource optimally; and
- Optimal mining of minerals must be undertaken, as the Minerals and Petroleum Board may recommend to the Minister to direct the holder of a mining right to take corrective measures if the Board establishes that the minerals are not being mined optimally in accordance with the Mining Work Programme. The Minister may, on the recommendation of the Board, suspend or cancel a mining right if the Minister is convinced that any act or omission by the holder justifies the suspension or cancellation of the right.

DCM is actively investigating opportunities for the continued and sustainable mining of chrome reserves and for the purposes of this project, has identified the historic opencast pits as sources for further re-mining of previously deposited chrome resources, which could not be beneficiated by prior technologies and now viable through the current plant.

Currently DCM is serviced by 1,200 permanent and 800 contractor employees. The majority of the employees are locals drawn from Lydenburg and villages around the mine, including Steelpoort Park, Kalkfontein and Buffelshoek.

In addition to the above motivation the 2017 IWMMP, which was based on the 2016 Numerical Groundwater Model conducted by iLEH indicated that the re-mining of the North and South Opencast Pits are highly recommended to avoid future dewatering. This project therefore further gives effect to this specialist recommendation.

Alternatives Considered:

No location alternatives were investigated for this project as the project are linked to the existing opencast pits. The only alternative is the no-go alternative where the status quo remains.

The key motivations for this project are: 1. Economic benefit of optimally mining available resources; and 2. The removal of the material from the opencast pits will result in the management of long-term groundwater impacts.

Impacts:

The project should be considered as a rehabilitation project, with significant economic benefits. The December 2020 Hydrogeological Study indicated that the removal of the tailings material from North Pit is anticipated to result in the most significant impact on groundwater quality in the long-term. In South Pit, the waste rock backfilled is expected to control groundwater quality to a greater extent and the removal of the tailings material is not expected to result in significant impacts on the aquifers.

The removal of tailings backfill from North Pit should therefore be considered a priority, as it is expected to significantly reduce the source to groundwater contamination in this area, especially since the Northern RWD is lined with HDPE.

1.p.ii Conditions that must be included in the authorisation

1.p.ii.1 Specific conditions to be included into the compilation and approval of the EMPr

Recommended Conditions:

The following conditions should be included in the authorisation in addition to the general conditions included in the Environmental Authorisation, if approved:

- Prior to awarding a contract to a third party for the removal of the tailings the mine must ensure that the third party and facility where the beneficiation will be undertaken is legally authorised to conduct these activities.
- The rehabilitation strategy for the remaining voids should involve only one of the following two options – leaving the voids open with the inclusion of the necessary safety measures to control unauthorised access; or secondly the backfilling of the remaining voids with discard and/or waste rock and

rehabilitate these areas to ensure the required 5% or less recharge. The recommendation of this EIA is the allowance for backfilling as is currently provided for in the financial provision by the mine.

- The final rehabilitation plan for the opencast pits – i.e. backfilling or the leaving of a void/management of decant should be finalised within 24 months of the completion of the reclamation of the material.

Should the final rehabilitation plan indicate the need to leave voids, the required decant measures must be identified and the suitable financial provision for this instance should be calculated and submitted as part of the overall rehabilitation fund for the mine. In this instance enviroberms should be placed around the voids.

1.q Period for which the Environmental Authorisation is required

The project is required for the duration of LOM, which may still continue in excess of 27 years. It is planned that tailings material will be recovered at a rate of approximately 40,000 tonnes per month. The South Backfill Pit contains approximately 431 426 tonness of tailings while the North Backfill Pit contains approximately 635 630 tonness of tailings. The recovery process is expected to last between 28-35 months. At the anticipated rate of recovery, approximately 23 trucks will be dispatched from the site daily containing tailings material.

1.r Undertaking

The undertaking by the Application to meet the requirements of this section is provided in Part B (EMPr) and is applicable to both the EIA report and EMPr.

1.s Financial Provision

The current calculated closure cost for the overall mine amounts to R 103 638 971.00 (excluding P&Gs, Contingencies and VAT). Of this cost R 3 979 211.00 (see Component 6) is allocated for the rehabilitation of open pits and final voids.

The future rehabilitation of the reworked opencast pits will have to be assessed as part of the hydrogeological study to determine the most suitable option. This may include ongoing backfilling as part of the operational phase, or the establishment of safety berms. At the current time provision is made for the establishment of safety berms around the voids.

North Backfill Pit perimeter: 494m

South Backfill Pit perimeter: 461m

As stated above, due to the nature of the activities, and the fact that these activities will not result in the significant alteration of the environment, the rehabilitation plan will be implemented with the aim of returning the site to the mine's overall closure objective and end land use. Infrastructure will only be removed once the mine enters the closure phase. These activities are part of the overall mine financial provision. For the purposes of this project, provision is only added for the inclusion of enviro-berms to keep voids safe in the event of premature closure.

A Sub Total 1 Amount of approximately R 387 423.64 (excluding VAT), will be required. It should be noted that this is in addition to the already allocated cost for backfilling as presented in the table overleaf.

1.s.i Explain how the amount was derived

Digby Wells Environmental was appointed by DCM during 2020 to complete the financial provision assessment for the rehabilitation and closure of the mine and in the process also considered the projects being applied for. Please refer to Annexure 7 for this report.

1.s.i.1 Method of Assessment

Digby Wells Environmental updated the closure costs assessment based on the regulatory requirements encapsulated in the MPRDA for the current closure scenario (unscheduled closure). The quantities calculated

and presented in the DMRE model are based on previous assessment undertaken and the site verification visit undertaken in June 2020.

According to the 2018 Financial Provision Report, which was updated by Digby Wells Environmental during 2019 and 2020. Successful closure depends on setting, continually reviewing and validating and finally meeting closure goals that align with company and stakeholder requirements. There should be minimal residual risk to the environment, and the community should realise benefits that will continue to exist without further involvement from the company. This philosophy was considered in the development of the financial provision for the current mine, life of mine and proposed projects.

The vision of mine closure should be to ensure that a process is established to guide all decisions and actions during a mine's life such that:

- Future public health and safety are not compromised;
- Environmental resources are not subject to physical and chemical deterioration;
- The post-mining use of the site is beneficial and sustainable in the long-term;
- Any adverse socio-economic impacts are minimised; and
- The opportunity is taken to maximize socio-economic benefits.

The above vision has been incorporated in the development of the management measures for the proposed projects.

Digby Wells Environmental updated the financial provision during 2020 and compiled a closure cost model using Microsoft Excel. The closure cost model consists of an input sheet, containing measurements of the infrastructure, a standard rate sheet and a summary sheet, which summarises the costs for closure. The closure cost model calculates the cost of demolishing, removing and rehabilitating each component of the mining area infrastructure.

The current calculated closure cost for the overall mine amounts to R 103 638 971.00 (excluding P&Gs, Contingencies and VAT). Of this cost R 3 979 211.00 (see Component 6) is allocated for the rehabilitation of open pits and final voids. Please refer to the following table:

Table 34: DCM 2020 Financial Provision Calculation, Table 7 (Digby Wells Environmental, 2020)

Component	Description	Total Cost
1	Dismantling of processing plant & related structures (incl. overland conveyors & Power lines)	R 1,286,555
2 (A)	Demolition of steel buildings & Structures	R 5,318,781
2 (B)	Demolition of reinforced concrete buildings & structures	R 34,597,404
3	Rehabilitation of access roads	R 13,305,857
4(A)	Demolition & rehabilitation of electrified railway lines	R 0
4(B)	Demolition & rehabilitation of non-electrified railway lines	R 0
5	Demolition of housing &/or administration facilities	R 4,465,900
6	Open pit rehabilitation including final voids & ramps	R 3,979,211
7	Sealing of shafts, adits & inclines	R 106,401
8(A)	Rehabilitation of overburden & spoils	R 4,094,974
8(B)	Rehabilitation of processing waste deposits & evaporation ponds (basic, salt producing waste)	R 8,535,871
8(C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic, metal-rich waste)	R 0
9	Rehabilitation of subsided areas	R 0
10	General surface rehabilitation	R 11,163,324
11	River diversions	R 13,382
12	Fencing	R 877,591
13	Water management	R 8,365,335
14	2 to 3 years of maintenance & aftercare	R 2,593,196
15(A)	Specialist studies	R 0
	Total cost + Weighting Factor 2	**R 103,638,971**
	Preliminary and General	R 6,218,338
	Contingency	R 10,363,897
	VAT (15%)	R 18,033,181
	Grand Total (Incl. VAT)	**R 138,254,388**

1.s.i.2 Preliminary Cost Estimation

It is important to note that the proposed project areas are located in disturbed areas, which are included into the overall closure cost for the mine (See component 6 in the table above). The future rehabilitation of the reworked opencast pits will have to be assessed as part of the hydrogeological study to determine the most suitable option. This may include ongoing backfilling as part of the operational phase, or the establishment of safety berms. At the current time provision is made for the establishment of safety berms around the voids.

North Backfill Pit perimeter: 494m

South Backfill Pit perimeter: 461m

As stated above, due to the nature of the activities, and the fact that these activities will not result in the significant alteration of the environment, the rehabilitation plan will be implemented with the aim of returning the site to the mine's overall closure objective and end land use. Infrastructure will only be removed once the mine enters the closure phase. These activities are part of the overall mine financial provision. For the purposes of this project, provision is only added for the inclusion of enviro-berms to keep voids safe in the event of premature closure.

Table 35: Financial Provision

Assore: Dwarsrivier Chrome Mine Evaluation Date: November 2020			**2020**			**Decommissioning / Restoration**
Rate Nr.	**Item Description**	**Unit**	**Quantity**	**Rate**	**Item Amount**	
	Earthworks					
	Opencast Rehabilitation (Enviro Berm)					
1	South Backfill Pit	m	461	R 343,80	R 158 489,93	Restoration
2	North Backfill Pit	m	494	R 343,80	R 169 835,19	Restoration
	TOTAL				R 328 325,12	
	Management and Administration					
	Preliminary & General (6%)				R 19 699,51	
	Contingency (10%)				R 32 832,51	
	Health & Safety				R 6 566,50	
				Total (ZAR)	**R 387 423,64**	

1.s.i.3 Financial Provision

The rehabilitation and liability estimate for the proposed project related to this application only was determined as a clean closure estimate, with no allowance for off-sets or salvage value. The assessment was conducted in accordance with the DMR Guideline and current best practice.

A Sub Total 1 Amount of approximately R 387 423.6 (excluding VAT), will be required. It should be noted that this is in addition to the already allocated cost for backfilling as presented in the table above, in the event of the need to remain open voids for groundwater management purposes.

The financial provision required by the holder of the mining right must be provided for by one or more of the following methods in order to achieve the total quantum of rehabilitation and remediation of environmental impacts and damage as well as final closure:

- Approved dedicated trust fund;
- Financial guarantee from a South African registered bank or any other approved financial institution;
- Cash deposit to be deposited at the office of the Regional Manager; or
- Any other manner determined by the Minister.

The client is required to annually assess the total quantum of environmental liability for the operation and ensure that financial provision is sufficient to cover the current liability (in the event of premature closure), as well as the end of life liability.

As per Government Legislature, the client is required to ensure full financial cover for the current liability at any point in the life of the operation. Pecuniary provision must be made for the shortfall between the existing trust fund balance and the premature closure or current environmental rehabilitation liability if applicable.

1.s.ii Confirm that this amount can be provided for from Operating Expenditure

The mine has a guarantee in place to cater for the financial provision of rehabilitation activities. This is assessed annually to ensure that suitable funds are available. The next assessment will be undertaken in 2021 and annually thereafter.

1.t Deviations from the approved Scoping Report and Plan of Study

1.t.i Deviations from the methodology used in determining the significance of potential environmental impacts and risks

The methodology to rate the impacts and risks associated with the proposed project detailed in this EIA report have not deviated from those described in the Scoping Report.

1.t.ii Motivation of the deviation

No deviations from the methodology proposed in the Scoping Report.

1.u Other information required by the Competent Authority

1.u.i Compliance with the provisions of sections 24(4)(a) and (b) read with section 24 (3) (a) and (7) of the National Environmental Management Act (Act 107 of 1998). the EIA report must include the

1.u.i.1 Impact on the socio-economic conditions of any directly affected person

The reworking of the material on site has a direct economic benefit to the mine, ongoing employment opportunities and supply of chrome to the markets.

There may be a short term increase in trucks on the road. Tailings will be 'mined' by a contractor or DCM-owned excavator. The mined tailings will then be loaded by a contractor or DCM-owned Front-End Loader (FEL) onto transport trucks (tipper trucks) for transport to third party buyers. Tipper trucks typically have 30-60 tonnes capacity. It is planned that tailings material will be recovered at a rate of approximately 40,000 tonnes per month. The South Backfill Pit contains approximately 431 426 tonness of tailings while the North Backfill Pit contains approximately 635 630 tonness of tailings. The recovery process is expected to last between 28-35 months. At the anticipated rate of recovery, approximately 23 trucks will be dispatched from the site daily containing tailings material. The mine will ensure an open channel of communication with the surrounding mines to address any potential concerns in terms of road access or usage. Trucks will be parked in the designated truck parking areas to avoid congestion on the roads.

In general (and not specific to this project only), from a social perspective, the following objectives and measures must be enforced.

