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ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT FOR THE PROPOSED EXTENSION OF THE TWO RIVERS PLATINUM MINING RIGHT AREA, STEELPOORT, LIMPOPO PROVINCE

Various portions of farms Tweefontein 360KT, Dwarsrivier 372 KT, Kalkfontein 367 KT and Buffelshoek 368 KT, Steelpoort, Limpopo Province

DMR REF: LP 178 MR

MSC REF: MSC/57/18/TRP

9 NOVEMBER 2018

Submitted as part of an application process for environmental authorisation in terms of the National Environmental Management Act (Act 107 of 1998) [as amended] in respect of listed activities that have been triggered by application in terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002) [as amended]

Applicant:	Two Rivers Platinum (Pty) Ltd
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DOCUMENT HISTORY

Document Control, Quality Control and Disclaimer

Report	**ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT FOR THE PROPOSED EXTENSION OF THE TWO RIVERS PLATINUM MINING RIGHT AREA**		
Client	Two Rivers Platinum (Pty) Ltd		
Responsible Person	Contact Person: Vhutshilo Mushiana Position: Environmental Manger Email: vhutshilo.mushiana@trp.co.za	Contact Person: JJ Joubert Position: General Manager Email: jj.joubert@trp.co.za	
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DOCUMENT REVIEWED BY

Responsible person	Date	Position
Vhutshilo V. Mushiana		Environmental Manager
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BASIS OF REPORT

This document has been prepared by Malan Scholes Consulting (Pty) Ltd (MSC) with reasonable skill, care and diligence, and taking account of the manpower, timescales and resources devoted to it in accordance with the appointment from the applicant.

This document has been prepared in accordance with the Department of Mineral Resources (DMR) Environmental Impact Assessment and Environmental Management Programme Report template format, and was informed by the guidelines posted on the official DMR website. This is in accordance with the requirements of the Minerals and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA). Given this, MSC has included additional information in the Introduction section of the report that it deems necessary and relevant to setting the scene for the environmental impact assessment (EIA) process. In addition, this report has been compiled in line with the requirements of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) and EIA regulations (2014), as amended.

The information contained in this report is relevant only to the specific project area and plan. It cannot be relied on for any other purpose or by any other person.

Information reported herein may be based on the interpretation of public domain data collected by MSC and/or information supplied by the applicant and/or its other advisors and associates. The data has been accepted in good faith as being accurate and valid.

This document may contain information of a specialised and/or highly technical nature and the reader is advised to seek clarification on any elements which may be unclear to it.

mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

AND

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

FOR LISTED ACTIVITIES ASSOCIATED WITH EXTENSION OF THE TWO RIVER PLATINUM MINING AREA, STEELPOORT, LIMPOPO PROVINCE.

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS 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	**Two Rivers Platinum (Pty) Ltd**
Project	Two Rivers Platinum Extension Project
Contact person	Mr JJ Joubert (General Manager)
Tel No	013 - 230 2800
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Physical Address	Dwarsrivier Farm 372KT, Steelpoort, Limpopo Province, 1133
File Reference Numbers SAMRAD	LP 178 MR

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 evaluation 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 a 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 a 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;

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

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

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

(g) Identify residual risks that need to be managed and monitored.

EXECUTIVE SUMMARY

Malan Scholes Consulting (Pty) Ltd (MSC) was appointed by Two Rivers Platinum (Pty) Ltd to undertake the environmental authorisation process to extend the Two Rivers Platinum (TRP) mining right to include the Tamboti Mining Right Area and Prospecting Right Areas. Two Rivers Platinum (TRP) is a Joint Venture (JV) between African Rainbow Minerals (ARM) and Impala Platinum. The mine is located in the Steelpoort area within the Greater Tubatse Local and Sekhukhune District Municipalities, approximately 20 km south-west of the town of Steelpoort, in the Limpopo Province.

Two Rivers Platinum has a New Order Mining Right (LP 178 MR) and Environmental Management Programme (approved 30 July 2015) to explore and mine the Platinum Group Metals (PGM's), chrome and other precious metals (gold and silver), and associated base metals and ores thereof on portions of the farm Dwarsrivier 373 KT, Tweefontein 360 KT, Buffelshoek 368 KT and Kalkfontein 367 KT. The mine intend to extend the current mining area into the Tamboti Mining Right (LP 165 MR) located on Remaining Extent of the Farm Kalkfontein 367KT and the Tamboti Prospecting Right (LP 2125 PR) located on Portion 1,2,3,4,5,6,8,9,10 and 11 of the Farm Kalkfontein 367 KT. The proposed mining right area is presented in Figure 1-1**.** The aim of the proposed inclusion is to be able to extend the existing underground workings and increase the current Life of Mine (LoM).

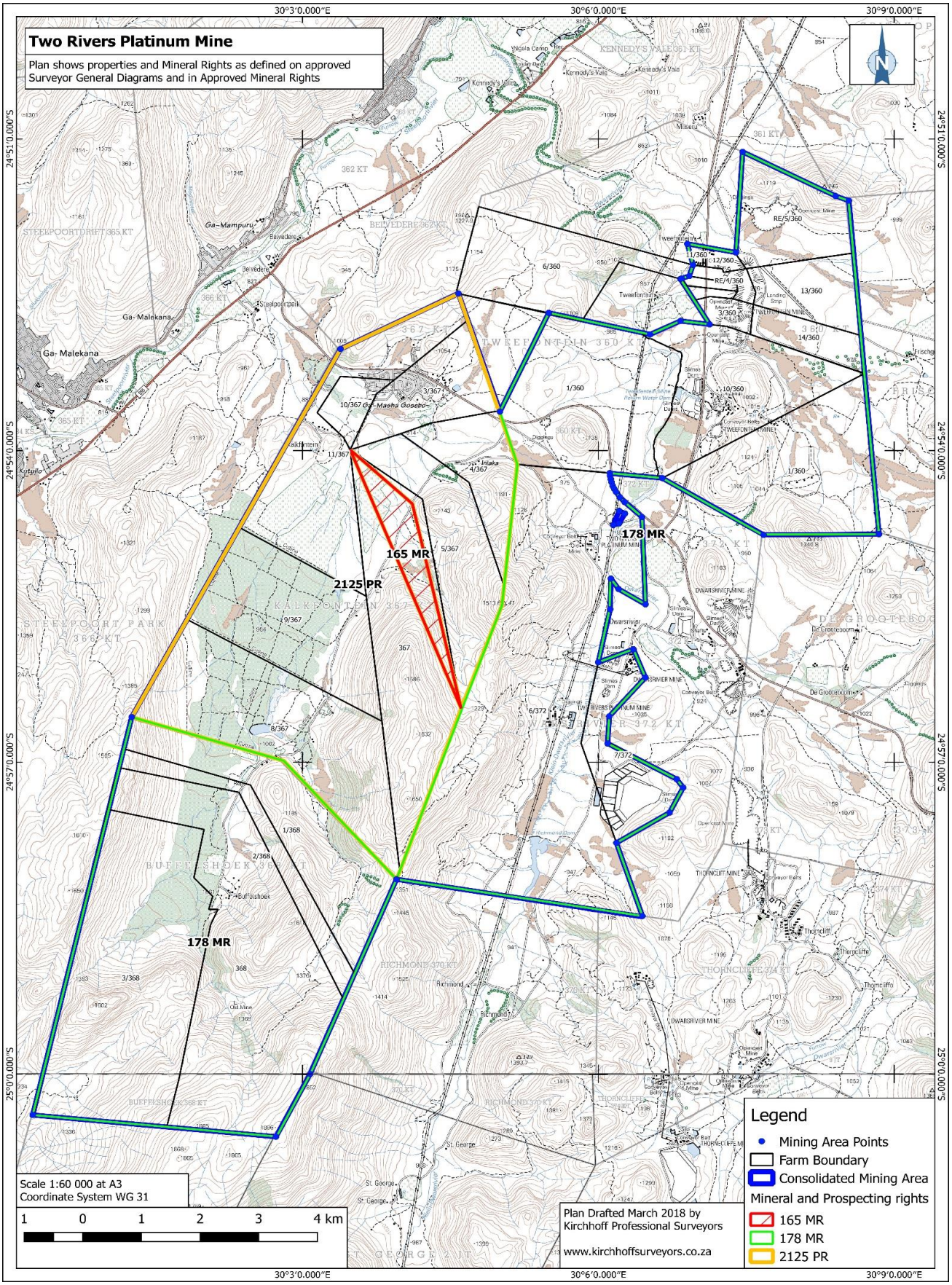

Figure 1-1: Mining Right Area

Activities at TRP commenced in 2003 with bulk sampling for a feasibility study. Trail mining operations and preliminary access development took place in 2004. The mining plan was submitted to the JV Board in December 2004, where after the project was released in June 2005 and construction commenced. Currently, the Upper Group 2 (UG2) is being mined from the underground via two portals, namely the Main decline and the North decline. The existing processing plant on site produces PGM concentrate.

It is the intention of TRP to extend the mining operations to sustain the UG2 production and grow the Merensky production. The proposed expanded mining operations are a westward down-dip and northward strike extension of the existing operations and extend across most of the Kalkfontein property. The proposed extension will be accessed via the two existing underground section (i.e. North and Main decline).

The depth of minerals extends from the surface outcrop at an elevation of approximately 900m above mean sea level to an elevation of between 750m and 400m from north to south, respectively. Because of the hilly nature of the topography, depth from surface may be up to 1000m. Trackless Bord and Pillar type mining methods are utilised at shallow to intermediate depths where a sufficiently wide mining cut is indicated. A mining section consists of 8-12 metre bords, with pillar sizes increasing with depth below surface. These bords are mined principally in a strike direction, except when re-establishing sections with geological disturbances (faults, dykes, potholes etc.).

Stoping sections exercise a multi-cycle operation during a shift. The full mining cycle in an eight bord section comprises two faces being drilled, two faces being cleaned, two faces being supported, with two faces standing idle. All the various phases are decoupled from one another, which assists in productivity. The two faces standing idle are essential when geological discontinuities are encountered as this provides additional face flexibility. A standard trackless Bord and Pillar section at TRP produces approximately 22,000 RoM tons of ore per month. This modular design allows production targets to be specified per shaft in terms of the number of Bord and Pillar sections required.

A schematic representation of the flow of ore mined from the two declines (i.e. North and Main) is presented in Figure 1-2 below. Existing Ventilation shafts will be utilized for the proposed expansion. Ore is mined from the production sections and transported by means of Load Haul Dumpers (LHD's) to a tipping facility located at the tail end of the nearest strike conveyor. The ore is transported via the strike conveyor system, along the strike towards the primary decline. Ore handling on surface is performed by either an overland conveyor system or by trucking, to the processing plant for processing, as per current operations. Waste rock and slimes are disposed at the current waste rock dump or slimes dam. Product is transported to the intended market.

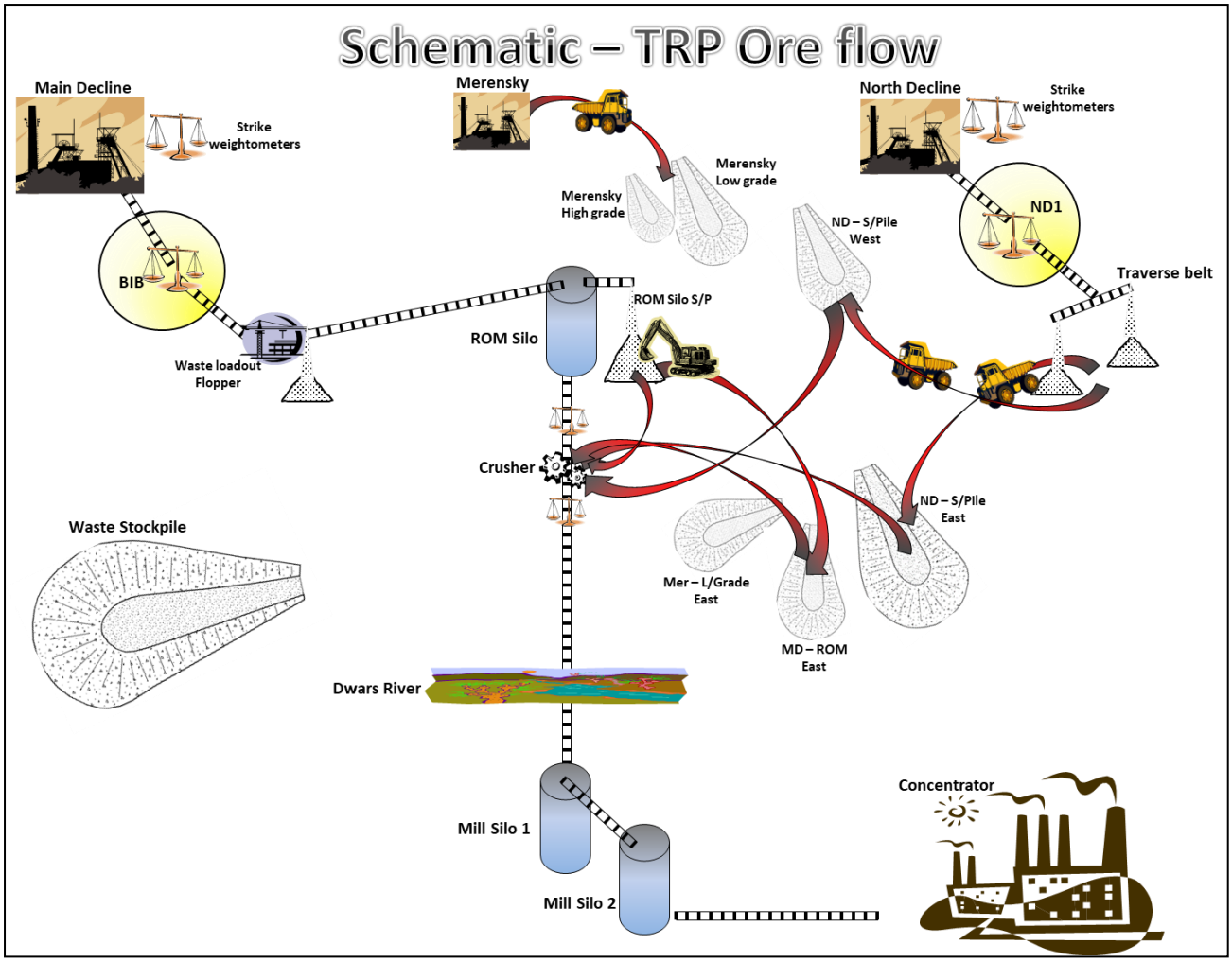

Figure 1-2: Schematic – TRP Ore Flow

The table below is a summary of the proposed TRP expansion activities.

Table 1-1: Description of the properties involved in the current application

Application	Mining Activity	Farm Portions Involved	Mining Rights
UG2 and Merensky Expansion	Underground mining of the Merensky reef	Dwarsrivier, Kalkfontein and Buffelshoek via the Merensky North decline on Dwarsrivier (no new surface infrastructure on Kalkfontein).	TRP's existing mining right area as well as transferred prospecting and mining rights from Kalkfontein. Application in progress to convert the prospecting to mining rights.
	Expansion of underground mining of the UG2 reef	Dwarsrivier, Kalkfontein, Buffelshoek and Tweefontein via existing declines (no new infrastructure on Kalkfontein & Tweefontein).	TRP's existing mining right area as well as transferred prospecting and mining rights from Kalkfontein. Application in progress to convert the prospecting to mining rights.

Legislative Requirements

The most important legislation applicable to the proposed project is the following:

- *National Environmental Management Act (No. 107 of 1998) [as amended]*
- Section 28 (1)*:* Duty of Care and responsibilities to minimise and remediate environmental degradation. EIA Regulations, 2017 (Government Notices 983 and 984) [as amended]
- *EIA Regulations, 2014 (Government Notices 982) [as amended] / Government Notice 325 (2017)* The proposed construction, operational and closure activities of the proposed development triggers the following listed activity that are listed in the EIA regulations for which a Scoping and Environmental Impact Assessment (EIA) process must be conducted:

  Activity 17:

  Any activity including the operation of that activity which requires a mining right as contemplated in Section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource, including activities for which and exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).

- *Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) [as amended]*
  - In order to apply for a mining permit, an application was submitted on the Department of Mineral Resources' Samrad online application system.
- *National Water Act (Act No.36 of 1998) [as amended]*
  - Section 19: Prevention and remedying effects of pollution
- *National Environmental Waste Act (Act No. 59 of 2008) [as amended]*
  - Section 16: General duty in respect of waste management
- *List of Waste Management Activities that have, or are likely to have a detrimental effect on the environment as promulgated in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended];*
- *Waste Classification and Management Regulations and Norms and Standards for the assessment of for landfill disposal and for disposal of waste to landfill, 2013 (Government Notice 634 – 635 of 2013) promulgated in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended];*
- *Regulations regarding the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation (GN R. 632 of 2015);*
- *Mine Health and Safety Act, 1996 (Act No. 29 of 1996) [as amended];*
- *National Heritage Resources Act, 1999 (Act No. 25 of 1999);*
- *National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) [as amended];*
- *National Dust Control Regulations, 2013 (Government Notice 827 of 2013);*
- *Veld and Forest Fire Act, 1998 (Act No. 101 of 1998) [as amended];*

- *National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) [as amended];*
- *Alien and Invasive Species Regulations (Government Notice 598 of 2014) and Alien and Invasive Species List, 2016 in terms of NEMBA (Government Notice 864 of 2016);*
- *Conservation of Agricultural Resources Act (no. 43 of 1983);*
- *Deeds registries Act, 1937 (Act no. 47 of 1937) [as amended];*
- *Hazardous Substances Act, 1973 (Act 15 of 1973) [as amended];*
- *Hazardous Chemical Substances Regulations, 1995 (Government Notice 1179 of 1995); and*
- *Other relevant national, provincial, district and local municipality legislation and guidelines that may be applicable to the application. Some of these are discussed in the next section.*

Need and Desirability

Two Rivers Platinum (TRP) is an established mine with surface processing plants, waste storage facilities and two decline shafts (i.e. North and Main). The underground mining activities produce approximately 22 000 tons RoM monthly for the two sections. At the current mining rate the mine will run out of minable reserves in the near future. To ensure that the mine is kept operational, TRP has acquired the Tamboti mining and prospecting rights.

The mine has applied under section 11(1) of the MPRDA for the written consent of the Minster of Mineral Resources to transfer the extension area to TRP. The extension of the mining area will increase the life of mine with 25 years.

The main benefits of the Two River Platinum mine are:

- Direct economic benefits will be derived from wages, taxes and profits. Indirect economic benefits will be derived from the procurement of goods and services and the spending power of employees;
- Extending the life of mine resulting in increased job security to employees.
- Implementation of the proposed project will result in skills development associated with the mining method;
- It contributes to the economic welfare of the surrounding community by creating working opportunities, in-house training to the regional population, creation of school and sport facilities, education and housing assistance and medical and clinical facilities;
- It contributes to the upliftment of living standards and the health and safety of the local community.
- The project will result in economic mining of a known resource as existing surface and underground infrastructure will be utilised.
- The net benefit to South Africa is a product produced for the world commodity market, earning South Africa the necessary foreign exchange and capital needed for a healthy economy and further capital investments in development projects for the long-term future of the country.

The project is aligned with the objectives of the MPRDA (Act 28 of 2002)

- To promote economic growth and mineral development in the Republic

- To promote employment and advance the social and economic welfare of all South Africans
- To ensure that the nation's mineral resources are developed in an orderly and ecologically sustainable manner while promoting justifiable social and economic development; and
- To ensure that holders of mining rights contribute towards the social-economic development of the area in which they are operating.

The Department of Environmental Affairs (DEA) published a Guideline on Need and Desirability (2017) in terms of the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended). The key components are listed and discussed below:

- Securing ecological sustainable development and use of natural resources
- Promoting justifiable economic and social development.

Ecological sustainable developments and use of natural resources

The project area has been selected on the basis of the presence of economically mineable resources in close proximity to the existing underground mining area. The underground mining areas will only be extended into the adjacent properties. The existing surface infrastructure (as described in this report) will be utilised for the processing of ore and disposal of waste. No surface infrastructure will be constructed. It is anticipated that no additional surface impact will take place. No additional impacts are anticipated on sensitive areas (i.e. aquatic ecosystems, biodiversity, heritage and social).

Some impacts on groundwater resources are anticipated and the impact was further investigated in the EIA phase by the appointed relevant specialist and is included within this report. Measures to mitigate the impacts to these resources will be included in the EIA and EMPr.

Promoting justifiable economic and social development

Community/society priorities are officially expressed through public documents including the provincial growth and development strategy and spatial development framework documents. The TRP project falls within the Greater Tubatse Municipality and forms part of the Greater Tubatse Municipality Local Economic Development (LED) Strategy. Four programmes for economic development form part of the LED. This comprises (1) Sector Development, (2) Economic Infrastructure Support, (3) Social Development, and (4) Institutional/Governance Reform. The projects that have been identified in the LED are aimed at economic development by ensuring job opportunities are created, jobs security is created, skills development takes place and that opportunities are created for South African Small, Medium and Micro Enterprise (SMME) development. Mining plays an important part in the sector development of the LED strategy. Mines contribute towards the socio-economic development of the region through social-upliftment and job creation as primary agents.

The proposed project will benefit society and the surrounding communities both directly and indirectly by providing job security at the proposed operation and through the extraction of mineral resources and

beneficiation of mineral resources within Limpopo. Direct economic benefits will be derived from wages, taxes and profits. Indirect economic benefits will be derived from the procurement of goods and services and the spending power of employees. The proposed development will also ensure local economic development through the implementation of projects identified in the Social and Labour Plan. TRP is fully committed to implementing development plans and projects that will facilitate local community and rural development in the area surrounding its project in line with the provisions of the Broad-Based Socio-Economic Empowerment Charter for the South African Mining Industry.

Alternatives

According to DEA (2017), Guideline on Need and Desirability, Department of Environmental Affairs, to describe the need for a development, it must be determined whether it is the right time for locating the type of land use and/or activity being proposed. To describe the desirability for a development, it must be determined, whether it is the right place for locating the type of land use and/or activity being proposed. Need and desirability can be equated to the concept of wise use of land which can be determined through asking the question: "what is the most sustainable use of land?"

The "no-go" alternative refers to the option of not going ahead with the proposed project. This would mean that there would be no change to the current status of the site and the positive socio-economic benefits of the proposed project would not be realised. The "no-go" alternative will result in closure of the mine.

The project alternatives being considered as feasible alternatives therefore include:

- *The site on which the proposed underground mining sections are to be located (underground layout alternatives);*
- *The mining method (technology alternatives);*
- *Design alternatives; and*
- Not implementing the mining activities ("*No-go" alternative*).

Public Participation

This section describes the public participation process (PPP) undertaken to date in line with Chapter 6 of the EIA Regulations (2014) (as amended). The process is undertaken to ensure compliance with the requirements in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) [as amended] (MPRDA) and the Environmental Impact Assessment Regulations (2014) [as amended]. The intention of the PPP was to inform I&APs, in sufficient detail, of the proposed project in order that I&APs may contribute meaningfully to the EIA process.

The PPP to date has included notification of I&APs through distribution of a Background Information Document (BID), placement of newspaper advertisements, placement of site, focussed engagement and meetings with community structures and public scoping meetings. A Scoping report was made available for 30 days and the final was submitted to the Department of Mineral Resources (DMR). A key aspect of public

consultation is the notification of landowners, occupier and users within and adjacent to the application area. More detail in this regard to the process followed is provided below.

Interested and affected party (I&AP) database

As part of the PPP, an I&AP database has been developed for the project. I&APs identified for the project include:

- landowners, lawful occupiers and ward councillors within and adjacent to the mining right application area
- community leaders and community structures
- non-government organisations and associations working in the area
- mines, industry and businesses in the area
- Parastatals
- commenting authorities:
    - Limpopo Department of Agriculture and Rural Development (LDARD);
    - Department of Water and Sanitation (DWS);
    - Department of Agriculture, Forestry and Fisheries (DAFF);
    - Department of Rural Development and Land Reform (DRDLR): Land Claims Commissioner;
    - South Africa Heritage Resource Agency (SAHRA);
    - Provincial Heritage Resources Authority Gauteng (PHRAG);
    - Department of Economic Development, Environment and Tourism; and
    - Greater Tubatse Municipality.

I&APs who attended meetings and /or submitted contact details have been registered on the I&AP database. The latest copy of the database is included in Appendix 6. The database will be updated on an on-going basis throughout the process.

Mining Right Application

- Scoping Phase:
    - A copy of the scoping report has been made available for a 30-day review and comment period, as from 18 July to 18 August 2018.
    - All comments have been included in the Scoping report as submitted to the Department of Mineral Resources and were acknowledged on the 12th of September 2018.
- Environmental Impact Assessment and Phase:
    - A copy of the Draft report will be made available for a 30-day review and comment period, as from 9th of November 2018 9th of December 2018.
    - An electronic copy of the Environmental Impact Assessment (EIA/EMP) can be downloaded. Please contact Malan Scholes Consulting (projects@malanscholesconsulting.co.za) for link.
    - Please send all comments to projects@malanscholesconsulting.co.za;

- Comments received during the public review period will be included into the final EIA/EMP report and the Comment and Responses Report, which will be submitted to the Department of Mineral Resources for decision.

Registration of any I&AP's can take place by registering on the I&AP's database, by sending details of the I&AP to MSC. Please feel welcome to contact us should you have further queries or would need additional clarification.

Advertisements and site notices

During the initiation of the public participation process (PPP), advertisements were placed in the following newspaper:

- Steelburger on Friday 9 March 2018 (local newspaper)

Site notices (5) in English, were placed at key positions in and adjacent to the mining right area on 8 March 2018. A copy of the site notices with the location of the notices presented in Appendix 6.

Additional Advertisements and site Notices: Scoping Phase

Announcement of the public review period for the Scoping phase documentation have been done through the placement of an advertisement and placement of site notices.

- Steelburger on Friday 20 July 2018 (local newspaper)

Site Notices (5) have been placed at key positions in and adjacent to the mining right area on 17 July 2018. Copy of the advertisement, site notice and placements of site notices are included in Appendix 6.

Advertisements and site Notices: Environmental Impact Assessment Phase

Announcement of the public review period for the Environmental Impact Assessment have been done through the placement of an advertisement and placement of site notices.

- Steelburger on Friday 9th November 2018 (local newspaper)

Site Notices (5) will be placed at key positions in and adjacent to the mining right area on 9th of November 2018. Copy of the advertisement, site notice and placements of site notices will be included in Appendix 6 of the Final EIA/EMPr to be submitted to DMR for decision.

Background Information Document (BID)

A BID document was compiled for the proposed project. The purpose of the BID was to inform I&APs about the proposed project, the EIA process, environmental attributes, possible impacts and means of providing input into the EIA process. The BID was made available in English and included details of the public scoping meetings. The BID was distributed at the public scoping meetings. The BID is presented in Apeendx 6.

During the Environmental Impact Assessment phase, the draft Environmental Impact Assessment and Environmental Management Report will be made available for comment during a 30 day period and comments will be incorporated and addressed within the final report.

Public Meetings

The purpose of holding the public scoping meetings was to:

- to provide an overview of the project and related EIA process
- to provide I&APs with an opportunity to:
    - raise any issues and concerns (both positive or negative)
    - provide input on any environmental sensitivities and potential impacts
    - to record issues within the formal assessment process so that they can be addressed during the course of the EIA
- to outline the way forward.

The date, venue and time of the public meetings are provided below.

Date	Venue	Time	Phase
Friday 23 March 2018	Ga-Malekana Community Hall	16h00 – 17h30	Scoping Phase

The meetings were held in English due to the diversity of languages present at the meetings with translation taking place where required. Copies of the BID (Scoping phase) and the Environmental Impacts Assessment Report (EIA Phase) were made available to attendees at the meetings. Minutes of the meeting are included in Appendix 6 (Public Participation Documents).

Community Leaders Meeting

A meeting with community leaders, Royal houses and community representatives were arranged as provided below.

Date	Venue	Time	Phase
Thursday 24 May 2018	Chrome Valley Lodge	10h00 – 12h00	Scoping Phase
To be confirmed			**EIA Phase**

The proposed project was presented to the community leaders and to obtain permission from the community leaders to arrange community public meetings. Minutes of the meeting is included in Appendix 6 and will be updated for the final submission to DMR.

Community Meetings

Additional public meetings were arranged through the community structures (i.e. Community Leaders) with the Kalkfontein community and the Buffelshoek community as presented below.

Date	Venue	Time	Phase
Thursday 7 June 2018	Kalkfontein Community Hall	10h00 – 12h00	Scoping phase
Thursday 7 June 2018	Buffelshoek Community Hall	13h00 – 15h00	Scoping Phase
To be confirmed			**EIA Phase**

The meetings were presented in English due to the diversity of languages present at the meetings with translation taking place where required. Copies of the BID were made available to attendees at the meetings. Proof of arrangement through the community structures are presented in Appendix 6.

Review of the Scoping Report and the Environmental Impact Assessment Report

I&AP review of Scoping Report

The Scoping Report was released for a period of 30 days from 18 July 2018 to 18 August 2018. Hard copies of the Scoping Report were submitted to all organs of state and relevant authorities. In addition, copies are placed at the following locations as presented below:

Venue	Location
Two Rivers Mine	SHEQ Offices
Kalkfontein Tribal Office	Tribal Office
Buffelshoek Tribal Office	Tribal Office
Malan Scholes Consulting Office	Reception First Floor, One-On-Jameson, 1 Jameson Avenue, Melrose Estate, Johannesburg

In addition, registered I&APs have been notified of the availability of the Scoping Report for review via SMS and E-mail notifications. Electronic copies of the Scoping Report have been made available via a link and on request.

A link was provided to all registered I&AP's from where an electronic copy of the DSR could have been downloaded:

https://malanscholesconsulting-my.sharepoint.com/:f:/g/personal/ajacklin_malanscholesconsulting_co_za/Ep7oxCA_nMBMqR4HZ04qPWEB7bbBD77xmnO6xwxxO72T3A?e=DAGjpg

I&AP review of Environmental Impact Assessment Report

The EIA/EMPR Report was released for a period of 30 days from 9th of November 2018 – 9th December 2018. Hard copies of the Draft EIA/EMPR Report were submitted to all organs of state and relevant authorities. In addition copies are placed at the following locations as presented below:

Venue	Location
Two Rivers Mine	SHEQ Offices
Kalkfontein Tribal Office	Tribal Office

Buffelshoek Tribal Office	Tribal Office
Malan Scholes Consulting Office	Reception First Floor, One-On-Jameson, 1 Jameson Avenue, Melrose Estate, Johannesburg

In addition, registered I&APs will be notified of the availability of the EIA/EMP Report for review via SMS and E-mail notifications. Electronic copies of the Draft EIA/EMP Report have been made available via a link and on request.

A link will be provided to all registered I&AP's from where an electronic copy of the EIA/EMPR can be downloaded.

Commenting Authorities

Hard copies of the Draft Scoping Report and the EIA/EMPR Report were delivered to the following commenting authorities:

- Limpopo Department of Agriculture and Rural Development (LDARD)
- Department of Water and Sanitation (DWS)
- Department of Agriculture, Forestry and Fisheries (DAFF)
- Department of Rural Development and Land Reform (DRDLR): Land Claims Commissioner
- South Africa Heritage Resource Agency (SAHRA)
- Provincial Heritage Resources Authority Gauteng (PHRAG)
- Department of Economic Development, Environment and Tourism (LDEDET)
- Greater Tubatse Municipality

Proof of delivery is included in Appendix 6. The document was uploaded to the SAHRA website as required by the commenting authority.

Next Phase - Way forward

Draft Environmental Impact Assessment

A Draft EIA/EMPR has been compiled (this report) on completion will be made available for a 30-day review period starting on the 9th of November 2018 – 9th of December 2018. Comments received during this period of time will be incorporated into a Final EIA/EMPR, which will be submitted for decision by the Competent Authority.

Final Environmental Impact Assessment

The Draft EIA/EMPR will be updated with all the comments and questions received during the 30 day public consultation period, which will be submitted for decision to the Competent Authority.

Summary of Issues raised

A high level summary of the issues/concerns raised during the Scoping public meetings are presented below and will be updated to include comments received during the Environmental Impact Assessment Phase of the project (this phase):

- Impact on groundwater and surface water
- Impact on biodiversity
- Jobs creation
    - Benefit to the community, Skills development
- Damage to Houses – Cracks
- Employment and the number of employees (Empowerment).

A comment and responses report (C&RR) containing all comments or responses as received during the Scoping phase is included in Appendix 6. *This C&RR will be updated to include all comments as received during the 30 day comment period of the EIA/EMPR before submission.*

Specialist studies

As part of the Environmental Impact Assessment phase for the extension of the TRP existing mining right area the following specialist study was to be included additionally:

- Geohydrological Study – *Received October 2018;*
- Heritage Letter/Short Report – *Received October 2018*

For description of the baseline information, the existing specialist studies form the approved (GCS) EMP/EIA (30 July 2015) will be used as reference.