<u>Maximise Employment Opportunities and Limit Skills Inequities</u>

Objective	Maximise local employment opportunities and limit skills inequities associated with the construction and operation	
Mitigation: Action/control	Responsibility	Timeframe
Prioritise local labour in the recruitment process as part of the company's own recruitment policy or as part of contractor management plan during construction and operations	Human resources/ Social and Labour Plan (SLP) officer	Before activities commences
Meet the targets of mining legislation and the relevant mining charter for employment of Historically Disadvantaged South Africans (HDSA) in management positions and core skills	Human resources/ SLP officer	Before construction activities commences

Put a procurement strategy as well as a contractor management plan (if relevant) in place to ensure that as close to 100% as possible local employment target in terms of unskilled labour is met	Human resources/ SLP officer	Before construction activities commences
Up-skill the local labour force as per SLP	Human resources/ SLP officer	Before construction activities commences
Develop a database of goods and services that could potentially be outsourced to the local community	Supply chain management	Before construction activities commences
Where local contractors are used, put a contractor management plan in place (if relevant) to ensure that the local employment and procurement targets of the operations are met	Supply chain management	Before construction activities commences
Performance Indicator	% local labour employed in different skill categories % HDSA in management positions Training programmes completed by local labour force. % of goods and services procured from local community by type of product	
Monitoring	Annually as per SLP and procurement strategies	

Minimise external costs for the local community

Objective	**Minimise external costs for the local community**	
Mitigation: Action/control	**Responsibility**	**Timeframe**
Implement management measures of specialist reports (ground and surface water and transport)	Environmental Officer	During planning phase
Establish a community forum to discuss potential complaints related to environmental considerations	Environmental Officer	During construction phase
Participate on a regular basis in the local business chambers and/or mining forums and address issues that could negatively impact on the area	Environmental Officer	During construction phase
Performance Indicator	The number of community complaints received and resolved. The number of chamber meetings attended, complaints received and resolved	
Monitoring	Per quarter (4 times a year)	

Minimise the negative economic impacts related to mine closure

Objective	**Minimise the negative economic impacts related to mine closure**	
Mitigation: Action/control	**Responsibility**	**Timeframe**
As per the requirements of the SLP, develop mechanisms to assist employees, prior to retrenchment date in the transition phase after closure of the operations including portable skilled development programmes during the operational phase of the mine, providing assistance in accessing available and suitable jobs with other local mines or companies etc.	Human resources/ SLP officer/	During operations/ before closure
Focus on non-core related local supply links during the operational phases of the mine to facilitate easier transitioning of local suppliers to other costumers	Supply chain/procurement	During construction
Plan community projects with an exit strategy of which beneficiaries are aware of	SLP officer, corporate social investment programme	During operations/ before closure
Performance Indicator	% spending on non-core mining local inputs % of employees that receive portable skills training % of retrenched employees placed in alternative employment Exit strategies for every community investment programme	

Monitoring	Annually/ just before closure

1.u.i.2 Impact on any National Estate referred to in Section 3(2) of the National Heritage Resources Act

The activities in question are restricted to existing disturbed areas. No impacts in this regard are expected.

1.v Other Maters required in terms of sections 24(4)(a) and (b) of the Act

Information regarding the baseline and potential impacts for this DCM project, is based on the existing information available, discussions with stakeholders (refer to Annexure 4), specialists (Annexure 6), the applicant and discussions with authorities (Annexure 5 and Annexure 4). The EAP has included all identified impacts, based on the current scope of the project, in this EIA and has assigned appropriate management measures to reduce and manage each identified impact, which are included in this EMPr.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1.a Contact Person and Correspondence Address

1.a.i Details of the Environmental Assessment Practitioner (EAP)

Table 36: Details of EAP

Name	Tanja Bekker
Designation	Environmental Assessment Practitioner
Postal Address	PO Box 22014, Helderkruin, 1733
Physical Address	21 Gladiolus Street, Roodekrans, 1724
Telephone Number	+27 (0) 82 412 1799
Cell Phone Number	+27 (0) 82 412 1799
Fax Number:	+ 27 (0) 86 551 5233
Email Address	tanja@envirogistics.co.za

1.a.ii Expertise of the EAP

The following table presents a summary of the EAP's experience:

Table 37: Experience of EAP

Name	Position	Qualification	Professional Registrations	Experience
Tanja Bekker	Registered Environmental Assessment Practitioner	M.Sc. Environmental Management (RAU, now University of Johannesburg)	Environmental Assessment Practitioners Association of South Africa (EAPASA) Reg No. 306/2019 Professional Natural Scientist (Pr.Sci.Nat) with the South African Council for National Scientific Professions (SACNASP) Reg No. 400198/09 Member of the International Association of Impact Assessors (IAIA) Member of the Environmental Law Association of South Africa (ELA)	19 Years

Please refer to Annexure 2 for the EAPs Curriculum Vitae.

Education

M.Sc. Environmental Management - RAU (University of Johannesburg)
B.Sc. Geography Honours - RAU (University of Johannesburg)
B.Sc. Earth Sciences (Geography & Geology) – RAU (University of Johannesburg)

Career Enhancing Courses

ISO 14000 Lead Auditors Course (WTH Management)
Certificate in Project Management (Pretoria University)
Management Advance Programme (MAP 81) (Wits Business School)

Professional Affiliations

Certified member of Environmental Assessment Practitioners Association of South Africa
Certified ISO 14001 Environmental Management System Auditor
Registered as a Professional Natural Scientist,
Member of the South African affiliate of the International Association for Impact Assessment
Member of the Environmental Law Association of South Africa (ELA).

Summary of the EAP's past experience

Ms. Bekker is registered as a Professional Natural Scientist with SACNASP and is also a registered Environmental Assessment Practitioner (EAP) with EAPASA, a legal requirement stipulated by the National Environmental Management Act, 1998. She is further certified as an ISO 14001 Lead Auditor. Her qualifications include a BSc. Earth Sciences (Geology and Geography), BSc. (Hons.) Geography, and a MSc. Environmental Management. In addition to these tertiary qualifications, she obtained a Certificate in Project Management, and completed the Management Advance Programme at Wits Business School.

With more than 19 years' working experience in environmental management and the consulting industry and managing various Large Account Clients, she understands the South African Regulatory System, and can advise client with due diligence on their environmental regulatory requirements and offer a solution driven service to their project life cycle. She is equipped with exceptional project management and coordination skills, which especially enhances the service she offers clients within the environmental permitting system.

Her key focus is environmental management and compliance with extensive experience in the mining industry. Project Management and Coordination of projects form a critical component of her duties, which include project planning, initiation of projects, client, authority and stakeholder consultation, specialist coordination, budget control, process control, quality control and timeframe management. Her interest lies in a client advisory capacity, being involved during due diligence investigations, pre-project development and assisting the client and engineering team in adding value to develop the project in an environmentally sustainable manner, considering client costs and liabilities, as well as considering the implication of environmental authorisation conditions and requirements on project deliverables. Her involvement in projects has spanned over the project life cycle from Due Diligence Investigations, Pre-Feasibility Investigations, Prospecting Right Applications, Mining Right Applications, Environmental Reporting and implementation and auditing of Environmental Management Plans and Authorisations.

1.a.iii Details of the Applicant

Dwarsrivier Chrome Mine (Pty) Ltd (hereafter referred to as “the mine” or “DCM”) is wholly owned by Assore Ltd.

According to information obtained from the official Dwarsrivier Web Page, the origin of the mine took place as a result of neighbouring properties to the north and south of DCM, which had existing chrome mining operations at the time of purchase in 1998. The owners of DCM, therefore invested in a feasibility study for the Plant, old Tailings Storage Facility (hereafter referred to as the “Old TSF”) and the mining of chrome. The designs for the opencast- and underground mines then commenced. Approval to proceed with the final design and construction of work was given in July 1999 (http://www.assmang.co.za/chrome.asp). The mine ceased opencast operations in 2006 and is currently operating as an underground (trackless, board and pillar operation) mine, producing chromite ore, with a Dense Medium Separation and Spiral Beneficiation Plant. DCM currently produces approximately 200,000t of chromite ore per month.

Table 38: Details of Applicant

Project applicant:	Dwarsrivier Chrome Mine (Pty) Ltd		
Registration no (if any):	2011/105280/07		
Trading name (if any):	N/A		
Responsible Person, (e.g. Director, CEO, etc.):	Environmental Representative		
Contact person:	Mr. Pieter Schoeman		
Physical address:	The mine is situated 25km outside of Steelpoort on the Remainder of Portion 1 (RE of Portion 1) and the Remainder Portion (Portion 0) of the farm Dwarsrivier 372KT and Portion 4 (a portion of Portion 3) of the Farm De Grooteboom 373KT		
Postal address:	PO Box 567, Lydenburg		
Postal code:	1120	Cell:	+27 (0) 76 028 7680
Telephone:	+27 (0) 13 230 5300	Fax:	+27 (0) 13 230 5318
E-mail:	pieters@dwarsrivier.co.za		

1.a.iv Environmental Authorisations

The mine is operating with all required environmental authorisations as indicated in the table below. Those highlighted are applicable to the current project.Table 39: List of Environmental Authorisations

#	Legislation	Licence	Reference	Date
1	Minerals Act, 1991 (Act No. 50 of 1991)	Approval for Dwarsrivier Phase II Chrome Project	OT6/2/2/426A	14 December 1999

#	Legislation	Licence	Reference	Date
2	National Water Act, 1998 (Act No. 36 of 1998) (NWA)	Regulation 4b (GN704) Exemption for undermining 2006	16/2/7/B400/C83/1	12 September 2006
3	NWA	Overall Water Use Licence (WUL)	16/2/7/B400/C83	21 January 2008
4	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA)	Environmental Management Programme (EMPr)	-	December 2010
5	NWA	WUL – Tailings Dam	04/B41G/G/792	8 July 2011
6	National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)	Environmental Authorisation for the proposed construction of a new Tailings Storage Facility	12/1/9-7/1e/GS4	9 July 2011
7	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEMWA)	Waste Licence – Hazardous Waste Temporary Storage Facilities[2]	12/9/11/L290/5	21 July 2011
8	MPRDA	Dwarsrivier Mine Tailings Storage Facility Environmental Management Programme	LP30/5/1/3/2/1(179)EM	22 August 2011
9	MPRDA	Approval for Three Plants	LP30/5/1/3/2/1 (179)EM	11 January 2012
10	NEMWA	Waste Licence – Temporary General Waste Storage Facilities	12/4/10-A/1/GS3	29 March 2012
11	NEMA	Construction of a Low-Level Bridge over the Groot Dwarsrivier	12/1/9/1-GS22	11 June 2012
12	NEMA	Environmental Permission for Construction of a Bridge over the Springkaanspruit River	12/1/9/1-GS62	19 September 2013
13	NWA	WUL – River Crossings	04/B41G/CI/2240	4 October 2013
14	NEMA	Section 24G Rectification	12/1/9-7/S24G/7-GS1	26 August 2014
15	NEMWA & NEMA	Integrated Environmental Authorisation	179EM	15 February 2018
16	NEMA	Integrated Environmental Authorisation	179EM	29 May 2019

Refer to Annexure 3 for the list of relevant (highlighted in table) Environmental Authorisations.

1.b Description of the Aspects of the Activity

The activities associated with this EMPr is presented in Section 1.d of Part A of this report (see Section 1.g.iii.1). The specific aspects associated with the activities are presented in Section 1.g.iv.1.

1.c Composite Map

Please refer to the following figure. For further information regarding the environmental characteristics of the area, please refer to Section A (Section 1.g.iii).

[2] Note that the Licence Holder has not and will not be commissioning the activity. The Environmental Authorisation has therefore not been implemented on site. The Licence Holder is not in contravention with the Environmental Authorisation.

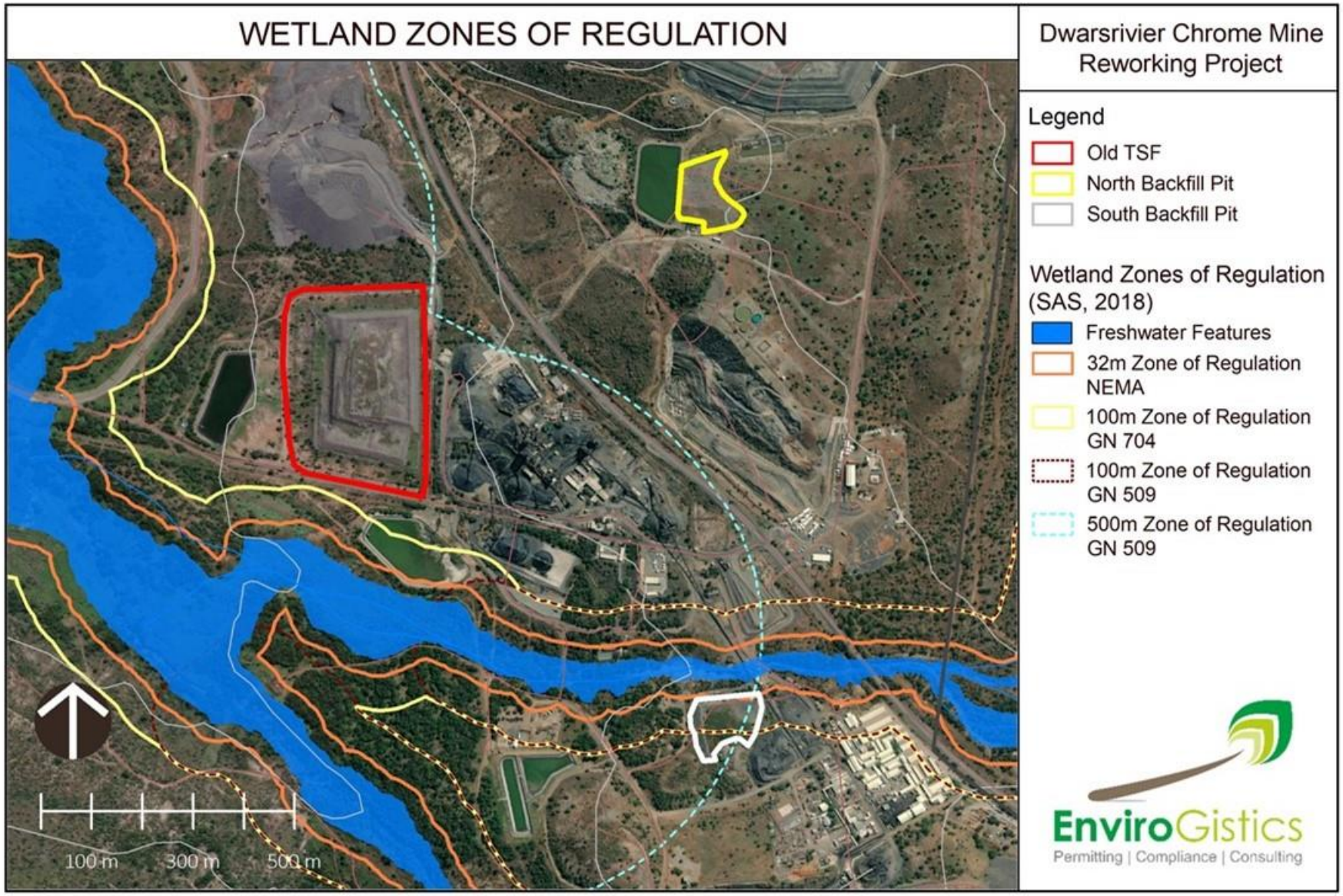


Figure 38: Composite Map

1.d Description of Impact Management Objectives including management statement

1.d.i Determination of Closure Objectives

The rehabilitation plan is developed on the basis that the rehabilitated areas are safe, stable, and non-polluting and are able to support a self-sustaining ecosystem similar to that of the surrounding natural environment. To ensure that the rehabilitation plan is aligned with the closure objectives, a high-level risk assessment of the project components has been undertaken to establish the potential risks associated therewith.

Please refer to Table 40 for the detailed assessment of impacts and recommended objectives. The key objectives to consider will include:

- Operate within the enviro-legal ambits of South Africa.
- Be aware of the latest environmental legal requirements.
- Include local labour and/or third party contracts where possible.
- Manage the logistic activities on roads in terms of truck parking and usage to minimise impact on other road users.
- Limit the impact of the activities on the ecological setting of the area.
- Operate the water management circuit on site to increase mining efficiency and reduce the need for maintenance of these facilities.
- Limit the loss of soils as far as possible and ensure that the integrity remains during stockpiling for the purposes of successful rehabilitation.
- Remain within the designated area demarcated for activities.
- Remain within the NEM:AQA Dust Regulation guidelines for rural communities.
- Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the operation of the reworking activities.
- Follow the waste hierarchy approach.
- Protect the integrity of the clean and dirty water system.
- Return the area to its intended final land use.

The following objectives and targets are proposed for groundwater management at the operations:

- Implement a management plan aimed at reducing and/or eliminating adverse impacts on the receptors, including the Groot Dwarsrivier. This management plan must be aligned with the Groundwater Remediation Strategy (Digby Wells Environmental, 2018).
- Track and record the progress of implementation of all groundwater management measures. This process must be geared at optimising the measures earmarked for implementation from the Groundwater Remediation Strategy.
- Implement sufficient monitoring procedures to measure the effectiveness of groundwater management measures within the delineated zones of influence.
- Analyse the information obtained from all monitoring programmes against compliance targets to establish trends as well as the objectives of the Groundwater Remediation Strategy.
- Should the trends indicate adverse impacts on groundwater levels and/or quality, implement suitable measures within the shortest possible time to remediate and/or eliminate such adverse impacts identified.

Through the implementation of the proposed mitigation measures, it is anticipated that the identified impacts can be managed and mitigated effectively, and the objectives set can be met. Through the implementation of the mitigation and management measures it is expected that:

- The pollution of soil and water resources can be effectively managed through containment.
- Impact on unknown heritage sites can be effectively managed to the implementation of a management protocol in the event that such facilities are encountered.
- Ecological impacts can be managed through the implementation of pollution prevention measures, minimising land clearing, restricting working hours (faunal disturbance), maintain speed limits and rehabilitation (including control of invasive species).

Please refer to Table 41 for the rehabilitation requirements for each of the project areas.

1.d.ii Potential risk of Acid Mine Drainage

Leach tests were however completed with distilled water as part of a waste classification study completed on mine residue deposits (iLEH, 2018).

The DCM monitoring programme furthermore confirm that both groundwater and process water have neutral to alkaline pH conditions. The risk of acidification of the mine water circuit is therefore considered to be low.

Information presented by EScience Associates (2010) confirms the fact that the mine is unlikely to acidify. Acid-base accounting undertaken as part of this study indicates that the tailings and waste rock is relatively inert and has low levels of potential acid generation. Sulphides are present, but in extremely minor quantities and in highly competent and impermeable rock. Sulphate concentrations in in groundwater is therefore also expected to remain low. The neutralising potential exceeds the acid generating potential in all cases. In the long-term, neutral pH conditions are expected. Under these conditions, low dissolved metal concentrations are expected.

The December 2020 Hydrogeological Study indicated that the removal of the tailings material from North Pit is anticipated to result in the most significant impact on groundwater quality in the long-term. In South Pit, the waste rock backfilled is expected to control groundwater quality to a greater extent and the removal of the tailings material is not expected to result in significant impacts on the aquifers.

The removal of tailings backfill from North Pit should therefore be considered a priority, as it is expected to significantly reduce the source to groundwater contamination in this area, especially since the Northern Return Water Dam (RWD) is lined with high-density polyethylene (HDPE).

The key motivations for this project are therefore: 1. Economic benefit of optimally mining available resources and 2. The removal of the material from the opencast pits will result in the management of long-term groundwater impacts.

1.d.iii Steps taken to investigate, assess, and evaluate the impact of acid mine drainage

Please refer to the section above.

1.d.iv Engineering or mine design solutions to be implemented to avoid or remedy acid mine drainage

Please refer to the sections above. Based on the specialist studies there are no acid mine drainage expected from activities taking place on site.

1.d.v Measures that will be put in place to remedy any residual or cumulative impact that may result from acid mine drainage.

Please refer to the sections above. Based on the specialist studies there are no acid mine drainage expected from activities taking place on site and proposed project.

1.d.vi Volumes and rate of water use required for the mining, trenching or bulk sampling operation.

No additional water requirements are associated with this Environmental Authorisation.

1.d.vii Has a water use licence has been applied for?

The activities in question will take place within the areas previously approved for backfilling. The WUL 2008 approves both the backfilling of the opencast pits as a GN704 activity and a Section 21g water use, as well as the activities in proximity to watercourses as Section 21c&i water uses, for this reason no additional water use is required.

1.d.viii Impacts to be mitigated in their respective phases

Please refer to Table 8 for the discussion on the sizes of disturbance.

Table 40: Planning, Construction, Operational and Decommissioning Phase Impact Table with Management Measure, Objectives and Standards (Significance before Mitigation –SbM; Significance after Mitigation – SaM; Can be avoided – CbA; R – Reversible; Ir – Irreversible; ST: 1-12 months; MT: 1-5 yrs.; LT: 5 years and more; LOM: Life of Mine)

Name of Activity / Activities	Impact Area / Potential Impacts	Potential Impacts / Potential Impacts	Rating Prior to Measures / Status	Rating Prior to Measures / SbM	Mitigation Type / Mitigation Measures	Rating Post Measures / Status	Significance / SaM	Significance / CbA/ R/Ir	Performance Objectives	Goals	Time Period for Implementation / ST	MT	LT	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
Planning Phase																		
Legal Requirements (Environmental Permits)	Legal Compliance	Unlawful water and waste activities, which could lead to NWA Directives and Section 24G Rectification fines.	N	-14	A legal assessment of all activities and future planned activities must be undertaken annually to ensure that all activities are authorised.	P	17	CbA	To operate within the enviro-legal ambits of South Africa.	Ensure that all activities undertaken by the mine are lawful with the required environmental licences in place.				x	Compliance in terms of Regulatory Requirements and the implementation of the EMP.	Appointment of an Independent Environmental Control Officer (ECO) to assess compliance with the EMP.	Independent ECO	Monthly for the construction phase. Thereafter annual external audits can be undertaken. Monthly update of legal register.
					All legally appointed personnel responsible or involved in water use activities and activities associated in the Environmental Authorisations on site must receive training on the requirements of the Environmental Authorisations and relevant Environmental Legislation.				To be aware of the latest environmental legal requirements.	All Departments responsible for development of the mine and associated capital projects, must understand the requirements of the environmental legislation and approved Environmental Authorisations and must include such into their planning processes.				x	Compliance in terms of Regulatory Requirements and the implementation of the EMP.	Monthly environmental meetings must be implemented to discuss the mining plan, implementation thereof, implication on current Environmental Regulations and potential constraints and liabilities. Minutes must be kept of these meetings and action plans with responsibilities must be drafted. The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts;	Safety, Health, Environment and Quality (SHEQ) Department to Coordinate	Monthly Environmental Meetings. Monthly update of legal register. Regular updates of Code of Practices (COPs) and Strategic Operating Plans (SOPs). Annual induction which includes the relevant contents of Environmental Authorisations, approved Environmental Reports and applicable Environmental Legislation.
					Biannual internal audits should be undertaken, on the lawful implementation of the Environmental Authorisation													
					A copy of the WUL must be available on site at all times.													

Name of Activity / Activities	Impact Area	Potential Impacts / Potential Impacts	Rating Prior to Measures: Status	Rating Prior to Measures: SbM	Mitigation Type / Mitigation Measures	Rating Post Measures: Status	Significance: SaM	Significance: CbA/ R/Ir	Performance Objectives	Goals	Time Period for Implementation: ST	MT	LT	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					The following buffers should be maintained: No activities, unless authorised, within the 1:100 year floodline. It should be noted that the opencast pits, especially South Opencast Pit is approved in the 2008 WUL as a Section 21 c&i, and also have exemption from GN704 for the purposes of backfilling.				Protection of sensitive environments.	Protection of sensitive environments.				x		• Regulations • COPs • SOPs Management and staff must be trained to understand the contents of these documents and to adhere thereto. Environmental Awareness training must be provided to employees. A site layout with all the no-go zones should be compiled.		No go zones map - immediately. Biannual internal Audits must be undertaken.
					Prior to awarding a contract to a 3rd party for the removal of the tailings the mine must ensure that the 3rd party and facility where the beneficiation will be undertaken in legally authorised to conduct these activities													
					The legal register must be updated to indicate all activities associated with Environmental Authorisations.				Proactive knowledge of potential system errors and/or constraints will avoid potential non-compliances or process delays.	Operational Environmental Management System that addresses the needs and responsibilities of all departments.				x				
					The mine must ensure to have a veld fire management plan in place, with a detailed implementation programme. This			CbA	Proactive management could illuminate uncontrolled fires.	No uncontrolled fires.				x		Update of fire management plan where required. Assessment of the effectiveness of the fire management plan during	SHEQ Department	Annual reviews

Name of Activity / Activities	Impact Area	Potential Impacts / Potential Impacts	Rating Prior to Measures / Status	Rating Prior to Measures / SbM	Mitigation Type / Mitigation Measures	Rating Post Measures / Status	Significance / SaM	Significance / CbA/ R/Ir	Performance Objectives	Goals	Time Period for Implementation / ST	MT	LT	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					should be regularly assessed as part of a Biodiversity Management Plan.											biodiversity management plan reviews.		
Operational Phase																		
Operation of the Reworking area and the transportation of the product to the plant and truck parking areas.	Geology	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Natural Topography	The ongoing removal of the material will result in a recreation of the open void, up until rehabilitation will be undertaken.	N	-11	All tailings must be removed from the opencast pits to result in the benefit of the project on the groundwater plume migration. The area will be landscaped to follow natural contours, upon completion of mining operations and in line with the numerical model requirements.	P	15	-	Reinstatement of topography	Meeting final land use objectives				x	Remain within demarcated footprints.	Ensure that the final footprint is shaped to allow for free flow and vegetation establishment.	Engineering Department and SHEQ Department.	Annual Biodiversity Action Plan (BAP) updates. Once footprints are available for rehabilitation this must be monitored weekly.
		The ongoing removal of the TSF will result in a positive impact with the reinstatement of the natural topography.	P	-7	All tailings must be removed from the footprint. The area will be landscaped to follow natural contours.	P	15	-	Reinstatement of topography	Meeting final land use objectives				x	Remain within demarcated footprints.	Ensure that the final footprint is shaped to allow for free flow and vegetation establishment.	Engineering Department and SHEQ Department.	Annual BAP updates. Once footprints are available for rehabilitation this must be monitored weekly.
	Soil	The removal and stockpiling of topsoil, which has been placed during the prior rehabilitation practices may lead to a loss of soil resource previously used in rehabilitation of the opencast pits through erosion of the stockpiles and chemical and physical degradation. This impact is considered important due to	N	-13	Adhere to Soil Stripping, Soil Stockpiling and Soil Management Plan as part of the original EMP (Soil Utilisation Guideline). Prior to construction of the road the soil will be stripped and placed on a soil stockpile. Remove topsoils previous placed as part of rehabilitation. Topsoil should be stockpiled on designated topsoil	N	-5	CbA	Limit the loss of soils as far as possible and ensure that the integrity remains during stockpiling for the purposes of successful rehabilitation. Protect the soil resources within the area in which the mine operates.	The integrity of the soils stockpiled must remain suitable for the purposes of rehabilitation. No disturbed areas should remain beyond the demarcated areas. 100% compliance to remain with approved footprint areas.	x				Soil erosion and incorrect stockpiling of topsoil.	Appointment of an Independent ECO to assess compliance with the EMP. The SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format,	SHEQ Department	Annual External Audit. Daily internal inspections. Recording of incidents when occurring. Annual induction. Inspection on the integrity of topsoil annually.