Reasoned Opinion of the EAP and Summary of Findings

Based on the findings, the EAP is of the opinion that the scoping phase be approved, due to the positive social and economic impacts it can have on the local and regional communities. The potential negative impacts have been investigated during the EIA phase and mitigation measures for the impacts developed and included in the EMPr. *Provided below is a summary of the main impacts expected as well as their respective significance ratings:*

Activity	Aspects Affected	Potential Impact	Significance Without Mitigation		Significance With Mitigation	
Operational Phase						
Extending of the underground mining sections; Blasting and Drilling	**Soils**	Soil compaction by heavy duty vehicles.	Low	30	Very Low	6
Extending of the underground mining sections; Blasting and	**Soils**	Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as	Low	30	Very Low	6

Activity	Aspects Affected	Potential Impact	Significance Without Mitigation		Significance With Mitigation	
Drilling		hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints.				
Underground mining; Blasting and Drilling	**Land Capability and Land Use**	Possibility of mining activities and workers causing veld fires destroying veld and animals on the study area and on adjacent land, impacting on the livelihood of surrounding land owners and users.	Low	22	Very Low	4.4
Underground mining; Blasting and Drilling	**Blasting**	Blasting hazard, specifically Ground vibration	Low	33	Very Low	19.8
Underground mining; Blasting and Drilling	**Ecological Impacts**	Disturbance and loss of fauna through noise, light and dust pollution and hunting, trapping and killing of fauna.	Low	33	Very Low	19.8
Underground mining; Blasting and Drilling	**Ecological Impacts**	Spreading of alien invasive species and bush encroachment of indigenous species.	Low	30	Very Low	18
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the operational phase.	Low	39	Low	23.4
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from construction vehicles; - Other chemicals from maintenance activities e.g. paints; and - Effluent discharges, due to a lack of stormwater management and system maintenance.	Medium	42	Low	25.2
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Impact of Nitrate based explosives used during mining on groundwater quality. Contamination plume can affect the groundwater resource.	Medium	56	Low	33.6
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the operational phase.	Medium	56	Low	33.6
Loading, hauling and conveying RoM to the Processing Plant, Processing of the RoM	**Hydrological Aspects; Surface water and Groundwater**	Possible impact on surface and groundwater from contaminated process water.	Medium	48	Very Low	9.6
Loading, hauling and conveying RoM to the Processing Plant, Processing of the RoM	**Hydrological Aspects; Surface water and Groundwater**	Possible impact of spills and overflows from pollution control dams and facilities.	Medium	48	Very Low	9.6
Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Hydrological Aspects; Surface water and Groundwater**	Seepage from waste management activities e.g. waste rock dumps, could cause a contamination plume affecting the underground water resources.	High	64	Medium	51.2
Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Hydrological Aspects; Surface water and Groundwater**	Discharge from Tailing Storage facilities and associated water handling infrastructure can cause contamination of surface water resources.	Medium	48	Low	28.8
Underground mining; Blasting and Drilling	**Air Quality**	Increased dust pollution (soil and ore fines), vehicles on gravel roads and storage of tailings and waste rock, as well as other mining and processing activities.	Low	30	Very Low	18
Underground mining;	**Air Quality**	Increased windborne dust (soil and ore fines),	Low	30	Very Low	18

Activity	Aspects Affected	Potential Impact	Significance Without Mitigation		Significance With Mitigation	
Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.		vehicle fumes and particulate matter PM10, altering air quality.				
Loading, hauling and conveying RoM to the Processing Plant	**Air Quality**	Increased dust pollution (soil and ore fines), vehicles on gravel roads and transport of RoM	Low	30	Very Low	18
Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of the mining activities and processing.	Low	33	Low	26.4
Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Disturbance due to vibrations caused by vehicles.	Low	30	Low	24
Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Impact of security lighting on surrounding landowners and animals.	Low	30	Low	24
Underground mining; Blasting and Drilling	**Sites of archaeological and cultural interests**	None expected	N/A		N/A	
Underground mining; Blasting and Drilling	**Visual aspects**	Visibility from sensitive receptors / visual scarring of the landscape and impact on 'Sense of Place' as a result of the visibility of the mining site including the waste management facilities and mining activities.	Low	33	Low	26.4
Underground mining; Blasting and Drilling	**Visual aspects**	Visibility of solid domestic and operational waste.	Low	33	Low	26.4
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM	**Waste**	Generation and disposal of general waste, litter and hazardous material during the operational phase and operational waste i.e. waste rock, tailings etc.	Medium	48	Low	28.8
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Waste (Including Hazardous Waste)**	Generation and disposal of additional hazardous operational waste i.e. waste rock, tailings, etc.	Medium	52	Low	31.2
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Services**	Need for services e.g. water, electricity and sewerage systems, causing additional strain on natural resources and service infrastructure.	Medium	48	Low	38.4
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant,	**Traffic**	The change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic.	Medium	44	Low	35.2

Activity	Aspects Affected	Potential Impact	Significance Without Mitigation		Significance With Mitigation	
Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.						
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Traffic**	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Medium	44	Low	35.2
Underground mining; Blasting and Drilling	**Health and Safety**	Possibility of mining activities and workers causing veld fires, which can potentially cause injury and or loss of life to mine workers and surrounding landowners, visitors and workers.	Low	36	Low	21.6
Underground mining; Blasting and Drilling, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Health and Safety**	Increased risk to public health and safety: Dangerous areas including the waste management activities and waste poses health risks and possible loss of life to mine workers and visitors to the site.	Low	36	Low	21.6
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Health and Safety**	Increased risk to public and worker health and safety	Low	36	Low	21.6
Underground mining; Blasting and Drilling	**Socio-Economic**	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Medium	42	Low	25.2
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM	**Socio-Economic: Positive Impacts**	Extended employment provision due to the implementation of the extension of the mining activities, allowing mining activities to continue for additional years.	Medium	45	Medium	45
Underground mining; Blasting and Drilling	**Socio-Economic: Positive Impacts**	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Medium	48	Medium	48
Closure Phase						
Closure and Rehabilitation	**Geology and Soils**	Soil compaction by heavy duty vehicles.	Low	21	Very Low	4.2
Closure and Rehabilitation	**Geology and Soils**	Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints.	Low	21	Very Low	4.2
Rehabilitation of site, removal of	**Geology and Soils**	Soil erosion	Low	21	Very Low	4.2

Activity	Aspects Affected	Potential Impact	Significance Without Mitigation		Significance With Mitigation	
infrastructure, sealing of shafts and closure of waste facilities						
Closure and Rehabilitation	**Land Capability and Land Use**	Possibility of mining activities and workers causing veld fires destroying veld and animals on the study area and on adjacent land, impacting on the livelihood of surrounding land owners and users.	Very Low	16	Very Low	3.2
Closure and Rehabilitation	**Ecological Impacts**	Disturbance and loss of fauna through noise, light and dust pollution as well as hunting, trapping and killing of fauna.	Low	24	Very Low	14.4
Closure and Rehabilitation	**Ecological Impacts**	Spreading of alien invasive species and bush encroachment of indigenous species.	Low	21	Very Low	12.6
Closure and Rehabilitation	**Ecological Impacts - Positive Impact**	Rehabilitation of area with natural vegetation and re-establishment of local biodiversity	Low	30	Very Low	18
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the closure phase.	Medium	44	Low	26.4
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from heavy duty vehicles; - Effluent discharges, due to a lack of stormwater management.	Low	22	Very Low	13.2
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the closure phase.	Low	33	Low	19.8
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Impaction groundwater from the pollution plume associated with the waste storage facilities.	Low	30	Low	24
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Contamination plume stemming from the underground sections could be affecting the underground water resources.	High	64	Medium	51.2
Closure and Rehabilitation	**Air Quality**	Dust (soil and ore fines) pollution due to rehabilitation activities and heavy duty vehicles.	Low	30	Very Low	18
Closure and Rehabilitation	**Air Quality**	Windborne dust (soil and ore fines) and vehicle fumes and particulate matter PM10, altering air quality.	Low	30	Very Low	18
Closure and Rehabilitation	**Noise, Vibration and Lighting**	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of heavy duty vehicles and equipment.	Low	24	Very Low	19.2
Closure and Rehabilitation	**Noise, Vibration and Lighting**	Disturbance due to vibrations caused by heavy duty vehicles.	Low	21	Very Low	16.8
Closure and Rehabilitation	**Noise, Vibration and Lighting**	Impact of security lighting on surrounding landowners and animals.	Low	21	Very Low	16.8
Closure and Rehabilitation	**Sites of archaeological and cultural interests**	None expected	N/A		N/A	
Closure and Rehabilitation	**Visual aspects**	Visibility from sensitive receptors / visual scarring of the landscape as a result of the closure and rehabilitation activities.	Low	32	Low	25.6
Closure and Rehabilitation	**Visual aspects**	Visibility of solid domestic and operational waste.	Low	32	Low	25.6
Closure and	**Waste**	Generation and disposal of general waste,	Low	36	Low	21.6

Activity	Aspects Affected	Potential Impact	Significance Without Mitigation		Significance With Mitigation	
Rehabilitation	**(Including Hazardous Waste)**	litter and hazardous material during the operational phase and operational waste i.e. waste rock, tailings etc.				
Closure and Rehabilitation, Rehabilitation of site, removal of infrastructure, sealing of shafts and closure of waste facilities	**Waste (Including Hazardous Waste)**	Generation and disposal of additional hazardous operational waste i.e. waste rock, tailings, etc.	Low	40	Low	24
Closure and Rehabilitation	**Services**	Need for additional services i.e. water, electricity and sewerage systems during the closure phase causing additional strain on natural resources and infrastructure.	Low	36	Low	28.8
Closure and Rehabilitation	**Traffic**	The change in the traffic patterns as a result of traffic entering and exiting the proposed mine on the surrounding road infrastructure and existing traffic.	Low	32	Low	25.6
Closure and Rehabilitation	**Traffic**	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Low	32	Low	25.6
Closure and Rehabilitation	**Health and Safety**	Possibility of closure activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.	Low	27	Very Low	16.2
Closure and Rehabilitation	**Health and Safety**	Increased risk to public health and safety: Dangerous areas including the waste management facilities poses health risks and possible loss of life to mine workers and visitors to the site.	Low	27	Very Low	16.2
Closure and Rehabilitation	**Socio-Economic**	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Low	33	Very Low	19.8
Closure and Rehabilitation	**Socio-Economic**	Economic impact should there be an incident of public health and safety.	Medium	45	Low	36
Closure and Rehabilitation	**Socio-Economic**	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Low	39	Low	31.2
Closure and Rehabilitation	**Socio-Economic**	Reduced period of providing employment for local residents and skills transfer to unskilled and semi-skilled unemployed individuals.	Low	30	Very Low	18
NO-GO Option						
No-Go Option	**Socio-Economic**	Reduced period of development and upliftment of the surrounding communities and infrastructure.	Medium	45	Low	36
No-Go Option	**Socio-Economic**	Reduced period of development of the economic environment, by job provision and sourcing supplies for and from local residents and businesses.	Medium	45	Low	36
No-Go Option	**Socio-Economic**	Positive: No additional negative impacts on the environment	Medium	45	Low	36

Recommendations

To achieve appropriate environmental management standards and ensure that the findings of the environmental studies are implemented through physical measures, the recommendations from the Environmental Impact Assessment are included within the Environmental Management Programme (EMP). The EMP will be based on all the information to be contained in the Environmental Impact Report (EIR) as well as all the specialists' reports.

Conclusion

The EIA process is currently in the Environmental Impact Assessment phase. The project has the potential to impact on the biophysical, cultural and socio-economic both within and surrounding project area. Input received initially during the scoping phase and the following environmental impact assessment phase allows for the meaningful assessment of all relevant biophysical, cultural and socio-economic issues. Potential impacts will be investigated by studies. Stakeholder engagement will continue throughout the EIA process. The Environmental Management Programme (EMPr) will contain more detailed mitigation measures which will also be incorporated into the Environmental Impact Report (EIR).

The proposed mitigation measures, if implemented, will reduce the significance of the majority of the identified impacts. It is therefore the recommended based on the assessment of the current available information, that the Environmental Impact Assessment and Environmental Management Programme for the proposed development be accepted by the Competent Authority.

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ABBREVIATIONS

Abbreviation	Description
ARC	Agricultural Research Council
BoQ	Bill of Quantities
BPEO	Best Practicable Environmental Option
CS	Community Survey
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DFS	Definitive Feasibility Study
DMR	Department of Mineral Resources
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECA	Environmental Conservation Act (Act 73 of 1989)
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Assessment Report
EMPR	Environmental Management Programme
FAII	Fish Assemblage Integrity Index
FTE	Full Time Equivalent
GNR	Government Notice Regulation
I&APs	Interested and Affected Parties
IDP	Integrated Development Programme
IEM	Integrated Environmental Management
IHAS	Invertebrate Habitat Assessment System
IHIA	Intermediate Habitat Integrity Assessment
IWUL	Integrated Water Use License
IWULA	Integrated Water Use License Application
LED	Local Eonomic Development
LOM	Life of Mine
MAMSL	Meter Above Mean Sea Level
MSC	Malan Scholes Consulting
MPRDA	Mineral and Petroleum Resources Development Act (Act 28 of 2002)
MRA	Mining Right Application
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMAQA	National Environmental Management: Air Quality Act, 39 of 2004
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEMWA	National Environmental Management: Waste Act (Act 59 of 2008)
NFA	National Forest Act (Act 84 of 1998)

NHRA	National Heritage Resources Act (Act 25 of 1999)
NWA	National Water Act (Act 36 of 1998)
PAIA	Promotion of Access to Information Act (Act 2 of 2000)
PAJA	Promotion of Administrative Justice Act (Act 3 of 2000)
PES	Present Ecological State
PGMs	Platinum-Group Metals
PM10	Thoracic Particulate Matter
PM2.5	Inhalable Particulate Matter
PPP	Public Participation Process
ROM	Run of Mine
RVI	Riparian Vegetation Index
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited
SANS	South African National Standard
SASS	South African Scoring System
SMME	South African Small, Medium and Micro Enterprise
TSF	Tailings Storage Facility
TPA	Tons Per Annum
TSP	Total Suspended Particulates

INTRODUCTION

Malan Scholes Consulting (Pty) Ltd (MSC) was appointed by Two Rivers Platinum (Pty) Ltd to undertake the environmental authorisation process to extent the Two Rivers Platinum (TRP) mining right to include the Tamboti Mining Right Area and Prospecting Right Areas. Two Rivers Platinum (TRP) is a Joint Venture (JV) between African Rainbow Minerals (ARM) and Impala Platinum. The mine is located in the Steelpoort area within the Greater Tubatse Local and Sekhukhune District Municipalities, approximately 20 km south-west of the town of Steelpoort, in the Limpopo Province.

Two Rivers Platinum (TRP) has a New Order Mining Right (LP 178 MR) and Environmental Management Programme (approved 30 July 2015) to explore and mine the Platinum Group Metals (PGM's), chrome and other precious metals (gold and silver), and associated base metals and ores thereof on portions of the farm Dwarsrivier 373 KT, Tweefontein 360 KT, Buffelshoek 368 KT and Kalkfontein 367 KT. The mine intent to extent the current mining area into the Tamboti Mining Right (LP 165 MR) located on Remaining Extent of the Farm Kalkfontein 367KT and the Tamboti Prospecting Right (LP 2125 PR). The proposed mining right area is presented in Figure 3 and 4.The aim of the proposed inclusion, is to be able to extend the existing underground workings and increase the current Life of Mine (LoM).

Information from the Consolidated EIA/EMPr has been used to inform and provide available baseline data as well as information regarding the existing activities on Two River Platinum Mine

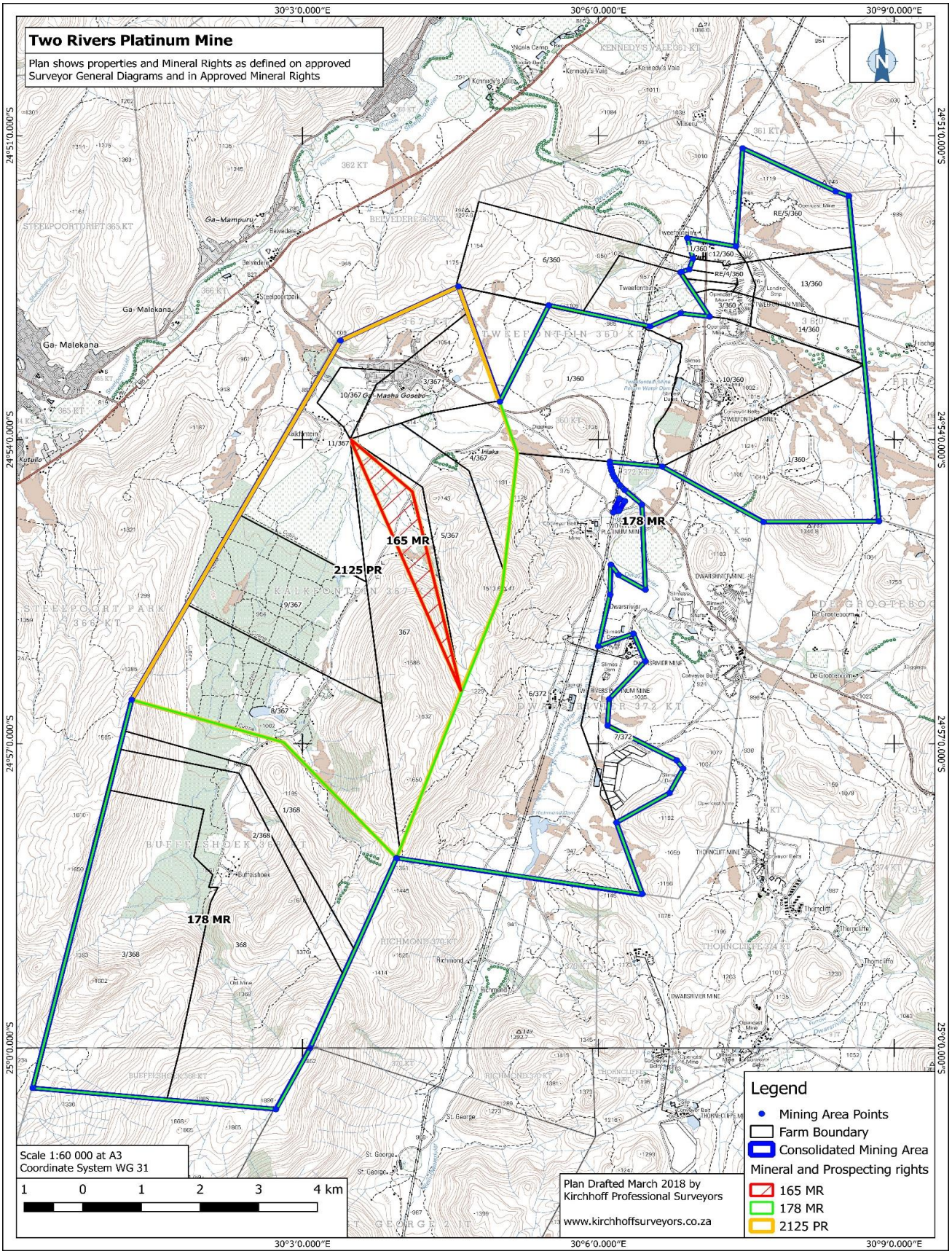

Figure 1-3: Mining Right Area

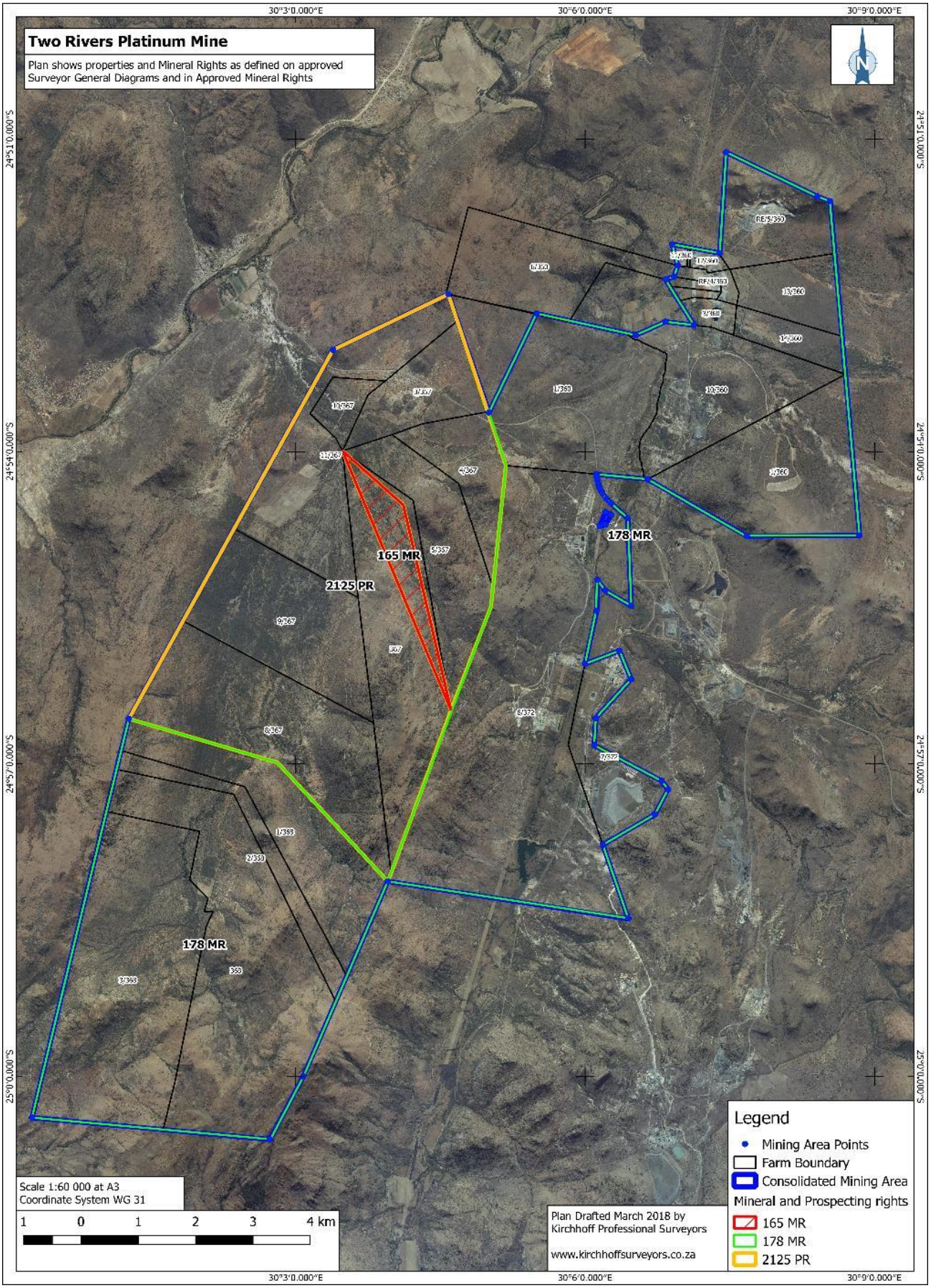

Figure 1-4: Mining Right Area

PART A: SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1 CONTACT PERSON AND CORRESPONDENCE ADDRESS

1.1 DETAILS

1.1.1 Details of the EAP

Name of the Practitioner:	DuToit Wilken	Corlien Lambrechts
Tel No.:	+27 (0) 11 718 4600	
Fax No.:	+27 (0) 10 020 5034	
Email address:	dutoit@elemental-s.co.za ; corlien@elemental-s.co.za	

1.1.2 Expertise of the EAP

1.1.2.1 The Qualifications of the EAP (With Evidence)

Please refer to Table 1 for a summary of the qualification and experience of the EAP. Refer to Appendix 1 and 2 for more details (CV).

Mr Du Toit Wilken (Pri.Sci.Nat):

- University of Pretoria, MSc Geography – 2015
- University of Pretoria, BSc Hons Environmental Science – 2010
- University of Pretoria, BSc Environmental Science – 2009

Ms Corlien Lambrechts:

- University of Pretoria, BSc Hons Zoology – 2015
- University of South Africa / North West University, BSc Environmental Management and Zoology - 2009

1.1.2.2 Summary of the EAPs Past Experience (In Carrying Out the Environmental Impact Assessment Procedure)

*(Attached the EAP's curriculum vitae as **Appendix 2**)*

Provided here is a summary of the qualification and experience of the EAP. Refer to Appendix 2 for more details (experience).

DuToit Wilken is an Environmental Scientist with more than 8 years of experience in applying the principles of Integrated Environmental Management, and in applying the Environmental Legislation to a number of

development projects and initiatives in Southern Africa. He is registered as a Pre.Sci.Nat. (SACNASP), Natural Scientist, Registration number 118911.He has co-ordinated and managed number of diverse projects and programs related to the Environment and Mining within both the public and private sectors and for national, multi-national and international companies. His interpersonal and organisational skills have enabled him to efficiently direct these projects from initiation to implementation.

A significant element of public participation is required throughout the life cycle of an EIA process. DuToit has successfully liaised with interested and affected parties, ensuring that all communication procedures and dialogues are open and transparent, and that capacity building is conducted where necessary. His proficient report-writing skills have been utilised for the compilation of a wide variety of reports, which include but is not limited to Basic Assessment Reports, Scoping and Environmental Impact Assessment Reports, Environmental Management Plans (Planning, Construction, Operation and Closure), Environmental Audit Reports, Opportunities and Constraints Analyses, Waste License Applications, Water-Use Application Reports and Mining Right Applications.

Corlien Lambrechts is an Environmental Scientist with 6 years of applicable experience in the relevant field of Environmental Management and has qualifications in Environmental Management and Zoology. She is registered as a Cand.Sci.Nat. (SACNASP), Candidate Natural Scientist, Registration number 100003/17. She fullfills the requirements for Pr.Sci.Nat and has applied for upgrade with the South African Council for Natural Scientific Professions.

In 2015 she enrolled for her Honors degree in Zoology at the University of Pretoria where she completed a project in the Cathedral Peak Drakensberg Mountain range studying differences in community structures of invertebrate species between natural grasslands and grasslands subjected to rehabilitation by South African Environmental Observation Network (SAEON) and in association with the University of Pretoria Centre of Invasion Biology (CIB). During her career within the Environmental management field, she has been involved in a wide variety of Ecological and Environmental applications and compilation of reports, which include as relevant to the compilation of this report: Basic Assessment Reports, Scoping and Environmental Impact Assessment Reports and Environmental Management Plans, Environmental Audit Reports, Water-Use Application Reports and Mining Right Applications.

Robyn Sally Mellett, the Environmental Scientist who is overseeing the project and is peer reviewing the project is a dedicated professional with over thirteen (15) years' experience in project management for an array of environmental related projects, including ensuring that planned mining projects obtained all necessary legal approvals and licensing prior to commencement. She has ten (10) years' experience in the mining sector, in three (3) countries, namely: Botswana, South Africa and Zimbabwe.

During her mining career, she has provided in-house support both strategic and operational to four (4) mining houses, namely: Aquarius Platinum (SA) (Pty) Ltd, Kumba Iron Ore, African Rainbow Minerals (Pty) Ltd and Sibanye-Stillwater. She has furthermore, played an environmental consulting role for several mining houses covering thirteen (13) different commodities, namely: Platinum Group Metals (PGMs), iron ore, gold, diamond, dolomite, lime, ferromanganese, coal, copper, nickel, cobalt, chrome and cement. She further, has two (2) years' experience in environmental consulting for the agriculture & residential sector. In addition, she has also played an advisory role in research, education, awareness and outreach in five (5) countries, namely: Afghanistan, Lesotho, South Africa, Swaziland and Taiwan. Currently, she is playing an environmental advisory role for Malan Scholes Consulting in South Africa.

2 DESCRIPTION OF THE PROPERTY

2.1 SITE LOCATION

Table 2-1: Property description and surveyor codes

Farm Name:	Two River Plat Right (LP 178 MR) • Portion 1, 3, RE 4, Re of 5, 6, 9, 10, 11, 12, 13 and 14 of the farm Tweefontein 360 KT. • Portion 6 and 7 of the farm Dwarsrivier 372KT, Portion 1, 2, 3, 4, 5 and 6 of the Farm Kalkfontein 367 KT and the Farm Buffelshoek 368 KT. Tamboti Mining Right (LP 165 MR) • located on Remaining Extent of the Farm Kalkfontein 367KT: and Tamboti Prospecting Right (LP 2125 PR) • located on Portion 1,2,3,4,5,6,8,9,10 and 11 of the Farm Kalkfontein 367 KT.	
Application area (Ha)	10 669.4983 hectares in accordance with MR	
Magisterial district:	Greater Tubatse Local and Sekhukhune District Municipalities. The Fetakgomo and Greater Tubatse Local Municipalities have been consolidated in 2016/2017.	
Distance and direction from nearest town	Approximately 20 km south-west of the town of Steelpoort, in the Limpopo Province	
21-digit Surveyor General Code for each farm portion	Portion 1 of the farm Kalkfontein 367 KT	T0KT00000000036700001
	Portion 2 of the farm Kalkfontein 367 KT	T0KT00000000036700002
	Portion 3 of the farm Kalkfontein 367 KT	T0KT00000000036700003
	Portion 4 of the farm Kalkfontein 367 KT	T0KT00000000036700004
	Portion 5 of the farm Kalkfontein 367 KT	T0KT00000000036700005
	Portion 6 of the farm Kalkfontein 367 KT	T0KT00000000036700006
	Portion 8 of the farm Kalkfontein 367 KT	T0KT00000000036700008
	Portion 10 of the farm Kalkfontein 367 KT	T0KT00000000036700010
	Portion 11 of the farm Kalkfontein 367 KT	T0KT00000000036700011

	Remaining Extent of the farm Kalkfontein 367 KT	T0KT00000000036700000
	Portion 1 of the farm Buffelshoek 368 KT	T0KT00000000036800001
	Portion 2 of the farm Buffelshoek 368 KT	T0KT00000000036800002
	Portion 3 of the farm Buffelshoek 368 KT	T0KT00000000036800003
	Remaining Extent of the farm Buffelshoek 368KT	T0KT00000000036800000
	Portion 6 of the farm Dwarsrivier 372 KT	T0KT00000000037200006
	Portion 7 of the farm Dwarsrivier 372 KT	T0KT00000000037200007
	Remaining Extent of Portion 1 of the farm Tweefontein 360 KT	T0KT00000000036000001
	Portion 3 of the farm Tweefontein 360 KT	T0KT00000000036000003
	Remaining Extent of Portion 4 of the farm Tweefontein 360 KT	T0KT00000000036000004
	Remaining Extent of Portion 5 of the farm Tweefontein 360 KT	T0KT00000000036000005
	Portion 6 of the farm Tweefontein 360 KT	T0KT00000000036000006
	Portion 9 of the farm Tweefontein 360 KT	T0KT00000000036000009
	Portion 10 of the farm Tweefontein 360 KT	T0KT00000000036000010
	Portion 11 of the farm Tweefontein 360 KT	T0KT00000000036000011
	Portion 12 of the farm Tweefontein 360 KT	T0KT00000000036000012
	Portion 13 of the farm Tweefontein 360 KT	T0KT00000000036000013
	Portion 14 of the farm Tweefontein 360 KT	T0KT00000000036000014

2.2 LOCALITY MAP (SHOW NEAREST TOWN, SCALE NOT SMALLER THAN 1:250 000)

(Show nearest town, scale not smaller than 1:250000 attached.

Please refer to Appendix 3 for the Locality Maps for the project area.

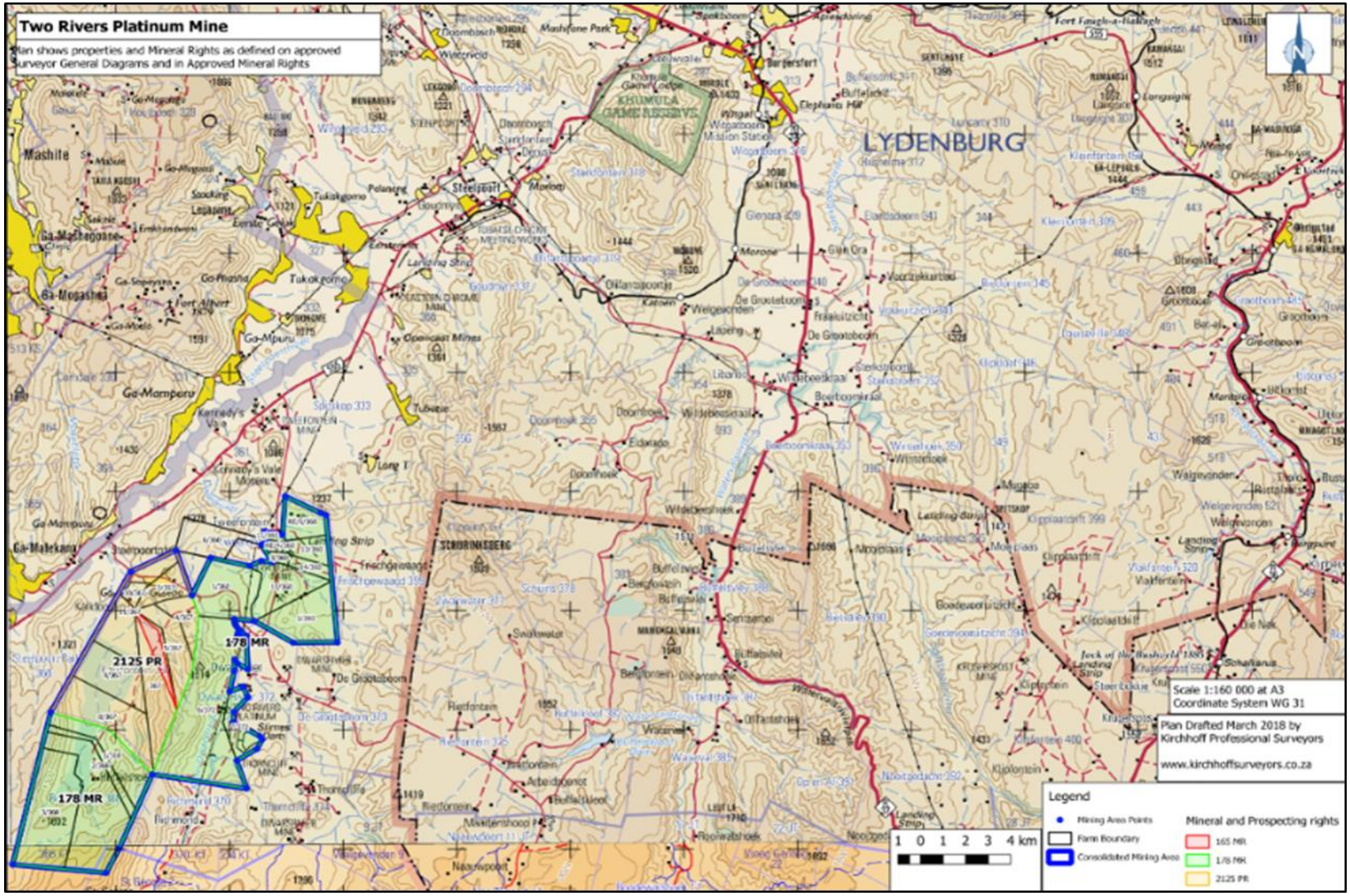

Figure 2-1: Locality of the Two RiversPlatinum Mine

3 DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY

3.1 LISTED AND SPECIFIED ACTIVITIES

Provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site and attach as Appendix.

Refer to Appendix 4.

Table 3-1: Listed and specified activities

Name Of Activity	Aerial extent of the Activity Ha or m²	Listed Activity	Applicable Listing Notice	Waste Management
Construction Phase				
N/A				
Operational Phase				
Extending of underground mining area from the existing underground area into the proposed adjacent properties	To be determined	**X**	GNR: 984 Activity 17 (As Amended)	
Drill and Blasting to be undertaken at the face of the bord sections	To be determined		NOT LISTED	
Transporting of ore by means of Load Haul Dumpers (LHD's) to a tipping facility	Exiting infrastructure		Approved Infrastructure	
Transporting of ore via the strike conveyor system, along the strike towards the primary decline	Exiting infrastructure		Approved Infrastructure	
Primary and secondary crushing of ore from underground sections	Exiting infrastructure		Approved Infrastructure	
Load and haul to stockpile areas. Stockpiling of ore	Exiting infrastructure		Approved Infrastructure	
Convey of ROM to Processing plant	Exiting infrastructure		Approved Infrastructure	
Transportation/transfer of the waste rock from the shafts to the WRDs.	Exiting infrastructure		Approved Infrastructure	
Deposition of waste rock onto existing waste rock dump.	Exiting infrastructure		Approved Infrastructure	
Primary and secondary milling of ore for processing	Exiting infrastructure.		Approved Infrastructure	
Processing of RoM	Exiting infrastructure		Approved Infrastructure	
Transportation/transfer of tailings to existing Tailing Storage Facility	Exiting infrastructure		Approved Infrastructure	
Dust Suppression	Extent of dirt roads		NOT LISTED	
Transport of Product to market	N/A		NOT LISTED	

Table 3-2: Description of the EIA Regulations Listed Activities

Legislation	Listed activities	Applicability of the activity	Competent Authority
NEMA and the EIA Regulations, 2014, as amended.	**GNR 984 Activities:** (17) Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including— (a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or (b) the primary processing of a mineral resource including crushing.	Extension of existing mining right area. Converting of prospecting right into a mining right.	DMR – Limpopo Province

3.2 DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN

(Describe Methodology or technology to be employed, including the type of commodity to be mined and for a linear activity, a description of the route of the activity)

Refer to Appendix 4 for Master Layout of 5 year Mining Plan

3.2.1 Background

Malan Scholes Consulting (Pty) Ltd was appointed by Two Rivers Platinum (Pty) Ltd to undertake the environmental authorisation process to extent the Two Rivers Platinum (TRP) mining right to include the Tamboti Mining Right Area and Prospecting Right Areas.

Two Rivers Platinum (TRP) is a Joint Venture (JV) between African Rainbow Minerals (ARM) and Impala Platinum. The mine is located in the Steelpoort area within the Greater Tubatse Local and Sekhukhune District Municipalities, approximately 20 km south-west of the town of Steelpoort, in the Limpopo Province.

TRP has a New Order Mining Right (LP 178 MC) and Environmental Management Programme (approved 30 July 2015) to explore and mine the Platinum Group Metals (PGM's), other precious metals (gold and silver), and associated base metals and ores thereof on portions of the farm Dwarsrivier 373 KT, Tweefontein 360 KT, Buffelshoek 368 KT and Kalkfontein 367 KT. The mine intent to extent the current mining area into the Tamboti Mining Right (LP 165 MR) located on Remaining Extent of the Farm Kalkfontein 367KT and the Tamboti Prospecting Right (LP 2125 PR) located on Portion 1,2,3,4,5,6,8,9,10 and 11 of the Farm Kalkfontein 367 KT. The aim of the proposed inclusion is to be able to extend the existing underground workings and increase the current Life of Mine (LoM).

Activities at TRP commenced in 2003 with bulk sampling for a feasibility study. Trail mining operations and preliminary access development took place in 2004. The mining plan was submitted to the JV Board in December 2004, where after the project was released in June 2005 and construction commenced. Currently, the Upper Group 2 (UG2) is being mined from the underground via two portals, namely the Main decline and the North decline. The existing processing plant on site produces PGM concentrate.