Name of Activity / Activities	Impact Area	Potential Impacts / Potential Impacts	Rating Prior to Measures / Status	Rating Prior to Measures / SbM	Mitigation Type / Mitigation Measures	Rating Post Measures / Status	Significance / SaM	Significance / CbA/ R/Ir	Performance Objectives	Goals	Time Period for Implementation / ST	MT	LT	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
		the fact that the mine may be operating on a negative topsoil balance and therefore the retaining of suitable topsoil is important for successful rehabilitation			stockpiles, unless around linear infrastructure, where the topsoil could be stockpiled next to the linear structure. The Topsoil Management Plan, 2016 should be implemented on all topsoils immediately to ensure that the integrity of the soils are maintained. Any new topsoil stockpiles should not exceed the recommended heigh in terms of the Topsoil Management Plan, 2016 of 2-4m. Where exceedance is present on existing facilities, erosion control measures should be implemented and vegetation establishment should be encouraged to assist in maintaining the structure of the soils for rehabilitation.											issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.		
		Contamination of Soil due to hydrocarbon spills due to the presence of vehicles	N	-11	Vehicles and Machinery will be regularly maintained. Maintenance programmes will be established and implemented. All refuelling of vehicles and	N	-2	CbA	Protecting of soil integrity.	Zero presence of contaminated land due to early detection and implementation of actions.	x			x	Soil Pollution			

Name of Activity / Activities	Impact Area	Potential Impacts / Potential Impacts	Rating Prior to Measures / Status	Rating Prior to Measures / SbM	Mitigation Type / Mitigation Measures	Rating Post Measures / Status	Significance / SaM	Significance / CbA/ R/Ir	Performance Objectives	Goals	Time Period for Implementation / ST	Time Period for Implementation / MT	Time Period for Implementation / LT	Time Period for Implementation / LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					equipment maintenance must be done within designated and demarcated areas.													
					Spill and absorption kits must be available and readily accessible at the parking and offloading areas. There should always be a spare kit available at any given time.											Ensure that spill and absorption kits are present at all times.		
					If necessary, the polluted soils will be remediated and affected areas rehabilitated.											Induction with the view on creating environmental awareness.		
		Contamination of Soils, due to unmanaged runoff from the facility is highly improbable as the area is contained within a closed storm water circuit. The overall removal of the site will however have a beneficial impact on the specific site soil conditions.	N	-5	Ongoing maintenance of the storm water management systems must be maintained.	P	15	CbA	Protecting of soil integrity.	Zero presence of contaminated land due to early detection and implementation of actions.				x	Compliance with approved Closure Plan.	Appointment of an Independent ECO to assess compliance with the EMP. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the	SHEQ Department	Annual BAP updates. Once footprints are available for rehabilitation this must be monitored weekly. Daily internal inspections. Recording of incidents when occurring.
					Any spills of tailings into the concrete channels should be removed and disposed of back onto the site or on a licenced facility.													
					Trucks must be loaded within the demarcated dirty water system. Any spills of tailings into the concrete channels should be removed and disposed of back onto the site or on a licenced facility.													
					Remain within demarcated areas.													
					Once footprints are available these should be graded													

Name of Activity / Activities	Impact Area	Potential Impacts / Potential Impacts	Rating Prior to Measures / Status	Rating Prior to Measures / SbM	Mitigation Type / Mitigation Measures	Rating Post Measures / Status	Significance / SaM	Significance / CbA/ R/Ir	Performance Objectives	Goals	Time Period for Implementation / ST	MT	LT	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					and topsoil should be placed to allow for re-vegetation.											management team. Ensure that the soils are replaced in line with the Topsoil Management Plan of the mine and that vegetation be undertaken in line with the approved Closure Plan.		
	Ecology	The establishment of Weeds and Invader Species.	N	-13	A weed eradication programme will be developed and implemented to eradicate weeds and invader plants and to prevent new invasions during the ongoing mining operation. If natural succession of vegetation is not established within one rainy season, after rehabilitation, the disturbed areas and areas adjacent to the infrastructural areas must be re-vegetated with an indigenous grass mix, if necessary, to re-establish a protective cover, to minimise soil erosion and dust emission.	N	-2	R	Limit the impact of the mining operation on the Ecological Setting of the area.	Reduce the presence of invader species by 90% on site.	x			x	Invasion of Weeds and Alien Vegetation.	A weed eradication plan must be implemented on site. This must be undertaken prior to the growing season. An ecological study should be undertaken to determine the status of revegetation on the site especially around the rehabilitated areas.	SHEQ Department and a Specialised Ecologist.	Weed monitoring (monthly) Weed eradication (annually or as required) Ecological Study (annually)
		Uncontrolled fires could impact on the surrounding ecological setting should the necessary measures not be implemented.	N	-13	The mine must ensure to have a veld fire management plan in place, with a detailed implementation programme. This should be regularly assessed as part of a	N	-2	CbA			x			x	Ecological Monitoring and Operational Procedure Updates	Update of fire management plan where required. Assessment of the effectiveness of the fire management plan during biodiversity	SHEQ Department	Annual reviews

Name of Activity / Activities	Impact Area	Potential Impacts / Potential Impacts	Rating Prior to Measures / Status	Rating Prior to Measures / SbM	Mitigation Type / Mitigation Measures	Rating Post Measures / Status	Significance / SaM	Significance / CbA/ R/Ir	Performance Objectives	Goals	Time Period for Implementation / ST	MT	LT	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					Biodiversity Management Plan.											management plan reviews. Ongoing induction programmes for new employees and contractors as well as refreshments for existing employees.		
					No open fires will be allowed on the mine and all parties will be subjected to induction, which should address the risk of fires and specific management measures in this regard (this should address the disposal of cigarettes as well).													
		Accidental death of animals on the existing roads.	N	-13	Clearly marked signs will be erected along the transportation routes to create awareness of animal crossings.	N	-1	CbA	Awareness creation on the importance of that natural ecosystem in which the mine operates. Implementation of safe operation practices.	Zero animal fatality.	x			x	Creation of Awareness.	Induction with the view on creating environmental awareness.	SHEQ Department	Annually for permanent staff. Start of each visit for contractors.
					A clearly marked and enforced vehicle speed will be implemented on the internal mine and transportation routes.													
					A detailed induction programme will be in place to ensure that all parties are aware of the rules and regulations on site in terms of the use of roads.													
					Vehicles may only travel on demarcated roads on site.													
	Riparian and Wetland Habitats	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Surface Water	Contamination of surface water resources. There are no surface water resources	N	-9	Clean and Dirty water separation systems should be maintained.	N	-2	CbA	Operate the site to limit the presence of spills and discharge	Maintain the SWMP on site.	x				Surface and Groundwater Pollution.	The water quality (constituents listed in the WUL) of the surface water resources must be	SHEQ Department	Monthly

Name of Activity / Activities	Impact Area	Potential Impacts / Potential Impacts	Rating Prior to Measures / Status	Rating Prior to Measures / SbM	Mitigation Type / Mitigation Measures	Rating Post Measures / Status	Significance / SaM	Significance / CbA/ R/Ir	Performance Objectives	Goals	Time Period for Implementation / ST	MT	LT	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
		in the area where the infrastructure is proposed, however, the natural runoff, which must be managed internally on site could become impacted. At the Old TSF reworking area, contamination of soils, due to unmanaged runoff from the facility is highly improbable as the area is contained within a closed storm water circuit. The overall removal of the site will however have a beneficial impact on the specific site soil conditions.							thereof through runoff.							monitored monthly and records must be kept of these results in a centralised system. Analysis of results must be undertaken by an accredited laboratory.		
					Manage storm water flow with temporary erosion control measures where possible (cut-off trenches or berms)											An incident reporting procedure should be available on site and definitions must be developed to determine when an incident is reportable. Reportable incidents should be reported to the Regulatory Authority as per the regulatory requirements, as well as stipulations as part of the WUL and Environmental Authorisations.	SHEQ Department	Reporting of incidents in terms of Environmental Authorisations, but generally within 24 hours of occurrence. Update of the Incident Reporting Procedure in terms of the procedure requirements.
					Vehicles/machinery will be regularly monitored and maintained. Maintenance programmes will be established and implemented.											Induction with the view on creating environmental awareness.	SHEQ Department	Annually for permanent staff. Start of each visit for contractors.
					All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site											Regular inspections of the integrity of the SWMP should be undertaken on site.	Engineering Department and SHEQ Department.	Quarterly
					Any spills occurring during the collection process must be cleaned up immediately.											GN704 Audits should be conducted on site.	Hydrologist	Annually

Name of Activity / Activities	Impact Area	Potential Impacts / Potential Impacts	Rating Prior to Measures: Status	Rating Prior to Measures: SbM	Mitigation Type / Mitigation Measures	Rating Post Measures: Status	Significance: SaM	Significance: CbA/ R/Ir	Performance Objectives	Goals	Time Period for Implementation: ST	MT	LT	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					Trucks must be loaded within the demarcated dirty water system. Any spills of tailings into the concrete channels should be removed and disposed of back onto the site or on a licenced facility.													
					Remain within demarcated areas.													
					Soil that has been contaminated by spillages, seepages and leachates will be sampled and analysed. If necessary, the soils will be treated, ameliorated or removed for safe disposal.											A penalty system must be developed for non-compliance.		Supplier to sign, prior to delivery.
					Any significant spills must be captured in the incident reports and must be reported to the relevant department. In this event a remediation strategy should be developed and enforced.					Clean spills, if occur within 24 hours.	x			x		Clear signage must be erected on site detailing: Responsible persons and contact details; Truck requirements (i.e. spill kits, tarpaulins, etc.); Incident reporting procedures; Location of spill or absorption kits.	Procurement	Signage to be erected as part of construction phase.
					A clean up procedure (i.e. Works Instruction) must be in place.													
	Groundwater	Groundwater down gradient of the northern RWD has been impacted by historical tailings deposition into the North Pit void. DCM monitored the quality of the	N	-15	Develop and implement a sound surface runoff management plan for the project. This plan must focus on containing all dirty water that could be generated during the project and	N	-10	R	Understanding the groundwater conditions and the ongoing improvement in terms of rehabilitation objectives.	Development of a clear and precise groundwater management plan.				x	Outcomes of the 2020 Numerical Model and/or updated groundwater management strategy and requirements as	GN704 Audits should be conducted on site.	Hydrologist/ Engineer	Annually

Name of Activity / Activities	Impact Area	Potential Impacts / Potential Impacts	Rating Prior to Measures / Status	Rating Prior to Measures / SbM	Mitigation Type / Mitigation Measures	Rating Post Measures / Status	Significance / SaM	Significance / CbA/ R/Ir	Performance Objectives	Goals	Time Period for Implementation / ST	MT	LT	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
		water in North Pit from May 2009 up to June 2016. Nitrate concentrations for this period exceeded 2000 mg/l up to March 2010 after which it gradually decreased to between 500 and 700 mg/l in 2016. NettZero (2018) reports that DCM changed the type of explosives it used during this time. A comparison between nitrate concentrations in North Pit to that measured in borehole ASDWBH3 indicates that a sharp increase in nitrates were measured in the groundwater around May 2013, which is about 4 years after nitrate concentrations started exceeding 2000 mg/l in North Pit. Significantly elevated nitrate concentrations persisted in ASDWBH3 until around March 2018, after which concentrations decreased to around 500 mg/l. This could provide			preventing clean runoff from entering the footprint area.										part of the issued WUL.			
					Measure the depths of all groundwater monitoring boreholes. This can be achieved with the dip meter used to measure groundwater levels and can thus be complied with during the next monitoring run.											Regular inspections of the integrity of the SWMP should be undertaken on site.	Environmental Department	Bimonthly
					Measure groundwater levels in all monitoring boreholes as per the Groundwater Monitoring Strategy and analyse these against on-site rainfall data to improve the estimation of the rate of recharge of rainwater. This activity will be undertaken during the next model update with the latest monitoring dataset.											Internal Audits.	Environmental Department	Annually
					Ensure that sufficient capacity is available to all contain dirty water within mining area. This management measure must consider the effects and impacts of siltation during the project. If the capacity of the dirty water containment measures is compromised											Groundwater level monitoring.	Hydrogeologist/ Environmental Department	Monthly

Name of Activity / Activities	Impact Area	Potential Impacts / Potential Impacts	Rating Prior to Measures / Status	Rating Prior to Measures / SbM	Mitigation Type / Mitigation Measures	Rating Post Measures / Status	Significance / SaM	Significance / CbA/ R/Ir	Performance Objectives	Goals	Time Period for Implementation / ST	MT	LT	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
		an indication of plume dilution through the throughflow of rainwater recharged to the aquifers as well as through source reduction in North Pit. Nitrate concentrations in borehole DRM7, drilled into the backfilled North Pit, fluctuated between 2 and 30 mg/l since monitoring began in October 2018. At present, nitrate concentrations in DRM7 are consistently below 6 mg/l. Similar observations are reported for borehole DRM8 drilled into the tailings backfill area in South Pit. This monitoring information suggests that the nitrate contamination in borehole ASDWBH3 is associated with historical tailings deposition in North Pit and that groundwater quality is likely to improve in this borehole with time, as the source of nitrate			through siltation or other impacts, these structures must be desilted to free up capacity.													
					Complete regular inspections of all dirty water management systems, including toe drains, cut-off trenches and berms, pollution control dams and stormwater diversion structures, specifically noting incidences of overflow and leakage. If the latter is identified, measures must be taken to rectify non-compliances immediately.											Groundwater monitoring in terms of the WUL.	Hydrogeologist/ Environmental Department	In line with the WUL
					Maintain sound house-keeping measures to prevent spills and leaks. If spills and/or leaks occur, they must be addressed and remediated as a matter of urgency.											Reassessment of the work conducted by Digby Wells Environmental (2019) through the following: Numerical Modelling; Geophysical survey; Aquifer Testing.	Hydrogeologist/ Environmental Department	Once off
					Maintain the groundwater monitoring programme in existing monitoring boreholes. Some amendments to the current monitoring programme are proposed. These are detailed below.											Update of the Numerical Model.	Hydrogeologist/ Environmental Department	Annually
					Measure and record rainfall daily on site													

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		Potential Impacts	Status	SbM	Mitigation Measures	Status	SaM	CbA/ R/Ir			ST	MT	LT	LOM				
		contamination has been reduced.																
	Air Quality	Increase in dust-fallout from opencast reworking and the reworking of the Old TSF. DCM currently conducts similar activities at the mine and will therefore make use of existing infrastructure, machinery and methods. Similar 'loading' methods are used at the mine Run of Mine (ROM) stockpiles. The mine has not experienced any concerns in compliance with dust fallout limits in terms of the NEMAQA.	N	-9	Ongoing air quality monitoring must be undertaken in terms of the NEM:AQA. Strictly enforced speed limits on all roads Ensure that the necessary dust suppression is implemented on the internal haul roads. All trucks must be covered with a tarpaulin when transporting product off site.	N	-5	CbA	Recording of dust fall out to determine trends.	Meeting ambient dust fall out limits in terms of applicable NEM:AQA Regulations.				x	Dust dispersal.	Dust dispersion will be monitored as part of the overall mine dust monitoring programme.	SHEQ Department	Dust monitoring to be done in line with the current monitoring programme
	Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Visual	Fugitive dust emissions during reworking activities may have a negative impact on the visual characteristics of the area. This will be a temporary impact and will cease once the material has been removed.	N	-5	Ongoing air quality monitoring must be undertaken in terms of the NEM:AQA. Ensure that the necessary dust suppression is implemented on the internal haul roads. All trucks removing tailings must make use of tarpaulins to cover the material.	N	15	CbA	Remain below the NEM:AQA dust limits.	No exceedances in terms of dust emissions.				x	Compliance in terms of Dust Regulation limits.	Ongoing dust monitoring.	SHEQ Department	Inspection on effectiveness of trucks and the use of tarpaulins: each truck load. Dust monitoring: Monthly
	Social	The demand for chrome has increased globally due to the increase in China	N	-16	The approval of the WML will allow the mine to commence with the reworking of the opencast pits,	P	15	CbA	Ongoing chrome supply into the market.	Achieving a key component of the National Waste Management Strategy.	-	-	-	x	Economic Growth and Investment. Operating	Compliance with final rehabilitation plan.	SHEQ Department	Annual BAP updates. Once footprints are available for

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		Markets. Not allowing the reworking of the opencast pits will result in a loss of an economic activity to the regional area. In addition to this, the reworking of the of the pit is a commitment made by the mine in the EMPr, 2010.			which will give effect to the National Waste Management Strategy and the EMPr, 2010 commitments. The project will also allow for the proactive management of the potential groundwater plume migration identified in the numerical models. Where possible local labour should be sourced and third party contractors supported.										facilities in and environmentally lawful manner.			rehabilitation this must be monitored weekly. Daily internal inspections. Recording of incidents when occurring. Annual Performance Assessments. Annual assessment the Mining Work Programme and Exploration Programme
		It is planned that tailings material will be recovered at a rate of approximately 40,000 tonnes per month. The South Backfill Pit contains approximately 431,426 tons of tailings while the North Backfill Pit contains approximately 635,630 tons of tailings. The recovery process is expected to last between 28 and 35 months. At the anticipated rate of recovery, approximately 23 trucks will be dispatched from	N	-9	The mine will ensure an open channel of communication with the surrounding mines to address any potential concerns in terms of road access or usage. Trucks will be parked in the designated truck parking areas to avoid congestion on the roads. Trucks will be parked in the designated truck parking areas to avoid congestion on the roads.	N	-7	CbA	Continuation of traffic around the mining areas.	Maintain good relationships with surrounding mines.	X	-	-	-		Open channel of communication. Restriction of vehicle movement and parking within the mines control.	Production and Logistical departments, with input from SHEQ department.	Daily

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		the site daily containing tailings material.																
	Geology	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Topography	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waste Management and Handling Hydrocarbon spills within the Mining Area and the management of Domestic and Hazardous Waste	Soils	Contamination of soil resources due to hydrocarbon spills.	N	-11	Storage of fuels and oils, the refuelling of vehicles and equipment maintenance must be limited to designated, bunded (bunds to be 110% of volume of the materials stored) areas. All fuels and soils must be stored in appropriate containers. Chemicals and hazardous material must be stored in suitable containers, fit for purpose and in line with SDS requirements. Where drip trays are too small, specially prepared, non-pervious bunds with solution trenches must be used to capture spillages Oils and potentially hazardous materials must be disposed of at a licensed facility and waste certificates obtained. A spill kit must be provided to be used in the event of a spill. If a spill occurs, the contaminated soil must be removed	N	-5	R	Protecting of soil integrity. Awareness creation on site regarding duty of care and waste management.	Zero presence of contaminated land due to early detection and implementation of actions.	x			x	Soil pollution	The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team. Induction with the view on creating environmental awareness.	SHEQ Department SHEQ Department	ECO: Annual external audits can be undertaken. SHEQ: Weekly monitoring Annually for permanent staff. Start of each visit for contractors.

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					immediately. Contaminated soil must be stored according to best practices until it can be disposed of at a suitably licensed facility.													
					Safety signage must be used at designated storage areas.													
					All workers must undergo an induction which includes environmental awareness training to make them aware of the environmental incident management procedures as well as the importance of complying with management measures.													
	Ecology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Riparian Habitat and Wetlands	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Surface Water	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Groundwater	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Visual	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Decommissioning and Closure Phase																		
Legal Requirements (Environmental Permits)	Legal Compliance	Unlawful activities could lead to NWA Directives and Section 24G Rectification fines.	N	-14	A legal assessment of all activities must be undertaken annually to ensure that all are licensed.	P	17	CbA	To operate within the enviro-legal ambits of South Africa.	Ensure that all activities undertaken by the mine are lawful with the required environmental licences in place.			x		Compliance in terms of Regulatory Requirements and the implementation of the EMP.	Appointment of an Independent ECO to assess compliance with the EMP. Biannual internal audits must be	Independent ECO & SHEQ Department	Quarterly: SHEQ Weekly: SHEQ

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					A detailed closure plan must be developed and submitted to the relevant departments for approval.					Ensure that all environmental authorisations on site is implemented on site and ongoing monitoring of compliance are undertaken to reach 100% compliance.						undertaken during the construction phase, where after annual internal audits can be undertaken, to ensure compliance with the Environmental Authorisation and EMP. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.		
					All legally appointed personnel responsible or involved in activities on site must receive training on the requirements of the Environmental Authorisations and EMPs				To be aware of the latest environmental legal requirements.	All Departments responsible for development of the mine, must understand the requirements of the environmental legislation and must involve this into their planning processes.								
					Quarterly decommissioning must be undertaken, on the lawful implementation of the Environmental Authorisation													
					Environmental Authorisations must be available on site at all times.													
					The legal register must be updated to indicate all updated activities.													
	Geology	No direct impact	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Earth Moving, shaping and ripping of ground	Topography	The shaping of the site should be undertaken in such a manner that it improves the overall topography of the site.	P	13	Pre-mining topography should be reasonably restored through shaping and landscaping, such that the topography of rehabilitated areas will ultimately be commensurate with that of adjacent, non-disturbed areas.	-	14	-	Develop the area to its intended final land use.	Implement an action plan to systematically plan for closure.				x	Final land use	An operational rehabilitation plan must be implemented and audited by the SHEQ Department.	SHEQ Department.	Monthly monitoring.

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					The final shaping should be viable to allow for potential agricultural activities and grazing opportunities post mining. If possible, ensure a continuation of the pre-mining surface drainage pattern.													
	Soils	Soil erosion	N	-11	Re-vegetate as soon as possible	N	-5	CbA	Develop the area to its intended final land use.	Continuous rehabilitation of the decommissioning area will be conducted in line with the Best Practice Guidelines released by the DWA.			x	x	Soil erosion and incorrect stockpiling of topsoil.	Erosion protection measures should be implemented and monitored on areas identified. Photographic records of assessments must be kept.	Independent ECO and SHEQ Department.	ECO: Weekly for the decommissioning phase. Thereafter annual external audits can be undertaken. SHEQ: Weekly monitoring Pedologist: Weekly assessment of soil rehabilitation.
		Ripping and topsoil replacement will restore the soil physical characteristics prior to re-vegetation.	P	13	Compacted soils will be ripped and topsoil will be replaced. After the topsoil has been replaced the area should be ameliorated and seeded, should self-succession of vegetation not take place. Only species indigenous to the area will be included. The soil fertility status should be determined by soil chemical analysis after levelling (before seeding/re-vegetation. Soil amelioration should be done according to soil analyses as recommended by a soil specialist, to correct the pH and nutrition status before revegetation.	P	14	CbA										
					Where sites have been alienated of vegetation or where soils have been													

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					compacted or covered with concretes, these sites will be ripped and ploughed.													
					The topsoil and sub-soils with the appropriate seedbed as stripped during the construction and operational phases will be placed over these areas to a depth as specified by a qualified specialist. The topsoil shall be appropriately ameliorated to allow vegetation to grow rapidly if required – it should be noted that the mine will encourage self-succession of vegetation, if this does not take place effectively a re-vegetation project will be implemented													
	Terrestrial Ecology (Fauna & Flora)	The rehabilitation of the site will allow reestablishment of natural vegetation.	P	10	Compacted soils will be ripped and topsoil will be replaced. After the topsoil has been replaced the area should be ameliorated and seeded, should self-succession of vegetation not take place. Only species indigenous to the area will be included. Remove alien vegetation post decommissioning, with long term	P	13	CbA	Protect the Ecology within which the mine operates	Free draining environment with successful self-succession in place.			x		Invasion of Weeds and Alien Vegetation.	A weed eradication plan must be implemented on site. This must be undertaken prior to the growing season. An ecological study should be undertaken to determine the status of revegetation on the site especially around the rehabilitated areas.	SHEQ Department and a Specialised Ecologist.	Weed monitoring (monthly); Weed eradication (annually or as required); Ecological Study (annually)

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					follow-up afterwards.													
					On-going alien and invasive floral species control are required through all phases of rehabilitation.													
					If a reasonable assessment indicates that the re-establishment of vegetation is unacceptable slow, the soil needs to be analysed and any deleterious effects must be corrected and the area be seeded with a seed mix to specification													
					Access to rehabilitated areas should be restricted to vehicles/machinery specifically required for the implementation of the closure plan.													
	Wetland	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Hydrology	Runoff from rehabilitated areas will impact on watercourses especially during intensive rainstorms especially if the area is not free draining.	N	-5	The areas will be landscaped to be free draining in line with the approved storm water management plan.	P	13	CbA	Protect the water resources within the area in which the mine operates.	Continuous rehabilitation of the decommissioning area will be conducted in line with the Best Practice Guidelines released by the DWA.	x				Surface water pollution & soil assessments.	To ensure a proactive approach, the SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. The water quality (constituents listed in the WUL) must be monitored monthly and records must be kept of these results in a centralised	SHEQ Department	Assessments: Weekly. Monitoring: Monthly
					Berms, should they be necessary, must remain upstream and downstream of the areas to ensure that clean water is kept separate from dirty water until the area is free draining and re-vegetation has occurred.													

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																system. Analysis of results must be undertaken by an accredited laboratory. Monitoring of the effectiveness of the rehabilitation programme must be undertaken. This should be undertaken by means of weekly inspections and keeping a photographic record.		
	Geohydrology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Visual	The rehabilitation (ripping, topsoil replacement and landscaping) will remove the visual incongruity.	P	11	An overall visual improvement will be noticed once all mining related infrastructure has been demolished and the area has been landscaped and re-vegetated. Demarcate the decommissioning area and limit the decommissioning activities as far as possible. Final shaping will be implemented such that the final profile of the rehabilitated areas is formed to emulate natural contours of the area. All material recovered from the demolition of buildings and/or structures will either	P	13	CbA	Successful establishment of vegetation.	Remain within the designated area demarcated for activities. Remain within the National Environmental Management: Air Quality Act, 2004 Dust Regulation guidelines for rural communities.				x	Comply with the National Dust Regulations.	Dust dispersion will be monitored as part of the overall mine dust monitoring programme.	SHEQ Department.	Monthly Monitoring with Annual Reporting.
															Vegetation establishment.	An ecological study should be undertaken to determine the status of revegetation on the site especially around the rehabilitated areas.	SHEQ Department	Monthly

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					be transported to a permitted disposal site, or made available to the local community as building materials (provided they are in a satisfactory condition following demolition). Linear infrastructure constructed by the mine (i.e. roads, conveyors and power lines) will be removed if it proves to inhibit land use at decommissioning. All fences erected around the mine will be dismantled and disposed of at a permitted disposal site.													
	Air Quality	All activities associated with the removal of infrastructure has the potential to release dust.	N	-7	Dust sampling will be undertaken on a monthly basis. Monthly monitoring reports will be generated by the mine or through a suitably qualified air quality specialist. In the event that air quality or dust issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.	N	-5	CbA	No concerns raised by surrounding landowners regarding air quality.	Remain within the designated area demarcated for activities. Remain within the NEM:AQA Dust Regulation guidelines for rural communities.	x			x	Dust dispersion.	Dust dispersion will be monitored as part of the overall mine dust monitoring programme.	SHEQ Department.	Monthly Monitoring with Annual Reporting.
	Noise	All activities associated with the removal of	N	-4	The removal of all infrastructure is to take place during	N	-5	CbA	No concerns raised by surrounding	Remain within the designated area	x			x	Noise Monitoring.	Adjacent landowners will be informed of the	SHEQ Department.	Regular noise monitoring.

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		infrastructure and rehabilitation has the potential to generate noise.			daytime periods only. Where noise becomes a nuisance, management measures will be investigated and implemented to address these.				landowners regarding air quality.	demarcated for activities.						planned dates of the significant demolition activities where applicable. Daily noise monitoring will be undertaken in the areas where high levels of noise take place during decommissioning.		
					Machinery with low noise levels and maintained in a good order to be used and to comply with the IFC's Health and Safety Regulations.													
					Speed control measures will be implemented by the mine through the placement of adequate signage.					Remain within the NEM:AQA Dust Regulation guidelines for rural communities.								
					Implement a penalty system for non-compliance to speed control measures and ensure that all workers are made aware of the penalty systems.													
					Gravel roads to be maintained in as good and smooth a condition as possible.													
	Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Decant Management	Decant and associated water resource pollution	Simulations indicate that decant will occur if the rate of recharge to the pits remain at 15% of MAP post closure.	N	-15	The mine should plan towards closure by implementing the following: • All rehabilitation must be completed during the decommissioning phase. In terms of groundwater, the rehabilitation must focus on containing dirty water and	P	14	R		Achieve the objectives of the Numerical Model and the curbing of the potential groundwater plume migration.				x	Outcomes of the 2020 Numerical Model and/or updated groundwater management strategy and requirements as part of the issued WUL.	Internal Audits.	Environmental Department	Quarterly

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					leachate, preventing the ingress of clean runoff and rainfall to the rehabilitated footprint areas and avoid ponding over rehabilitated areas. • The outcome of the scavenger borehole optimisation project, as detailed in the operational phase management measures, will govern how long after closure abstraction of contaminated groundwater should continue. Current estimation is that the abstraction will be required for at least 17 years after closure, during which the water treatment plant must remain operational. • In order to minimise negative long-term impacts associated with the operations, it is important to complete tailings reclamation at the Old TSF to soil level over the entire footprint. All tailings must be removed during the project. Soil testing and remediation, as mentioned above, must form part of the rehabilitation phase.										Achieve land use objectives.			

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					• The groundwater monitoring programme must be maintained for the duration of the life of the operations as well as for a period of at least two years after mine closure. This information must be used to confirm the effect of rehabilitation at mine closure. • At the end of the two-year monitoring programme, the post-closure groundwater impact assessment must be re-evaluated and adjusted, as necessary, based on the results of the monitoring programme. • Once the monitoring data and the re-assessment of post-closure groundwater impacts are available, DCM must discuss these with the authorities and determine the need of additional monitoring through consultation.													
					Opencast pits must be rehabilitated to ensure a recharge of 5% or less. The reason for this is the findings from the groundwater model: If the rate of recharge to the pits cannot be reduced											Groundwater level monitoring.	Hydrogeologist/ Environmental Department	Monthly

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					to 5% of MAP or lower during rehabilitation, simulations suggest that the risk of decant will increase. Simulations suggest that the water level in the North Pit will not reach the decant point if the rate of recharge to the pit can be reduced to 5% of MAP or lower. There is a small possibility that the South Pit may decant if the rate of recharge can be reduced to 5% of MAP through additional rehabilitation. The pit is unlikely to decant if all rainfall to the pit can be eliminated in future. Opencast Pits 1-4 are not expected to decant if the rate of recharge can be reduced to 5% of MAP and less													
					Complete all rehabilitation to a satisfactory level, focussing specifically on maintaining dirty water and runoff in designated areas. Effective rehabilitation of these areas must aim to reduce the rate of recharge of rainwater as far as possible. No ponding must be allowed over										Groundwater monitoring in terms of the WUL.	Hydrogeologist/ Environmental Department	Period of two years after mine closure at least.