It is the intention of TRP to extend the mining operations to sustain their UG2 production and grow the Merensky production. The proposed expanded mining operations are a westward down-dip and northward strike extension of the existing operations extends across most of the Kalkfontein property. The proposed extension will be accessed via the existing underground section (i.e. North and Main decline).

The depth of minerals extends from surface outcrop at an elevation of approximately 900m above mean sea level to an elevation of between 750m and 400m from north to south, respectively. As a result of the hilly nature of the topography, depth from surface may be up to 900m. Trackless Bord and Pillar type mining methods are utilised at shallow to intermediate depths where a sufficiently wide mining cut is indicated. A mining section consists of 8-12 metre bords, with pillar sizes increasing with depth below surface. These

bords are mined principally in a strike direction, except when re-establishing sections with geological disturbances (faults, dykes, potholes etc.).

Stoping sections exercise a multi-cycle operation during a shift. The full mining cycle in an eight bord section comprises two faces being drilled, two faces being cleaned, two faces being supported, with two faces standing idle. All the various phases are decoupled from one another, which assists in productivity. The two faces standing idle are essential when geological discontinuities are encountered as this provides additional face flexibility. A standard trackless Bord and Pillar section at TRP produces approximately 22,000 RoM tons of ore per month. This modular design allows production targets to be specified per shaft in terms of the number of Bord and Pillar sections required.

A schematic representation of the flow of ore mined from the two declines (i.e. North and Main) is presented below. Existing Ventilation shafts will be utilised for the proposed expansion. Ore is mined from the production sections and transported by means of Load Haul Dumpers (LHD's) to a tipping facility located at the tail end of the nearest strike conveyor. The ore is transported via the strike conveyor system, along the strike towards the primary decline. Ore handling on surface is performed by either an overland conveyor system or by trucking, to the processing plant for processing, as per current operations. Waste rock and slims are disposed at the current waste rock dump or slims dam. Product is transported to the intended market.

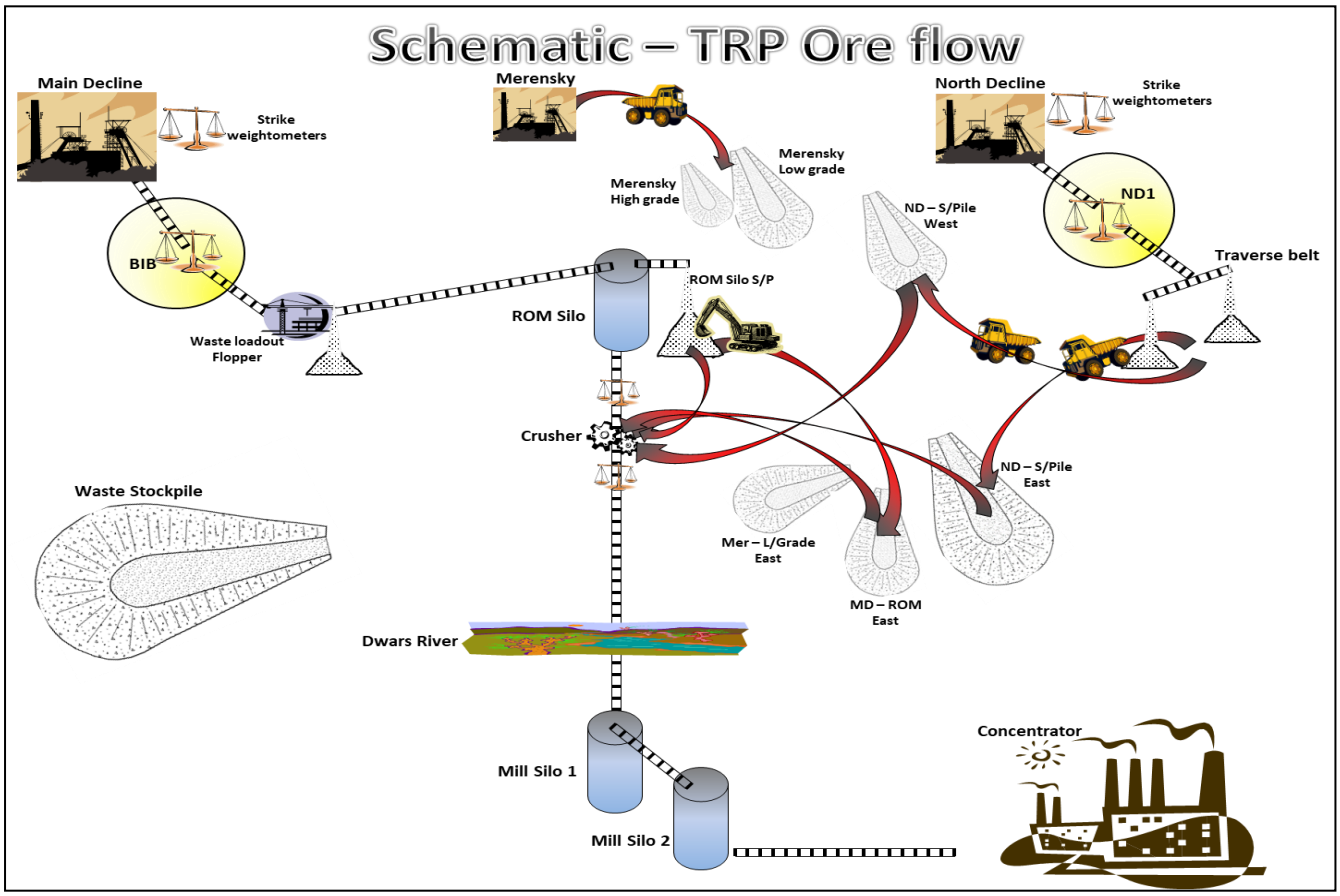

Figure 3-1: Schematic – TRP Ore Flow

3.2.2 Mining Operations

The estimated life of mine for the Two River Platinum mine and the extension is more than 25 years. Table 3-3 provides a summary of the mining rights and property descriptions for the existing mining right area and the proposed extension. The figure below is an indication of the schedule mining operations for the next 5 years. The mining schedule will be updated annually.

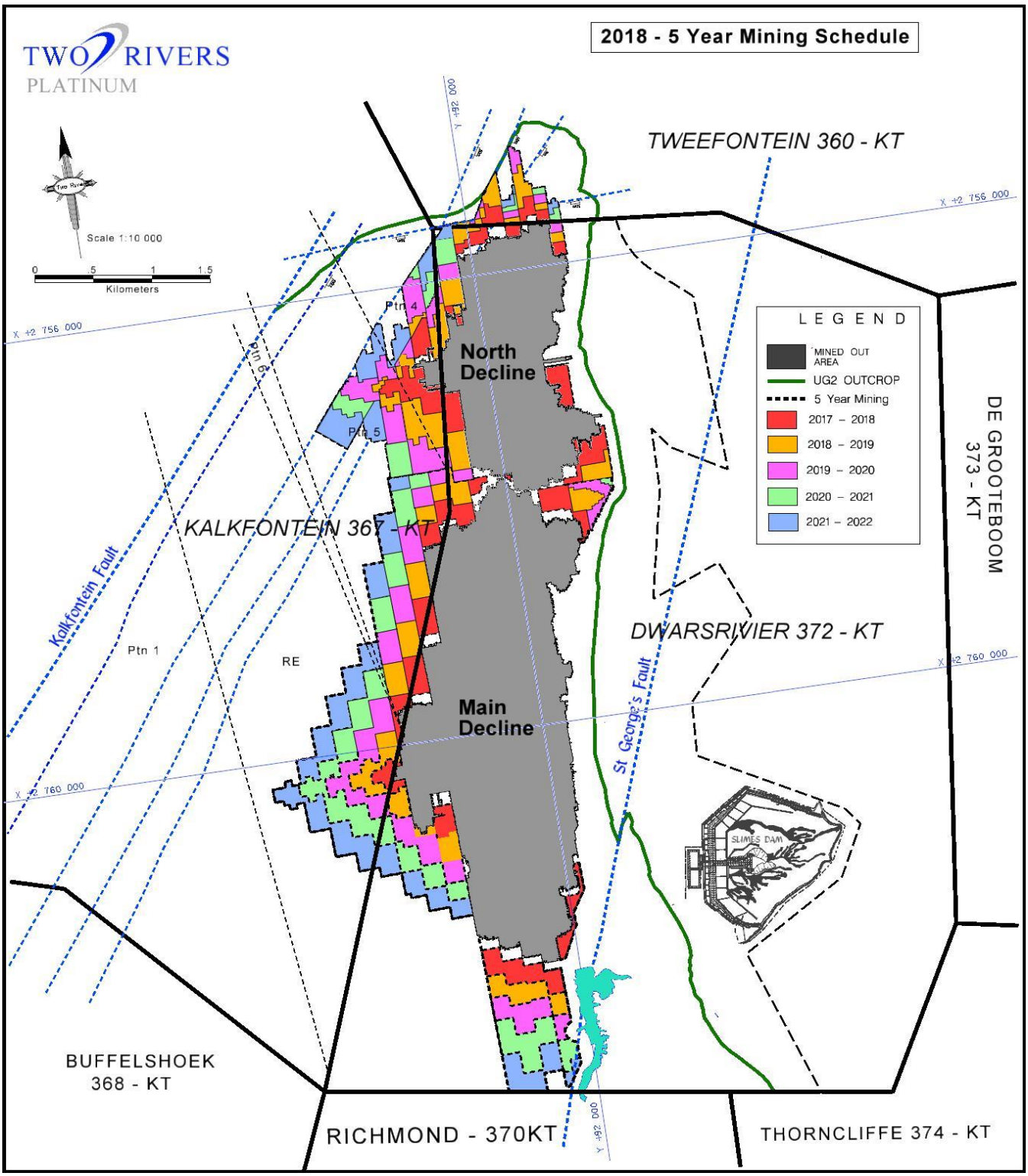

Figure 3-2: Mining Schedule

Table 3-3: Summary of Mining Rights

Farm Name	Farm Number	Portions	Mining Right Number
Kalkfontein	367 KT	1,2,3,4,5,6,8,9,10 and 11	**LP 30/5/1/2/3/2/1 (2125) PR**
Kalkfontein	367 KT	Remaining Extent	**LP 30/5/1/2/3/2/1 (165) MR**
Dwarsrivier	372 KT	6 and 7	**LP 30/5/1/2/3/2/1 (178) MR**
Tweefontein	360 KT	1, RE of 1, 3, RE of 4, RE of 5, 10, 11,12,13 and 14	
Kalkfontein	367 KT	1,2,3,4,5 and 6	
Buffelshoek	368 KT	All portions	

Below is a short description of the authorisations in place at Two River Platinum Mine.

Table 3-4: Existing Authorisations of Current Operation

Authorisation	Description	Date
DMR 4/2003 OT 5/3/2/545	Initial Mining Right (DMR)	4 March 2003
WUL 24053346. DWAF - NWA	Initial Water Use License (DWA)	13 Dec 2004
DWA, Nelspruit. 16/2/7/B400/C110/2	Gen authorisation – NWA, low level culvert to cross the Groot Dwars.	26 Jan 2006
File No 17.2.4.E -66. Mpumalanga - ECA	DDS Storage Silos	5 April 2006
File No 17.2.5 E-54. Mpumalanga - ECA	Richmond Road upgrade	4 Oct 2006
File No 17.2.5 E-54. Mpumalanga - ECA	Fuel and lubrication system	28 Nov 2006
DME Witbank OT6/2/2/472	Amendment EMP (North Decline)	22 January 2007
DMR Stamped EMP document.	Chrome Plant	27 Nov 2007
Ref 12/1/9-6/7-GS3. LDEDET - NEMA	Above ground diesel, explosive and oil storage tanks	15 Oct 2008
DME Ref MP 30/5/1/2/3/2/1 (234) EM OT6/2/2/472	Plant upgrade – crusher and flotation cells	21 January 2009
Ref 12/1/9-6/7-GCS10. LDEDET - NEMA	Above ground explosive emulsion tanks	31 December 2009
DMR Polokwane Ref: LP 30/5/1/3/2/1 (178) EM.	North Opencast (authorised, but not yet undertaken).	14 Dec 2010
DMR Limpopo. LP 178 MRC. MPRDA	New Order Mining Right	20 March 2013
DMR Limpopo. LP 178 MRC. MPRDA	Section 102 – Consolidated EIA ad EMP	30 July 2015
DWS - IWUL Licence No: 06/B41H/AJIGC/6098 File No: 27/2/2/B741/10/1	Integrated Water Use License (DWS)	October 2017

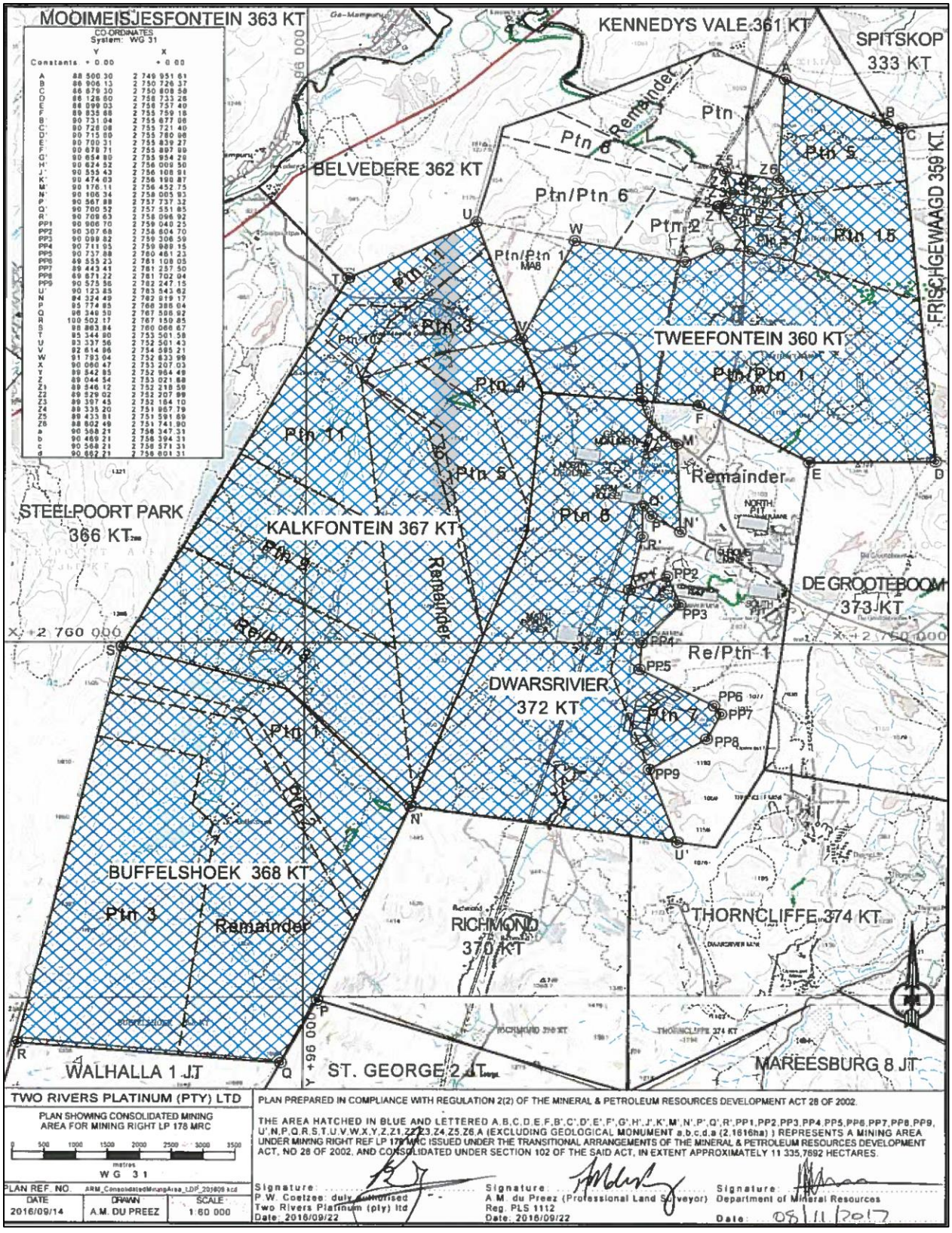

Figure 3-3: Regulation 2(2) Map as per Amended Mining Right, dated 08/11/2017

3.2.3 Mining Method

TRP consists of two declines shafts (i.e. North and Main) each with an associated underground mining area.

Trackless Bord and Pillar type mining methods are utilised at shallow to intermediate depths where a sufficiently wide mining cut is indicated. A mining section consists of 8-12 metre bords, with pillar sizes increasing with depth below surface. These bords are mined principally in a strike direction, except when re-establishing sections with geological disturbances (faults, dykes, potholes etc.).

Conventional drilling, blasting and scraper mining is utilised in the stoping and secondary development areas. Drilling of the main development faces are done by means of mechanised drill rigs, whilst stoping, secondary development and support drilling is done by pneumatic hand-held drills. Explosives are transported to the faces by means of an explosives carrier and charged up. The broken rock is loaded with load haul dumps (LHDs) and transported with dump trucks to the tipping points.

Stoping sections exercise a multi-cycle operation during a shift. The full mining cycle in an eight bord section comprises two faces being drilled, two faces being cleaned, two faces being supported, with two faces standing idle. All the various phases are decoupled from one another, which assists in productivity. The two faces standing idle are essential when geological discontinuities are encountered as this provides additional face flexibility. A standard trackless Bord and Pillar section at TRP produces approximately 22,000 RoM tons of ore per month. This modular design allows production targets to be specified per shaft in terms of the number of Bord and Pillar sections required.

3.2.4 Mining Process

The Two Rivers Platinum (TRP) has two decline shafts and a processing plant. The schematic representation of the Ore flow is presented in Figure 1-4. RoM from the North shaft is conveyed to a stockpile area from where it is fed into the RoM silo. The RoM from the Main shaft is conveyed to the RoM Silo. From the RoM silo the RoM is crushed before the two plant silos. The plant is fed from the silos at a constant rate.
The plant consists out of the following.

- Crushing & screening;
- Dense media separation (DMS) & waste rock disposal;
- Milling and flotation processes;
- Thickening of concentrate and tailings;
- Stockpiling and loading of product; and
- Tailings disposal.

3.3 DESCRIPTION OF MINERAL PROCESSING OPERATIONS

3.3.1 Crushing

ROM and stockpile ore is crushed from 400mm to -90mm size in a primary jaw crusher. This is further crushed to -20mm in a cone crusher that operates in closed circuit with a vibrating screen. The secondary crusher was an addition to the circuit to enable the milling rate to be increased by providing the primary mill with smaller feed.

The primary and secondary crushing plants are located halfway between the Main Shaft complex and the TRP plant, such that ROM ore existing the Main decline is first conveyed ~1km to a coarse ore silo over a section of overland conveyor.

Ore from the crushing plant is subsequently conveyed to the fine ore silos, located at the TRP process facilities

3.3.2 Milling

The standard MF2 process flow is employed, namely mill - float; mill – float. There are two Vecor ball mills installed in series, individually powered by 5,200 kW Alstom motors:

- One 24ft (grinding length) Primary mill
- One 26ft (grinding length) secondary mill

Primary milling is to 35% -75 microns. Secondary milling is to 75% -75 microns. The mills are installed in closed circuit with cyclone banks, which perform the separation of material, based on the size, with the undersize (overflow) from the cyclones being directed to the flotation plant, while the oversize (cyclone underflow (being returned to the mills).

3.3.3 Flotation

The flotation circuit includes primary and secondary rougher flotation. This is followed by 3-stage cleaner flotation, i.e. cleaner, re-cleaner and re-re-cleaner flotation. The flotation process is subject to rigorous planned maintenance schedules.

3.3.4 Filtration

The concentrate from the flotation circuit is filtered by a single Larox vertical hydraulic press filter, which reduces the concentrate to 15% moisture. The dewatered concentrate is subsequently conveyed to a storage building, from where it is loaded into trucks for transport to an Impala smelting facility. It is reported that the possibility exists to send concentrate slurry directly to the smelting operations, which requires a tanker type transport truck, as the smelter does have the ability to conduct dewatering.

3.3.5 Tailings Scavenger Plant (TSP)

The TSP receives live tailings from the concentrator plant and employs additional flotation cells to produce a low-grade concentrate. This is pumped to the final concentrate thickener. The TSP concentrate combines with the Concentrator final concentrate and is then filtered out and then trucked to Impala Smelter. The TSP plant produces ~1200 6E ounces monthly, of additional recovery.

3.3.6 Tertiary Milling Plant

To further improve recovery of both PGM's as well as recover chromite, which is also present in the TRP orebody, a Tertiary Milling Plant has been constructed. The Main Plant concentrator tails is pumped to the Tertiary Milling and chromite recovery plant.

The incoming tails are first processed through a set of cyclones, which are used to separate the fine and coarse material. The coarse material is rich in chromite. The coarse material from the cyclones is pumped to the "Spiral Concentration Circuit". This spiral plant is a highly specialised equipment with no moving parts, which uses gravity and centrifugal force to separate small particles of different sizes and densities. The circuit consists of Roughers, 1st stage cleaner, 2nd stage Cleaner, Re-cleaner, scavenger roughers, and scavenger cleaners. Additional spirals have been added to provide additional recovery.

Through the spiral circuit, the chromite is upgraded and recovered, with subsequent stacking for product load-out. The chromite is trucked to Maputo harbour. Currently, the production of chromite is reported at ~22,000tpm.

A portion of the stream (the rougher middlings) that is discarded by the spirals is high in silicate content and is also rich in PGMs. This stream is pumped to the tertiary mill, for subsequent grinding, resulting in additional size reduction of the materials. This slurry discharge from the mill is then pumped to the main plant flotation circuit, where the chemicals are added to recover the additional PGMs, upgrading the final concentrate grade.

3.3.7 Mine Infrastructure

The mine infrastructure presently consists of, inter alia, the following structures and infrastructure - Approved in the 2015 (GCS) EMP/EIA. The mine is a fully operational mine with:

- Two declines and associated processing infrastructure:
- Storm water dams, Drying Beds, Settling Dams and a treatment facility;
- Dirty Water Handling Infrastructure – RWD, Cut off trenches;
- Overland ore conveyances;
- Waste material stockpiles;
- High mast lighting. 10-15 high mast lights at each new shaft, in high traffic and security critical areas;
- Ore silo to provide surge capacity for the overland conveyor system;
- Office blocks;
- Change houses – change facilities, ablution and storage lockers for 350 – 400 people at each shaft;
- Lamp and crush facility at each shaft;
- Roads network;
- Haul Roads;
- Bus stop and parking for personnel and visitors;
- Security and access control;
- Cable storage and salvage yard;

- Sewage (treatment plants included as vendor supplied units, sized according to personnel complement;
- Firefighting and prevention (fire hydrants and hose reels, electric and diesel pumps to operate the deluge systems in the main substations of both shafts);
- Storm Water Management (cut off drains and berms at the Main and North shafts);
- General stores at each shaft for rock drills, rotary equipment, batteries and gas cylinders;
- Explosive stores (a local explosives magazine to cater for daily usage, filled daily from the primary storage);
- Bulk fuel and lubricant storage (to receive store and dispense a week's consumption of each product);
- Miscellaneous facilities: portal rainwater sump and drain, dirty water sump and drain, covered walkways, brake test ramp, refuse disposal facilities, electrified fencing around the perimeter of the infrastructure;
- Processing plants (UG 2 and Merensky);
- ROM Circuits, Silo's and Stockpiles;
- Primary processing plant;
- Secondary processing plant;
- Underground infrastructure (refuge bays, workshops, offices and diesel and lubricant storage);
- Existing Tailings Storage and Waste Rock Facilities; and
- New Tailings Storage Facility and associated pipelines.

3.4 EXISTING AND PROPOSED ACTIVITIES

The proposed listed activities for which this application has bee be submitted, is for the extension of the existing underground mining area.

The existing activities include all the activities listed above, environmental authorisations are presented in Table 3-4. The current mining operations consist out of two underground section accessed by two declines shafts (Main and North). The mine has a processing plant and associated waste disposal and water management infrastructure.

4 POLICY AND LEGISLATIVE CONTEXT

Relevant South African legislation requires various authorisations prior to the commencement of the Proposed Project. Although cognisance of all applicable legislation is being taken, the following table details the relevant environmental authorisations, which are required:

Table 4-1: Policy and Legislative Context

Applicable legislation and guidelines used to compile the report	Reference where applied
Constitution of South Africa, 1996 (Act No. 108 of 1996) [as amended] • *Section 24* *Environment: Everyone has the right-* • *to an environment that is not harmful to their health or well-being; and* • *to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that-* *i) prevent pollution and ecological degradation;* *ii) promote conservation; and* *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*	The proposed development has the potential to harm the environment and poses a risk to the health and wellbeing of people. The development however, also has the potential to secure sustainable development through reusing process products and thereby limiting the use of natural resources. The Applicant has the overall responsibility to ensure that the rights of people in terms of Section 24 of the Constitution are protected in terms of the proposed development activity.
National Environmental Management Act (No. 107 of 1998) [as amended] • *Section 28 (1)* *Duty of Care and responsibilities to minimise and remediate environmental degradation.*	The Applicant is the developer and overall responsibility of the mine rests with him, especially in terms of liabilities associated with the operational phase.
EIA Regulations, 2014 (Government Notices 982 -984) [as amended, 2017] *The proposed construction, operational and closure activities of the proposed development triggers the following listed activity that are listed in the EIA regulations for which a Scoping and Environmental Impact Assessment (EIA) process have to be conducted:* • *Activity 17:* *Any activity including the operation of that activity which requires a mining right as contemplated in Section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource, including activities for which and exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).*	The proposed development requires amendment of the mining right. Section 102 amendment of the EMPr.
EIA Regulations, 2014 (Government Notices 982 -984) (as amended). *Chapter 6: Regulation 39 to 44: Public Participation;* *Chapter 4: Application for Environmental Authorisation:* *Part 3 Scoping and Environmental Impact Report (S&EIR)* *Appendix 2: Scoping Report* *Appendix 3: Environmental Impact Assessment Report* *Appendix 4: Environmental Management Programme*	The EIA Regulations, 2014 [as amended] prescribes inter alia: the manner in which public participation needs to be conducted as well as the requirements of a scoping and environmental impact assessment process and the content of a scoping report, environmental impact assessment report and environmental management programme.

Applicable legislation and guidelines used to compile the report	**Reference where applied**
Appendix 5: Closure Plan *Appendix 6: Specialist Reports*	The content of specialist reports, closure plans and environmental audit reports are also provided.
Mineral and Petroleum Resources Development Act, 2002 (Act. 28 of 2002) [as amended]:	Sections 16 and 22. In terms of Section 102 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) an amendment of the mine works programme and Environmental Management Programme (EMPr) for an existing mining right will be applied for.
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended] • *Section 16* *General duty in respect of waste management;* • *Section 17;* *Reduction, re-use, recycling and recovery of waste;* • *Section 18; and* *Extended producer responsibility; and* • *Section 21* *General requirements for storage of hazardous and general waste.*	The expansion of the underground mining area will produce general and hazardous waste which need to be managed and disposed of according to best practices such as recycling, safe storage, etc. Disposal will take place on the existing approved waste disposal facilities (WRD and TSF) of the mine.
National Water Act, 1998 (Act No. 36 of 1998) [as amended] • *Section 3* *Regulation of flow and control of all water* • *Section 19* *Prevention of pollution to watercourses* • *Section 21* *The water use activities associated with the proposed development requires compliance with the requirements of the NWA as listed under GN No. 19182. An application for an integrated water use license is lodged in terms of Section 21 of the National Water Act, 1998 (Act 36 of 1998) [as amended] to undertake the following activity:* *Section 21: (g) disposing of waste in a manner which may detrimentally impact on a water resource.* *Section 21(j); Removing, discharge or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people*	The mine has an existing Water Use License (Licence No: 06/B41H/AJIGC/6098) for the following Section 21 water uses: • Section 21(a): Talking of water from a water resource • Section 21(b): Storage of water • Section 21(c): Impeding or diverting the flow of water in a watercourse • Section 21(e): Engaging in a controlled activity • Section 21(g): Disposing of water in a manner which may detrimentally impact on a water resource. • Section 21(i): Altering the bed, banks, course or characteristics of a watercourse. • Section 21(j): Removing, discharging or disposing of water found underground. The removing, discharging or disposal of water found underground from the proposed extension is authorised in the approved WUL. No additional water management infrastructure is required for the proposed extension. Water management on the mine to be in line with the requirements of the site specific WUL and GN R704 National Water Act, 1998 (Act No. 36 of 1998)
Mine Health and Safety Act, 1996 (Act No. 29 of 1996) [as amended] and associated regulations • *Chapter 2, Sections 2 – 4* *Responsibilities of owner* • *Chapter 2, Sections 5 – 13* *Responsibilities of manager;* • *Chapter 2, Sections 14 – 18;* *Documentation requirements;* • *Chapter 2, Section 19 – 20 and 22 to 24* *Employee's rights and duties; and* • *Chapter 2, Section 21* *Manufacturer's and supplier's duty for health and safety*.	The development activities will create an environment that is not safe and healthy for workers on and visitors to the site. The act provides for measures to prevent threats to the health and safety of humans in the development area.
National Heritage Resources Act, 1999 (Act No. 25 of 1999) • *Section 44 (1);*	Protection of indigenous heritage resources on the property. As the mine is an existing underground mine and the underground sections will only be expanded, it is

Applicable legislation and guidelines used to compile the report	**Reference where applied**
Preservation and protection of heritage resources; • *Section 3 Types and ranges of heritage resources (i) (i);* *Objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens*.	anticipated that no new surface area will be disturbed.
National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) [as amended] • *Section 32* *Control of dust* • *Section 34* *Control of noise*	Impacts on surrounding landowners need to be managed through dust and noise mitigation measures.
National Dust Control Regulations, 2013 (Government Notice 827 of 2013) • *Section 3* *Dust fall standard* • *Section 4* *Dust fall monitoring program* • *Section 6* *Measures for control of dust* • *Section 7* *Ambient air quality monitoring (PM_{10})* • *Section 8* *Offences* • *Section 9* *Penalties*	Dust fall out need to be monitored in accordance to the standards set out in the monitoring programme with the specified measures due to the Applicant being liable to offences and penalties associated with non-conformance to dust which may influence employees and surrounding landowners.
Veld and Forest Fire Act, 1998 (Act No. 101 of 1998) [as amended] • *Section 12 (1)* *Duty of the landowner to prevent fire from spreading to neighbouring properties.*	Cautionary steps in avoiding the spread of fires to and from neighbouring properties.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) [as amended] • *Section 9* *Norms and standards* • *Section 27* *Delegation of power and duties* • *Section 30* *Financial accountability* • *Section 43* *Biodiversity management plans.*	Indigenous vegetation need to be protected and managed in accordance with management measures set out in the management plans developed for the mine and the Applicant need to ensure he is aware of and covers his liabilities. *ToPs Listing Notices regulating Threatened or Protected species in South Africa and regulation of activities pertaining to the listed species.*
Alien and Invasive Species Regulations (Government Notice 598 of 2014) and Alien and Invasive Species List, 2014 in terms of NEMBA (Government Notice 599 of 2014) • *Notice 2* *Exempted Alien Species in terms of Section 66 (1)* • *Notice 3* *National Lists of Invasive Species in terms of Section 70(1) – List 1, 3-9 & 11* • *Notice 4* *Prohibited Alien Species in terms of Section 67 (1) – List 1, 3-7, 9-10 & 12*	It is the responsibility of the Applicant to ensure that all prohibited plant and animal species are eradicated as far as possible.
Conservation of Agricultural Resources Act (no. 43 of 1983)	Listed invader/alien plants occurring on site which requires management measures to be implemented to strive to

Applicable legislation and guidelines used to compile the report	Reference where applied
• *Section 5* *Prohibition of spreading of weeds* • *Section 12* *Maintenance of soil conservation works and maintenance of certain states of affairs* • *Section 16* *Regional Conservation Committees*	maintain the status quo environment, especially through the guidelines provided by the Regional Conservation Committee.
Hazardous Substances Act, 1973 (Act 15 of 1973) [as amended] • *Section 2* *Declaration of grouped hazardous substances;* • *Section 4* *Licensing;* • *Section 16* *Liability of employer or principle* • *Section 9 (1)* *Storage and handling of hazardous chemical substances* • *Section 18* *Offences*	The Applicant must ensure the safety of people working with hazardous chemicals (specifically fuels), as well as safe storage, use and disposal of containers during the on-site operational phase together with the associated liability should non-compliance be at the order of the day.
Hazardous Chemical Substances Regulations, 1995 (Government Notice 1179 of 1995) • Section 4 *Duties of persons who may be exposed to hazardous chemical substances* • Section 9A (1) *Penalties*	Hazardous substances will be stored and utilised on the site and non-compliance to management measures will result in prosecution of the Applicant in terms of his liabilities to the socio-economic environment.
Waste Classification and Management Regulations and Norms and Standards for the assessment of for landfill disposal and for disposal of waste to landfill, 2013 (Government Notice 634 – 635 of 2013) promulgated in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended]; and Regulations regarding the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation (GN R. 632 of 2015)	The expansion of the underground mining area will produce general and hazardous waste which need to be managed and disposed of according to best practices such as recycling, safe storage, etc. Disposal will take place on the existing approved waste disposal facilities (WRD and TSF) of the mine.
Guideline on the need and desirability in terms of the Impact Assessment (EIA) Regulations, 2017.	This guideline has been taken into account as part of project planning.
NEMA: Government Notice 805 - Companion Guideline on the Implantation of the Environmental Impact Assessment Regulations, 2010, October 2012.	The application for Environmental Authorisation is submitted in terms of the EIA Regulations.
Public Participation guideline in terms of NEMA EIA Regulations, Department of Environmental Affairs, 2017	Consultation with Interested and Affected Parties and Communities.
Public Participation 2010, Integrated Environmental Management Guideline Series 7, DEA	This guideline has informed the public participation process for the project.
Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations, 2015 (Notice 1147 of 2015) • *Regulation 5: Scope of financial provision* • *Regulation 6: Method for determining financial provision* • *Regulation 12: Preparation and submission of plans and reports*	An applicant must determine the financial provision through a detailed itemisation of all activities and cost, calculated based on the actual cost of implementation of the measures required.
Regulations on use of Water for Mining and Related Activities Aimed at the Protection of Water Resources,	Every person in control of a mine or activity must take measures to manage water in an effective manner as

Applicable legislation and guidelines used to compile the report	**Reference where applied**
1999 (Notice 704 of 1999). • *Regulation 4: Restrictions on location of mining activities* • *Regulation 7: Protection of water resources* • *Regulation 12: Technical investigation and monitoring.*	prescribe by the regulation.
NEM:AQA: GNR 283. National Atmospheric Emissions Reporting Regulations, 2015. *For purposes of these Regulations, emission sources and data providers are classified according to groups A to D listed in Annexure 1 to these Regulations.* Section 5(3): *For purposes of these Regulations, emission sources and data providers are classified according to groups A to D listed in Annexure 1 to these Regulations.*	Any person, that holds a mining right or permit in terms of the MPRDA. Emissions report must be made in the format required for NAEIS to the relevant air quality officer.
Noise Control Regulations (R 154 GG 13717 of 10 January 1992) *The national Noise Control Regulations (NCRs) (GN R154 in Government Gazette No. 13717 dated 10 January 1992) were promulgated in terms of section 25 of the ECA. These NCRs were revised under Government Notice Number R. 55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations.* *Subsequently, in terms of Schedule 5 of the Constitution of South Africa of 1996, legislative responsibility for administering the noise control regulations was devolved for provincial and local authorities. Provincial Noise Control Regulations exists in the Free State, Gauteng and Western Cape provinces.*	Insignificant/Low noise impacts is expected as all noise levels is preceived to be within the specified limits. However, Noise monitoring of the new underground sections is to be included in the current Noise monitoring framework.
Provincial Ordinances and Municipal By-laws *In addition to national legislation, some of South Africa's nine provinces have their own provincial biodiversity legislation, as nature conservation is a concurrent function of national and provincial government in terms of the Constitution of South Africa.*	Limpopo Environmental Management Act, 2004 (LEMA) (Act No. 7 of 2004). The Act aims to manage and protect the environment in the Province; to secure ecologically sustainable development and responsible use of natural resources in the Province; generally, to contribute to the progressive realisation of the fundamental rights contained in Section 24 of the Constitution of the Republic of South Africa; and to give effect to international agreements effecting environmental management which are binding on the Province.
All other relevant national, provincial, district and local municipality legislation and guidelines that may be applicable to the application.	

5 NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES

(Motivate the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location).

Two Rivers Platinum (TRP) is establish mine with surface processing plants, waste storage facilities and two decline shafts (i.e. North and Main). The underground mining activities produce approximately 22 000 tons RoM monthly for the two sections. At the current mining rate the mine will run out of minable reserves in the near future. To ensure that the mine is kept operational, TRP has acquired the Tamboti mining and prospecting rights.

The mine has applied under section 11(1) of the MPRDA for the written consent of the Minster of Mineral Resources to transfer the extension area to TRP. The extension of the mining area will increase the life of mine to 25 years. The proposed extension of the underground mining area will enable Two River Platinum (Pty) Ltd to extend the life of mine (LOM) with a significant number of years and therefore the benefits for South Africa as well as for the local communities as described above will also be extended.

The main benefits of the Two River Platinum mine are:

- Direct economic benefits will be derived from wages, taxes and profits. Indirect economic benefits will be derived from the procurement of goods and services and the spending power of employees;
- Extending the life of mine resulting in increased job security to employees.
- Implementation of the proposed project will result in skills development associated with the mining method;
- It contributes to the economic welfare of the surrounding community by creating working opportunities, in-house training to the regional population, creation of school and sport facilities, education and housing assistance and medical and clinical facilities;
- It contributes to the upliftment of living standards and the health and safety of the local community.
- The project will result in economic mining of a known resources as existing surface and underground infrastructure will be utilised.
- The net benefit to South Africa is a product produced for the world commodity market, earning South Africa the necessary foreign exchange and capital needed for a healthy economy and further capital investments in development projects for the long-term future of the country.

The project is aligned with the objectives of the MPRDA (Act 28 of 2002):

- To promote economic growth and mineral development in the Republic
- To promote employment and advance the social and economic welfare of all South Africans
- To ensure that the nation’s mineral resources are developed in an orderly and ecologically sustainable manner while promoting justifiable social and economic development; and
- To ensure that holders of mining rights contribute towards the social-economic development of the area in

which they are operating

The Department of Environmental Affairs (DEA) published a Guideline on Need and Desirability (2017) in terms of the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended). The key components are listed and discussed below:

- Securing ecological sustainable development and use of natural resources
- Promoting justifiable economic and social development.

Ecological sustainable developments and use of natural resources

The project area has been selected on the basis of the presence of economically mineable resources adjacent to the existing underground mining area. The underground mining areas will only be extended into the adjacent properties. The existing surface infrastructure (as described in this report) will be utilised for the processing of ore and disposal of waste. No surface infrastructure will be constructed. It is anticipated that no additional surface impact will take place. No additional impacts are anticipated on sensitive areas (i.e. aquatic ecosystems, biodiversity, heritage and social).

Some impacts on groundwater resources is anticipated and the impact will be further investigated in the EIA phase by the appointed relevant specialist. The results of these studies will be included in the EIA. Measures to mitigate the impacts to these resources will be included in the EIA and EMPr.

Promoting justifiable economic and social development

Community/society priorities are officially expressed through public documents including the provincial growth and development strategy and spatial development framework documents. The TRP project falls within the Greater Tubatse Municipality and forms part of the Greater Tubatse Municipality LED Strategy. Four programmes for economic development form part of the LED. This comprises (1) Sector Development, (2) Economic Infrastructure Support, (3) Social Development, and (4) Institutional/Governance Reform. The projects that have been identified in the LED are aimed at economic development by ensuring job opportunities are created, jobs security is created, skills development takes place and that opportunities are created for SMME development. Mining plays an important part in the sector development of the LED strategy. Mines contributes towards the socio-economic development of the region through social-upliftment and job creation as primary agents.

The proposed project will benefit society and the surrounding communities both directly and indirectly by providing job security at the proposed operation and through the extraction of mineral resources and beneficiation of mineral resources within Limpopo. Direct economic benefits will be derived from wages, taxes and profits. Indirect economic benefits will be derived from the procurement of goods and services and the spending power of employees. The proposed development will also ensure local economic development through the implementation of projects identified in the Social and Labour Plan. TRP is fully committed to implementing development plans

and projects that will facilitate local community and rural development in the area surrounding its project in line with the provisions of the Broad-Based Socio-Economic Empowerment Charter for the South African Mining Industry.

According to DEA (2017), Guideline on Need and Desirability, Department of Environmental Affairs, to describe the need for a development, it must be determined whether it is the right time for locating the type of land use and/or activity being proposed. To describe the desirability for a development, it must be determined, whether it is the right place for locating the type of land use and/or activity being proposed. Need and desirability can be equated to the concept of wise use of land which can be determined through asking the question: “what is the most sustainable use of land?” Considering the above, the need and desirability of an application must be addressed separately and in detail answering *inter alia* the following questions:

Table 5-1: Need and desirability considerations

Securing ecological sustainable development and use of natural resources		
1. 1.1	How will this development (and its separate elements/aspects) impact on the ecological integrity of the area? How were the following ecological integrity considerations taken into account? 1.1.1 Threatened Ecosystems, 1.1.2 Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure, 1.1.3 Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs"), 1.1.4 Conservation targets, 1.1.5 Ecological drivers of the ecosystem, 1.1.6 Environmental Management Framework, 1.1.7 Spatial Development Framework, and 1.1.8 Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).	Since TRP is an existing mine with existing surface infrastructure. The site has already been transformed ecologically within the TRP footprints. It is not foreseen that any ecological sensitive ecosystems will be affected as part of the underground expansion project. The baseline information provided within the document described all the ecological aspects as previously assessed for the construction and operation of the TRP surface infrastructure. Sensitive landscapes and features have been assessed and described within the section regarding Sensitive Landscapes (Table 9-12).
1.2	How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Since TRP is an existing mine with existing surface infrastructure. The site has already been transformed ecologically within the TRP footprints. It is not foreseen that any ecological sensitive ecosystems will be affected as part of the underground expansion project.
1.3	How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Since TRP is an existing mine with existing surface infrastructure. The site has already been transformed ecologically within the TRP footprints. It is not foreseen that any ecological sensitive ecosystems will be affected as part of the underground expansion project. An underground mining environment may have the potential to pollute the underground watersystem and dewater the aquifer. These have been assessed by the Hydrogeologist and the risk has been determined as low since the mine will pump water throughout the Life of Mine. Measures to prevent possible Acid Mine Drainage and monitoring thereof have been described within this document. Waste Classification has been done. No offset strategies are relevant for this operation.
1.4	What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided	All possible impacts that may be as a result of the new underground sections have been mitigated and will be subjected to a monitoring

	altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	framework as prescribed within the Environmental Management Programme. Since the TRP has no additional surface infrastructure forming part of the application, all waste removed, such as WRD etc., will be deposited on the existing and licensed Waste facilities on the TRP mine. All operational features and policies will be expanded to include the new underground expansion areas as well.
1.5	How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Since TRP is an existing mine with existing surface infrastructure. The site has already been transformed ecologically within the TRP footprints. It is not foreseen that any heritage or cultural aspects will be affected as part of the underground expansion project. Therefore, a letter was obtained from a Heritage specialist for exemption of a Heritage assessment (as per request from SAHRA). The exemption letter stated that: "…Because the proposed expansion will consist of underground mining only, it is recommended that the applicant applying for the extension of the underground mining area be exempted from further Phases of archaeological impact assessments, subject to minimum standards: Archaeological and Palaeontological Components of Impact Assessments as set out by the South African Heritage Resources Agency (SAHRA) which states that: *When a property is either very disturbed (e.g. has been quarried or mined) or is very small and the archaeologist can see that it is highly unlikely that any archaeological remains will be found, a 'Letter of Recommendation for Exemption' from a full Phase 1 report may be supplied."* The following recommendations are made in order to avoid the destruction of heritage remains in the demarcated areas: • Should the need arise to develop any additional surface areas, it is recommended that the area be inspected by a qualified archaeologist. This stems from the fact that Pistorius (2009) stated that additional burial sites that were not observed during the survey, might exist within the study area. • Because only existing mining infrastructure will be utilised for the proposed mining activities, no additional impacts should occur. Therefore, the proposed development may continue, subject to the abovementioned conditions. • Should culturally significant material may be exposed, all activities must be suspended pending further • Archaeological investigations by a qualified archaeologist. Also, should skeletal remains be exposed, all activities must be suspended and the relevant heritage resources authority contacted (See National

		Heritage Resources Act, 25 of 1999 section 36 (6)).
1.6	How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Non-renewable resources will be the ore and geology removed from the underground sections during the mining expansion process. Within this document the No-Go alternative was included for assessment and the No-Go alternative is rejected, as it is not the best suited scenario for the specific section of land where the current TRP operations are found. Since the resources associated with this application are situated underground, no surface impacts will occur. No mitigation is applicable to the removal of the resource as it is the nature of mining to exploit minerals for the sale and usage in various industries and within the economy of South Africa.
1.7	How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts? 1.7.1. Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life). 1.7.2. Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources within the proposed development alternative?) 1.7.3. Do the proposed location, type and scale of development promote a reduced dependency on resources?	Since the TRP mine is an existing mine, using renewable resources such as water etc. Since the underground mining area will mean an increase in the Life of Mine, the increase in resource usage is not expected. If so, the existing WUL, which governs and manages the use of water on the premises, will be updated to reflect and manage any new changes. The current operation is subjected to re-usage of water as process water and dust suppression. The Water Balance will be updated on a yearly basis to aid and reflect any water savings or losses to be investigated. The Intergrated Water and Waste Management Plan will prevent impacts to the water environment and these documents should be updated to include the new underground expansion areas.
1.8	How were a risk-averse and cautious approach applied in terms of ecological impacts? 1.8.1 What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)? 1.8.2 What is the level of risk associated with the limits of current knowledge? 1.8.3 Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	No ecological impacts is expected as part of this application, however, indirect impacts such as incidental water pollution and thereby polluting the natural environment and ecology may occur and risk will be managed and mitigated to prevent this from happening. Ecological aspects were included in the Impact Assessment, which is a quantifying tool to calculate risk for environmental aspects. No gaps in knowledge are known for the ecological aspects of the project, since no

		direct surface impacts or infrastructure will be required additionally (other than those already utilised/existing).
1.9	How will the ecological impacts resulting from this development impact on people's environmental right in terms following. 1.9.1 Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts? 1.9.2 Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	Impacts such as noise, dust and other health and safety aspects were assessed within this document; however, the risk is low. Since TRP is an existing operation with Environmental policies and Standard Operating Procedures (SOPs) in place to avert impacts of the existing operations, these should be extended to include the underground expansions as well. This will ensure that negative impacts associated with mining are not adverse and managed to the best level possible. Monitoring of impacts related to dust, noise and water (Monitoring frameworks) are existing on the TRP site and will incorporate any impacts that may be created as a result of the underground sections, which is expected to be low/insignificant due to being located underground. Positive impacts will be those associated with the extension of the Life of Mine (LoM), which is increased work security, social development and local economic growth.
1.10	Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	Ecosystem services will not be affected by the new underground sections; water will need to be removed from the underground sections to ensure safe mining conditions. All impacts and aspects related to the underground sections have been discussed and assessed as part of this document. The BGIS assessment indicates that approximately 85.2% of the municipality are currently considered untransformed. This figure is however regarded an overestimation of the true extent of remaining natural (pristine) habitat. The study site corresponds to the Savanna Biome as defined by Mucina & Rutherford (VegMap, 2006) with the Sekhukhune Mountain Bushveld ecological type spatially represented within the study site. The existing mining and associated activities has contributed to the transformation of the natural habitat. However, the proposed extension of the underground section will not have a direct impact on the transformation of natural habitat. The secondary impacts associated with the dumping of waste rock and slimes will be on the existing authorised footprint and is to be included in the approved EMPr. It should be noted that the processing of ROM, disposal of waste rock and slime will take place as per current operations.
1.11	Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?	Refer to all the comments made above as positive and negative aspects have been addressed.

1.12	Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	Alternatives have been assessed within Section 7 below. No feasible alternatives exist for the proposed underground extension as TRP is an existing mine and the best suited alternative is the one included within this application, since it will utilise all the existing surface infrastructure on the mine (leading to no additional surface impacts).
1.13	Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	Cumulative impacts will be those associated with the existing mining operations within the area, such as the existing TRP mine. Cumulative impacts as a result of the underground section will not be significant, since the new underground extension will "replace" the other underground sections as their resources are depleted. Underground water abstraction volumes may or may not increase. The applicant will apply for a WUL amendment to their current allowed abstraction volumes if necessary. As already mentioned, through the implementation of good practice environmental management measures as well as mitigation measures, all direct and cumulative impacts which may result from the proposed development will be addressed and ensure that the environment is affected to the minimum.
Promoting justifiable economic and social development"		
2.1	What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?: 2.1.1 The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area, 2.1.2 Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.), 2.1.3 Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and 2.1.4 Municipal Economic Development Strategy ("LED Strategy").	The project is aligned with the objectives of the municipal Spatial Development Framework (SDF) and Integrated Development Plan (IDP) and will not compromise the integrity of these respective forward planning documents.
2.2	Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area? 2.2.1. Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	Considering the key sectors identified in Greater Tubatse Municipality LED Strategy advocates four programmes for economic development. This comprises (1) Sector Development, (2) Economic Infrastructure Support, (3) Social Development, and (4) Institutional/Governance Reform. The projects that have been identified in the LED are aimed at economic development by ensuring job opportunities are created, jobs security is created, skills development takes place and that opportunities are created for SMME development.

		Mining plays an important part in the sector development of the LED strategy. The mine also contributes towards the socio-economic development of the region through social-upliftment and job creation as primary agents.
2.3	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	Refer to comments made above. The underground extension will allow for an increase in the Life of Mine and thereby as a result increase the positive effects associated with the socio-economic environment in terms of employment stability and local economic benefits.
2.4	Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?	As mentioned above, the underground extension will allow for an increase in the Life of Mine and thereby as a result increase the positive effects associated with the socio-economic environment in terms of employment stability and local economic benefits.
2.5	In terms of location, describe how the placement of the proposed development will; 2.5.1. result in the creation of residential and employment opportunities in close proximity to or integrated with each other, 2.5.2. reduce the need for transport of people and goods, 2.5.3. result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport), 2.5.4. compliment other uses in the area, 2.5.5. be in line with the planning for the area, 2.5.6. for urban related development, make use of underutilised land available with the urban edge, 2.5.7. optimise the use of existing resources and infrastructure, 2.5.8. opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement), 2.5.9. discourage "urban sprawl" and contribute to compaction/densification, 2.5.10. contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs, 2.5.11. encourage environmentally sustainable land development practices and processes 2.5.12. take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.), 2.5.13. the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential), 2.5.14. impact on the sense of history, sense of place and heritage of the area	Alternatives have been assessed within Section 7 below. No feasible alternatives exist for the proposed underground extension as TRP is an existing mine and the best suited alternative is the one included within this application, since it will utilise all the existing surface infrastructure on the mine (leading to no additional surface impacts). This is the preferred option and location and it is favourable in terms of the existing infrastructure and services currently present within the site and local vicinity (transport etc.). The existing TRP infrastructure will complement the new underground expansions as it will optimise the use of existing resources and infrastructure. No opportunity costs associated with spatial reconstruction priorities, bulk infrastructure developments and urban sprawl issues are expected. Local workers and services are utilised and will continue to be utilised to ensure local development and contribution to the correction of the historically distorted spatial patterns and optimum use of existing infrastructure etc. Investment will be in the local settlement area to generate the highest socio-economic returns. In terms of the location of a strategic mineral resource, the preferred alternative is restricted by this factor, as minerals can only be mined where existing and verified. Therefore, this factor has been incorporated in the application. No impacts on the sense of history, sense of place and heritage are expected and a letter for exemption was obtained from the Heritage

	and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and 2.5.15. in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	specialist to confirm this. If at any stage during the development artefacts or historical aspects are uncovered, a specialist will be consulted immediately to ensure that possible heritage aspects remain conserved. Since the TRP mine is an existing mine with the necessary surface infrastructure to support the new underground extension, no sudden catalyst reaction or influx is expected. However, since the Life of Mine is extended as a result of the application (if approved), it will provide long terms socio-economic development of the area.
2.6	How were a risk-averse and cautious approach applied in terms of socio-economic impacts 2.6.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)? 2.6.2. What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge? 2.6.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	No updated Socio-Economic report was done or required for the compilation of this report. Socio-Economic aspects have been adequately assessed and addressed within this document and the Environmental Management Programme as mitigation measures. Updated information from the 2016/2017 Integrated Development Plan was used to inform the Baseline assessment as well as the impact prediction. A Social and Labour Plan (SLP) have been developed for the TRP mine. It is important to keep in mind that the TRP is an existing mine and no sudden large-scale influx of workers or activities are associated or predicted for the activity applied for. Also refer to the comments below
2.7	How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following: 2.7.1. Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts? 2.7.2. Positive impacts. What measures were taken to enhance positive impacts?	***Crime, Health and HIV*** Influx of foreigners and job seekers and increase in disposable income for local people may create negative social impacts such as crime, alcoholism and prostitution in and around the project area. This will usually result in moderate to high negative impacts to the surrounding communities. The TRP mine is an existing mine which required approval for extension of its underground activities which will expand as outlined in this report. Therefore, a large influx of new workers and foreigners is not expected as the mine has been already established. Job-seekers in the area may start to show new interest in the mine as it becomes apparent that operations are extending and new work opportunities may become available. A medium to low or low negative impact is expected, with several positive impacts as well. ***Land Tenure, Use and Capability*** In terms of Land use, the expansion activities and mining operational

		activities will not significantly add to the existing negative impacts of air pollution due to dust, visual and noise impacts, restricted access, loss of grazing and cultivation land, and loss of land for cultural or traditional practices due to mining. The impact will be of low to insignificant since the underground application does not propose any additional surface infrastructure and all existing aspects on the TRP will be utilised. The underground section is only an extension current mine's underground activities. The positive impact of mining and expansion of its current operational capacity and output in the project area will include increased business opportunities, greater demand for goods and services, increased capacity for employment opportunities, etc. The economic and the social and labour plan (SLP) benefits will therefore be of high positive significance. If the TRP underground section is authorised, the Life of Mine will be extended. The land on the applicable farms will not be significantly impacted on the surface. A visual inspection of the surface was recommended to aid as an early detection and prevention measure, but it is unlikely that any impacts will occur as the underground section will use the existing shafts/declines. If any surface impacts occur at any stage during the project, it will be rehabilitated as close as practically possible to its pre-mining conditions. ***Noise*** The impact of noise from various aspects and equipment of the mining operation will be of low to insignificant negative significance taking cognizance that blasting and drilling will occur underground as the shafts/declines have already been established and are in use. Recommendations have been made for mitigation measures to ensure that impacts will be low, managed and monitored. ***Air Pollution*** The impact is considered low to insignificant negative significance. The dust generated during the expansion activities and operational phase may reduce the air quality of the localised air within the underground sections and therefore Occupational Health monitoring was proposed as no other air quality problems is foreseen which will not be catered for as part of the

		existing air management programmes and monitoring. ***Light and Visual Aspects*** The visual impact will be insignificant since the extension does not include any surface infrastructure or impacts. TRP is an existing mine and therefor all light and visual impacts will be of low significance and already in existence. ***Economic Opportunities, Infrastructure Development and Employment*** The impact will be positive to the local and regional economy and those who will get jobs as a result of the expansion of the mining operations into the adjacent sections and the extension of the Life of Mine will also impact favourably on the community. The number of actual jobs and contracts that will be created renders the mining operation to be of medium/high positive significance. This will further be enhanced by the possible secondary economic activities that may arise within the Local Municipality. Increase in disposable income may create negative social impacts such as crime, alcoholism and prostitution in and around the project area. The significance of this is also thought to be of low consequence, because the area has already been subjected to mining industries over a long period of time and no sudden "boom of activities" is expected.
2.8	Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	Ecosystem services will not be affected by the new underground sections; water will need to be removed from the underground sections to ensure safe mining conditions. All impacts and aspects related to the underground sections have been discussed and assessed as part of this document. The existing mining and associated activities has contributed to the transformation of the natural habitat. However, the proposed extension of the underground section will not have a direct impact on the transformation of natural habitat. The secondary impacts associated with the dumping of waste rock and slimes will be on the existing authorised footprint and is to be included in the approved EMPr. It should be noted that the processing of ROM, disposal of waste rock and slime will take place as per current operations. Thereby, no additional impacts are expected to spill over to the ecological environment. All impact predicted have been included in the EMPR for management and monitoring to mitigate and prevent additional impacts as far as possible.

		Assessed socio-economic aspects have already been described within previous comments and have been addressed within this document.
2.9	What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	Refer to comments made above. The TRP is an existing operations and no new additional surface infrastructure are proposed as part of the underground extension and this will only influence the Life of Mine (which will extend), thereby increasing long term sustainability of socio-economic benefits. It is the preferred option in terms of socio-economic considerations.
2.10	What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	There is no need for other alternatives to be considered as the option included within this document is the best suited and preferred option. No other better suited or feasible alternatives exist. The mine has and will continue to employ local workers and source services from the local area where possible to ensure social equity and benefits to disadvantaged persons. The TRP mine has an approved Social and Labor Plan, which is also adhered to and implemented in accordance to the law.
2.11	What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	Refer to all the comments made within this section of the report as it has already been addressed. TRP has an existing Mining Right and has obtained the adjacent rights through a Section 11 transfer approved from the Minister. Workers sources by TRP are in accordance with the Social and Labor Plan. Skills development and socio-economic uplifment forms part of the legal obligations as approved TRP Social and Labor Plan.
2.12	What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	The TRP mine is an existing mine with all the required operational features and procedures as well as a SHEQ officer to ensure that all Health and Safety aspects are adhered.
2.13	What measures were taken to: 2.13.1. ensure the participation of all interested and affected parties, 2.13.2. provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, 2.13.3. ensure participation by vulnerable and disadvantaged persons, 2.13.4. promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means, 2.13.5. ensure openness and transparency, and access to information in terms of the process, 2.13.6. ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge, and 2.13.7. ensure that the vital role of women and youth in environmental management and development were recognised and their full participation	The public participation process has been followed as prescribed and has been described in Section 8. All Interested and Affected parties will be provided a chance to register and comment on the project. All comments received during the Public Participation Phase will be included within the final documentation as to be submitted to DMR for decision.

	therein were be promoted?	
2.14	Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	Refer to comments made above regarding the Public participation process. Traditional communities have been involved and community meetings have already been conducted during the Scoping phase and will be initiated again as part of the EIA phase public consultation process.
2.15	What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	Refer to the above comments made regarding the community involvement. If the decision is approved, all I& APs registered need to be informed within 14 days. TRP also has an approved Social and Labor Plan, which is implemented to ensure community upliftment and local economic development.
2.16	Describe how the development will impact on job creation in terms of, amongst other aspects: 2.16.1. the number of temporary versus permanent jobs that will be created, 2.16.2. whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area), 2.16.3. the distance from where labourers will have to travel, 2.16.4. the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and 2.16.5. the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	The extension of the underground section will increase the Life of Mine (as mentioned) and this will create more permanent jobs and preserve the existing employee opportunities on the mine. As mentioned above, the Mineral Rights have already been obtained via a Section 11 transfer (as described within this document). Therefore, other land uses to the surface are not applicable at this stage and no change forms part of this application. The extension into these properties is located underground and current land uses such as agriculture, grazing and wilderness will not be affected at present.
2.17	What measures were taken to ensure: 2.17.1. that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and 2.17.2. that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	Since the Public Participation Process involves all the relevant departments, no conflicts of interests are foreseen and none was recorded during the Scoping phase of the project.
2.18	What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	Refer to all comments made above regarding socio-economic benefits that may result from the project as well as those already present due to the existing TRP project.
2.19	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	Yes. Mitigation measures as well as long term monitoring are include within the EMPR, which will ensure that impacts remained managed and monitored (to prevent both short and long term impacts).
2.20	What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	Financial Provisioning forms part of the DMR EIA/EMPR requirements and is to be provided either by Financial Guarantee/ Bank Security before the operation may commence. These funds are to be used for Closure and Rehabilitation costs, to restore the natural environment. The "Polluter Pays principle" also describes the concept which will ensure that the TRP mine restores and control pollution in the event that it becomes necessary.

2.21	Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	Alternatives have been assessed within Section 7 below. No feasible alternatives exist for the proposed underground extension as TRP is an existing mine and the best suited alternative is the one included within this application, since it will utilise all the existing surface infrastructure on the mine (leading to no additional surface impacts). This is the preferred option and location and it is favourable in terms of the existing infrastructure and services currently present within the site and local vicinity (transport etc.). Local workers and services are utilised and will continue to be utilised to ensure local development and contribution to the correction of the historically distorted spatial patterns and optimum use of existing infrastructure etc. Investment will be in the local settlement area to generate the highest socio-economic returns. In terms of the location of a strategic mineral resource, the preferred alternative is restricted by this factor, as minerals can only be mined where existing and verified. Therefore, this factor has been incorporated in the application. No impacts on the sense of history, sense of place and heritage are expected and a letter for exemption was obtained from the Heritage specialist to confirm this. If at any stage during the development artefacts or historical aspects are uncovered, a specialist will be consulted immediately to ensure that possible heritage aspects remain conserved.
2.22	Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	Refer to comments made above, specifically those made for point 2.7.

6 PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

The authorisation is required for a period of 30 years.

7 MOTIVATION FOR THE OVERALL PREFERRED SITE, ACTIVITIES AND TECHNOLOGY ALTERNATIVE

NB!! to This section is about the determination of the specific site layout and the location of infrastructure and activities on site, having taken into consideration the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout.

7.1 MOTIVATION FOR THE PREFERRED SITE, ACTIVITIES AND ALTERNATIVES

The details of the alternatives considered are described in the sections below. The alternatives were investigated in detail during the EIA Phase following completion of the relevant specialist studies. The only updated specialist study completed was a Hydrogeological assessment. During the public consultation process, SAHRA requested a reasoned opinion/letter of exemption of a Heritage specialist, which was also included within this report.

7.2 DETAILS OF THE DEVELOPMENT FOOTPRINT ALTERNATIVES CONSIDERED

With reference to the site plan provided as Appendix 4 and the location of the individual activities on site, provide details of the alternatives considered with respect to:
(a) the property on which or location where it is proposed to undertake the activity;
(b) the type of activity to be undertaken;
(c) the design or layout of the activity;
(d) the technology to be used in the activity;
(e) the operational aspects of the activity; and
(f) the option of not implementing the activity.

According to DEA (2017), Guideline on Need and Desirability, Department of Environmental Affairs, feasible and reasonable alternatives must be identified for a development as required by the NEMA EIA Regulations and applicable to EIA. Each alternative is to be accompanied by a description and comparative assessment of the advantages and disadvantages that such development and activities will pose on the environment and socio-economy. Alternatives form a vital part of the initial assessment process through the consideration of modifications to prevent and/or mitigate environmental impacts associated with a particular development. Alternatives are to be amended when the development's scope of work is amended. It is vital that original as well as amended alternative identification, investigation and assessment together with the generation and consideration of modifications and changes to the development and activities are documented.

Although an array of alternatives could be investigated for each project, such alternatives will not necessarily be applicable to each project and/or project phase. However, there must always be strived to seek alternatives that maximises efficient and sustainable resource utilisation and minimise any negative impacts on the bio-physical

and socio-economic environments.

Feasible alternatives

The following alternatives were investigated as feasible alternatives:

- *The site on which the proposed underground mining sections are to be located (site and layout alternatives);*
- *The mining method (technology alternatives)*
- *Design alternatives; and*
- Not implementing the mining activities (*No – Go alternative*).

Table 7-1 below contains the analysis of alternatives identified.

Table 7-1: Alternatives Analysis

TYPE OF ALTERNATIVE: Location	**ALTERNATIVE EXPLANATION: Develop on an alternative property Develop on alternative sites on the same property/properties**
No location alternatives have been identified or are assessed as part of this application, since the proposed alternative is located within the existing mining area. No site alternatives for the extension of underground mining area are applicable as the portions onto which the underground sections will be extended to, is immediately adjacent to the existing underground workings. The localities of the proposed development also mean that the existing infrastructure of the mine can be utilised for the processing and disposal of waste as per current operations, which makes it ideal in terms of current placement and avoiding any additional footprint creation requirements.	
TYPE OF ALTERNATIVE: Activity	**ALTERNATIVE EXPLANATION: Develop an alternative activity e.g. Incineration of waste vs. landfill disposal, abstraction of water vs. re-use/recycling of water.**
No activity alternatives have been identified or are assessed as part of this application. Water is already re-used as part of the process water utilised by existing operations.	
TYPE OF ALTERNATIVE: Design	**ALTERNATIVE EXPLANATION: Adapt architectural and/or engineering designs.**
No design or engineering alternatives have been identified or are assessed as part of this application. No mining method alternatives have been assessed as the current mining methods will be utilised.	
TYPE OF ALTERNATIVE: Layout	**ALTERNATIVE EXPLANATION: Adapt spatial configurations of an activity on any site e.g. Locate manure dams away from water resources.**
No Layout alternatives have been assessed.	
TYPE OF ALTERNATIVE: Technological	**ALTERNATIVE EXPLANATION: Adapt methods or processes that can be implemented to achieve the same goal e.g. Introduction of bacteria rather than chemicals to waste water.**
No method or process alternative have been assessed. The current mining methods will be utilised.	
TYPE OF ALTERNATIVE: Demand	**ALTERNATIVE EXPLANATION: The demand for products and/or services can be met by other means e.g. The demand for paper can be met through deforestation or rather by efficient and viable recycling.**
No alternatives to meet demand were identified or are assessed in this application.	
TYPE OF ALTERNATIVE: Input	**ALTERNATIVE EXPLANATION: Implement different input materials and/or sources e.g. Utilisation of woodchips for fuelling boilers rather than electricity.**

No input alternatives were identified or are assessed in this application.	
TYPE OF ALTERNATIVE: **Routing**	**ALTERNATIVE EXPLANATION:** **Implement alternative routes for linear developments such as power line servitudes, transportation and pipeline routes e.g. Elongate and divert a railway line to exclude a sensitive environment.**
N/A	
TYPE OF ALTERNATIVE: **Transport**	**ALTERNATIVE EXPLANATION:** **Method of transportation of product or ore.**
No alternatives have been assessed. The current mining methods will be utilised, and transport will be by the current mining and processing infrastructure. Existing haul roads and other access routes will be utilised as the existing surface infrastructure will be utilised.	
TYPE OF ALTERNATIVE: **Scheduling and Timing**	**ALTERNATIVE EXPLANATION:** **Adapt the order and/or scheduling of several measures which plays a part in a program as it will influence the overall effectiveness of the end result.**
No alternative scheduling has been investigated. Scheduling will be based on the mine planning. The application for the environmental authorisation process to extent the Two Rivers Platinum (TRP) mining right to include the Tamboti Mining Right Area and Prospecting Right Areas will allow an increase in the Life of Mine.	
TYPE OF ALTERNATIVE: **Scale**	**ALTERNATIVE EXPLANATION:** **Adapt the scale of an activity ex. 15 vs. 35 housing units, 12m2 vs. 0.5km2.** ***P.S. Scale and magnitude is interrelated.***
At this stage, no alternatives in terms of scale have been identified or are assessed.	
TYPE OF ALTERNATIVE: **Magnitude**	**ALTERNATIVE EXPLANATION:** **Adapt the magnitude which is directly related to the extent of an activity.** ***P.S. Scale and magnitude is interrelated. An activity may be very small scale but can pose an extensive magnitude ex. Destroying an extremely sensitive wetland on a very small scale could result in a magnitude of such as destroying the whole wetland and/or ecological system.***
At this stage, no alternatives in terms of magnitude have been identified or are assessed. However, the impacts of the proposed underground extensions will be much less significant when compared to surface mining extensions/opencast methods. Underground mining methods will possibly decrease the magnitude of impacts on the environment.	
TYPE OF ALTERNATIVE: **No-Go**	**ALTERNATIVE EXPLANATION:** **The option of not undertaking and implementing the activity at all.**
The length of time that the local, regional and national socio-economic environment will benefit from the mining activities will decrease by a significant number of years, should the proposed activities not be implemented.	

8 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

Describe the process undertaken to consult interested and affected parties including public meetings and one on one consultation. NB the affected parties must be specifically consulted regardless of whether or not they attended public meetings. (Information to be provided to affected parties must include sufficient detail of the intended operation to enable them to assess what impact the activities will have on them or on the use of their land.

This section describes the public participation process (PPP) undertaken to date in line with Chapter 6 of the EIA Regulations (2014)[as amended]. The process is undertaken to ensure compliance with the requirements in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) [as amended] (MPRDA) and the Environmental Impact Assessment Regulations (2014) [as amended]. The intention of the PPP was to inform I&APs, in sufficient detail, of the proposed project in order that I&APs may contribute meaningfully to the EIA process.

The PPP to date has included notification of I&APs through distribution of a Background Information Document (BID), placement of newspaper advertisements, placement of site, focussed engagement and meetings with community structures and public scoping meetings. A key aspect of public consultation is the notification of landowners, occupier and users within and adjacent to the application area. More detail in this regard to the process followed is provided below.

8.1 OBJECTIVES OF PUBLIC PARTICIPATION

The purpose of this Public Participation Process is:

- To provide Background Information to the proposed activity;
- To provide a locality map indicating the locality of the proposed activity;
- To notify potential Interested and Affected Parties of the Environmental Process to be followed in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002);
- To notify potential Interested and Affected Parties of the Environmental Process to be followed in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended; and
- To obtain issues and concerns from potential Interested and Affected Parties regarding the Environmental Processes to be followed and the proposed activity and the impacts that may be expected.

Public Participation is important for the following reasons:

- It provides an opportunity for Interested & Affected Parties (I&APs), Environmental Assessment Practitioners (EAPs) and the competent authority (CA) to obtain clear, accurate and understandable information about the environmental impacts of the proposed activity or implications of a decision;
- It provides I&APs with an opportunity to voice their support, concerns and questions regarding the project application or decision;
- It provides I&APs with the opportunity of suggesting ways for reducing or mitigating any negative impacts of the project and for enhancing its positive impacts;
- It enables an applicant to incorporate the needs, preferences and values of affected parties into its application;
- It provides opportunities for clearing up misunderstandings about technical issues, resolving disputes and reconciling conflicting interests;
- It is an important aspect of securing transparency and accountability in decision-making; and
- It contributes toward maintaining a healthy, vibrant democracy.

8.2 IDENTIFICATION OF I&APS

As part of the PPP an I&AP database has been developed for the project. I&APs identified for the project include:

- Landowners, lawful occupiers and ward councillors within and adjacent to the mining right application

area

- Community leaders and community structures
- Non-government organisations and associations working in the area
- Mines, industry and businesses in the area
- Parastatals
- Commenting Authorities:
    - Limpopo Department of Agriculture and Rural Development (LDARD)
    - Department of Water and Sanitation (DWS)
    - Department of Agriculture, Forestry and Fisheries (DAFF)
    - Department of Rural Development and Land Reform (DRDLR): Land Claims Commissioner
    - South Africa Heritage Resource Agency (SAHRA)
    - Provincial Heritage Resources Authority Gauteng (PHRAG)
    - Department of Economic Development, Environment and Tourism
    - Greater Tubatse Municipality

I&APs who attended meetings and /or submitted contact details have been registered on the I&AP database. The latest copy of the database is included in Appendix 6. The database will be updated on an on-going basis throughout the process.

8.3 MINING RIGHT APPLICATION

- A copy of the scoping report has been made available for a 30-day review and comment period, as from 18 July to 18 August 2018. The Draft Environmental Impact Assessment Report will be made available to the public between 9th of November – 9th of December 2018.
- An electronic copy of the documents can be downloaded. Please contact Malan Scholes Consulting (projects@malanscholesconsulting.co.za) for link.
- Please send all comments to projects@malanscholesconsulting.co.za;
- Comments received during the public review period have been included into the report and the Comment and Responses Report.