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					rehabilitated areas. All rehabilitated surfaces must be free draining.													
					Plan for and budget to continue with the groundwater monitoring period for a minimum of two years after mine closure. The continued need for groundwater monitoring will depend on the outcome of the final mine closure groundwater impact assessment.											Reassessment of the work conducted by Digby Wells Environmental (2019) through the following: Numerical Modelling; Geophysical survey; Aquifer Testing.	Hydrogeologist/ Environmental Department	Once off
					The re-mining of the North and South Opencast Pits is highly recommended as the proposed voids which should remain will have the potential to eliminate decant. The groundwater models suggests that: If a final void is left, groundwater levels would recover and stabilise with time if the rate of recharge to the pits can be reduced to around 5% of MAP through rehabilitation. The volume of groundwater inflow to the pits will reduce to near zero at this point, as the gradients towards the pits would be zero once											Update of the Numerical Model.	Hydrogeologist/ Environmental Department	Annually

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					groundwater levels have recovered. Under this scenario, the inflow and outflow to the final voids would be rainfall and evaporation.													
					In the event of decant, the following should be considered: The Northern RWD constructed on the western side of North Pit could be used to contain decant from the pit in the long-term, as the decant position is located in this area. This dam is lined with HDPE and would therefore comply with industry standards to contain decant. The following should be given consideration regarding the use of the dam to contain decant: • The dam must be able to contain the volume of decant as well as comply with the requirements of GN704 in terms of freeboard if decant is unavoidable. • A mechanism should be put in place below the decant elevation of the pit (950 mamsl) that will drain the pit water into the RWD if water levels												

Name of Activity / Activities	Impact Area	Potential Impacts / Potential Impacts	Rating Prior to Measures: Status	Rating Prior to Measures: SbM	Mitigation Type / Mitigation Measures	Rating Post Measures: Status	Significance: SaM	Significance: CbA/ R/Ir	Performance Objectives	Goals	Time Period for Implementation: ST	MT	LT	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					inside the pit rise above the decant elevation. A perforated pipe connecting the pit and the dam, can be considered. The options available should however be confirmed by an engineer, who should modify the existing designs to meet post-closure decant management requirements. Similarly, at South Pit the existing portal can be shaped and modified upon closure to act as a final void and to control decant, if required. As for the RWD at North Pit, the final void must be designed to ensure that water levels inside the pit would be kept below the decant elevation (942 mamsl). This is typically achieved through evaporation from the final void. The following specific measures are recommended to minimise and/or eliminate the impacts associated with decant: • If subsidence over underground workings is identified as a possibility, a												

Name of Activity / Activities	Impact Area	Potential Impacts / Potential Impacts	Rating Prior to Measures: Status	Rating Prior to Measures: SbM	Mitigation Type / Mitigation Measures	Rating Post Measures: Status	Significance: SaM	Significance: CbA/ R/Ir	Performance Objectives	Goals	Time Period for Implementation: ST	MT	LT	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					geotechnical study must be completed to delineate areas of possible subsidence. This information must be used to re-assess the risk of decant and to quantify the associated impacts. Current simulations assume that no subsidence will take place. Subsidence was however identified as one of the possible environmental risks associated with the DCM operations (Digby Wells Environmental, 2020). • If water-bearing structures are intersected during mining that contribute significant volumes of seepage to the pits and underground workings, they must be characterised and quantified. The risk and timing of decant must be re-assessed taking this information into consideration. • The quality of decant will be assessed through ongoing monitoring in boreholes DRM7 and DRM8. • Surface and underground rehabilitation													

Name of Activity / Activities	Impact Area	Potential Impacts / Potential Impacts	Rating Prior to Measures / Status	Rating Prior to Measures / SbM	Mitigation Type / Mitigation Measures	Rating Post Measures / Status	Significance / SaM	Significance / CbA/ R/Ir	Performance Objectives	Goals	Time Period for Implementation / ST	MT	LT	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					measures must be designed to minimise the risk of decant. Opencast mining areas must be backfilled, shaped and made free draining to limit the rate of recharge of rainwater to the absolute minimum.													
Waste Management and decommissioning of hazardous (also fuels) substances	Geology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Topography	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Soil, Land Use and Land Capability	Spills around the diesel storage areas and product stockpiles may result in the contamination of soils.	N	-11	Any hydrocarbon, effluent or other contaminants should be collected and the soils remediated immediately. A contaminated land assessment should be undertaken at all areas where diesel was stored, as well as where fuel pipelines were placed.	N	-5	R	Protection of Soil Integrity to achieve final land use objectives.	Zero presence of contaminated land due to early detection and implementation of actions.		x	x	x	Protection of soil resources.	Compliance with contaminated land objectives and limits.	SHEQ Department	Ongoing
	Terrestrial Ecology (Fauna & Flora)	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wetland	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Groundwater	Handling or Hazardous Waste within workshops and general mine area.	N	-10	Clean and dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be	N	-6	CbA	Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.	Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions within the IWWMP. Maintain a 100% safe disposal record on the		x		x x	Groundwater Pollution and potential trends.	The groundwater quality (constituents listed in the WUL) must be monitored monthly and records must be kept of these results in a centralised system. Analysis of results must be undertaken by an accredited laboratory	SHEQ Department	Quarterly (decommissioning)

Name of Activity / Activities	Impact Area	Potential Impacts / Potential Impacts	Rating Prior to Measures: Status	Rating Prior to Measures: SbM	Mitigation Type / Mitigation Measures	Rating Post Measures: Status	Significance: SaM	Significance: CbA/ R/Ir	Performance Objectives	Goals	Time Period for Implementation: ST	MT	LT	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					implemented on site.					disposal of hazardous waste.								
					Hazardous waste handling should only take place within bunded and/or lined areas.													
					Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site.													
					Documentation of removal and safe disposal must be available on site.													
		Handling of Building Rubble	N	-9	All building rubble will follow the waste hierarchy and will therefore either be sold for reuse where possible and as a last option be disposed of at a licensed facility suitable for such waste.	N	-6	CbA		Implement and operate a detailed waste manifest on site and maintain a 100% safe disposal record on the disposal of waste on site.			x	x				
		Handling and Storing of Domestic Waste	N	-12	Clean and dirty water separation systems should be maintained.	N	-9	CbA		Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions within the IWWMP.		x		x				
					Waste management training must be implemented on site.													
					Clear signs informing staff of waste management practices must be implemented on site.					Maintain a 100% compliance with cradle to grave principles.				x				
					Groundwater monitoring must be undertaken in such a manner as to ensure that any potential													

Name of Activity / Activities	Impact Area	Potential Impacts / Potential Impacts	Rating Prior to Measures: Status	Rating Prior to Measures: SbM	Mitigation Type / Mitigation Measures	Rating Post Measures: Status	Significance: SaM	Significance: CbA/R/Ir	Performance Objectives	Goals	Time Period for Implementation: ST	MT	LT	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					impacts from the site can be detected.													
					Recycling practices must be investigated and implemented on site.					Maintain a 100% accurate recording of waste and submission of such recording to the Department.				x				
	Surface Water	Handling of Hazardous Waste within workshops and general mine area could contaminate the dirty water storage areas. The water is then reused in the system and could have impacts on the integrity of the storm water system and also the production.	N	-11	Clean and Dirty water separation systems should be maintained up until closure.	N	-6	CbA	Develop the area to its intended final land use.	Maintain the SWMP on site.				x	Surface water pollution & soil assessments.	To ensure a proactive approach, the SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. The water quality (constituents listed in the WUL) of the dam must be monitored monthly and records must be kept of these results in a centralised system. Analysis of results must be undertaken by an accredited laboratory.	SHEQ Department	Assessments: Weekly. Monitoring: Monthly
					Waste management training must be implemented on site.					Maintain a 100% no-spill record.				x				
					Clear signs informing staff of waste management practices must be implemented on site.					Clean spills, if occur, within 24 hours.				x				
					Hazardous waste handling should only take place within bunded and/or lined areas.					Maintain a 100% safe disposal record on the disposal of hazardous waste.				x				
					Hazardous waste and contaminated materials should be removed by a licenced removal company and taken to a suitable and licenced landfill site.					Provide training to all staff on best practices regarding waste management every year.	x			x				
					Documentation of removal and safe disposal must be available on site.													
					Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and													

Name of Activity / Activities	Impact Area	Potential Impacts / Potential Impacts	Rating Prior to Measures / Status	Rating Prior to Measures / SbM	Mitigation Type / Mitigation Measures	Rating Post Measures / Status	Significance / SaM	Significance / CbA/ R/Ir	Performance Objectives	Goals	Time Period for Implementation / ST	MT	LT	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					an action plan developed.													
		Handling and Storing of Domestic Waste should have no impact on the surface water resources due to the location of the facility. However, incorrect disposal of waste could hamper the integrity of the storm water system.	N/A	-9	Clean and dirty water separation systems should be maintained up until closure. Waste management training must be implemented on site. Weekly inspections of storm water management systems must be undertaken. Any blockages or maintenance requirements must be documented, and an action plan developed. Clear signs informing staff of waste management practices must be implemented on site. Recycling practices must be investigated and implemented on site. Building rubble must be disposed of in line with the requirements of the NEMWA. Access control must be strictly enforced.	N	-5	CbA		Maintain a 100% compliance with cradle to grave principles. Self-succession of vegetation should establish within the first rainy season after construction has been completed.	x x			x x				
	Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Visual	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1.e Impact Management Outcomes

Please refer to Table 40 for the impact management outcomes.

1.f Impact Management Actions

Please refer to Table 40 for the impact management outcomes.

1.g Financial Provision

1.g.i Determination of Financial Provision

1.g.i.1 Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under Regulation 22(2)(d) as described in 2.4 herein

The closure objectives of this project, therefore, will tie into the overall mine's closure objectives, which includes:

- To operate within the enviro-legal ambits of South Africa.
- To be aware of the latest environmental legal requirements.
- Limit the impact of the activities on the ecological setting of the area.
- Operate the water management circuit on site to increase mining efficiency and reduce the need for maintenance of these facilities.
- Limit the loss of soils as far as possible and ensure that the integrity remains during stockpiling for the purposes of successful rehabilitation.
- Remain within the designated area demarcated for activities.
- Remain within the NEM:AQA Dust Regulation guidelines for rural communities.
- Protect heritage resources for future generations.
- Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the activities associated with the proposed project.
- Follow the waste hierarchy approach.
- Protect the integrity of the clean and dirty water system.
- Return the area to its intended final land use.

The closure objectives have been developed to reach the final land use as defined in the mine's Rehabilitation Plan, December 2016. The overall objectives of the closure plan are to achieve the following:

"The proposed final land use would be to return the area to wilderness area. This would include demolishing all infrastructure that will not be handed over to a third party and promoting the growth of the surrounding Sekhukhune Mountain Bushveld species. It is evident that the re-establishment of this vegetation biome on site will not be difficult as areas that have already undergone rehabilitation have seen a large success in terms of the revegetation."

Please refer to the previous section and Table 40 providing a detailed description of the management objectives and the standards required to be achieved.

1.g.i.2 Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties

Please refer to Part A, for the detailed discussion regarding I&AP Consultation. The detailed issues and response report is attached to Annexure 4. The draft EIA report and EMPr will be made available electronically to all stakeholders and in hard copy to all commenting authorities.

1.g.i.3 Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main mining activities, including the anticipated mining area at the time of closure

As presented in Part A of this document, the following table presents the key closure requirements:

The following table specifically highlights closure actions important to the proposed activities:

Table 41: Summary of Rehabilitation and Closure Actions

Target Area	Main Actions
Roads and Parking Areas	Mine roads that are not needed for closure and post-closure uses at the site (e.g. security and monitoring) will be closed; Removal of all signage, fencing, shade structures, traffic barriers, etc.; All 'hard top' surfaces to be ripped and bitumen/concrete removed along with any culverts and concrete structures; All concrete lined drainage channels and sumps will be demolished and removed; All potentially contaminated soils are to be identified and should be removed and remediated; All haul roads that have been treated with saline dust suppression water need to be treated as "sealed" roads with the upper surface ripped and removed to designated contaminant disposal areas; Monitor and maintain vegetation establishment; and Remove alien invasive vegetation; and Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.
Opencast footprint	The work completed by Digby Wells Environmental (2019) needs to be confirmed through the completion a more detailed fieldwork study in order to ensure that the scavenger borehole system is efficiently implemented as identified in the 2020 Numerical Model compiled by iLEH. The rehabilitation strategy for the remaining voids should involve only one of the following two options – leaving the voids open with the inclusion of the necessary safety measures to control unauthorised access; or secondly the backfilling of the remaining voids with waste rock and rehabilitate these areas to ensure the required 5% or less recharge to avoid decant. The final rehabilitation plan for the opencast pits – i.e. backfilling or the leaving of a void/management of decant should be finalised within 24 months of the approval of the Integrated WML. Should the final rehabilitation plan indicate the need to leave voids, the required decant measures must be identified and the suitable financial provision for this instance should be calculated and submitted as part of the overall rehabilitation fund for the mine

1.g.i.4 Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives.

The rehabilitation requirements stipulated in this EMPr is based on current approved closure conditions as approved in the mine's overall approved EMPr, as well as the input of various specialist studies as discussed in this report.

The rehabilitation measures requires:

- Removal of infrastructure;
- Sloping of areas to be free draining where possible;
- Replacement of topsoil;
- Allowance for self-succession, but where this is not possible, the implementation of a revegetation programme.

1.g.i.5 Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline

For the purposes of this project, a Sub Total 1 Amount of approximately R 387 423.64 (excluding VAT), will be required. It should be noted that this is in addition to the already allocated cost for backfilling as presented in the table above, in the event of the need to remain open voids for groundwater and decant management purposes.