8.4 NOTIFICATION OF I&APS

8.4.1 Advertisements and Site Notices

During the initiation of the public participation process (PPP), advertisements were placed in the following newspaper:

- Steelburger on Friday 9 March 2018 (local newspaper)

A copy of the advertisement placed is included in Appendix 6.

Site notices (5) in English, were placed at key positions in and adjacent to the mining right area on 8 March 2018. A copy of the site notices are presented with the location of the notices presented in Appendix 6.

Additional Advertisements and site notices have been placed during the Scoping phase:

- Steelburger on Friday 20 July 2018 (local newspaper)
- Site Notices (5) have been placed at key positions in and adjacent to the mining right area on 17 July 2018. Copy of the advertisement, site notice and placements of site notices are included in Appendix 6.

8.4.2 Advertisements and site Notices: Environmental Impact Assessment Phase

Announcement of the public review period for the Environmental Impact Assessment have been done through the placement of an advertisement and placement of site notices.

- Steelburger on Friday 9th November 2018 (local newspaper)

Site Notices (5) will be placed at key positions in and adjacent to the mining right area on 9th of November 2018. Copy of the advertisement, site notice and placements of site notices will be included in Appendix 6 of the Final EIA/EMPr to be submitted to the DMR for decision.

8.4.3 Background Information Documents (BID)

A BID document was compiled for the proposed project. The purpose of the BID was to inform I&APs about the proposed project, the EIA process, environmental attributes, possible impacts and means of providing input into the EIA process. The BID was made available in English and included details of the public scoping meetings. The BID was distributed at the public scoping meetings. The BID is presented in Appendix 6.

8.4.4 Public Meetings

The purpose of holding the public scoping meetings was to:

- to provide an overview of the project and related EIA process
- to provide I&APs with an opportunity to: o raise any issues and concerns (both positive or negative)
    - provide input on any environmental sensitivities and potential impacts
    - to record issues within the formal assessment process so that they can be addressed during the course of the EIA
- to outline the way forward.

The date, venue and time of the public meetings are provided below.

Table 8-1: Public Meetings held

Date	Venue	Time	Phase of Application
Friday 23 March 2018	Ga-Malekana Community Hall	16h00 – 17h30	Scoping

The meetings were held in English due to the diversity of languages present at the meetings with translation taking place where required. Copies of the BID were made available to attendees at the meetings. Minutes of the meeting for all meetings will be included in Appendix 6.

8.4.4.1 Community Leaders Meeting

A meeting with community leaders, Royal houses and community representatives were arranged as provided below.

Date	Venue	Time	Phase
Thursday 24 May 2018	Chrome Valley Lodge	10h00 – 12h00	Scoping Phase
To be confirmed			**EIA Phase**

The proposed project was presented to the community leaders and to obtain permission from the community leaders to arrange community public meetings. Minutes of the meeting is included in Appendix 6 and will be updated for the final submission to DMR.

8.4.4.2 Community Meetings

Additional public meetings were arranged through the community structures (i.e. Community Leaders) with the Kalkfontein community and the Buffelshoek community as presented below.

Table 8-2: Community Meetings held

Date	Venue	Time	Phase of Application
Thursday 7 June 2018	Kalkfontein Community Hall	10h00 – 12h00	Scoping
Thursday 7 June 2018	Buffelshoek Community Hall	13h00 – 15h00	Scoping
To be confirmed			EIA

The meetings were presented in English due to the diversity of languages present at the meetings with translation

taking place where required. Copies of the BID were made available to attendees at the meetings. Minutes of the meeting for all meetings held will be included in Appendix F-viii. Proof of arrangement through the community structures are presented in Appendix 6.

8.5 NOTIFICATION OF I&APS OF REPORTS AVAILABILITY

8.5.1 I&AP review of Scoping Report

The Scoping Report was released for a period of 30 days from 18 July 2018 to 18 August 2018. Hard copies of the Scoping Report were submitted to all organs of state and relevant authorities (See Appendix 6). In addition copies are placed at the following locations as presented below:

Table 8-3: Application Documents and Reports for Public Review (Scoping and EIA)

Venue	Location
Two Rivers Mine	SHEQ Offices
Kalkfontein Tribal Office	Tribal Office
Buffelshoek Tribal Office	Tribal Office
Malan Scholes Consulting Office	Reception First Floor, One-On-Jameson, 1 Jameson Avenue, Melrose Estate, Johannesburg

In addition, registered I&APs have been notified of the availability of the Draft EIA/EMP Report and from the 9th of November, the Environmental Impact Assessment Draft for review via SMS and E-mail notifications. Electronic copies have to be made available via a link and on request.

A link will be provided to all registered I&AP's from where an electronic copy of the EIR/EMPr can be downloaded.

8.5.2 Commenting Authorities

Hard copies of the Draft Scoring Report and Draft Environmental Impact Assessment Report were delivered to the following commenting authorities:

- Limpopo Department of Agriculture and Rural Development (LDARD)
- Department of Water and Sanitation (DWS)
- Department of Agriculture, Forestry and Fisheries (DAFF)
- Department of Rural Development and Land Reform (DRDLR): Land Claims Commissioner
- South Africa Heritage Resource Agency (SAHRA)
- Provincial Heritage Resources Authority Gauteng (PHRAG)
- Department of Economic Development, Environment and Tourism (LDEDET)

- Greater Tubatse Municipality.

Proof of delivery of those delivered during the onset of the Environmental Impact Assessment will be included in Appendix 6 along with the Scoping Phase acknowledgment of receipts. The document was uploaded to the SAHRA website as required by the commenting authority.

8.6 NEXT PHASE - WAY FORWARD

All comments received from I&APs and organs of state and responses sent will be included in the final Environmental Impact Assessment Report to be submitted to the Competent Authority (CA).

8.6.1 Final Scoping report and submission made

On completion of the 30-day review period, a Final Scoping Report was compiled which included comments received during the I&AP review period. The report was submitted to the DMR for its review via the online SAMRAD system. The Scoping was acknowledged on the 16th of August 2018.

A high level summary of the issues/concerns raised during the public meetings are presented below:

- Impact on groundwater and surface water
- Impact on biodiversity
- Jobs creation
  - Benefit to the community, Skills development
- Damage to Houses – Cracks
- Employment and the number of employees (Empowerment).

8.6.2 DMR review of Environmental Impact Assessment and Environmental Managent Report

On completion of the 30-day review period, a Final Environmental Impact Assessment and Environmental Management Report will be compiled which will include comments received during the I&AP review period.

The Department of Mineral Resources will make a decision and approve or reject the Environmental Authorisation based on the contents of the final report submitted.

8.7 ISSUES RAISED BY I&APS

8.7.1 Summary of Issues Raised By I&APs From Public Participation

(Complete the table summarizing comments and issues raised, and reaction to those responses)

Comments received until the compilation of the draft EIA report are listed below; comments received during the public review period have been discussed in this section. Please see ***Appendix 6*** *for a full comments and responses report. A summary of comments received during the public participation process is presented below.*

This table will be updated after the 30 day commenting period of the Draft EIA to include all additional comments as received. All comments/concerns will be incorporated into the Final EIA to be submitted to DMR end of 2018.

Table 8-4: Summary of issues raised by I&APs

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
AFFECTED PARTIES					
Landowner/s					
No comments received as yet.					
Lawful occupier/s of the land					
N/A, refer to Community	X				
Landowners or lawful occupiers on adjacent properties					
N/A, refer to Community	X				
Municipality					
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWS					
SAHRA	**X**		Letter dated 3rd of September 2018: "Interim Comment: *SAHRA Archaeology, Palaeontology, Meteorites (APM) Unit requires a letter of exemption from a heritage specialist to be compiled by a suitably qualified archaeologist, and submitted to the case for commenting in the*	The letter as requested from SAHRA during the public consultation process has been conducted and included within this report.	*Comment concluded.* Sections applicable for Heritage aspects include Section 9.13, Section 10.6 and Section 11.5.4. All Impact and Management Tables include impacts rated and mitigated during all phases of the

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
			EIA phase. The letter must have a map of the mine right area, indicating where all the existing infrastructure is located, as well as any previously identified heritage resources that maybe conserved in situ. *Should you have any further queries, please contact the designated official using the case number quoted above in the case header*."		development.
Communities					
Scoping Meeting – Public Open Meeting (23 March 2018) Community Member	**X**	23 March 2018	The community indicated that the mine should have more representation present at the meeting. They requested that the following people be present at the meeting to be able to answer questions posted by the community. • Transformation officer;	During additional Scoping phase meetings the required mine representatives were present at the meetings. During the EIA phase of the project public meeting will be arranged and the mine representatives will be present at the meetings.	*Comment concluded.* The meetings held for the EIA phase have/will include the additional representatives as requested by the community member. Please refer to Public Participation report.

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
			• Procurement; and • Managers.		
Scoping Meeting – Public Open Meeting (23 March 2018) Community Member	**X**	23 March 2018	The community requested that the meeting is postpone and that the Public meeting is arrange as requested.	Additional scoping phase meeting were arranged (See table 11 and 12). More meetings will be arrange during the EIA phase of the project.	*Comment concluded.* Refer to the comment made above. The EIA Phase will take cognisance of the additional members as was present/invited during the Scoping phase.
Community Leaders Meeting (24 May 2018)					
Community Leaders Meeting (24 May 2018) Mr Masha	**X**	24 May 2018	Asked which portion to be affected and further asked that community must be engaged. He also asked how TRP is going to address the environmental impact and put measures in place. He said that fauna and flora will be affected also due to water shortages	The EAP responded on the issues raised: 1. A map was presented to indicate which portion will be included into the mining right. 2. Impacts identified during the scoping phase will be address during the EIA phase of the project. Mitigation measures will be included in EMP. 3. Additional community meeting will be arranged through the community leaders	*Comment concluded.* Details about the property and the relevant farm portions may be viewed within Table 2-1.

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
				and Royal houses.	
Mr Maimela	**X**	24 May 2018	Emphasizes was placed on the fact that some of the wells had water before but now is dry and request for transparency about information.	The EAP responded on the issues raised: I. The impact of the mine on the groundwater resource will be investigated during the EIA phase II. The Draft Scoping and Draft EIA will be made available for public review.	*Comment concluded.*Groundwater impacts and dewatering specifically were addressed within the specialist study conducted. The Predictive modelling done for Groundwater indicated the maximum simulated change in hydraulic head is at the abstraction borehole TRPGWM16D (~1.91m change in simulated head). The average change in head simulated is 0.43 m. Refer to Section 11.5.10.1 within this document.

Interested and Affected Parties		**Date**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
List the names of persons consulted in this column, and		**Comments Received**			
Mark with an X where those who must be consulted were in fact consulted.					
Mr Tau	**X**	24 May 2018	He asked whether the tailings dam will be constructed at Kalkfontein	Mr Dzondzi responded that TRP already secured an area for new Tailings dam at De Groote boom and environmental authorization has been obtained for the project.	*Comment Concluded.* A list of current authorisations of the TRP may be viewed in Table 3-4**.**
			Tau mentioned that houses will be affected by blasting during mining.	Mr Jacobs responded that a complaint was received that the blast has causes damage to the houses. An external independent company was appointed by the mine to do samples and investigation, the report is available on request. The report concluded that TRP blasting did not cause the damage to the properties.	*Comment Concluded.* Regular monitoring and possible appointment of third party monitoring/auditing has been recommended as mitigation measures to control and manage blasting related impacts (although it is not expected to occur for the undeground extensions). Please note: The specialist investigation from the 2015 application noted that main blasting

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
					impacts associated with underground mining may be expected from the construction of declines/shafts, and this project will utilise the exitsing shafts.
			Asked if the community can get mining rights for surface while TRP is mining underground in the same area.	No opencast reserves are available within the area. Explanation was given on how deep the reef is and that it cannot be open casted mined (JJ)	Comment Concluded. Additionally refer to Section 3.2.2, Section 3.2.3 and Section 3.2.4 which explains the background of the mining operations and methods to be utilised.
			Water crisis should be addressed since dams and wells are dry.	Groundwater impact assessment will be included in the EIA phase of the project (DW). Mr Bethrum Dzondzi added the water the water shortage can be reviewed on the Social and Labour Plan. He emphasize that there are measures of addressing water issues sometimes it can be due to seasons and	*Comment concluded.* Sections applicable for Heritage aspects include Section 9.13, Section 10.6 and Section 11.5.4. All Impact and

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
				request the members that for now we must focus on the Project itself. He will facilitate the process of checking water quality and quantity.	Management Tables include impacts rated and mitigated during all phases of the development.
Mr Maimela	**X**	24 May 2018	He requested that dust monitoring results should be shared since it affects them too. He further proposed regular information sharing or forum sessions.	All information is available at the mine on request. The mine has platforms and forums in place where information can be presented.	*Comment concluded.* Please contact the mine as specified. However, dust monitoring results and compliance have been included within the document as part of the baseline scenario and may be viewed in Section 9.10 of this report.
Community Meeting – Buffelshoek (7 June 2018)					
Community Meeting – Buffelshoek (7 June 2018)	**X**	7 June 2018	Question was raised regarding the farm boundaries and the mining area. The schedule only presents a 5 year plan. The life	The life of mine is 25 year based on current resources. The planning is only undertaken for 5 years and will be updated annually (RM). The farm boundaries and mining area is presented	*Comment Concluded.* Additionally refer to Section 3.2.1, Section 3.2.2, Section 3.2.3 and

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
			of mine is presented as 25 years.	in the BID (RM).	Section 3.2.4 which explains the background of the mining operations and methods to be utilised.
		7 June 2018	What will the extent of mining be in Buffelshoek?	No mining is taking place at Buffelshoek, but in future mining may take place. Additional exploration will be required to establish the reserve (BD)	*Comment Concluded.* This application is in terms of expanding the existing underground section and not any additional surface infrastructure at present, additionally refer to the 5 year mining schedule, which reflects the properties on which the expansions is to take place (Figure 3-2.)
		7 June 2018	Will the Scoping Report be made available for public review?	I&AP's will have 30 days for review of the documents for the date it is made available for public review. This will be done during the	*Comment Concluded.* Public Particpation details are discussed in

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
				scoping and EIA phase of the project (RM). All registered I&AP's will be informed when the documents are made available.	Section 8 and specifically the review and subission of the Scoping Report within Section 8.6.1.
		7 June 2018	Concern regarding the first arranged scoping meeting of 23 March was raised.	During the first scoping meeting held on 23 March 2018 the community raised the concern that not all communities affected were included. For this reason additional scoping meeting with community leaders and the communities were arranged (RM). All scoping meeting will be reflected in the Draft Scoping Report.	*Comment Concluded.* Public Particpation details are discussed in Section 8 and specifically indicates the additional Meetings and advertisements placed to address this issue raised.
		7 June 2018	Will chrome and PGM's be mined and where will processing take place?	Chrome and PGM's will be mined within the mining right area. Processing will take place at the current processing plant. No new surface infrastructure forms part of the application (RM).	*Comment Concluded.* Additionally refer to Section 3.2.1, Section 3.2.2, Section 3.2.3 and Section 3.2.4 which explains the background of the mining operations and

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
					methods to be utilised. Processing is discused within Section 3.3.
		7 June 2018	Will the community benefit from the chrome mining? Will the community obtain 26% shareholding?	The shareholding concern does not form part of the scope of the current application and process. ARM legal has met with the community leaders and legal representation and the concerns will be addressed on another platform by ARM Legal (BD).	*Comment Concluded* As mentioned, this is an application for Environmental Authorisation and is not the correct platform for shareholding/ profit sharing.
		7 June 2018	The legal representative of the community to be included in the consultation process and future meetings.	The comments are noted and the legal representative will be included in the process (RM).	*Comment Concluded.* Public Particpation details are discussed in Section 8 will include legal representatives as requested by the community.
		7 June 2018	Employment and SME opportunities for the community	Employment and SME's will be address by the mine through the SLP (BD).	*Comment Concluded.* The TRP has an approved Social and Labour Plan. Utilising

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					local workers and service providers were also included as management/mitigation prescribed boost the local economy These are included in the EMPR document (Management tables i.e. Table 24-1**)**
		7 June 2018	Concern was raised regarding Groundwater and that the mine will have an impact on the groundwater quality and quantity.	Groundwater will be addressed by a groundwater specialist study and will form part of the EIA phase.	*Comment concluded.*Groundwater impacts and dewatering specifically were addressed within the specialist study conducted. Quality aspects have been investigated and deterioration of water quality is not largely expected as a result of

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
					the underground sections since the underground sections is to be pumped during the development and will create a migrating effect of nutrients towards the extraction point. The Predictive modelling done for Groundwater indicated the maximum simulated change in hydraulic head is at the abstraction borehole TRPGWM16D (~1.91m change in simulated head). The average change in head simulated is 0.43 m. Refer to Section

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
					11.5.10.1 within this document.
		7 June 2018	How will the project affect the following; • Blasting; • Grazing; • Groundwater	No surface infrastructure will be constructed and the mine is well below surface level and it is anticipated that the mine will not have additional surface impacts. Groundwater will be addressed by a specialist study during the EIA phase.	*Comment concluded.* Refer to comments made above regarding Groundwater and Blasting associated rsks. The Land use of the mine is not expected to be impacted directly as a result of the underground application, since the application has no surface infrastructure. Impacts for Land use may be viewed in Section 11.5.2 and Table 12-1.
		7 June 2018	No surface infrastructure will be constructed. Will any additional	Employment will be address by the mine through the SLP (BD).	*Comment Concluded.* The TRP has an

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			employment opportunities created		approved Social and Labour Plan. Utilising local workers and service providers were also included as management/mitigation prescribed boost the local economy These are included in the EMPR document (Management tables i.e. Table 24-1**)**
Community Leader	**X**	7 June 2018	Senior leaders/Legal team to be present at the next meeting.	Noted.	*Comment Concluded.* Refer to comment made above.
Dept. Land Affairs					
Limpopo Department of Rural Development and Land Reform (DRDLR) Chief Director: Mr A. Mkhabela 70 Absa Building Hans Van Rensburg	**X**		A copy of the Scoping Report has been submitted to the Department. *No comments received as yet.*		Refer to Section 8.5.2 regarding Commenting Authorities

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
Polokwane, 0700					
Traditional Leaders					
Refer to Communities					
Dept. Environmental Affairs					
Limpopo Department of Economic Development, Environment & Tourism (LDEDET) tshuketanim@ledet.gov.za Signed by Deputy Director: Environmental Impact Management	**X**	16 August 2018	RE: COMMENTS ON SCOPING REPORT FOR THE PROPOSED EXTENSION OF TWO MINING AREA AT STEELPOORT WITHIN FETAKGOMO TUBATSE LOCAL SEKHUKHUNE DISTRICT 1. The above matter refers. 2. The Department acknowledges receipt of your request for comments on the Scoping Report (SR) for the above mentioned proposal received by the Department on 18 July 2018. 3. The above mentioned SR	Noted, thank you.	All Legislation considered during the process has been included in Section 4 and the specialist reports (baseline information) has been incorporated in Section 9. Where new information has been updated, such as the Groundwater specialist assessment, this was indicated within the specific section related to that subject field.

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
			has been reviewed and the Department support the inclusion of information contained in historical specialist studies especially the biodiversity study in the environmental impact assessment process. 4. Based on the findings made, the Department has no objection(s) against the approval of the SR subject to the condition in paragraph 3 above. 5. The onus is on the applicant to prevent possible illicit actions by ensuring compliance to other requirements of other government departments (i.e. National, Provincial and Local) and all Municipal by-		

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			laws.		
Other Competent Authorities affected					
Department of Mineral Resources (DMR)	**X**	12 September 2018	*Received Acknowledgement of Scoping Report:* I refer to the abovementioned matter and confirm that your SR submitted on 23 August 2018 is hereby acknowledged. Acknowledgement of your SR does not grant you permission to commence with Mining activities. Commencement of a listed activily without an environmental authorisation constitutes an offence in terms of Section 49A (1) (a) of NEMA, 1998 (Act 107 of 1998) as amended and upon conviction for such an offence, a person is liable to a fine not exceeding R10 million or to imprisonment for a period not		*Comment Concluded.* All timeframes as specified in NEMA Regualstions has been abided by and the final EIA/EMPR will be submitted for decision within the prescribed timeschedule.

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
			exceeding ten years, or to both such fine and such imprisonment. NB: Regulation 45 of 2014 EIA Regulations stipulates that 'an application in terms of these Regulations lapses and a competent authority will deem the application as having lapsed, if the appltcant fails to meet any of the time-frames prescribed in terms ofthese Regulations, unless extension has been granted in terms of regulation 3(7). "		
Department of Water and Sanitation (DWS)	**X**	18 September 2018	The Department of Water and Sanitation (DWS) has assessed the above-mentioned application 16/217/8400/C110/1 and wish to comment as follows: 1. The applicant shall take note of Section 22(1) of the	The Two Rivers Platinum have an existing water use license (WUL) Licence No: 06/B41H/AJIGC/6098 (File No: 27/2/2/B741/10/1) TRP water is supplied from the Klein and Groot Dwars Rivers, and the Inyoni dam located within the Klein Dwars river catchment. No additional water supply is	*Comment Concluded.* Information regarding the WUL may be viewed within Section 23 of the report. The aspect has also been suggested to be

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			National Water Act, 1998 (Act 36 of 1998), "Permissible water use",a person may only use water- a) without a licence- i. if that water use is permissible under Schedule 1; ii. If that water is permissible as a continuation of an existing lawful use (section 32); or iii. If that water use is permissible in terms of general authorisation issued under section 39; b) If the water use is authorised by a licence under this Act; or	required for expansion of the existing UG2 mine. Water to be abstracted under Section 21(a) and 21(j) (pumped from the underground) has already been licensed in accordance under the WULA submitted December 2013, issued October 2017. If it becomes evident that the Two Rivers Platinum will have to increase pumping volumes at any stage, a WUL amendment or new application process will be initiated	included as part of the Environmental Conditions (Section 13), which states that if pumpng rates (as already authorised under the existing WUL) is not sufficient to include the undergroudn expansion, a WUL amendment/new application will need to be done. Refer within this report for other requested information as it was provided within Section 9 (such as h occurance of wetlands etc.) Please note that no surface

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
			c) If the responsible authority has dispensed with a licence requirement under subsection (3), (of the same Act). 2. Therefore any other water use related activities associated with the proposed project that are not permissible as indicated on paragraph 1 above shall have to be authorized by DWS prior to such water use activities taking place. 3. Water supply: The applicant is requested to provide the Department with the source, quality and estimated quantity of the water that will be used for the employees during the operation		infrastructure is proposed as part of the project and existing facilities (already authorised) will be utilised as per approved WUL (2017). The other general recommendations made by DWS has been prescribed as mitigation measures, such as Dust suppression (which is already licensed under NWA for the existing footprint). Waste handling. Disposal and storage. A detailed stormwater

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			(mining) and abstracted from the ground water aquifer in order to continue with operations as mentioned on page 68 and 71. The applicant shall also take note of section 21(a) *"taking water from* a *water resource"* water use of the National Water Act, 1998 (Act 36 of 1998) unless if the is permissible as outlined on paragraph 1 above. The applicant shall provide DWS with a copy of signed service agreement with the service provider if water will be provided by the municipality or any stakeholder involved. 4. Dust suppression: As		management plan has been submitted for all surface water infratsructure to obtain the 2017 WUL for TRP.

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
			indicated on page 66, 69 and 72, that dust will be generated by heavy duty vehicles, processing of RoM, and from storage facilities (i.e. tailings dams) during operations phase and closure phase, if water is to be used to suppress the dust. The applicant shall provide the source, quality and estimated volume of water to be used for dust suppression. 5. Ablution facilities: The applicant shall provide DWS with the type of sanitation system implemented or to be implemented on site during operational phase (mining) and information on		

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			the management of treated effluent. The applicant shall also take note of section 21(g) "disposing of waste in a manner which may detrimentally impact on a water resources" water use of the National Water Act (Act 36 of 1998). The applicant shall provide DWS with the copy of signed service agreement with the service provider or local municipality with regard to the disposal of the waste. 6. Wetland: An indication shall also be provided on the availability of any wetland or river within the proposed area as these are regarded as water resources in terms		

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
			of NWA and requires full protection from any possible impacts. The applicant shall note that any activity or infrastructure located within 1:100 year flood line of a water resources is a water use activity in terms of section *21 (c) and (i) "impeding or diverting the flow of water in* a *watercourse; altering the bed, banks, course or characteristics of* a *watercourse"* of the National Water Act, 1998 (Act No.36 of 1998) and shall have to be authorized by DWS before commencement of such activity. 7. Pollution of underground		

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			and surface water: This shall be avoided by the implementing of proper water and waste management plan to prevent hydrocarbons spillages from trucks and seepage of hydrocarbons and water from waste storages (i.e. waste rock dump, tailings dam, PCD) facilities into the soil. Furthermore, if there are spillages of hydrocarbons onto the soil as mentioned on page 64, the hazardous waste shall be disposed off at waste disposal site permitted to handle such materials. The applicant shall also take note of section 21(g) "disposing of waste in a		

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
			manner which may detrimentally impact on a water resources" water use of the National Water Act (Act 36 of 1998). The applicant shall provide DWS with the copy of signed service agreement with the service provider or local municipality with regard to the disposal of the waste. 8. Storage Facilities: The applicant shall ensure that fluids are stored and handled properly in a concrete or cement lined surface with berm walls to avoid any seepage into the groundwater resources and also ensure that the design of the storage area is such		

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
			that any leakages or spillages can be contained. 9. The applicant shall provide DWS with a detailed Storm Water Management Plan to be implemented on site to prevent or minimize soil erosion. 10. Site Rehabilitation: After mining the site needs to be rehabilitated in such a way that it prevents rapid runoff of water that could result in soil erosion. The soil must be stabilised on order to prevent the resulting wash downs into any water resources and where possible rehabilitation of the disturbed areas must be		

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
			done concurrently with the mining activity. 11. General and Hazardous waste management: The applicant shall ensure that domestic waste or any waste generated on site during operations as mentioned on page 66 and 68 is handled, transported and disposed off at a designated landfill site. The applicant shall also take note of section 21(g) "disposing of waste in a manner which may detrimentally impact on a water resources" water use of the National Water Act (Act 36 of 1998). The applicant shall provide DWS		

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
			with the copy of signed service agreement with the service provider or local municipality with regard to the disposal of the waste. 12. Location of mining area: The applicant shall note that in terms of regulation 4 of the Government Notice 704 of 04 June 1999: Restrictions on locality, "No person in control of a mine or activity may-(b) except in relation to a matter contemplated in regulation 10, carry on any underground or opencast mining, mining or any other operation or activity under or within the 1:50 years flood line or within a horizontal distance of 100 metres from		

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
			any water course or estuary, whichever is the greatest". Therefore the Applicant shall demonstrate compliance with the stated regulation before commissioning of the mining operation. The Applicant shall provide DWS with the exact distance of the mine from the river, borehole, wetland, dam, drainage line and waterfall or any water resource. 13. The applicant shall note that in terms of section 19(1) of the National Water Act, 1998 (Act 36 of 1998), It is stated that "An owner of land, a person in control of land or a person who occupies or uses the land on		

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
			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 resources must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring". Any pollution incident(s) originating from the proposed project shall be reported to the Provincial Head of the DWS within 24 hours.		
OTHER AFFECTED PARTIES					
Limpopo Department of Agriculture and Rural Development (LDARD) *Departmental Head: Mr S.I Mahlangu* *District Government Office* *89 Thabo Mbeki Dr*			A copy of the Scoping Report has been submitted to the Department. *No comments received as yet.*	N/A	N/A

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**	**Date** **Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
Modimolle *0510*				
Provincial Heritage Resource Authority (PHRA) *Departmental Head: Mr M. Mannya* *21 Biccard Street* *Polokwane* *0700*		A copy of the Scoping Report has been submitted to the Department. *No comments received as yet.*	N/A	N/A
Department of Agriculture, Forestry and Fishery (DAFF) *Director: Limpopo* *69 Biccard Street* *Agric Village 2* *Polokwane, 0700*		A copy of the Scoping Report has been submitted to the Department. *No comments received as yet.*	N/A	N/A
Greater Tubatse Municipality *Municipal Manager* *Economic and Land Development Department* *1 Kastania Street* *Burgersfort, 1150*		A copy of the Scoping Report has been submitted to the Department. *No comments received as yet.*	N/A	N/A
OTHER:				
No other parties applicable at present.				

9 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE DEVELOPMENT FOOTPRINT ALTERNATIVES

(The environmental attributed described must include socio- economic, social, heritage, cultural, geographical, physical and biological aspects)

No alternatives locations are feasible for the underground section as it is already located within its ideal location to access the underground reserves and utilise the surface infrastructure of the existing Two Rivers Platinum mining operations. Therefore, the baseline environment as described below is the Environmental attributes as associated for the expansion of the Two Rivers Platinum mining area (underground).

9.1 TYPE OF ENVIRONMENT AFFECTED BY THE PROPOSED ACTIVITY

(Its current geographical, physical, biological, socio- economic and cultural character)

This Section provides a brief description of the existing biophysical and built/social environment within the immediate vicinity of the proposed activities. It draws on existing knowledge from previous investigations, discussions with various role-players, site visits and the project team's knowledge. It serves to present the context against which the potential positive and negative impacts associated with the various aspects of the proposed project can be identified.

The information in this section is largely sourced from the available historic specialist studies performed as well as the updated Hydrogeologist report (2018) and Heritage Exemption Letter (2018).

All other information sourced from the 2015 TRP Consolidated EIA/EMPR and specialist reports will be made available electronically upon request.

9.2 REGIONAL LOCATION

The study area falls within the Tubatse Local Municipality and the Sekhukhune District Municipality, Limpopo Province.

The proposed extension of the underground mining area will be located on various portions of farms Tweefontein 360KT, Dwarsrivier 372 KT, Kalkfontein 367 KT and Buffelshoek 368 KT, Steelpoort, Limpopo Province.

9.3 GRADIENT AND LANDSCAPE CONTEXT

The project area is located on the gently undulating plains of the Steelpoort River valley. The valley features a strip of plains on either side of the river and the plains are flanked by a series of hills, which are the foothills of the eastern escarpment of southern Africa.

The surrounding area comprises of undulating, mountainous terrain, where elevations range from 1 900 mamsl in the Schurinksberg range in the east to 800-1 000 mamsl in the Steelpoort, Dwarsrivier and Klein-Dwarsrivier river valleys. The elevation rises steeply to 1 600m to the west and south west of the Dwarsrivier valley, on the western periphery of the Dwarsrivier farm. Major topographical features include the Dwarsriver and Klein Dwarsrivier river systems and steep slopes forming part of the Merensky and UG2 outcrops.

The elevation of the project area decreases from 1369 metres above mean sea level (mamsl) in the east to 938 mamsl in the west. The elevation of the mining area ranges from 1087 mamsl to 1348 mamsl. Most of the project area has gentle slopes ranging from between 0° and 8°. The steepest slopes occur on the ridges and range from 18° to 58°. The mining area is located on a ridge and has isolated slopes of between 0° and 19°.

9.4 CLIMATE

9.4.1 Regional Climate

The project area is situated on the eastern escarpment on the border of the Highveld and Northern Transvaal climatic zones (Schulze, 1974) and falls within the Northern Transvaal Climate Zone, as defined by Schulze (1994). The climate is semi-arid and hot with rainfall occurring as a result of thunderstorms. The rainy season extends from November to March, with the peak rainfall occurring in January. Rainfall is somewhat variable with 12% of all years, experiencing drought conditions. The mean annual rainfall is in the order of 703mm. Frost is rare and generally only occurs from July to August.

Average daily maximum temperatures are approximately 32 ºC in January, and 22 ºC in July, with extremes in the order of 42 ºC and 31 ºC respectively. Average daily minimum temperatures are approximately 18 ºC in January and 4 ºC in July, with extremes of the order of 8 ºC and -7 ºC respectively.

The mean annual evaporation (MAE) for the project area is 1261 mm, with the highest monthly evaporation occurring from October to March, whilst during April to September lower monthly evaporation is observed.

Table 9-1: Monthly rainfall and Evaporation for the study area (Noa Agencies (Pty) Ltd, 2018)

Month	Monthly Rainfall (mm)	Symonds Pan Evaporation (mm)	Evaporation Factor	Lake Evaporation (mm)
January	111.5	165.0	0.84	138.6
February	88.3	137.6	0.88	121.0
March	75.5	135.8	0.88	119.5
April	41.8	104.4	0.88	91.9
May	14.8	87.9	0.87	76.5
June	6.2	71.4	0.85	60.7

July	5.2	78.2	0.83	64.9
August	5.8	103.5	0.81	83.8
October	60.0	134.1	0.81	108.6
November	111.7	161.7	0.81	131.0
December	108.7	152.6	0.82	125.1
September	20.6	168.0	0.83	139.4
TOTAL	**650**	**1500**	**N/A**	**1261**

9.4.2 Prevailing Wind Direction

The local wind field is characterised by south-easterly and north-easterly winds with a very low frequency of winds from the western sector (due to the mountainous terrain to the west). The north-easterly wind flow increases during day-time conditions with south-easterly wind flow increasing during the night. Low to moderate wind speeds with an average wind speed of 3.3m/s. Local source contributors to ambient PM10 concentrations in the vicinity of the study site are: domestic fuel burning and vehicle activity in residential areas close to the mine; surrounding chrome and platinum mining activities; cattle ranching in the Steelpoort Valley; agricultural activities and limited cultivation in fertile areas adjacent to the Steelpoort River.

9.5 GEOLOGY

The baseline information in this section of the report is extracted from the approved GCS (GCS Environmental Engineering (Pty) Ltd, 2015)*; EMP/EIA (approved 30 July 2015) as well as the Geohydrological study conducted* (Noa Agencies (Pty) Ltd, 2018).

The proposed UG2 and Merensky expansion project areas, are situated in the eastern limb of the Bushveld Igneous Complex, mainly anorthosite and norite with thin localized layers of chromite and pyroxenite, the world's largest layered intrusion, comprising the emplacement of at least 7 105km^3 of magma into the sediments of the Transvaal Supergroup. The UG2 sub-outcrops approximately north/south along the Klein Dwarsrivier valley and dips towards the west at 7-10º. Faults with dolerite intrusive dykes dominate the structural setting creating steeply incised valleys.

Two (2) dyke sets are evident. The most prominent set strikes NNE-SSW comprises a series of relatively closely spaced dyke intrusions. The second set strikes WNW ESE and is widely spaced. The dolerite dykes are fine to medium grained with an average thickness of less than 10m.

The farm Dwarsrivier 372 KT on which Two Rivers Platinum Mine is located is underlain by rocks of the Winnaarshoek and Winterveld Norite-Anorthosite formations of the Rustenburg Layered Suite. These formations comprise alternating layers of chromatite, pyroxenite, norite and anorthosite (GCS, 2013). The outcrop of the Winterveld Norite-Anorthosite formation, which hosts the platiniferrous UG2 chromitite layer and Merensky Reef, is orientated north-south.

The Merensky unit is the thinnest cyclic unit and defines a transition to the main zone and is mainly overlain by a feldspathic pyroxenite that may be pegmatitic and typically consist of chromitite, pyroxenite, thin norite and anorthosite. The UG2 chromitite reef, which may be up to 1.2 m thick and contains minimal sulphide, still carries a similar PGE grade to the Merensky reef (GCS, 2013). Within the TRP UG2-seam there may also be internal pyroxenite partings, which in cases may result in split reef facies whereby the UG2 is separated into two or three seams especially in the southern-most portion of the property (GCS, 2013). These partings are often associated with good groundwater strikes, when located within the first 60 m to 80 m below surface.

9.6 SOIL, LAND USE AND LAND CAPABILITY

9.6.1 Existing Mine (and Location of the UG2 and Merensky Expansion)

Specialist studies were undertaken in 2001 – 2002 and again from the first expansion project in 2013, the following information was extracted from the EMP/EIA (GCS Environmental Engineering (Pty) Ltd, 2015)*:*

In the initial infield studies in 2001-2002 a total of thirteen (13) soil forms were identified in the study area (existing mine infrastructure) including: Hutton (Hu), Avalon (Av), Westleigh (We), Valsrivier (Va), Swartland (Sw), Sterkspruit (Ss), Sepane (Se), Bonheim (Bo), Glenrosa (Gs), Mayo (My), Mispah (Ms), Oakleaf (Oa) and Willowbrook (Wo).

In the study carried out in August 2002 on the Northern Decline Area, a total of four (4) soil forms were identified in the study area including: Hutton (Hu), Valsrivier (Va), Glenrosa (Gs) and Mispah (Ms). The soil forms Oakleaf, Valsrivier and Mispah dominate the existing mine infrastructure areas.

For the expansion of the TSF a specialist study was undertaken by TerraAfrica in 2013. For the investigation three different main soil groups were identified i.e. soil of the Mispah, Oudtshoorn and Rensburg soil forms. The site is dominated by very shallow rocky soils of the Mispah form (47.5% or 75.5 ha of the total study area) as well as soil with a dorbank horizon of the Oudtshoorn form (76.7 ha or 48.3%). The other soil form identified is that of the Rensburg form that consist of a vertical A-horizon overlying a G-horizon.

Soil was chemically analysed at a soil laboratory and was found to range from slightly acidic to mildly alkaline. High levels of calcium and magnesium were tested.

Two main land capability classes namely grazing and wilderness capability were identified for the footprint site and pipeline route. Grazing land capability included all the soil forms except soils from the Mispah soil form. The area has very low potential for irrigated and rainfed crop production due to the soil properties. The area has an average grazing capacity of 6-8 ha per large animal unit and the entire study area can carry approximately 20 head of cattle without resulting in veld degradation.

9.7 HYDROGEOLOGY

The baseline information in this section of the report is extracted from the approved GCS; EMP/EIA (approved 30 July 2015) as well as the updated Geohydrological study conducted in 2018 (Noa Agencies (Pty) Ltd, 2018).

Groundwater in the current and proposed expansion areas (Kalkfontein and Tweefontein farms, the north of Dwarsrivier) is controlled by shallow weathered and deep fractured aquifers. Some alluvium primary aquifers are associated with the floodplain of the Dwars River, but this does not play a role for the underground mining. The groundwater occurrence in the deep aquifer is controlled by the lateral and vertical distribution of fracture zones.

9.7.1 Hydrocensus

A hydrocensus was conducted across the Project area during February 2018. The survey included the proposed mining footprint areas and adjacent properties and concentrated on identifying existing boreholes to enhance the knowledge of the groundwater systems and current groundwater use.

During the 2018 hydrocensus 51 groundwater sites (boreholes and springs) were identified. Groundwater level measurements were possible from 32 boreholes. The 51 sites included:

- 11 boreholes which are in use;
- 7 blocked boreholes;
- 29 open / capped boreholes;
- 1 private borehole;
- 1 exploration borehole;
- 1 destroyed borehole; and
- 1 spring.

During the hydrocensus the following information was collected for each site:

- Borehole position (X, Y, Z-coordinates);
- Information relating to equipment installed;
- Borehole construction details;
- Borehole yield – if known;
- Groundwater level, if possible; and
- Current use.

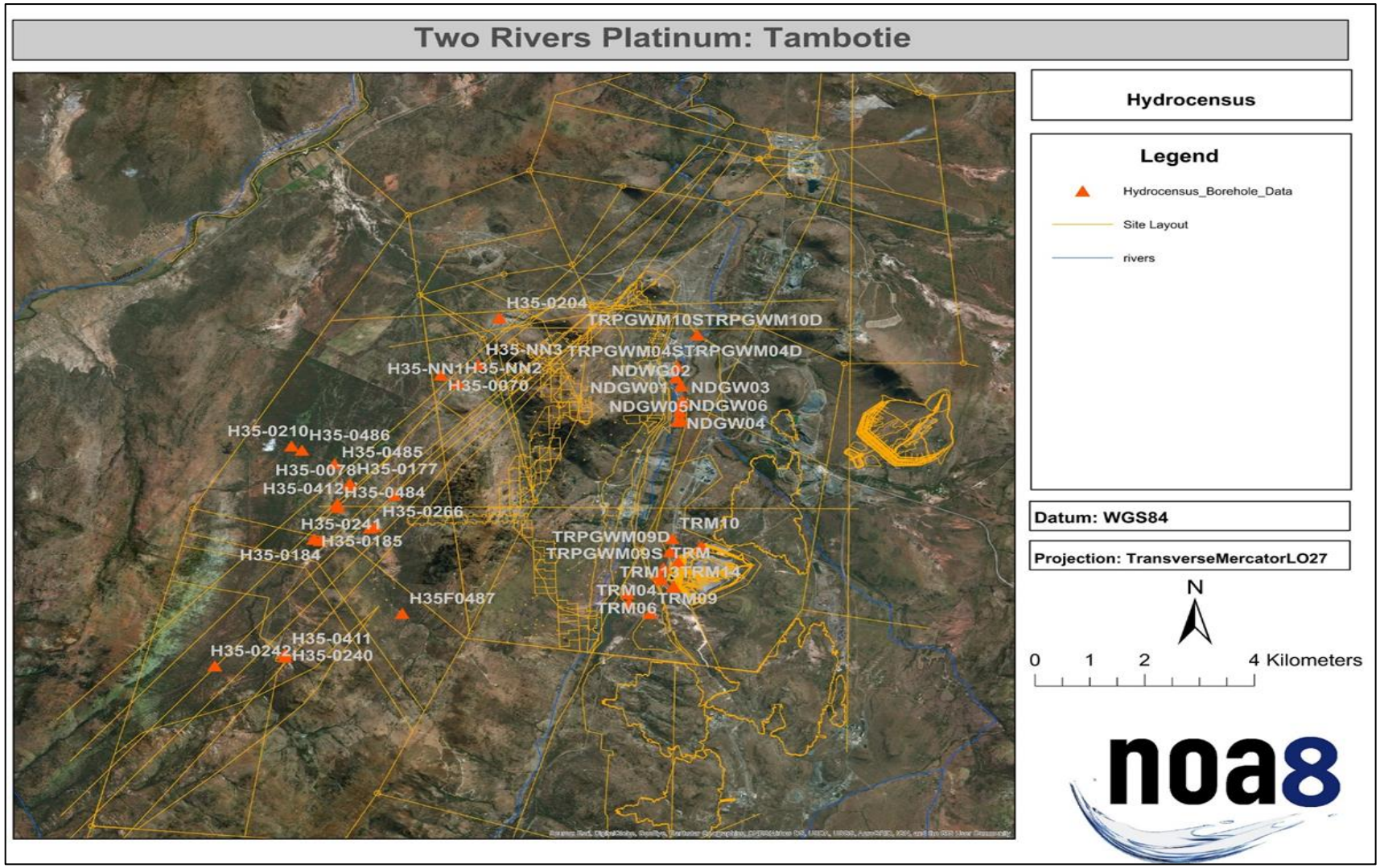

Figure 9-1: TRP Tamboti 2018 Hydrocensus

Water levels were measured by using a dip meter to measure the distance from the mouth of the borehole (borehole collar elevation) to the groundwater table depth in the borehole. The height of the borehole collar was subtracted from the measured water level to define a water level below surface (measured in m bgl).

The groundwater level varied from surface at the spring and boreholes TRPGWM06S and TRPGWM06D, to a maximum depth of 54.65 m bgl at borehole H35-0078. Boreholes TRPGWM06S and TRPGWM06D are located downstream from the Richmond Dam. Time series groundwater level or quality data are not available to determine seasonal groundwater changes.

The identified boreholes are in three distinct clusters. The first cluster is located to the west, in the valley between the mining area and the Steelpoort River and R555 main road (farm Kalkfontein area). This area includes many private and community water supply boreholes. The second cluster is located downgradient of the TSF and Richmond Dam. The third cluster is around the main TRP mining area.

9.7.2 Groundwater Levels

The average groundwater level for the area is 12 m bgl with an increase in depth of the water table as the surface elevation increases. Boreholes at higher elevations, close to the pit area, have maximum water levels of 21 m bgl. The correlation between the topographical elevation and the water table elevation is 95%, confirming that the groundwater table elevation follows the topography. The general groundwater flow direction flows in a south-western direction towards the Dwars River (GCS Environmental Engineering (Pty) Ltd, 2015)).

An increase in the depth to the groundwater table is expected in the steeper parts of the hill. The groundwater table in the pit area is expected to be well below the pit floor and thus no significant groundwater flow is expected into the pit from a groundwater perspective. On the steeper slopes runoff will be higher with a much lower recharge rate and this effects the groundwater table and can cause a significant difference in depth to the groundwater table in comparison to the flatter area where recharge is higher.

The static water levels in the site area measured during the 2018 hydrocensus ranged between zero and 54 m bgl. There is a big difference in groundwater level depths between the Dwars River valley (where the mines are) and the valley towards the west (farm Kalkfontein). The groundwater table in the Kalkfontein area is on average 38 m bgl and for the Dwars River valley area approximately 7 m bgl. The shallow groundwater table potentially relates to the various perennial stream transecting this area / valley.

Groundwater flow on a local scale will be towards the Klein and Groot Dwars Rivers and the Springkaanspruit. The Groot Dwars River is the main receptor of groundwater flow within the area.

However, the Springkaanspruit could locally receive groundwater baseflow, especially in the wet season.

9.7.3 Groundwater Quality

The groundwater quality assessment is based on water samples collected during the 2012 and 2013 GCS studies, many from the newly drilled monitoring boreholes, as well as sampling done during the 2018 aquifer test programme. Water samples were also collected from the first TSF in 2013 to identify chemicals of concern and possible source concentrations.

The following observations were made from the results:

1. Nitrate (N) values were elevated in two boreholes (TRP GWM21 and TRP GWM18) and exceeded the drinking water standards. It was concluded at the time that the nitrate could have been a result of the nearby house septic system combined with livestock activity. Bacteriological analysis would help to confirm the origin as mining related impacts can also add nitrate to the local groundwater environment.
2. Elevated magnesium concentrations were encountered all sampling sites, but is common in Bushveld Igneous Complex aquifers due to groundwater and host rock chemical reactions.
3. Calcium also exceeded the DWS guideline limits and is typical of ambient Bushveld Igneous Complex aquifers.
4. The samples from the first TSF (pool water, slurry water and return water dam) exceeded the maximum allowable standard for drinking water, with reference to electrical conductivity, nitrate and sodium. The elevated concentrations are probably due to plant processes and the recirculation of water exposed to evaporative processes.

Groundwater samples were collected from seven boreholes during the 2018 aquifer testing programme. Samples were taken towards the end of the aquifer tests.

Another 42 water samples were collected during three separate sampling runs in March 2018 to define the status of groundwater in the Tamboti area.
The water samples were analysed for basic inorganic parameters and the results were compared against the SANS 241:2015 Drinking Water Standards. Water quality analysis included the various elements as indicated in Table 9-2 to Table 9-4. The laboratory test certificates are attached in Appendix C of the updated hydrogeological assessment.

Based on the water quality data there are three characteristic water types in the area:

1. Calcium/ magnesium-bicarbonate water;
2. Sodium–chloride dominant water; and
3. Sodium/ magnesium-sulphate dominant water.

The groundwater in the valley to the west of the Tamboti mining area is defined by the calcium/ magnesium-bicarbonate type water. This area is characterised by agricultural activities and grazing.

The groundwater in this valley is characterised as recent recharged water and has high calcium concentrations (exceeding the SANS limits) and slightly elevated magnesium concentrations (still in SANS guideline limits). The elevated calcium and magnesium concentrations are characteristic of the Bushveld Igneous Complex aquifers. The groundwater is classified as very hard water. The groundwater sampled at the top of this valley (boreholes H35-0240 and H35-0411) measured low element concentrations.

A high nitrate concentration was measured in one borehole (H35-0177) in this valley. It has been assumed that the elevated nitrate concentration is associated with animal movement around this borehole.

The sodium–chloride and sodium/ magnesium-sulphate waters are associated with the valley hosting the Tamboti mining area. Magnesium and calcium concentrations are similar to the valley to the west, but elevated concentrations of sulphate, nitrate, chloride, sodium and total chromium were also measured.

Water sampled from the TSF in 2013 (GCS, March 2013) measured high concentrations of chloride, sulphate, nitrate, free and saline ammonia, magnesium and sodium. It is possible that leaching of minerals from the waste rock on surface and the TSF contributes to the elevated element concentrations measured in boreholes in the area.

It was not possible to identify a trend in terms of the shallow and deep aquifer water qualities. Elevated element concentrations were measured in some shallow boreholes, but not in the adjacent deep monitoring borehole. In other areas the opposite was observed and in other borehole sets both measured high concentrations. It has been assumed that groundwater of poor quality is present in the shallow and deep aquifers and that flow along fracture sets contribute to the random water qualities.

The rest of the salts and metals (based on the various analysis done) were within the SANS drinking water guideline limits. Calcium and total hardness concentrations did however exceed the DWS drinking water guidelines, but relate more to scaling effects that are likely to occur in water heating appliances such as kettles and geysers, and results in low efficiencies and the partial obstruction of pipes. High concentrations of calcium also impair the lathering of soap.

Table 9-2: Hydro-chemical results – Set 1

Parameter	Unit	SANS241 Standard Limits		DWS Drinking Standards	H35-0177	H35-0185	H35-0240	H35-0241	H35-0487	H35-0182	H35-0411
Chloride	mg Cl/ℓ	Aesthetic ≤300			14.3	15.0	48.0	13.7	8.4	25.1	48.4
Calcium	mg Ca/ℓ			No health. Scaling intensifies from 32mg/L	98.54	77.9	5.24	78.7	61.22	91.78	4.47
Magnesium	mg Mg/ℓ			Diarrhoea and scaling issues from 70mg/L	50.58	50.3	0.16	42.62	35.09	73.1	0.02
Electrical Conductivity at 25°C	mS/m	Aesthetic ≤170			87.6	69.0	26.9	71.2	57.2	96.6	24.9
Fluoride	mg/ℓ		Chronic health ≤1.5		0.58	0.1	0.87	0.15	0.1	0.68	0.6
Nitrate	mg/ℓ		Acute health ≤11		15.56	0.94	0.014	0.352	0.08	0.14	0.06
pH at 25°C		≥5 - ≤9.7			7.4	7.5	9.5	7.4	8.1	7.3	9.7
Sulphate	mg SO_4/ℓ	Aesthetic ≤250	Acute health ≤500		9.72	5.05	7.11	6.04	19.39	38.2	5.64
Total Alkalinity	mg $CaCO_3$/ℓ				413.8	364.0	17.5	374.2	290.4	490.8	7.9
Total Dissolved Solids	mg/ℓ	Aesthetic ≤1200			577.0	401.24	175.0	463.0	372.0	622.0	171.0
Total Hardness	mg $CaCO_3$/ℓ	60–120 mg/l, moderately hard	120–180 mg/l, hard	more than 180 mg/l, very hard	453.89	449.0	13.73	371.65	297.07	529.65	11.23
Sodium	mg Na/ℓ	Aesthetic ≤200			26.14	17.8	45.67	18.97	17.35	25.66	45.71
Potassium	mg K/ℓ			No aesthetic or health effects below 50mg/L	0.3	0.4	0.92	0.58	1.37	0.21	0.34
Silica	mg/ℓ				27.68	28.4	13.22	27.44	23.61	33.56	14.65
Aluminium	mg Al/ℓ	≤0.3			0.01	0.05	0.04	0.01	0.01	0.01	0.05
Iron	mg Fe/ℓ	Aesthetic ≤0.3	Chronic health ≤2		0.01	0.28	0.19	0.01	0.02	0.01	0.01
Manganese	mg Mn/ℓ	Aesthetic ≤0.1	Chronic health ≤0.4		0.01	0.05	0.01	0.01	0.02	0.01	0.01

Table 9-3: Hydro-chemical results – Set 2

Determinant	Unit	SANS 241 Standards Limits		DWS Drinking Standards	CD 1	CD 2	MDCD 1	MDCD 2	NDCD 1	NDCD 2	CPCD 1	NDSWD 1	TRTD 1	TRTD 2
Total Dissolved Solids	mg/ℓ	Aesthetic ≤1200			2804	2782	2570	2542	4326	4808	954	2882	1386	1406
Nitrate	mg N/ℓ		Acute health ≤11		209	225	164	143	411	435	2,9	240	24,9	35,3
Chloride	mg Cl/ℓ	Aesthetic ≤300			585	538	586	599	672	862	151	504	194	212
Total Alkalinity	as $CaCO_3$				273	246	356	300	243	219	523	357	203	148
Fluoride	mg F/ℓ		Chronic health ≤1.5		0,44	0,44	0,43	0,39	0,84	0,70	0,30	0,59	0,47	0,47
Sulphate	mg SO_4/ℓ	Aesthetic ≤250	Acute health ≤500		142	145	135	134	206	266	102	140	435	430
Total Hardness as $CaCO_3$	mg /ℓ	60–120 mg/l, moderately hard	120–180 mg/l, hard	more than 180 mg/l, very hard	955	812	835	760	1012	1128	477	766	430	438
Calcium	mg Ca/ℓ			No health. Scaling intensifies from 32mg/L	173	149	153	123	219	216	71,8	162	46,9	34,7
Magnesium	mg Mg/ℓ			Diarrhoea and scaling issues from 70mg/L	127	107	110	110	113	143	72,3	87,7	76,0	85,3
Sodium	mg Na/ℓ	Aesthetic ≤200			439	344	392	400	509	632	141	387	261	279
Potassium	mg K/ℓ			No aesthetic or health effects below 50mg/L	32,0	27,5	26,9	25,9	40,5	50,0	8,51	28,4	40,9	48,0
Iron	mg Fe/ℓ	Aesthetic ≤0,3	Chronic health ≤2		0,01	0,04	<0.01	0,04	0,01	<0.01	0,01	<0.01	0,01	<0.01
Manganese	mg Mn/ℓ	Aesthetic ≤0,1	Chronic health ≤0.4		0,04	0,10	0,01	0,01	0,08	0,04	0,02	0,05	0,03	<0.01
Electrical Conductivity at 25°C	mS/m	Aesthetic ≤170			416	405	385	363	611	669	151	422	207	209
pH at 25°C	pH units	≥5 - ≤9.7			7,99	7,99	8,40	8,54	7,71	7,75	8,37	8,14	8,19	8,79
Hexavalent Chromium Cr^{6+}	mg /ℓ		Chronic health ≤0.05		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Chromium	mg Cr/ℓ		Chronic health ≤0.05		0,11	0,10	0,04	0,04	0,11	0,05	0,16	0,06	0,05	0,04
Lead	mg Pb/ℓ		Chronic health ≤0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	mg Cu/ℓ		Chronic health ≤2		0,01	<0.01	0,01	<0.01	<0.01	0,01	0,01	0,04	<0.01	0,01
Cadmium	mg Cd/ℓ		Chronic health		<0.00	<0.00	<0.003	<0.003	<0.003	<0.0	<0.0	<0.00	<0.0	<0.0

			≤0.003		3	3				03	03	3	03	03
Dissolved Vanadium	mg V/ℓ			Not suitable over 1.0	0,02	0,01	0,01	0,02	0,01	0,01	0,04	0,01	<0.01	<0.01
Total Inorganic Nitrogen as N	mg /ℓ				274	291	209	174	624	623	14,0	347	61,6	51,6
Free and Saline Ammonia	mg N/ℓ				55,1	57	36,0	22,7	183	166	9,31	90,5	18,5	<0.20
Aluminium	mg Al/ℓ	Operational ≤0.3			0,03	0,05	0,04	0,10	0,05	0,06	0,03	0,16	0,03	0,02

Table 9-4: Hydro-chemical results – Set 3

Boreholes	Guideline Limits	Total Dissolved Solids	Nitrate NO_3 as N	Chlorides as Cl	Sulphate as SO_4	Calcium as Ca	Magnesium as Mg	Sodium as Na	Potassium as K
	SANS 241 Standards Limits	Aesthetic ≤1200		Aesthetic ≤300	Aesthetic ≤250			Aesthetic ≤200	
			Acute health ≤11		Acute health ≤500				
	DWS Drinking Standards					No health. Scaling intensifies from 32mg/L	Diarrhoea and scaling issues from 70mg/L		No aesthetic or health effects below 50mg/L
TRPGWM1D		1130	57.9	174	44.5	134	100	53.1	0.85
TRPGWM1S		602	<0.1	270	39.8	6.33	66.9	95.8	0.64
TRPGWM2D		334	<0.1	103	<1	35.2	16.4	56.7	0.7
TRPGWM2S		488	<0.1	103	61.1	5.64	70.4	77.2	0.6
TRPGWM4D		182	<0.1	91.2	5.4	10.6	0.73	54.9	0.67
TRPGWM4S		2354	197	273	95.9	301	154	56.1	1.31
TRM 5BD		414	<0.1	12.5	2.06	13.6	31.5	104	1.45
TRM 5BS		538	0.25	9.82	4.34	27.4	53.4	117	0.2
TRM 11BD		668	2.5	21.9	48.6	36.6	58.6	154	3.11
TRM 11BS		748	4.85	18.1	17.2	23.8	56.4	173	0.33
TRPGWM9D		972	<0.1	232	138	23.3	112	125	2.5
TRPGWM9S		752	<0.1	219	56.1	7.16	106	101	1.39
TRPGWM10S		276	0.47	19.1	38.3	26.6	32.2	27.9	0.76
TRPGWM10D		984	68.1	20.3	68.9	157	74.3	29.9	0.41
TRPGWM12S		406	<0.1	15.3	<1	45.6	43.2	41.4	0.51
TRPGWM12D		172	<0.1	48.8	1.49	2.59	1.38	59.9	0.59
TRPGWM13S		814	7.98	75.6	51.4	78.2	100	35.8	0.82
TRPGWM13D		358	<0.1	121	1.57	19.1	43.7	40.3	1.47
TRPGWM14S		888	<0.1	174	322	30.4	57.6	195	1.04
TRPGWM14D		866	<0.1	184	282	27.2	51.4	182	1.07
DBG 1		1024	31.1	117	159	155	80.7	44.4	1.93
DBG 2		558	2.71	21.6	52.1	59.1	76.5	30	1.83
DBG 3		488	1.41	9.4	37.2	61.1	57.4	30.1	1.23
KALF 1		656	2.19	72.5	49.3	64.6	85.5	36.8	7.65
TRPGWM6D		974	1.87	187	211	88.6	66.5	70.4	2.25

TRPGWM6S		820	<0.1	183	253	61.5	54.3	129	1.23
TRPGWM8D		234	<0.1	87.4	7.34	6.86	0.72	63.5	2.58
TRPGWM8S		336	<0.1	9.52	19.1	80.8	17.8	16.9	0.31
TRPGWM15D		1466	6.69	187	458	119	118	131	0.55
TRPGWM15S		798	<0.1	174	133	36.2	66.4	73.8	0.51
TRPGWM16D		286	<0.1	11.6	2.49	31.2	37.7	23.2	0.29
TRPGWM16S		352	<0.1	18.4	2.74	39	45	24.1	0.58

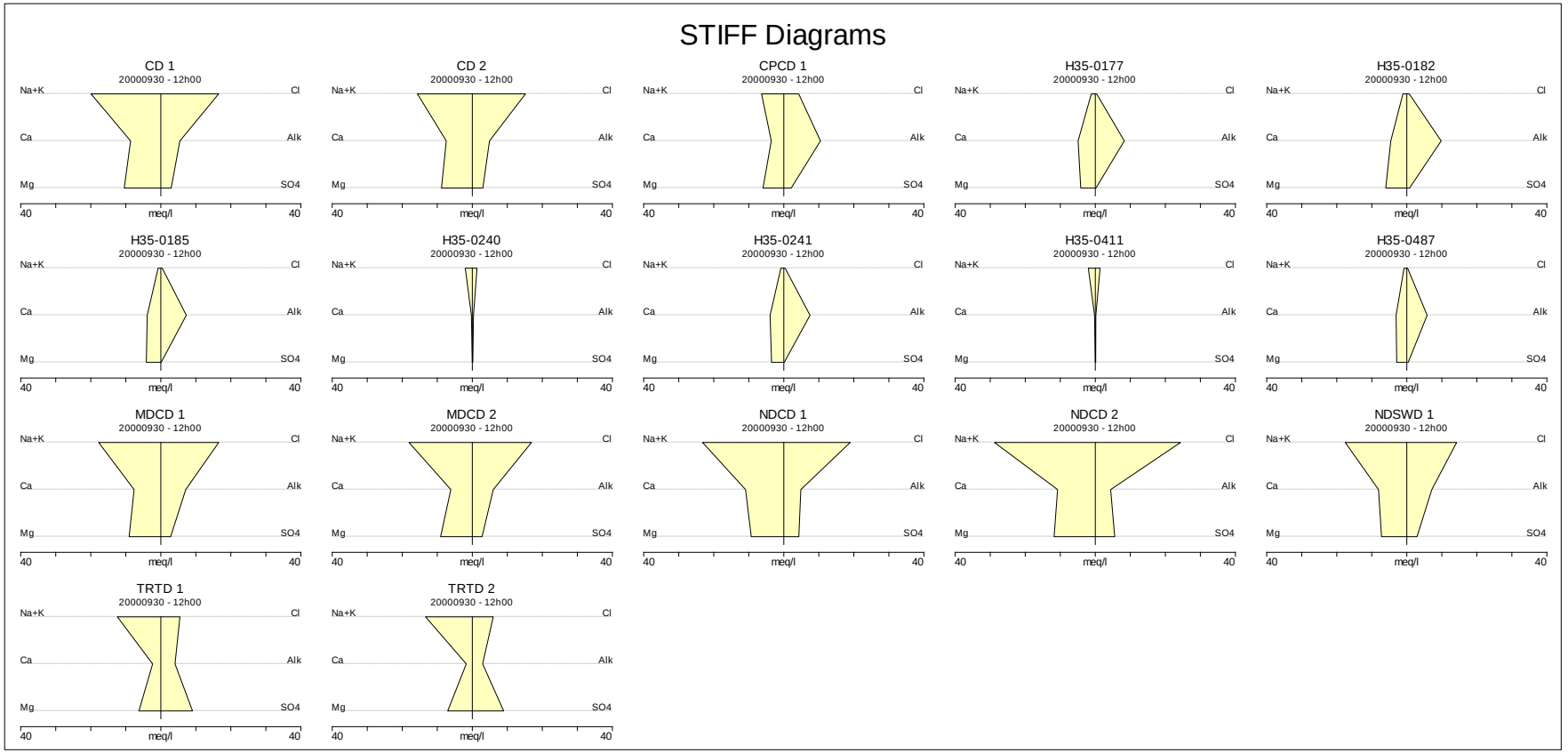

Figure 9-2: **Stiff Diagrams**

Table 9-5: 2018 Aquifer test programme summary (VSA Leboa Consulting, 2018)

Constant drawdown yield tests – 24 hours test	BH Depth	Water Level	Test Yield	Test Duration	Sust. Yield	Max Drawdown	Recovery	T-value early	S-value
H35-0177	69.95m	43.94m	2.64 L/s	24h	1.6 L/s	11.06m	24hr - 92%	16.0 m^2/day	0.002
H35-0182	39.60m	30.60m	0.8 L/s	12h	0,6 L/s	3.63m	12hr - 78%	18.0	0.002
H35-0241	99.24m	44.50m	3.43 L/s	24h	2,1 L/s	11.66m	24hr - 93%	20.0	0.002
H35-0240	120.0m	21.50m	0.4 L/s	3.5h	0,2 L/s	60.50m	14hr - 30%	-	-
H35-0185	72.0m	42.29m	4.08 L/s	6h	2.0 L/s	13.07m	7hr - 94%	17.0	0.002

9.7.4 Borehole Yields

Borehole yields for this area may vary from 0.1 litres per second (L/s) to 0.5 L/s. Deeper weathered zones and some of the regional linear geological structures can provide yields of between 2 L/s and 5 L/s.

Aquifer tests conducted during February 2018 indicated constant abstraction rates between 0.4 L/s and 4.0 L/s. Five boreholes located in the Kalkfontein and Buffelshoek areas were tested.

9.7.5 Conceptual Model

Background water levels at the site are between zero and 54 m below surface. Background water quality shows elevated nitrate concentrations which is probably related to cattle and septic tanks influencing the water quality, but also elevated calcium and magnesium concentrations that might relate to natural processes.

Water strikes are mostly associated with the shallow weathered profile indicating transmissivities (T) of about 2 m^2/d for the weathered aquifer and 0.002 m^2/d for the deeper, non-weathered layers. The 2018 aquifer test programme indicated T-values of 16 to 20 m^2/day (VSA Leboa Consulting, 2018).

Recharge is expected to be low for the steep rock outcrop areas due to the high runoff rates. Increased recharge rates are expected for the lower laying valley areas, filled by weathered material.

9.7.6 Shallow Weathered Aquifer

The unconfined, shallow hydro-stratigraphic unit is developed in the flat lying valley and terrace areas between the major mountain ridges. The extent of this shallow hydro-stratigraphic unit is confined to the different valleys and terraces and is most likely not spatially connected across the mountain ridges.

The shallow groundwater storage can occur in three geological components (not all geological components are present in all areas):

1. Alluvial deposits, including all unconsolidated material which may include a lower zone of calcrete and clay rich saprolite;
2. Shallow weathered bedrock; and
3. Shallow fractured bedrock.

The upper critical zone consists of well layered norite, anorthosite and pyroxenite. These geological units have an influence on the weathering patterns, resulting in variable weathered thicknesses. The lower critical zone and lower zone consist mainly of pyroxenite, while anorthosite and norite are largely absent. Weathering of these pyroxenite resulted in deep clay layers on surface and a well-developed deeper fractured hydro-stratigraphic unit.

The thicknesses of the different components of this unit are variable and differ quite considerably

between the different valley locations.

Vertical hydraulic continuity is expected across these geological units, however, where the clay rich saprolite layer is well developed, limited connectivity is expected.

9.7.7 Semi-Confined to Confined Fractured Aquifers

A series of shallow (14 to 17°) west dipping, semi-confined to confined hydro-stratigraphic units are developed in the pyroxenite, of the upper critical zone of the Bushveld. These units are localised in extent and underlie the upper units. On hills and mountain ridges, where the upper zones are not developed, these pyroxenite hydro-stratigraphic units are outcropping.

Groundwater storage occurs in the matrix and open joints of the weathered, oxidised pyroxenite close to surface, but at depth is restricted to open or partly open fracture-joint systems, in un-weathered pyroxenite. The pyroxenite is expected to die out at depths of approximately 100 to 120 m bgl, where fracture-joint systems are expected to be mainly closed due to the pressure from the overlying material.

Distinct hydrogeological differences can be expected along the strike of the UG2 pyroxenite aquifer in terms of groundwater recharge and storage, between the higher lying hill areas and the intervening valley area.

9.7.8 Other Hydro-stratigraphic Units

Other hydro-stratigraphic units in the study area are related to major geological structures including sub-vertical NNE trending dolerite dykes and fracture/fault zones, as well as NNW trending fracture zones. There is indication that these structures represent linear features of increased hydraulic conductivity and act as preferential groundwater flow paths.

Further, there are indications based on historical percussion drilling, that deep fractured bedrock hydro-stratigraphic units exist in the bedrock of the lower critical zone and lower zone of the Bushveld. The deeper unit is currently very poorly defined and it is likely that it is confined to linear steep fracture/fault zones and dolerite dyke intrusions.

For the De Grooteboom aquifer, transmissivity values of 1.5 m^2/d for weathered zones, 0.3 m^2/d for hill outcrops, 0.8 m^2/d for anorthosite and 290 m^2/d for highly transmissive alluvial zones at the Groot Dwars River was obtained (GCS, 2013).

Transmissivity for the shallow aquifer is high where the aquifer is coincident with faulting and is about 250 m^2/day. Elsewhere the shallow aquifer values are much lower with hydraulic conductivities ranging from 0.07 to 11.92 m/day.

9.7.9 Conceptualisation of the local groundwater regime

The following section provides key notes on the local aquifer(s) and the governing flow dynamics.

9.7.9.1 Aquifer Systems

The norites and pyroxenites of the BIC comprise:

1. An unweathered and intact rock matrix, with negligible porosity and permeability
2. Faults and joint planes – referred to as fractures.

The groundwater flow regime is governed by a complex fracture network. The flow regime varies in space and time and is often related to structurally controlled flow systems.

9.7.9.2 Groundwater Recharge

The major source of water into the groundwater flow model is recharge from precipitation.

Rainfall records provide a mean annual precipitation of 650 mm/a. Regional recharge coefficients are approximately 5% thereof (~32.5 mm/a). An annual recharge value of between 0.9% of MAP for the steep sloped rock outcrop areas, increasing to 5% of MAP for the flat valley bottoms (MAP ± 650 mm) was estimated (Figure 9-9).

9.7.9.3 Model Development

9.7.9.3.1 Modelling protocol and guidelines

The numerical modelling follows a serious of processes in achieving an acceptable fit through calibration. This enables the model to be used for any predictive scenario - in this case the simulating the expected dewatering due to the extension of the underground mine onto the Kalkfontein 367 KT mining right area. The data obtained, historical and current, were reviewed as input data to:

1. Construct and populate a numerical model with adequately defined and defendable model boundaries.
2. Complete a steady state calibration of the model by adjusting the hydraulic conductivity values and recharge until an acceptable fit was obtained. An acceptable fit is when the root mean square error is less than 10% of the difference of the calibrated head distribution in the model domain i.e. less than 10% of the difference between the maximum and minimum simulated head.
3. The calibrated model is then used for predictive modelling and for the simulation of various scenarios to evaluate relevant dewatering designs and assessment of impacts.

9.7.9.3.2 Model Layers

The numerical model comprises two layers. This is summarised in Figure 9-7 which lists the hydro-stratigraphic unit thickness, depth below ground, as well as the hydraulic conductivity and storage characteristics of each hydro-stratigraphic unit.

Table 9-6: Conceptual hydrogeological model values

Zone no	Hydraulic zone	Layer	Layer thickness (m)	Transmissivity (m^2/d)	Hydraulic conductivity (Kxy) (m/d)	Storativity
1	Gabbro	1	50	12.50	0.25000	1.00E-03
2	Magaliesberg Fm	1	50	10.00	0.20000	1.00E-03
3	Gabbro Norite (Main Zone)	1	50	6.25	0.12500	1.00E-03
4	Granophyre	1	50	7.50	0.15000	1.00E-03
5	Rayton	1	50	7.50	0.15000	1.00E-03
6	Schilpadnest Fm (Critical Zone)	1	50	5.00	0.10000	1.00E-03
7	Silverton	1	50	7.50	0.15000	1.00E-03
8	Vlakfontein (Marginal Zone)	1	50	10.00	0.20000	1.00E-03
9	Dykes	1	50	0.00	0.00001	1.00E-03
10	Faults	1	50	50.00	1	1.00E-03
11	Gabbro	2	100	0.625	0.00625	1.00E-05
12	Magaliesberg Fm	2	100	0.5	0.005	1.00E-05
13	Gabbro Norite	2	100	0.25	0.0025	1.00E-05
14	Granophyre	2	100	0.375	0.00375	1.00E-05
15	Rayton	2	100	0.375	0.00375	1.00E-05
16	Schilpadnest Fm	2	100	0.25	0.0025	1.00E-05
17	Silverton	2	100	0.375	0.00375	1.00E-05
18	Vlakfontein	2	100	0.5	0.005	1.00E-05
19	Dykes	2	100	0.000025	0.00000025	1.00E-05
20	Faults	2	100	2.5	0.025	1.00E-05
21	Gabbro	3	850	0.53125	0.000625	8.00E-07
22	Magaliesberg Fm	3	850	0.425	0.0005	8.00E-07
23	Gabbro Norite	3	850	0.2125	0.00025	8.00E-07
24	Granophyre	3	850	0.31875	0.000375	8.00E-07
25	Rayton	3	850	0.31875	0.000375	8.00E-07
26	Schilpadnest Fm	3	850	0.2125	0.00025	8.00E-07
27	Silverton	3	850	0.31875	0.000375	8.00E-07
28	Vlakfontein	3	850	0.425	0.0005	8.00E-07
29	Dykes	3	850	0.00002125	0.000000025	8.00E-07
30	Faults	3	850	2.125	0.0025	8.00E-07

9.7.9.3.3 Model representation and mesh

FEFLOW® was used as the preferred modelling package for the proposed mine dewatering scenarios, using finite elements. The numerical mesh is shown in Figure 9-3, while the geological input and calibration boreholes used are depicted in Figure 9-5**.** The mesh was discretised such that the number of obtuse angles (>90 degrees) i.e. to ensure that violating Delaunay criteria is less than 5% - assisting in mathematical and numerical computing and stability of the model. The mesh around the Two Rivers Platinum mine workings was refined to allow for detailed input of boundary conditions associated with the underground mine. The numerical model and simulations focus on the

underground mine extension only. The FEFLOW® model was constructed using 441 502 elements and 332 025 nodes, spatially distributed over 2 layers.