1.g.i.6 Confirm that the financial provision will be provided as determined.

It is hereby confirmed that the financial provision will be provided as determined. All areas disturbed will be included in the financial provision as calculated during the annual evaluation and will be updated and provided for annually as per the required Regulations.

1.h Mechanisms for monitoring compliance with and performance assessment against the EMPr and reporting thereon

The following sections present the monitoring requirements of the mine as presented in the 2018 approved EMPr and still relevant.

1.h.i Water Monitoring

DCM established a surface water monitoring network in 2000 and consisted out of four (4) monitoring locations, spatially distributed along the Groot Dwarsrivier and Klein Dwarsrivier aquatic systems. In 2009/2010 the monitoring network was augmented to include the monitoring of water associated with selective mine infrastructure, i.e. RWDs, TSF and Clarifier.

The table below summarises the surface water monitoring network, while Figure 39 presents their spatial distribution in relation to project infrastructure.

Table 42: Current Monitoring Network Summary

Sample Point ID	Coordinates		Description	Monitoring Period	
	Longitude	Latitude		From	To
S1	30°07'21.88"E	24°56'43.56"S	Groot Dwarsrivier: Upstream of Project site.	2000	ongoing
S2	30°06'02.57"E	24°55'44.71"S	Klein Dwarsrivier: Upstream of Project site.	2000	ongoing
S3	30°06'20.44"E	24°55'24.72"S	Groot Dwarsrivier: Downstream of Project site, after confluence with Springkaanspruit.	2000	ongoing
S4	30°06'19.90"E	24°54'30.13"S	Groot Dwarsrivier: Downstream of Project site.	2000	ongoing
S6	30°06'41.28"E	24°55'39.94"S	Return Water Dam – Lower	2009	ongoing
S7	30°06'58.28"E	24°55'54.71"S	Return Water Dam – Upper	2009	ongoing
S9	30°06'43.39"E	24°55'41.92"S	Tailings Storage Facility	2009	ongoing
C1	24°56'15.32"S	30° 7'12.28"E	Clarifier	2010	ongoing

The surface water sample points are summarised in the following table.

Table 43: Surface Water Points as per current Integrated Water and Waste Management Plan (IWWMP) recommendations

Sample Point ID	Description	Coordinates	
S11	Water Collection Sump	24°55'9.28"S	30° 7'26.41"E
S12	Plant	24°55'46.39"S	30°7'3.47"E
S14	Dewatering Storage Dam	24°56'19.74"S	30° 7'14.67"E
S16	New RWD	24°55'29.00"S	30° 7'11.63"E
S17	North Shaft Settling Dams	24°55'38.32"S	30° 7'17.00"E

The following table presents the monitoring compliance including the responsible persons, implementation period, and mechanist for monitoring compliance.

The current water monitoring programme requires water quality analysis. The surface and groundwater-monitoring programme is assessed on an annual basis. Based on these assessments, new monitoring sites may be included in the monitoring programme. Chemical analyses to be conducted include, *inter alia*: Total Dissolved Solids (TDS), pH, Electrical Conductivity (EC), Alkalinity, SO_4, Ca, Mg, K, Cl, Na, Fe, and Mn. An annual report will be generated detailing water quality trends experienced during the operational phase and highlighting areas of concern. This annual report will be submitted to DWS.

Water quality monitoring results will be stored on a database for use determining water quality trends. The results will be used to update and confirm the groundwater model at the end of the operational phase. Trend analysis will also assist to determine if additional management measures are required.

Table 44: Ground Water Monitoring Programme

Point	East (WGS84, LO31)	South (WGS84, LO31)	Description	Elements	Frequency
DRM1	-89 803	-2 758 421	Down gradient of Lower RWD	Ca, K, Mg, Na, SO_4, Nitrate-NO_3, Total Inorganic Nitrogen –N, Cl, F, pH, EC, TDS, Cr, Cu, Cd, Fe, V, Total alkalinity.	Quarterly
DRM2	-89 789	-2 758 349	Down gradient of Lower RWD		
DRM3	-89 676	-2 757 996	West of quarry		
DRM4	-89 203	-2 758 623	In plant area		
DRM5	-89 422	-2 758 739	Down gradient of Upper RWD	Total Petroleum Hydrocarbon (TPH)	Annually
DRM6	-88 639	-2 760 019	South of explosives bay		
DRO4/DRO	-89 936	-2 758 363	In floodplain, close to S3		
ASDWBH1	-88 527	-2 758 376	Inside north pit area	Ca, K, Mg, Na, SO_4, Nitrate-NO_3, Total Inorganic Nitrogen –N, Cl, F, pH, EC, TDS, Cr, Cu, Cd, Fe, V, Total Petroleum hydrocarbon (TPH), Total alkalinity.	Quarterly (TPH annually)
ASDWBH10	-89 274	-2 758 136	North of old TSF		
ASDWBH11	-88 525	-2 759 132	Inside office complex		
ASDWBH2	-88 545	-2 757 234	Northern part of North Pit area		
ASDWBH3	-88 950	-2 758 090	South West of the North Pit		
ASDWBH4	-88 487	-2 757 923	East of the North Pit		
ASDWBH5	-89 194	-2 759 159	Down gradient of Dam26		
ASDWBH6	-89 080	-2 759 200	Up-gradient of Dam26		
ASDWBH9	-89 567	-2 758 424	Up-gradient of Lower RWD		
TMM	-89 156	-2 759 118	Hazardous storage area		
Sewage BH/SWBH	-88 881	-2 759 030	Down gradient of main sewage works		
North Pit	-88 848	-2 758 112	Borehole drilled into the deepest section of North Pit. Coordinates must be confirmed once on-site conditions have been evaluated.	Ca, K, Mg, Na, SO_4, Nitrate-NO_3, Total Inorganic Nitrogen –N, Cl, F, pH, EC, TDS, Cr, Cu, Cd, Fe, V, Total Petroleum hydrocarbon (TPH), Total alkalinity. Leach tests on material drilled from borehole	Quarterly (TPH annually)
South Pit	-88 801	-2 759 047	Borehole drilled into the deepest section of South Pit. Coordinates must be confirmed once on-site conditions have been evaluated.	Ca, K, Mg, Na, SO_4, Nitrate-NO_3, Total Inorganic Nitrogen –N, Cl, F, pH, EC, TDS, Cr, Cu, Cd, Fe, V, Total Petroleum hydrocarbon (TPH), Total alkalinity. Leach tests on material drilled from boreholes	Quarterly (TPH annually)
Rainfall	TBC	TBC	Rainfall station at offices or new TSF	Not applicable	Daily

Figure 39: Surface Water Monitoring Points

1.h.ii Storm Water and Clean and Dirty Water Infrastructure

The monitoring of surface water management infrastructure must be undertaken as follows:

- Storm water management system around the reworking areas must be maintained; and
- A maintenance program will be followed as part of the storm water and clean and dirty water infrastructure monitoring.

1.h.iii Air Quality Monitoring

Dust monitoring is undertaken using the latest ASTM standards. Dust monitoring is undertaken at five (5) points around the mine within a 28 - 31 day schedule:

- DWR001 (School);
- DWR002 (Far North Point);
- DWR003 (Parking Lot South Shaft);
- DWR004 (Discard Storage Facility South Shaft); and
- DWR005 (North Shaft.

Figure 40: Dust Monitoring Locations

The mine is located outside residential areas (non-residential) and should therefore comply with the following limits in terms of the National Dust Control Regulations, 2013:

Restriction Areas	Dust fall rate (D) (mg/m2/day) – averaged over 30 days.	Permitted frequency of exceeding dust fall rate
Residential area	D < 600	Two within a year, not sequential months.
Non-residential area	D < 1200	Two within a year, not sequential months.

1.h.iv Ecological Monitoring

Through initiating and maintaining a terrestrial monitoring programme, the biodiversity within DCM, comprising the unique and sensitive floral species composition associated with the Sekhukhuneland Centre of Floristic Endemism, with special mention of floral assemblages associated with Sekhukhune Mountain Bushveld, Sekhukhune Bushveld and rivers and associated instream habitat areas, will be protected.

Through maintaining a terrestrial bio-monitoring programme the biodiversity of the landscape, with special mention of sensitive environments and faunal and floral assemblages, can be monitored and information can be provided to adequately manage the biological resources associated with the mining footprint and associated sphere of influence. The broad objective of the biodiversity monitoring programme is to:

- Comply with the Dwarsrivier Safety, Health and Environment (SHE) standards, Environmental Management Programme (EMPr) and Environmental policies;
- Assess the Present Ecological State (PES) of terrestrial ecology within the DCM footprint and associated sphere of influence;
- Monitor spatial and temporal trends in biological resource integrity in the vicinity of DCM; and
- Report any emerging issues.

In order to ensure that impact mitigation takes place to an adequate level should the proposed mining expansion proceed, the Biodiversity Action Plan (BAP) must be updated with the additional activities and the relevant management actions which must be undertaken to manage impacts on the ecology of the region in association with other stakeholders in the area whom have an impact on the freshwater resources. The BAP and the implementation of additional management measures must continue to be overseen by an environmental panel which should include representatives from the mine, appropriately qualified specialists as well as local communities and water users in the greater catchment as well as other mines.

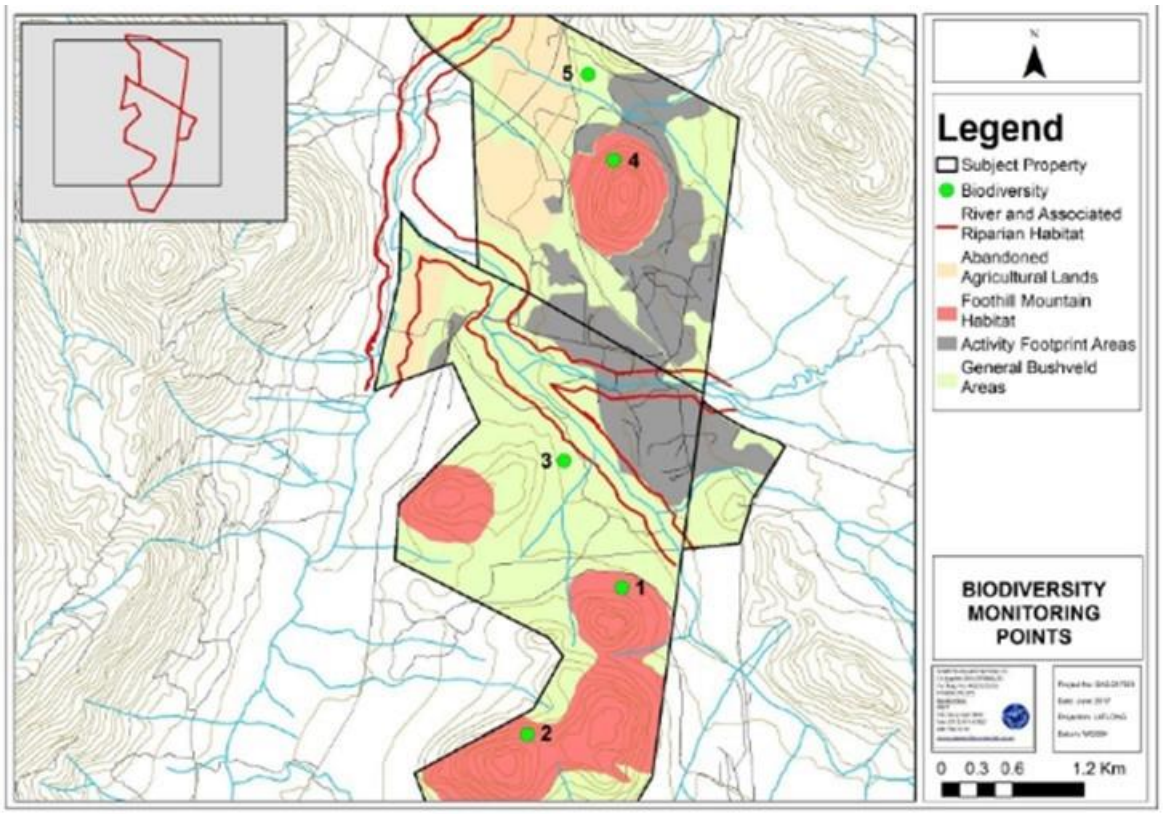

Figure 41: Locations of individual biodiversity monitoring points in relation to DCM.

1.h.v Closure Monitoring

The following monitoring programme is recommended upon closure:

Table 45: Post Closure Monitoring Programme

Component / Aspect	Monitoring		Performance / success criteria	Corrective action
	Methodology	**Frequency / duration**		
Soil Management				
Soil fertility	• Undertake a visual assessment and delineate areas where poor vegetation growth has occurred; • Submit soil samples to an accredit soil laboratory to conduct soil fertility analysis.	Yearly until soil fertility supports the final land use or for at least 5 years post-closure	• Soil analysis results comply with remediation targets at a 95 percentile level; and • Self-sustaining vegetation establishment.	• Apply amelioration where required as informed by sampling undertaken.
Erosion	• Conduct a visual assessment to determine areas of potential erosion; and • Undertake field investigations, fixed point photography to document the significance of the erosion occurring on site	Twice yearly for at least 5 years post closure.	• No evidence of significant erosion; and • Good vegetation cover and species composition.	As required: • Re-shape areas to ensure that they are free-draining; • Establish vegetation on bare patches; and • Repair and stabilisation of erosion gullies and sheet erosion.
Post-mining end land use	• Assess activities completed, as well as legal and related documentation completed and signed-off; and • Ensure rehabilitation measures are aligned to the LUP.	Once off, at mine closure.	• Area has been rehabilitated to an aesthetic quality not to compromise potential tourism; • Transfer to third party operator has taken place once the area has been proven to be safe for redevelopment; • Legal and zoning issues have been addressed; and • Vegetation re-establishment, cover and composition are sustainable.	• Refer back to end land use approach and refine measures to be implemented in achieving the desired final land use.
Topography	• Conduct a visual assessment to determine areas of potential erosion; and • Undertake regular digital surveys of rehabilitated areas to confirm that final topography is aligned with landform designs.	During rehabilitation phase	• No evidence of significant erosion. • No evidence of water pooling on rehabilitated areas. • The final profile achieved should be acceptable in terms of surface water drainage requirements and the end land use objectives.	As required: • Re-shape areas to ensure that they are free-draining; and • Refer back to end land use approach and refine measures to be implemented in achieving the desired final land use.