Hydrogeological boundaries are detailed as:

1. Vertical and spatial distribution of the hydro stratigraphic units
2. The piezometry (head contours from measured water levels) indicated a natural groundwater flow from the topographical high in the south towards the north, along the main drainage rivers i.e. Dwars and Steelpoort Rivers.
3. The north eastern boundary is classified as a no-flow boundary and coincides with the surface water divide of the Quaternary catchment B41J.
4. To the east and to the west the boundaries are classified as no-flow boundaries along the B42F and B41E catchments respectively.
5. Internal partial barrier boundaries are defined by faults explicitly added to the modelling domain, as well as head boundary constraints along the river and drainages.

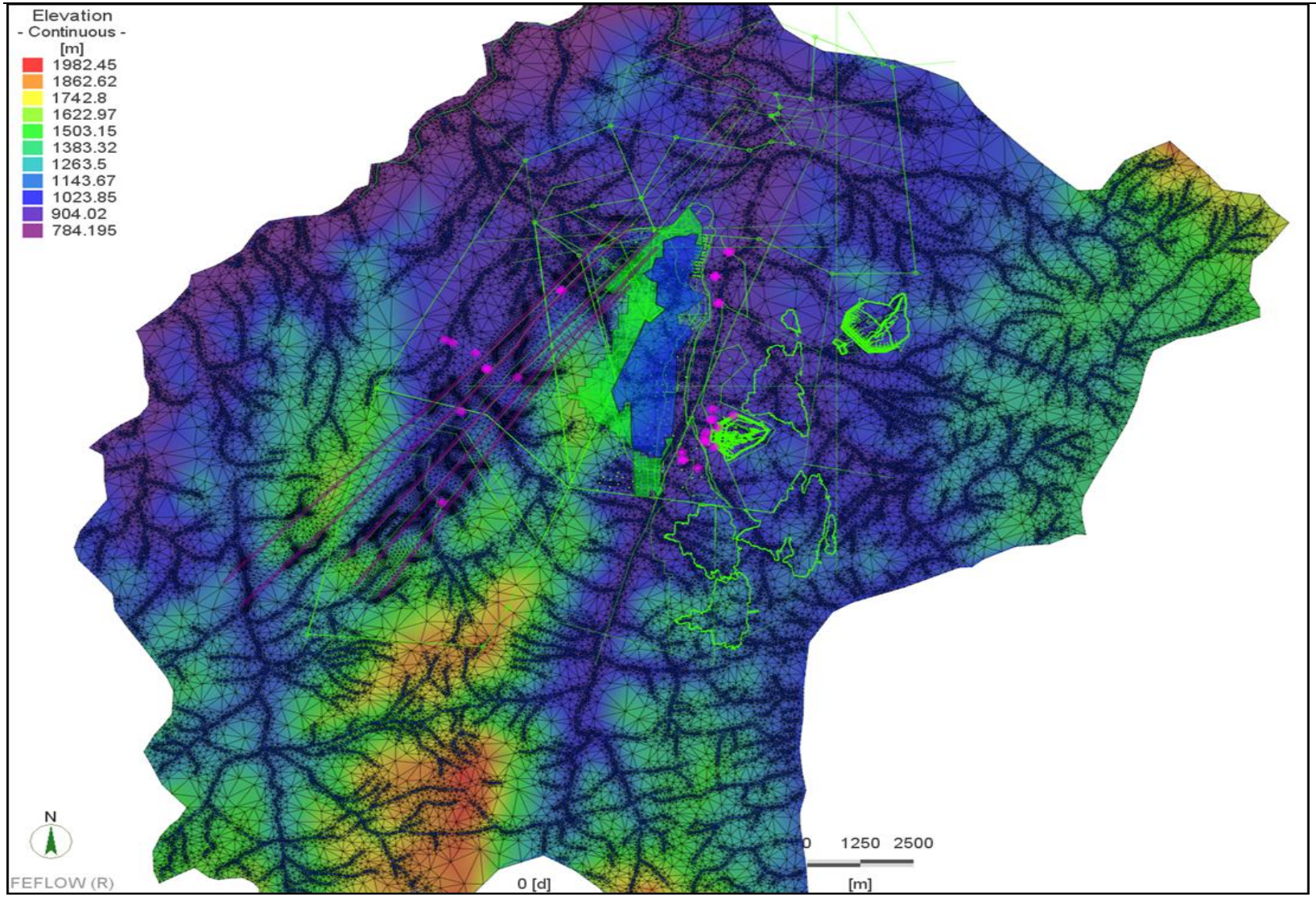

Figure 9-3: Model generated mesh

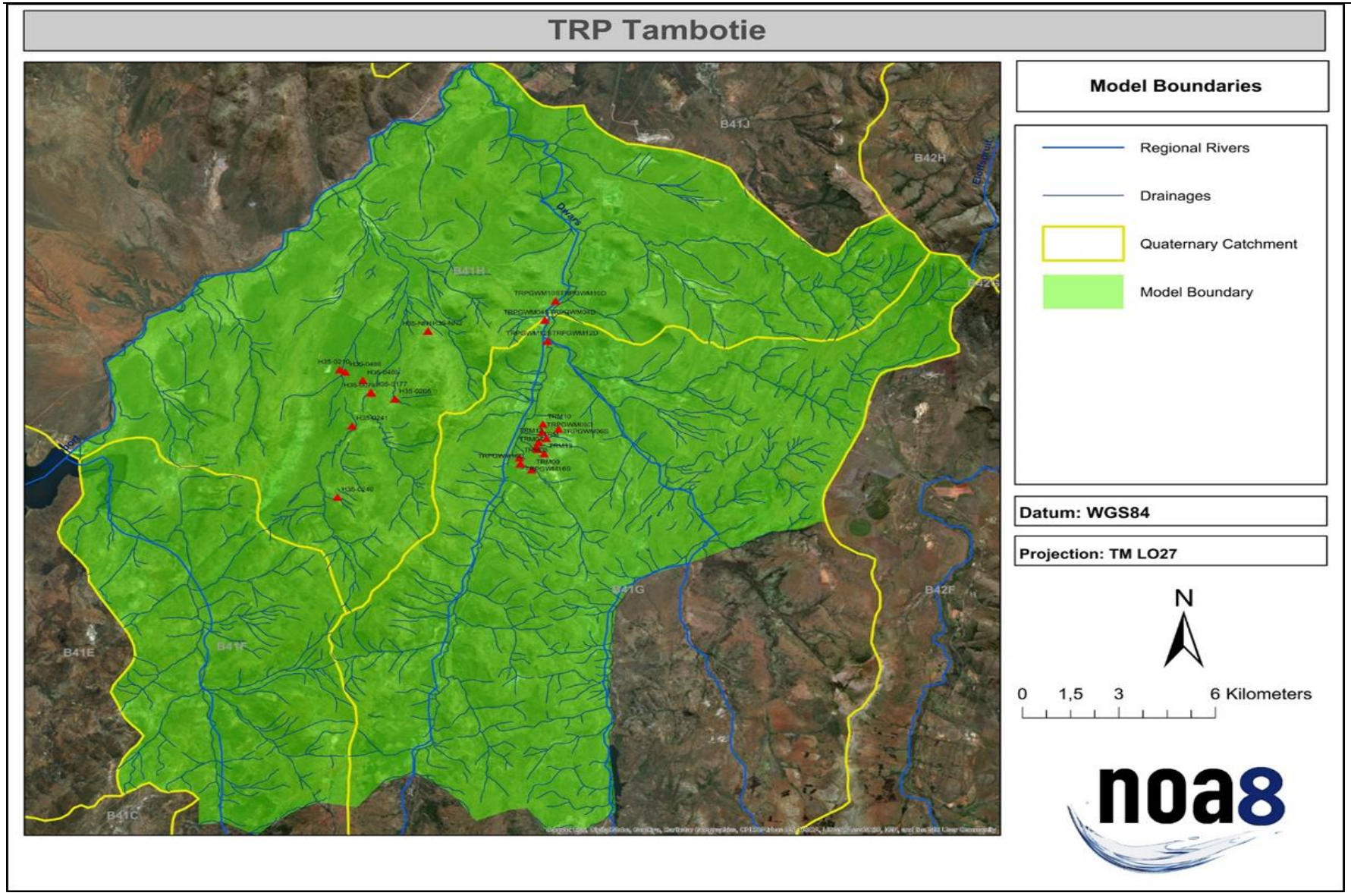

Figure 9-4: Model boundaries and quaternary catchment

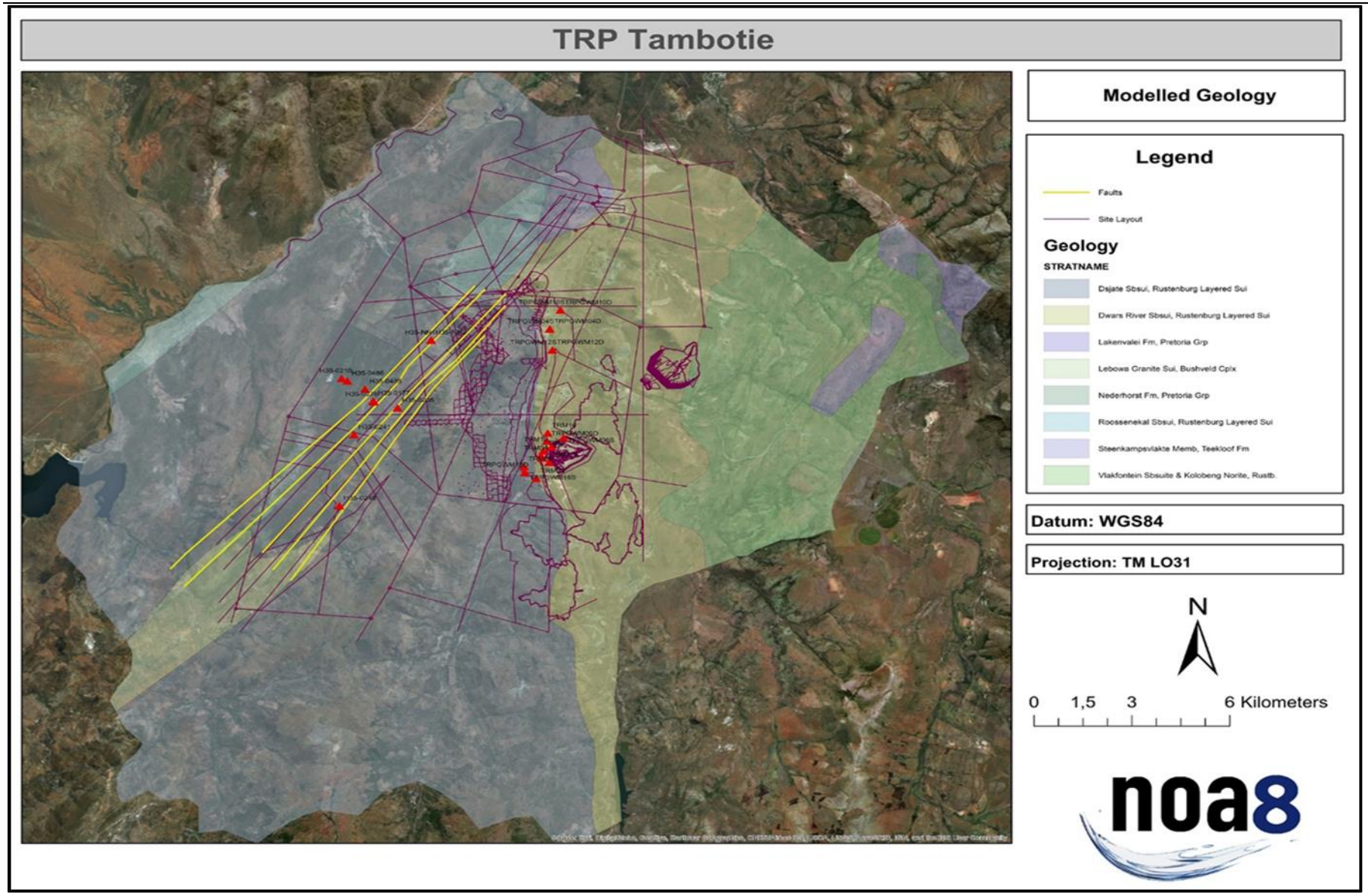

Figure 9-5: Modelled geology and calibration boreholes

9.7.10 Model Calibration

9.7.10.1 Simulation scenarios

Various simulations are required when using the numerical flow model as a tool in mine dewatering and potential impact assessments. Both recent and historical data are used to calibrate the model. This is always an iterative process. The calibration process is completed both in steady state (time independent, with only hydraulic conductivity and recharge parameters adjusted) and transient state (time dependent, with aquifer storage as an added adjustable parameter).

The following scenarios were simulated and are discussed here:

1. Steady state calibration: status quo – current impacted mining and affected water levels.
2. Transient calibration. The steady state calibrated model was used to calibrate the model to simulate the current mine dewatering volumes. The Two Rivers Mine Water Balance (Golder Associates) was consulted. The mine water balance was simulated for the perion 2010-01-01 to 2040-01-01.
3. Predictive scenarios:
    a. Mine dewatering for year 0 – year 5 of proposed underground mining (redictive modelling have been included in Section 11.5.10.1 below).

9.7.10.2 Steady state calibration

The objective of the steady state model calibration was to reproduce measured water levels at observed heads and generated piezometry. Twenty (20) observation points were used for the initial steady state model calibration, of which the water levels were measured during the hydrocensus. Figure 9-6 is a scatter diagram of the observed versus modelled heads while Table 9-6 indicates the measured and modelled heads and the calibration error.

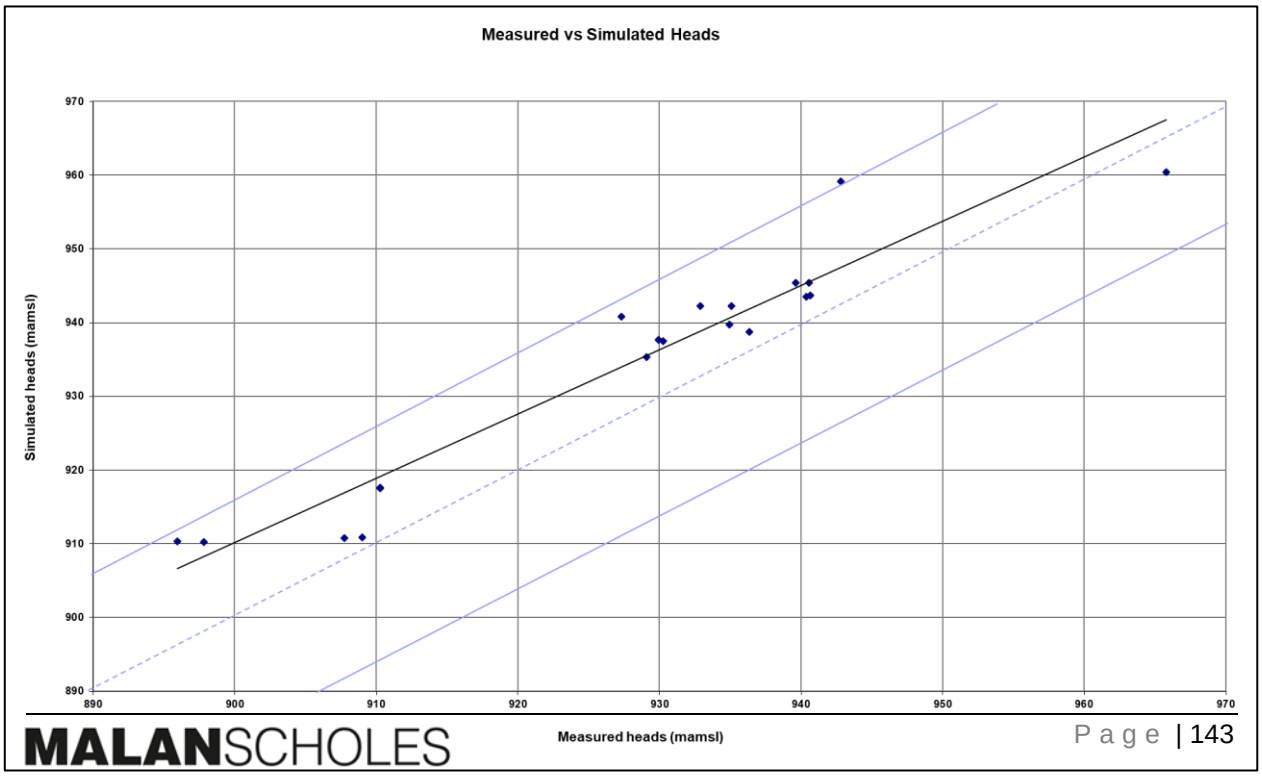

Figure 9-6: Scatter diagram of observed and modelled hydraulic heads

The minimum calibration error is 1.84m and the maximum error 16.30m. The standard practice for calibration evaluation is to obtain a Root Mean Square Error (RMSE) of such a value that, when compared with the head difference measured in the modelled area, it should not exceed 10%. In this case the RMSE correlates to approximately 2% measured against the water level changes over the model domain (% of the difference between the maximum and minimum simulated head distribution).

9.7.10.3 Calibration discussion: 2017/18 data points

The 2018 data points were used in the calibration process, with updated water levels as indicated in Figure 9-7. A 96% correlation was achieved with a RMSE of 9.69% (maximum error of 16.30m (TRM13) and minimum error of 1.84m (TRPGWM12S)).

The steady state model was deemed calibrated to be converted to a transient model to simulate various management scenarios.

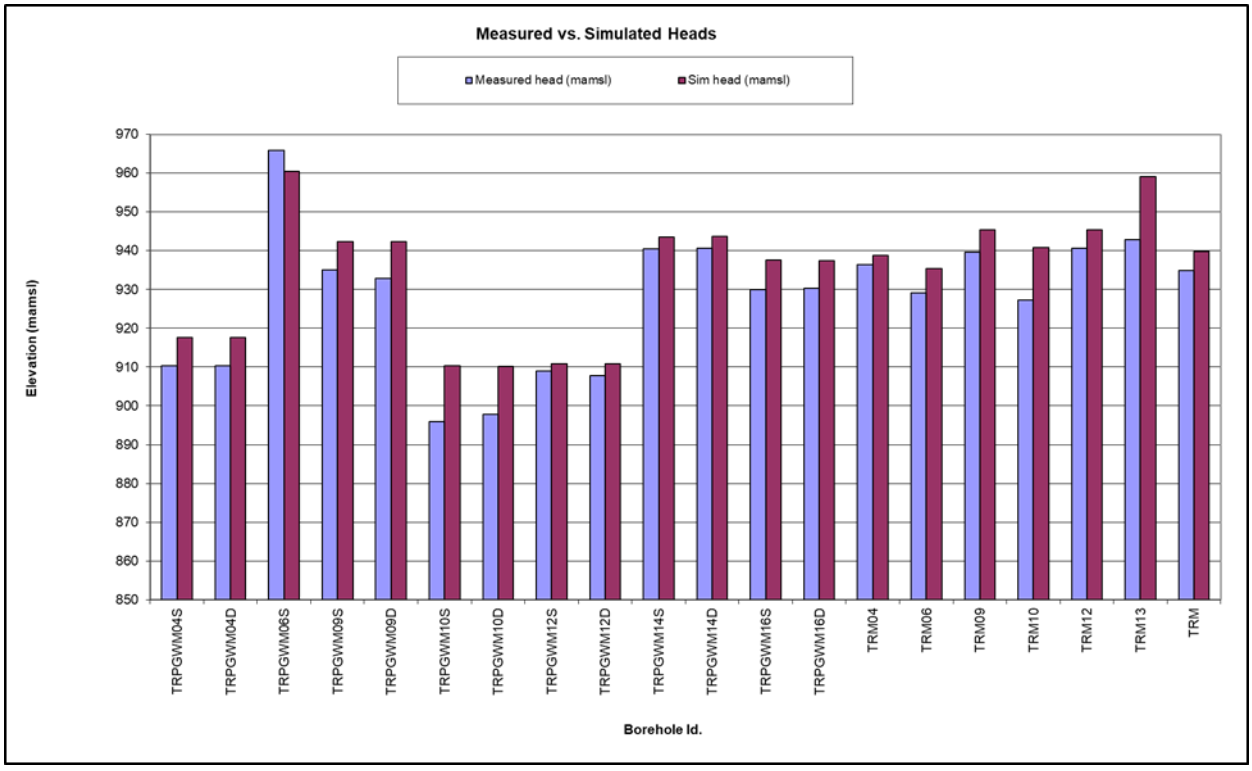

Figure 9-7: Steady state calibration results: measured versus simulated (2018 data)

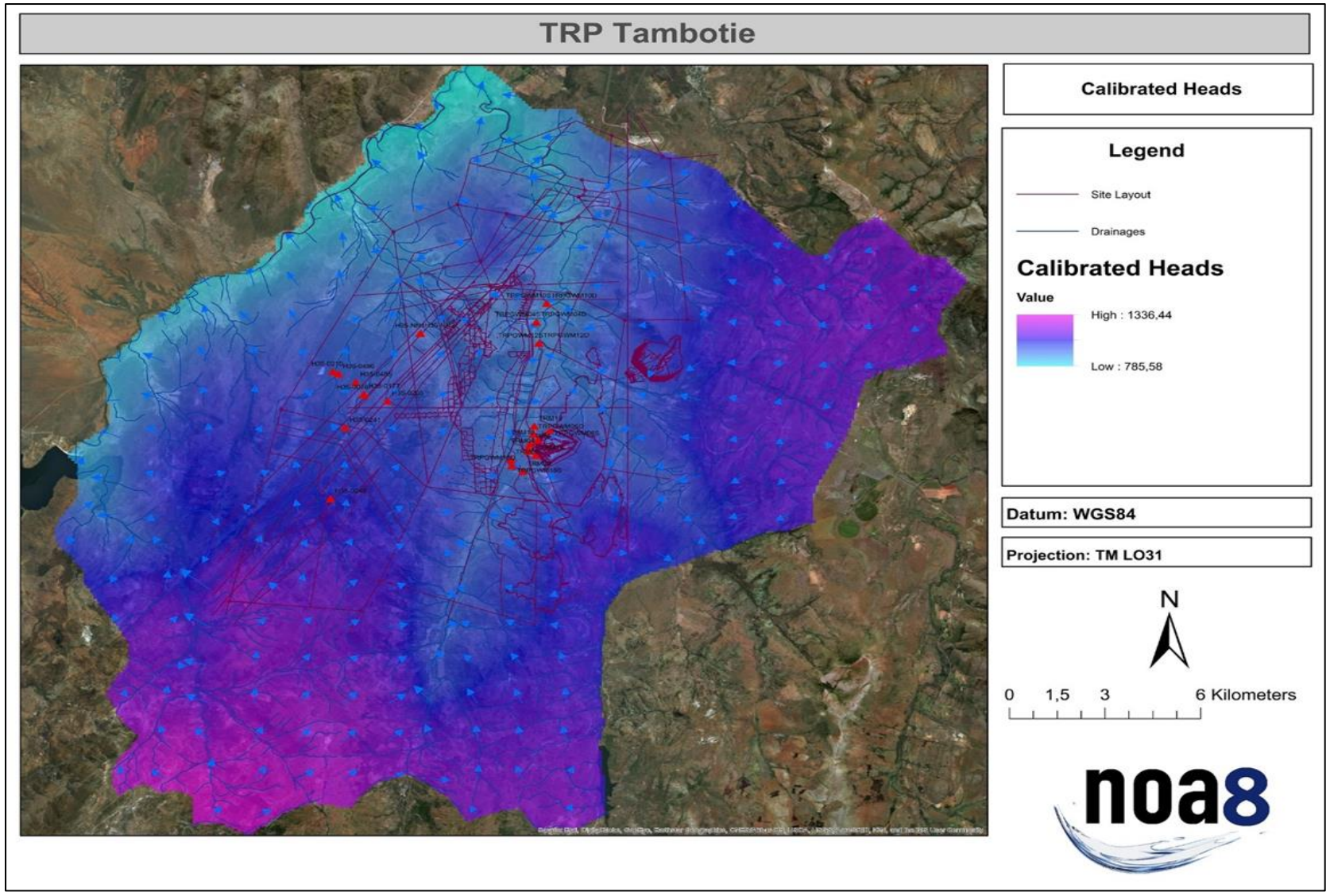

Figure 9-8: Steady state calibrated groundwater levels and potentiometric surface

Table 9-7: Steady state modelled heads and calibration error

Site No.	Latitude	Longitude	X	Y	Z	BH	Water Level (mbcl)	Measured head (mamsl)	Sim head (mamsl)	Mean Absolute Error (m) MAE	Mean Error (m) ME	Root Mean Sqaure Error (m) RMS
1	30.100510	-24.914100	-90869	-2756839	917.62	TRPGWM04S	7.32	910.30	917.63	7.33	-7.33	53.73
2	30.100520	-24.914050	-90868	-2756834	917.62	TRPGWM04D	7.32	910.30	917.55	7.25	-7.25	52.58
3	30.104450	-24.950300	-90445	-2760847	965.98	TRPGWM06S	0.20	965.78	960.45	5.33	5.33	28.40
4	30.099380	-24.951340	-90956	-2760966	941.41	TRPGWM09S	6.32	935.09	942.28	7.18	-7.18	51.62
5	30.099410	-24.951400	-90953	-2760972	941.41	TRPGWM09D	8.51	932.90	942.29	9.38	-9.38	88.05
6	30.103850	-24.907790	-90536	-2756138	908.48	TRPGWM10S	12.53	895.95	910.29	14.34	-14.34	205.74
7	30.103840	-24.907820	-90537	-2756141	908.48	TRPGWM10D	10.66	897.82	910.22	12.40	-12.40	153.77
8	30.101280	-24.921110	-90786	-2757615	917.13	TRPGWM12S	8.13	909.00	910.84	1.84	-1.84	3.37
9	30.101280	-24.921050	-90786	-2757609	917.13	TRPGWM12D	9.37	907.76	910.82	3.06	-3.06	9.34
10	30.097930	-24.957000	-91098	-2761594	944.17	TRPGWM14S	3.78	940.39	943.52	3.14	-3.14	9.83
11	30.097930	-24.957030	-91098	-2761597	944.17	TRPGWM14D	3.50	940.67	943.67	3.00	-3.00	9.01
12	30.092700	-24.961850	-91623	-2762134	937.20	TRPGWM16S	7.28	929.92	937.63	7.71	-7.71	59.46
13	30.092610	-24.961800	-91632	-2762129	937.20	TRPGWM16D	6.95	930.25	937.49	7.24	-7.24	52.40
14	30.097560	-24.956210	-91136	-2761506	940.32	TRM04	3.95	936.37	938.78	2.41	-2.41	5.80
15	30.092390	-24.959800	-91656	-2761907	938.71	TRM06	9.63	929.08	935.34	6.27	-6.27	39.27
16	30.096080	-24.963790	-91280	-2762347	946.50	TRM09	6.87	939.63	945.44	5.81	-5.81	33.81
17	30.099690	-24.948680	-90927	-2760671	936.05	TRM10	8.72	927.33	940.79	13.46	-13.46	181.28
18	30.100710	-24.953400	-90820	-2761193	944.01	TRM12	3.43	940.58	945.41	4.83	-4.83	23.31
19	30.100020	-24.958480	-90886	-2761756	951.95	TRM13	9.12	942.83	959.13	16.30	-16.30	265.85
20	30.098290	-24.954640	-91064	-2761332	942.84	TRM	7.91	934.93	939.76	4.83	-4.83	23.31
Avg								**927.84**	**934.47**	**7.16**	**-6.62**	**67.50**
Min								**895.95**	**910.22**	**1.84**	**-16.30**	**3.37**
Max								**965.78**	**960.45**	**16.30**	**5.33**	**265.85**
Correl								**0.96**				
									Σ =	143.12	-132.46	1349.92
									1/n =	7.16	-6.62	67.50
									SQRT			8.22
									RMS% of water level range =			**9.69%**

9.7.11 Steady state and transient state model calibration discussion

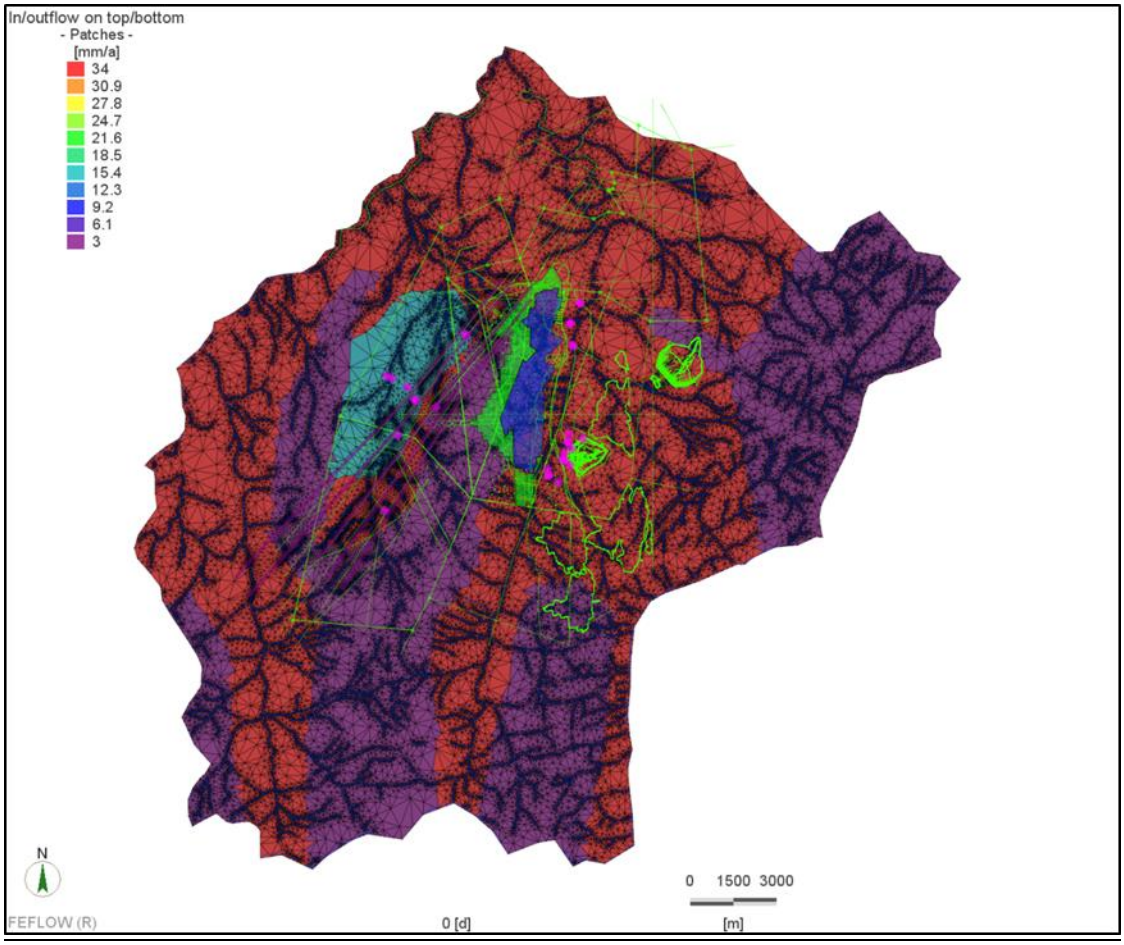

Figure 9-9: Recharge distribution used in model calibration

Predictive modelling has been discussed within Section 11.5.10 below as it was used to inform the Impact prediction process.

9.8 SURFACE WATER

The baseline information for this section is extracted from the hydrological assessment, compiled by GCS in 2012 (GCS Environmental Engineering (Pty) Ltd, 2015).

9.8.1 Water Management Area

TRP is located within the B41G quaternary catchment of the Olifants Water Management Area (WMA), also referred to as WMA 4. The Olifants River originates near Bethal in the Highveld of Mpumalanga, initially flowing northwards before curving eastwards and reaching Mozambique via the Kruger National Park. In Mozambique, the Olifants River joins the Limpopo River before discharging into the Indian Ocean.

The main tributaries of this WMA are the Wilge, Elands and Ga-Selati Rivers on the left bank, and the

Steelpoort, Blyde and Klaserie Rivers.

9.8.2 Baseline hydrological

The project area consists of a main catchment within which a relevant sub-catchment was delineated. The catchment is mainly rural. In order to calculate the peak flows, the Rational, Alternative Rational, Standard Design Flood and an Empirical Method were utilised. The flows were calculated under current conditions (natural and current mining activities) and were determined for a 24-hour rainfall event. The area is not anticipated to have a large potential stream flow reduction impact on the runoff of the immediate and general area. The results of the SDF method were chosen as the best of those calculated. For the larger of the two catchments analysed, the 1 in 100-year peak flow, using this method, was 2155.1m^3/s and the 1 in 50-year peak flow was 1693.8m^3/s. For the smaller catchment the results were 67.9m^3/s and 53.3m^3/s, respectively.

A water quality evaluation was performed on a sampling point in the site area. The water sample indicated relatively good quality water in terms of compliance to the SAWQG and SANS standards. The sample had elevated metals (iron and aluminium), which could have resulted from natural water-rock interactions. These will not have an adverse effect on health. The water quality results did not show an impact from mining on the streams. Floodlines on river sections were analysed to evaluate risks associated with potential flooding of infrastructure and protection of natural resources. The floodline analysis showed that the relevant floodlines fall largely but not exclusively within 100m of the rivers analysed.

9.8.3 Wetlands

The existing EMP/EIA (GCS 2015) states that small pockets of wetland vegetation exist on the property, but this is only associated with the major rivers that run through the site (Groot and Klein Dwars Rivers). Wetlands do not exist in isolation on any other area of the property.

9.9 FAUNA AND FLORA

The following baseline information for the existing mining area was extracted from the EMP/EIA (GCS 2015)

The Dwars River area comprises two vegetation types, namely Sekhukhune Plains Bushveld and Sekhukhune Mountain Bushveld (Mucina & Rutherford, 2006). Sekhukhune Plains Bushveld is confined to the level plains of major river valleys in northern Mpumalanga and southern Limpopo Provinces. It has a conservation status of Vulnerable and is considered poorly protected. Almost 50% of the project area is covered by transformed and untransformed portions of Sekhukhune Pains Bushveld. Sekhukhune Mountain Bushveld dominates the mountainous western half of the project area.

This vegetation type is also confined to northern Mpumalanga and southern Limpopo provinces, and has a conservation status of Least Threatened. However, it is hardly protected and Mucina and Rutherford (2006) comment that the area within the vicinity of the Dwars River is under increasing pressure from mining activities. The project area is situated within the Sekhukhuneland Centre of Plant Endemism (SCPE), an area characterised by a high proportion of range-restricted endemic plants, many of which are threatened (Van Wyk & Smith, 2001).