Component / Aspect	Monitoring		Performance / success criteria	Corrective action
	Methodology	**Frequency / duration**		
Vegetation establishment	○ Determine whether re-established vegetation communities are on a trajectory of achieving a stable self-sustaining community dominated by species typical of the climax-species present in the adjacent areas; ○ Inspect rehabilitated areas to assess vegetation establishment and provide for early detection of erosion in recently planted/seeded areas (monthly); ○ Undertake fixed point photography at specific points at the rehabilitated sites to obtain a long term directly comparable method of determining changes in the landscape; and ○ Conduct evaluation of rehabilitated areas by means of field inspections. During these assessments measurement of growth performance and species abundance will be carried out to determine: i. Plant basal cover and species abundance in the grassed areas. Estimates of vegetation canopy and ground cover as well as height; ii. Distribution, growth and survival of woody species; iii. Dominant plant species (woody and herbaceous); iv. Presence of exotic invasive species, and degree of encroachment; v. Browsing or grazing intensity; vi. Notes regarding erosion, such as, type, severity, degree of sediment build-up; and vii. Species composition and richness.	Quarterly for at least 5 years post-closure.	▪ Limited to no erosion; and ▪ Self-sustaining vegetation ecosystem.	As required: ▪ Revegetate poorly established rehabilitated areas; ▪ Reseed bare patches; and ▪ Apply additional fertiliser and/ or organic matter, depending on the condition of the vegetation and the initial organic material application.
Alien and Invasive floral species	▪ Visually inspect areas where invasive species have been previously eradicated and areas prone to invasive species (e.g. eroded/degraded areas, along drainage lines, etc.); and ▪ Undertake surveys on relevant sites where bush encroachment has previously been identified to determine the status quo of invasive vegetation.	Yearly for at least 5 years post-closure.	▪ Limit and/or prevent declared Category 1, 2 and 3 invader species establishing; ▪ Minimise extended threat to ecosystems, habitats or other species; ▪ Increase the potential for natural systems to deliver goods and services; and ▪ Minimise economic or environmental harm or harm to human health.	▪ Revisit mitigation measures; and ▪ Continue control and management.
General site status	▪ Conduct a visual assessment with respect to compliance of the afore-mentioned closure measures and to ensure that the site is aesthetically neat and tidy, and that no health or safety risks exist on site.	Once-off following implementation of rehabilitation measures.	▪ Waste/rubble free sites.	As required: ▪ Clear remnant rubble and dispose of in open quarry as backfill material.

Component / Aspect	Monitoring		Performance / success criteria	Corrective action
	Methodology	Frequency / duration		
Surface Water Quantity	• Visually assess the functionality of the surface water drainage systems feeding surface water runoff from rehabilitated areas. • Undertake field investigations, fixed point photography to document the significance of the erosion occurring on site.	After the first major rains of the season and after any major storm.	• No evidence of significant erosion; and • No evidence of water pooling on rehabilitated areas.	As required: • Re-shape areas to ensure that they are free-draining; and • Refer back to end land use approach and refine measures to be implemented in achieving the desired final land use.
Surface Water and Groundwater Quality	• Sample and monitor surface and groundwater quality.	Quarterly for at least 3 years post-closure.	• Water quality results within ranges of the WUL and/or DWS standards.	As required: • Increase monitoring frequency and detect point sources. • Optimise monitoring plan if needed.
Groundwater Quantity	• Sample and monitor groundwater levels in the vicinity of the mine.	Quarterly for at least 3 years post-closure.	• No evidence of dewatering and lowering of water tables within the vicinity of the mine.	As required: • Increase monitoring frequency and detect point sources. • Optimise monitoring plan if needed.

1.i Monitoring frequency and Responsible person

Please refer to Table 40 for the management actions required. Also refer to Section 1.h for the monitoring programme recommendations.

1.j Period for implementing actions

Please refer to Table 40 for the management actions required.

1.k Mechanisms for monitoring compliance

Please refer to Table 40 for the management actions required.

1.l Indicate the frequency of the submission of the performance assessment report.

Internal Audits

Quarterly internal audits should be undertaken to ensure that the conditions of this EMP are implemented.

External Performance Assessments

It is recommended that the independent external performance assessments be undertaken annually.

The external performance assessments must also include the overall mine assessment of the financial provision and EMP commitment. The report should be submitted to the DMR within 30 days of finalisation.

Other Performance Indicator Assessments

Due to the dynamic nature in which the mine is addressing the water management on site and considering the near-future projects that are planned, the following measure to ensure that performance measures are reached are recommended:

- Ongoing water monitoring in terms of the monitoring protocol.
- Biannual meetings be scheduled with the DWS and/or CMA to discuss the action plan compliance and status.
- Annual update of the IWWMP.

1.m Environmental Awareness Plan

1.m.i Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work

1.m.i.1 Education and Training

DCM is a Sector Education Training Authority's (SETA) accredited training facility. The primary objectives include:

- The availability, in terms of quality, quantity, and employment equity, of the range of skills required to access, extract and beneficiate the ore-body productively and safely, on a sustainable and environmentally responsible basis, inclusive of production, technical, support and administrative competencies
- The skilling of employees in portable competencies, which relate to existence outside the mining environment and which can be applied to sustain individuals and communities once mining careers, are ended
- Increasing the employability of selected people from the local community

1.m.i.2 Internal and External Communication and Awareness Raising

1.m.i.2.a Emergency Response Plan

Environmental emergencies occur over the short term and require an immediate response. A mine, as part of its management tools, especially if it is ISO 9000 and ISO 14001 compliant, should have an Emergency Response Plan.

This plan should be placed around the mine where it will be easily viewed. The plan should contain a list of procedures, evacuation routes and a list of emergency contact numbers. It is advisable that the mine tests the emergency response plan in order to identify any areas for improvement.

If the emergency has the potential to affect surrounding communities, they should be alerted via alarm signals or contacted in person. The surrounding community will be informed, prior to mining taking place, of the potential dangers and emergencies that exist, and the actions to be taken in such emergencies.

Communication is vital in an emergency and thus communication devices, such as mobile phones, two-way radios, pagers or telephones, must be placed around the mine.

DCM has an Emergency Preparedness and Response Plan in place on site. This plan specifically addresses the following:

- Procedures applicable to all surface areas;
- Procedures applicable to veld fires;
- Procedures applicable to underground fires;
- Damage to a radioactive source;
- Radioactive source and fires;
- Major fall of ground accidents;
- Major power failure;
- Tailings Dam collapse;
- Flooding in the underground workings;
- Labour unrest;
- Handling petrochemical spills;
- Lightning detector warning alarm within the mining area, surface and underground;
- Safety harness fall rescue plan;
- Rescue and response capability; and
- Management of Emergencies.

1.m.i.2.b Purpose

The purpose of this procedure is to provide guidance to deal with emergencies efficiently and to:

- Ensure the health and safety of all personnel;
- Recover to normal operation as soon as possible;
- Co-ordinate evacuation; and
- Prevent, minimise damage to the environment.

Emergencies Include:

- Environmental Emergencies:
  - Spillages/ Uncontrolled Release over 1000 litre; and
  - Flooding (underground flooding, storm water flooding, overflow of RWDs, break TSF wall).
- Other Emergencies:
  - Uncontrolled fires, which cannot be extinguished by portable extinguishers;
  - Flooding (underground flooding, storm water flooding, overflow of RWDs, break TSF wall);
  - Bomb threats;
  - Strikes;
  - Total power failure;
  - Explosions;
  - Radio Active Sources; and
  - Assaults/ violence.
- Safety and Health Emergencies:
  - Personal injuries;
  - Property damage;
  - Dangerous occurrences; and
  - Diseases.

1.m.i.3 Communication

1.m.i.3.a Internal and External Communication Systems

A system of information sharing with regulatory authorities and Interested and Affected Parties (I&APs) was developed with the following objectives-

- Keep them updated on environmental management progress at the operations;
- Inform them about new developments at the operation and provide them with an opportunity to express their concerns about these;
- Provide them with a means to discuss environmental matters with the operation whenever necessary;
- Simplify involvement in the processes of updating existing and obtaining new permissions; and
- Provide a forum for detailed discussion of issues when necessary.

Basic public involvement principles that need to be applied are as follows-

- Involvement of all I&APs;
- Respect for the opinions of all I&APs;
- True two-way exchange of information, with listening on both sides;
- Follow-up on commitments made;
- Feedback on how concerns expressed by I&APs have been or are being addressed;
- Clear channels of communication;
- Accurate records of every interaction with I&APs, including names and contact details of people involved;
- Accurate records of information exchanged with I&APs – including letters, reports and other documents that were exchanged; and
- Records of meetings circulated to I&APs so that they can check that the record of information shared is correct.

For public meetings, the following principles should be applied-

- Advance notice of any meetings (at least 21 days) to allow people sufficient time to attend the meetings; and
- Scheduling of meetings with consideration of people's time constraints.

1.m.i.3.b Identification of Stakeholders

Parties that have been involved in information sharing and other types of communication include the following-

- Local residents;
- Business / Industry / Other Mines;
- Community / Development;
- Environmental Services;
- National Authorities-
    - DMRE;
    - DWS;
    - LDEDET;
    - Department of Agriculture.
- Provincial authorities include:
    - Olifants River CMA;
    - Department of Agriculture and Land Administration;
    - Provincial Heritage Resources Agency;
    - Department of Public Works;
    - Provincial Administration;
    - Department of Economic Planning and Development;
    - Department of Health and Social Services;
    - Department of Local Government and Housing;
    - Department of Roads and Transport; and
    - Local and District Municipalities.

1.m.i.3.c Public liaison and forum participation

No formal public liaison or forum participation exists currently. The Constitutions for water forums in this area have been drawn up during 2005, and are awaiting approval by the Minister of the DWS. The Olifants River CMA was established on 27 February 2015 and the mine is activity involved in consultation with the DWS with the last site visit conducted on 1 November 2017 by the DWS officials. A meeting was also held with the DWS regarding this project on 19 July 2018.

1.m.i.3.d Distribution of information

All information which is required for distribution is being placed on the internet site of Assmang Ltd.

An effective internal communication strategy will be implemented to inform:

- employees of possible retrenchments;
- other affected parties (sending areas, municipalities, etc.) of the possible retrenchments at the operation; and
- Outside parties of the possible retrenchments at the operation.

1.m.ii Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment

The following protocols must be developed by the mine, in parallel to the actions recommended in Table 40:

- Task/ Issue Based Risk Assessments must be undertaken with all workers involved in the specific task in order to establish an understanding of the risks associated with a specific task and the required mitigation and management measures.
- Environmental emergencies occur over the short term and require an immediate response. A mine, as part of its management tools, especially if it is ISO 9000 and ISO 14001 compliant, should have an Emergency Response Plan. This plan should be placed around the mine where it will be easily viewed. The plan should contain a list of procedures, evacuation routes and a list of emergency contact numbers. It is advisable that the mine tests the emergency response plan in order to identify any areas for improvement.
- If the emergency has the potential to affect surrounding communities, they should be alerted via alarm signals or contacted in person. The surrounding community will be informed, prior to mining taking place, of the potential dangers and emergencies that exist, and the actions to be taken in such emergencies.
- Communication is vital in an emergency and thus communication devices, such as mobile phones, two-way radios, pagers or telephones, must be placed around the mine.
- Protocols to be developed should include:
    - Waste Management procedure;
    - Emergency Preparedness' Procedure;
    - Hydrocarbon Spill Management Procedure;
    - Monitoring Protocol; and
    - Alien Invasive Management and Monitoring Procedure.

1.n Specific information required by the Competent Authority

DCM is required to make financial provision for final rehabilitation activities on the site. The Regulations for Financial Provision states in Regulation 8 the following:

8. (1) an applicant or holder of a right or permit must make financial provision by one or a combination of a—

(a) Financial guarantee from a bank registered in terms of the Banks Act, 1990 (Act No. 94 of 1990) or from a financial institution registered by the Financial Services Board as an insurer or underwriter;

(b) Deposit into an account administered by the Minister responsible for mineral resources; or

(c) Contribution to a trust fund established in terms of applicable legislation, on condition that—

(i) this may not be used for the financial provision required in terms of regulations 6(a) or (b) or regulation 11(1)(a) or (b); and

(ii) This may not be used by an applicant for, or holder of, a mining permit in terms of the Mineral and Petroleum Resources Development Act, 2002.

DCM will provide for the closure liability through a Bank Guarantee as allowed by NEMA.

Please also refer to Table 12 in this report.

2 UNDERTAKING REGARDING CORRECTNESS OF INFORMATION

The EAP herewith confirms:

2.a The correctness of the Information provided in the Reports

2.b The inclusion of Comments and Inputs from Stakeholders and I&APs

2.c The inclusion of Inputs and Recommendations from the Specialist Reports where relevant

2.d That the Information provided by the EAP to I&APs and any Responses by the EAP to Comments and Inputs made by I&AP are correctly reflected herein

Signature of the Environmental Assessment Practitioner

EnviroGistics (Pty) Ltd

Name of company

25/07/2021

Date

3 UNDERTAKING REGARDING LEVEL OF AGREEMENT

Undertaking by the client:

Herewith I, the person whose name and identity number is stated below, confirm that I am the person authorised to act as representative of the applicant, and confirm that the above report comprises EIA and EMP compiled in accordance with the guideline on the Departments official website and the directive in terms of sections 29 and 39 (5) in that regard, and the applicant undertakes to execute the Environmental management plan as proposed.

Pistor Schoeman

Full Names and Surname

8511145047088

Identity Number

Environmental Superintendent

Designation

Signature

24/07/2021

Date

Annexures

Annexure 1: DMR Acknowledgment of Receipt

Annexure 2: EAP Curriculum Vitae

Annexure 3: Environmental Authorisations

Annexure 4: Title Deeds

Annexure 5: Stakeholder Consultation

- Background Information Document
- Stakeholder Database
- Comments received
- Minutes of meetings
- Proof of submission to commenting authorities

Annexure 6: Specialist Reports

- Groundwater Study

Annexure 7: Financial Provision Study

Annexure 8: A3 Figures

Annexure 1: DMR Acknowledgement of Receipt

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Background Information Document

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Comments received

Adverts

Notifications

Annexure 6: Specialist Reports

Groundwater Study

Annexure 7: Financial Provision Study

Annexure 8: A3 Figures