Fourteen vegetation communities are within the project area based on distinctive plant structure and floristic composition, as follows:

- Kirkia – Triaspis Closed Woodland
- Lydenburgia – Vitex Open Woodland
- Protea – Tristachya Open Woodland
- Lydenburgia – Olea Outcrop Thicket
- Xerophyta - Myrothamnus Sheetrock Shrubland
- Acacia Closed Woodland
- Sclerocarya - Bolusanthus Open Woodland
- Euclea - Rhus Open Shrubland
- Lydenburgia - Euclea Open Woodland
- Plains Thicket
- Degraded Old Lands
- Lydenburgia - Olea Riverine Thicket
- *Combretum erythrophyllum* Riverine Woodland
- Phragmites - Imperata Marsh

9.9.1 Important Flora

Fifteen Red Data plants have been identified in the existing mining area. Three of these are significantly threatened and are in urgent need of conservation attention:

Gladiolus sp. nov. – This spectacular iris has only recently been discovered in the Kennedy's Vale area by Graham Deall in 2005. It has subsequently also been located at TRP near the North Decline (M. Lötter pers. comm.). The species is currently being described by Dr John Manning of the South African National Biodiversity Institute and is confirmed as a very range-restricted endemic of the SCPE. Mervyn Lötter of the MTPA has suggested that the preliminary Red Data status of this new species should be Critically Endangered. The species appears to favour arid woodland on rocky hillslopes and flowers at the end of summer. Within the project area it is only known from a small area on a hill slope above the North Decline.

Zantedeschia pentlandii – this well-known bulb is endemic to the SCPE and is most common at higher altitudes in the upper Dwars River valley and the Roossenekal area. It has a National Red Data status of Vulnerable and is threatened by illegal collecting. Scattered specimens were located in Lydenburg

– Vitex Open Woodland, Protea – Tristachya Open Woodland and Xerophyta – Myrothamnus Sheetrock Shrubland within the project area.

Resnova sp. aff. megaphylla – this is a bulbous plant that appears to be very similar to Resnova megaphylla, which has a Red Data status of Vulnerable. However, this species complex has not yet been satisfactorily described and there is some measure of uncertainty over the precise identification of the Two Rivers taxon. It is confined to shady areas below large boulders on the upper east-facing slopes, only in Lydenburgia – Vitex Open Woodland and Lydenburgia – Olea Outcrop Thicket.

Thirty-one (31) plants species are endemic or near-endemic to the Sekhukhuneland Centre of Plant Endemism (27), the Wolkberg Centre of Plant Endemism (1) or Mpumalanga (3). The most range-restricted of these are the new *Gladiolus sp.* described above, *Zantedeschia pentlandii, Aloe fouriei and Resnova sp.aff. megaphylla*. Forty-three species are protected by legislation, in terms of the Mpumalanga Nature Conservation Act (No.10 of 1998), the Limpopo Environmental Management Act, 2003 (No. 7 of 2003) and the National Forests Act, 1998 (No. 38 of 1998).

Twenty-four (24) plant species with either national or provincial Red Data status potentially occur within the vicinity. However, most of these have only a Moderate to Low chance of occurring.

9.9.2 Fauna (Animal Life)

The following baseline information for the existing mining area was extracted from the EMP/EIA (GCS 2015)

9.9.2.1 Mammals

Twenty-eight (28) mammal species were confirmed to occur on Dwarsriver 372 KT during fieldwork in 2008, four of which have Red Data status and seven of which are protected. The highest species diversity was reported in Plains Woodland with 23 species, followed by Closed Woodland on Rocky Mountain Slopes with 22 species. More extensive fieldwork, including more nocturnal surveys, would have produced a slightly longer list. A total of 72 trap nights was achieved during 2008 fieldwork, with only three rodent species being caught.

9.9.2.2 Birds

As a result of the presence of numerous habitats on the property, including man-made, as well as an elevation varying from 890m to 1 513m, a high diversity of species was recorded. The quarter-degree grid 2430 CC, in which the study area falls, supported 268 bird species during the Southern African Bird Atlas Project, a total reflecting high diversity and but perhaps only moderate observer coverage. The greater Kennedy's Vale area was rated as being of Low conservation importance for birds by the Mpumalanga Tourism & Parks Agency (MTPA).

A total of 221 bird species was recorded during fieldwork, a fairly comprehensive list and a number

which more extensive fieldwork would only slightly increase. The highest species diversity was reported in Plains Woodland with 145 species, followed by Closed Woodland on Rocky Mountain Slopes with 120 species.

Seven of the bird species potentially occurring in the vicinity of the mine are protected under the National Environmental Management: Biodiversity Act (No.10 of 2004), namely Southern Ground Hornbill, Martial Eagle, Cape Vulture, White-backed Vulture, Tawny Eagle, Bateleur and Lesser Kestrel.

9.9.2.3 Reptiles and Frogs

Twenty-nine (29) reptiles and ten frogs were confirmed to occur during fieldwork. Of these, four are endemic (Van Dam's Girdled Lizard, Transvaal Thick-toed Gecko, Sekhukhune Flat Lizard and Clicking Stream Frog) and five are protected under the National Environmental Management: Biodiversity Act 2004 (No. 10 of 2004): Water and Rock Monitors, Leopard and Lobatse Hinged Tortoises and Van Dam's Girdled Lizard. The highest species diversity for reptiles was reported in Open Woodland on Rocky Mountain Slopes (15 species) and for frogs, the Riverine Wetland (8 species).

The mining area is in an area classified as being of Low importance for both reptiles and frogs, but is home to a moderate diversity of species. A total of 21 conservation-important reptiles and frogs potentially occur. Of the species potentially occurring, one has Red Data status, namely Southern African Python. This large snake favours broken, hilly savannas, particularly if close to water, and therefore has a High likelihood of occurring on the property. It is listed as Vulnerable, mainly due to the traditional medicine trade and direct persecution by landowners.

9.9.2.4 Selected Invertebrates

Pycna sylvia, South Africa's largest endemic cicada species was thought to be extinct until its recent rediscovery during an EIA survey at Der Brochen in 2001. It has been suggested (Malherbe 2002, Malherbe et al. 2004, Harrison 2005) that *Vitex obovata subsp. wilmsii* may be the main food plant for nymphs of *Pycna sylvia*, and that the adult cicadas also preferentially feed on this tree species, albeit with less fidelity. Subsequent observations by our team suggest that the presumption of a close association of *P. sylvia* with *Vitex obovata* may have been over-hasty and based on inadequate data.

9.10 AIR QUALITY

Reference is made to the Air Quality Assessment, Airshed Planning Professionals (December 2012), for description of the baseline conditions (GCS Environmental Engineering (Pty) Ltd, 2015).

The information contained in this section has been extracted from this report which was undertaken with the focus on the TRP current operations. The sensitive receptors closest to the TRP mine

(approximately 3km to the west of the proposed TSF site) are two informal settlements, referred to as Village 1 and Village 2 in the air quality report and the residential areas of Ga-Mampuru, Kokwaneng, Madimola and Didingwe River Lodge.

Local source contributors to ambient PM_{10} (airborne particulates) concentrations in the vicinity of the study site are:

- Domestic fuel burning and vehicle activity in residential areas/sensitive receptors close to the mine;
- Surrounding chrome and platinum mining activities;
- Cattle ranching in the Steelpoort Valley;
- Agricultural activities and limited cultivation in fertile areas adjacent to the Steelpoort River.

It can be assumed the surrounding chrome and platinum mining activities is the largest source contributor in the area. The rock dumps, gravel roads, crushing of ore, possible open pit operations and TSFs associated with these mines produce dust which contributes to the overall atmospheric dust load in the area.

Typical mitigation measures such as a speed limit of 30km/h implemented will serve a triple purpose: Reduce dust fallout, reduce exhaust emissions and ensure the safety of workers. Another measure is through dust suppression by means of spraying water on surrounding roads.

Information was added within this section from the current Dust Management Programme (Dustwatch CC, 2018) for the period between 27 December 2017 and 24 January 2018. This will provide a current scope into the air quality before the new activity commences. The results were the following:

- The highest fall-out dust result in this period was 1026 mg/m^2/day from the Tailings Dam unit.
- The South Pot unit result was 855_mg/m^2/day in this period.
- The Middle Pot unit result was 953_mg/m^2/day in this period.
- The North Decline Pot unit result was 469_mg/m^2/day in this period.
- The result from the Tailings Dam unit was 1026_mg/m^2/day in this period.
- The Plant Area unit result was 605_mg/m^2/day in this period.

Table 9-8: Dust compliance results available at the drafting of this report (February 2018)

Unit name	Residential or Non-residential Area	Applicable Compliance - Dustfall rate (D) (mg/m²/day) – averaged over 30 days.	Non-compliant or compliant. Two within a year, not sequential months. *
South Pot	(Non-residential)	D < 1200	Compliant in this period. Compliant for the year. No exceedances.
Middle Pot	(Non-residential)	D < 1200	Compliant in this period. Compliant for the year. No exceedances.
North Decline Pot	(Non-residential)	D < 1200	Compliant in this period. Compliant for the year. No exceedances.
Tailings Dam	(Non-residential)	D < 1200	Compliant in this period. Compliant for the year. No exceedances.
Plant Area	(Non-residential)	D < 1200	Compliant in this period. Compliant for the year. No exceedances.

9.11 NOISE

Mining and mining activities often emit significant noise levels which can become a nuisance or health risk to mine workers and fauna within the mining area, but also to the surrounding land users and occupiers and fauna. The most sensitive receptors identified for the project area is the surrounding communities including land users, mine workers, mining communities and permanent farm homesteads and settlements. The region is predominantly occupied by mining, tourism and agricultural land uses.

The main noise generation activities of the proposed development during all phases are:
Operation phase:

- Transportation of materials; and
- Offloading of materials.

Closure or care and maintenance phase:

- Limited number of vehicles moving around the site.

Noise generation can therefore be expected on the proposed site due to activities and actions as indicated above. Noise levels may possibly exceed allowed limits for noise as indicated in SANS 10103: 2008.

The existing noise levels in the vicinity of the TRP site include traffic on the R555 road and mining activities. Environments which are recognized as being noise sensitive include residential areas, offices, educational facilities and health and church buildings.

None of these sensitive environments exist in close proximity to the TRP mining area. It should also be kept in mind that the application/ new activities proposed isan extension of the underground mines and therefore, noise on the surface will be limited.

It will however still be important to implement a noise monitoring programme to monitor noise levels and implement mitigation measures should the set limits be exceeded.

9.12 VISUAL AESTHETICS

Reference is made to the Visual Impact Assessment (2013), for description of the baseline conditions.

The mining area lies in the valley of the Dwars and Groot Dwars Rivers, surrounded by large hills which form part of the Schurinksberg range. The majority of the land use is occupied by thicket / bushland with mining activities forming a major part of the greater precinct. The area has a rural, bushveld atmosphere with mining activity forming a major part of the regional economy.

From the study it was established that the existing mining area presents a moderately disturbed sense of place. Although it is disturbed, the pleasant scenery and rural atmosphere adds attraction to the region.

9.13 ARCHAEOLOGY AND HERITAGE

In 2002, Anton von Vollenhoven conducted the Heritage Impact Assessment (HIA) for the initial mine application. A heritage assessment looking specifically at the UG2 and Merensky expansion project area was conducted in 2012 (Shasa, 2012). No additional Heritage Impact Assessment will be undertaken for the expansion of the underground area as no surface infrastructure will be constructed.

The results from the 2012 studies showed that large areas of this proposed project area are already under mining operations. Primary focus was on the area's leading north from the current mining area where survey took place to determine if any areas would be viable for expansion. The areas covered, from the existing mine, indicated both Iron Age and historical occupation, but no sites of heritage significance. Graves were found in these areas but have since been relocated prior to the start of trial mining, in consultation with the affected community.

For the 2013 expansion project (NEMA EIA) the, South African Heritage Resource Agency requested a desktop palaeontological study for the proposed TSF and Pipeline route. The study was undertaken by Wits University in 2013. No palaeontological resources are expected in the mining area. The figure below is an indication of all the Heritage resources currently present and protected at TRP.

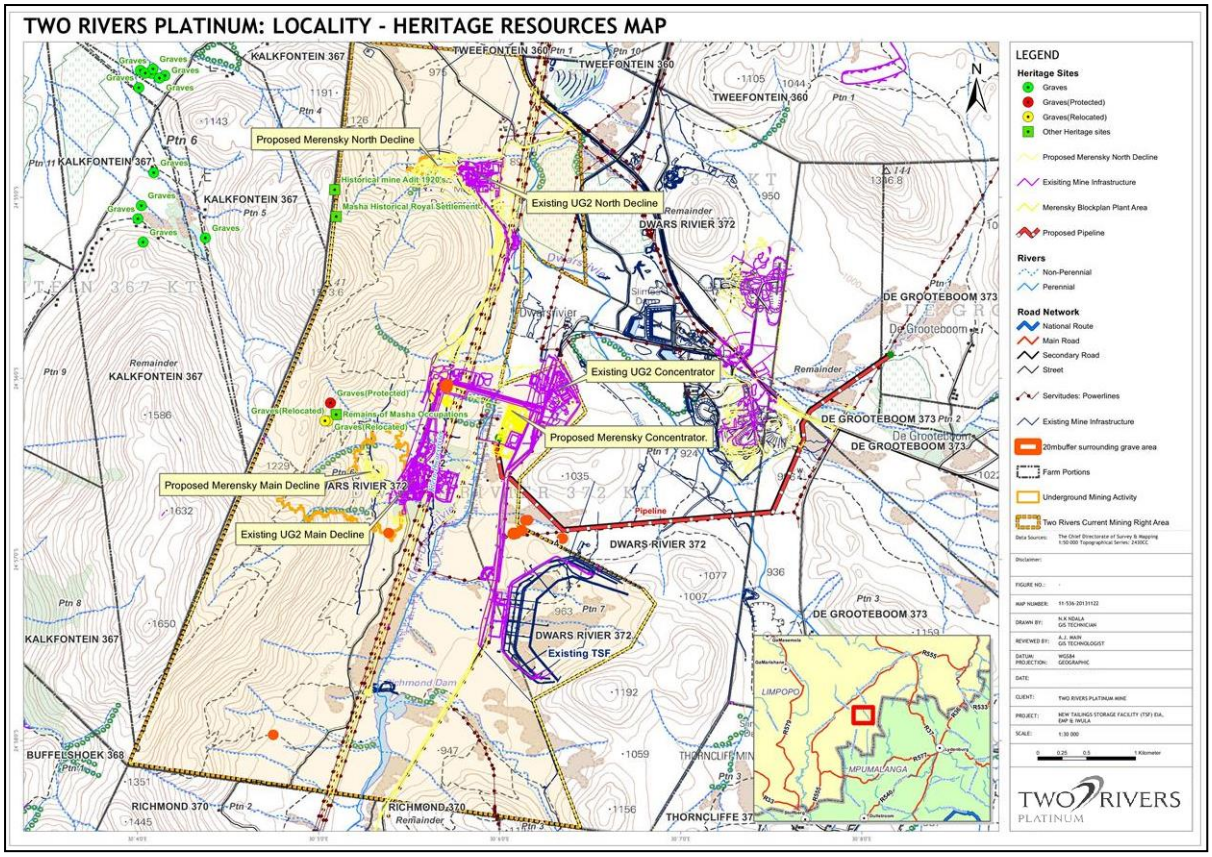

Figure 9-10: Heritage Resources at TRP (GCS, EMP 2015)

As per comments received from SAHRA during the Scoping phase of the application process, a letter of exemption from a Heritage specialist was requested for the proposed development if an updated Heritage specialist study was not conducted.

The exemption letter stated that: "…Because the proposed expansion will consist of underground mining only, it is recommended that the applicant applying for the extension of the underground mining area be exempted from further Phases of archaeological impact assessments, subject to minimum standards: Archaeological and Palaeontological Components of Impact Assessments as set out by the South African Heritage Resources Agency (SAHRA) which states that: *When a property is either very disturbed (e.g. has been quarried or mined) or is very small and the archaeologist can see that it is highly unlikely that any archaeological remains will be found, a 'Letter of Recommendation for Exemption' from a full Phase 1 report may be supplied."*

The following recommendations are made in order to avoid the destruction of heritage remains in the demarcated areas:

- Should the need arise to develop any additional surface areas, it is recommended that the area be inspected by a qualified archaeologist. This stems from the fact that Pistorius (2009) stated that additional burial sites that were not observed during the survey, might exist within the study area.
- Because only existing mining infrastructure will be utilised for the proposed mining activities, no

additional impacts should occur. Therefore, the proposed development may continue, subject to the abovementioned conditions.

- Should culturally significant material may be exposed, all activities must be suspended pending further
- Archaeological investigations by a qualified archaeologist. Also, should skeletal remains be exposed, all activities must be suspended and the relevant heritage resources authority contacted (See National Heritage Resources Act, 25 of 1999 section 36 (6)).

9.14 SOCIO-ECONOMIC ENVIRONMENT

Information as included within the Scoping Report (SR) has been updated to incorporate the recent changes in Municipality structures in the area. Since the only information available during the Scoping phase was obtained from the previous EIA/EMPR (2015), this section was updated to include the new Integrated Development Plan for the Fetakgomo-Greater Tubatse Municipality (2016). This municipality is formed as an amalgamation between the former Fetakgomo local municipality and the former Greater Tubatse Municipality as both are classified as Category B municipalities in terms of spatial and economic characteristics.

9.14.1 Regional Context

The newest IDP (Fetakgomo Greater Tubatse Municipality, 2016) was obtained from the Governmental website[1] and will give baseline information on the socio-economic structure for the new Fetakgomo Greater Tubatse Municipality.

Its municipal boundaries have been determined in the Demarcation Notice published in Gazette no. 2629 dated 11th November 2015. The MDB (Municipal Demarcation Board) Circular 8/2015: Redetermination of Municipal Boundaries in terms of Section 21 of Local Government: Municipal Demarcation Act, 1998 (Act No. 27 of 1998), has amended the municipal boundaries of Lim 476 by amalgamating the former municipal areas of FTM (Lim 474) and GTM (Lim 475) into the boundaries of the new municipal area.

The Fetakgomo Greater Tubatse (Lim 476) Municipality was established and officially proclaimed in the Section 12 Notice Limpopo Provincial Gazette no. 2735, its short title: “Notice in terms of s12 of the Local Government: Municipal Structures Act, 1998 (Act 117 of 1998): Disestablishment of Existing Municipalities and Establishment of New Municipalities”, dated 22nd July 2016 issued by the Member of the Executive Council (MEC) for Local Government in Limpopo Province.

The political governance of the municipality, Fetakgomo Greater Tubatse, is operated on a collective executive system combined with a ward participatory system. The municipality has a total of 39

[1] http://www.fgtm.gov.za/sstaff/pages/sites/fgtm/documents/idp/Consolidated%20IDP%20DRAFT%201%20FOR%20FTM%20NEW.pdf

wards, making it the third (3rd) largest municipality in the Limpopo Province in terms of wards after Polokwane with 45 wards and Thulamela with 41 wards. The municipality has a total of 77 councillors. Of these, 39 are ward councillors while 38 were proportionally elected.

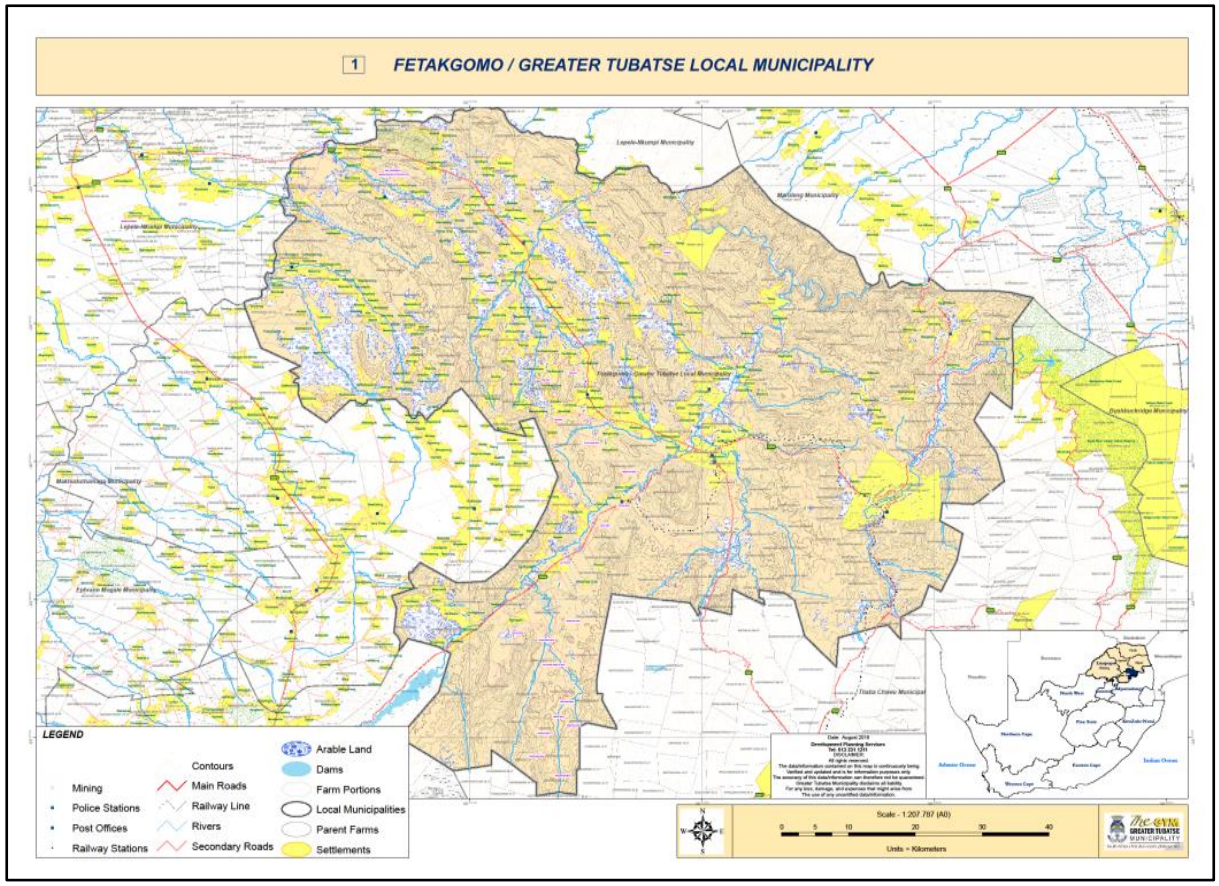

Figure 9-11: New Fetakgomo Greater Tubatse Local Municipality

The proposed site falls within the Fetakgomo-Greater Tubatse Local Municipality (FGTLM) area which forms part of the Sekhukhune District Municipality.

GTLM has a council that consists of a total of 77 councillors. Of these, 39 are ward councillors while 38 were proportionally elected. The Executive Committee of the municipality is led the Mayor while the municipal Speaker presides over the Council in terms of Section 49 and 37 of the Local Government: Municipal Structures Act 117 of 1998 respectively.

This large municipality comprises of 39 wards and 297 villages. The municipality is largely dominated by rural landscape with only 06 (six) proclaimed townships.

The area of jurisdiction of FGTLM is approximately 4 550 km^2 (Fetakgomo Greater Tubatse Municipality , 2016). According to the FGTLM the northern part has inferior social and engineering infrastructure which impacts on the stability of the economy in this area. This may be attributed to the rural nature of the area. As such, upliftment in the area is of critical importance. There is also virtually no economic base in the northern part of the area and the area is solely dependent on government

handouts and migrant labour income for survival.

9.14.1.1 Population Profile

According to the 2011 census information; the total population of the former FGTLM combined is approximately 429 471 with 106 050 households. In 2016 a community survey was undertaken for FGTLM, making it the most highly populated municipality within the Sekhukhune district. It also appears from in the current 2016 Community Survey as compared to the 2011 results that the Fetakgomo Tubatse Local Municipality there has been a population of 490 381 with household increase of 125 454. As per the current community survey 2016 the former Greater Tubatse local Municipality increased with 0.037% and the former Fetakgomo local municipality increase slightly with 0.007. The total percentages of FGTLM as combined increased with 0.043% which put the municipality as the highest in the District.

The population in the district per genders is shown below in Table 9-9.

Table 9-9: Sekhukhune District Population group by gender (FGTLM IDP, 2016/17)

2011 STATSA			2016 Community Survey			
Male	**Female**	**Total**	**Male**	**Female**	**Total**	**Growth Rate**
497 648	579 191	1 076 840	548 463	621 299	1 169 762	0.019

The table above indicate the total number of Households for Fetakgomo and Tubatse 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.

9.14.1.2 Language

The languages that are spoken within the GTLM include Sepedi (94%) and isiZulu (1.2%). Other languages make up the remaining 4.8% (StatsSA, 2011). Table 9-10 below provides more detail the languages spoken by the people of GTLM.

Table 9-10: Languages spoken by the people of GTLM

Afrikaans	English	IsiXhosa	IsiZulu	Sepedi	Sesoto	SiSwati	Xitsonga	Tshivenda	Others
0.5%	0.5%	0.3%	1.2%	94%	0.1%	0.4%	0.6%	0.1	0.4

9.14.1.3 Gender & Age Distribution

Table 9-11 shows that the total population is dominated by young people below 18. The age categories below the age of 18 comprise 51% of the population. The ratio for females is almost equal at ages between 0-17 and then this makes a change. Male-female distribution is then dominated by females for example, from ages 19-65.

Table 9-11: Gender and age distribution within former GTLM (GTLM, 2016/17)

Age	Male	Female	Grand Total
0-4	22 878	21 999	44 877
5-9	20 271	22 517	42 788
10-14	22 440	23 354	45 794
15-19	19 349	19 811	39 160
20-24	15 907	19 112	35 019
25-29	13 245	14 505	27 750
30-34	10 667	11 582	22 249
35-39	7324	8828	16 152
40-44	6076	9519	15 595
45-49	4952	7109	12 061
50-54	4180	6448	10 628
55-59	3241	3993	7234
60-64	2552	4075	6627
65-69	2256	3015	5271
70-74	1484	3086	4570
75-79	1124	2618	3742
80-84	362	1322	1684
85+	335	1911	2266
Grand Total	**158 663**	**184 804**	**335 676**

9.14.1.4 Education Levels

Education levels in the Limpopo province lag behind those of other provinces of South Africa. While average literacy levels for South Africa were 82.2%, literacy levels for Limpopo were 73.6% in 1991. The Greater Tubatse Local Municipality has 163 primary schools, 92 secondary schools and 8 private schools with a total of 114 723 learners and 3 689 educators. Burgersfort, Ohrigstad and Steelpoort each have a primary school and Burgersfort has additional private primary and secondary schools. Two state of the art schools have been developed by the Department of Limpopo, i.e. Nthame primary school at Riba and Batubatse primary school in Prakitiseer. In rural areas, an abundance of primary schools tends to be common as many pupils leave school early in search of employment in order to support their families. Those that can afford to continue to secondary school do so within the area or in more developed towns outside the municipality (GTLM IDP, 2016/17). 22.6% of people above the age of 20 have completed matric (grade 12); while 6.6% have higher education (STATSSA, 2011). Figure 9-12 shows education levels in Greater Tubatse Local Municipality.

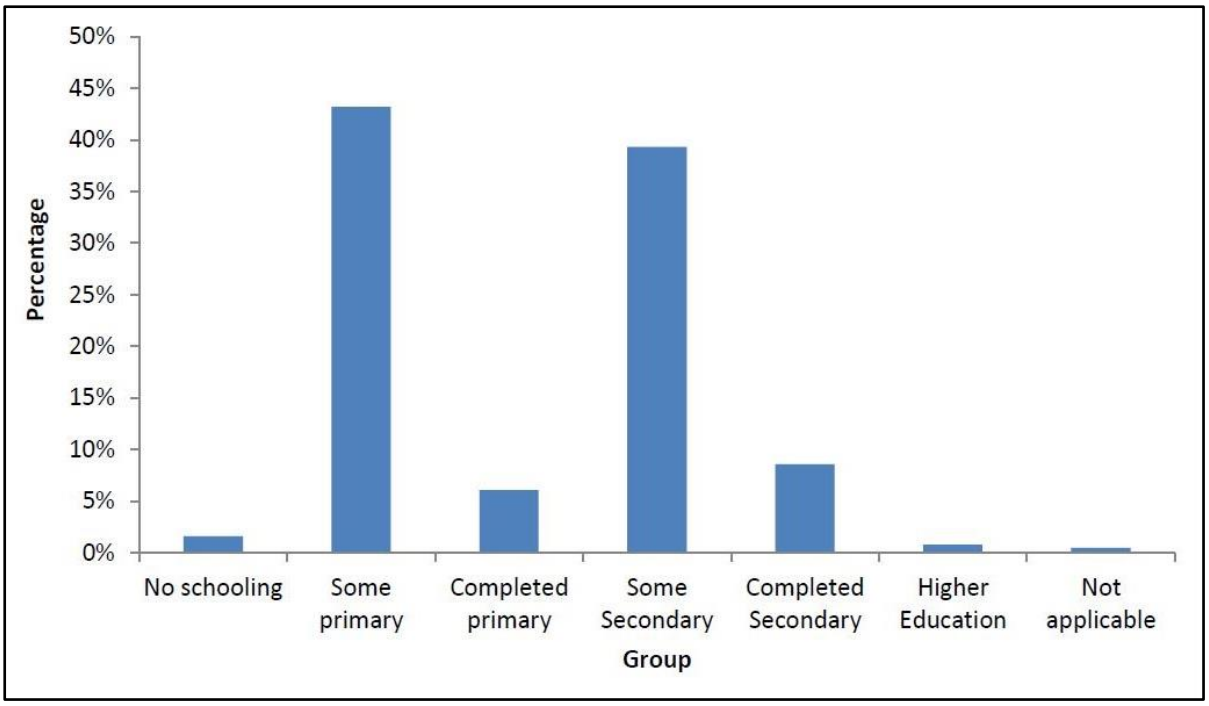

Figure 9-12: Education levels in Greater Tubatse Local Municipality (StatsSA, 2011)

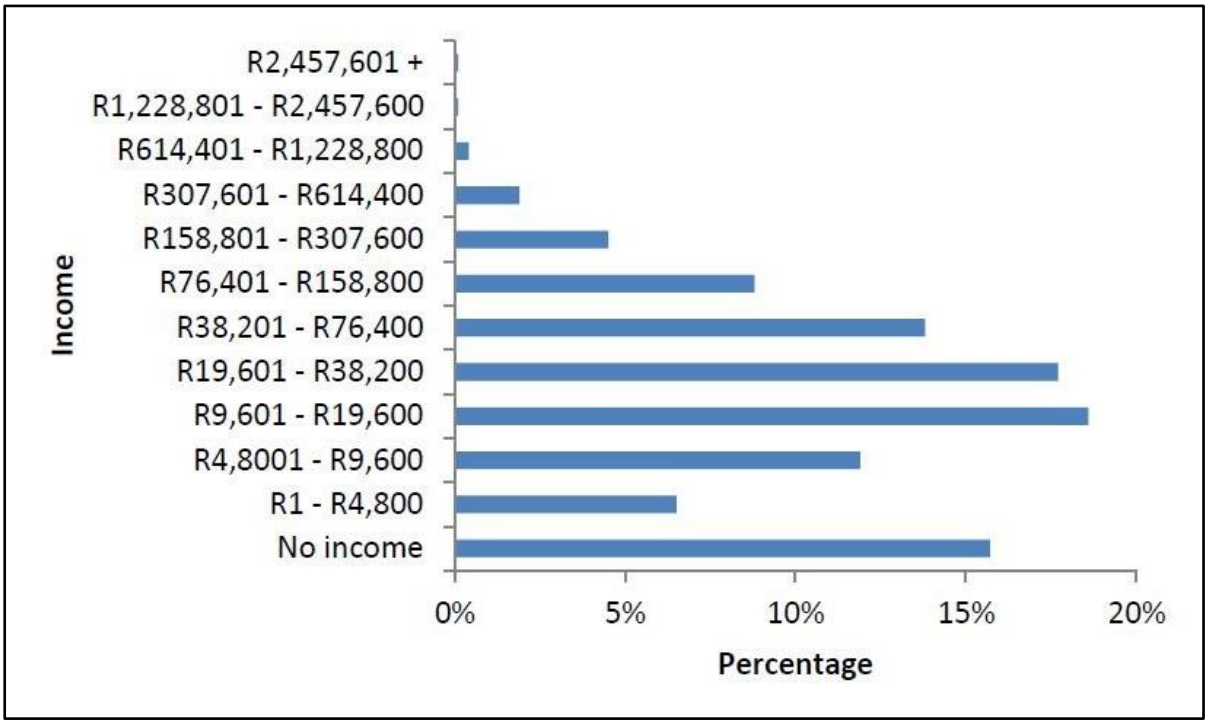

Figure 9-13: Average household income in GTLM (StatsSA, 2011)

9.14.1.5 Employment Status

The Former Greater Tubatse Local Municipality has a youth unemployment rate of 59.6%. In 2009, The Greater Tubatse Local Municipality had the highest rate of unemployment at 28 022 and in 2015 it still had the highest with 22 264 people unemployed (Local Economic Development Strategy , 2015). Figure 9-13 and Figure 9-14 illustrates the employment status of the people of GTLM.

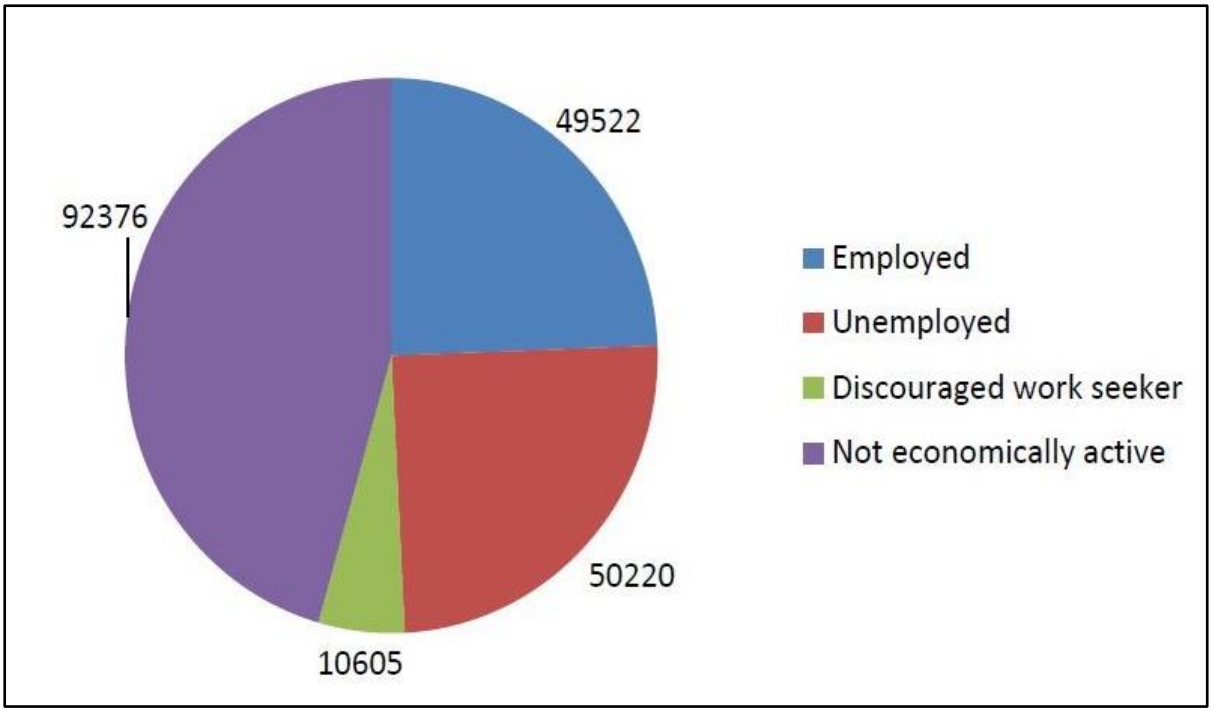

Figure 9-14: Employment status of people aged 15 - 64 in GTLM (StatsSA, 2011)

9.14.1.6 Infrastructure and Services

Owing to FGTLM's rural nature, the municipality is plagued by challenges of poor or backlogged service delivery. The provision and maintenance of services become costly because most of the settlements are situated far apart. Some areas are also not large enough to achieve the economic threshold required to make social facilities available in a manner that is economically viable (FGTLM IDP, 2016/17). Majority of infrastructural projects within FGTLM are Expanded Public Works Programme related projects. Such projects aid in the generation of employment opportunities and the assurance of the improvement of the socio- economic conditions within the area. 800 jobs were created in the 2014/2015 financial year through the construction of the small access bridges and other related projects.

9.15 . DESCRIPTION OF THE CURRENT LAND USES

(Show all environmental and current land use features)

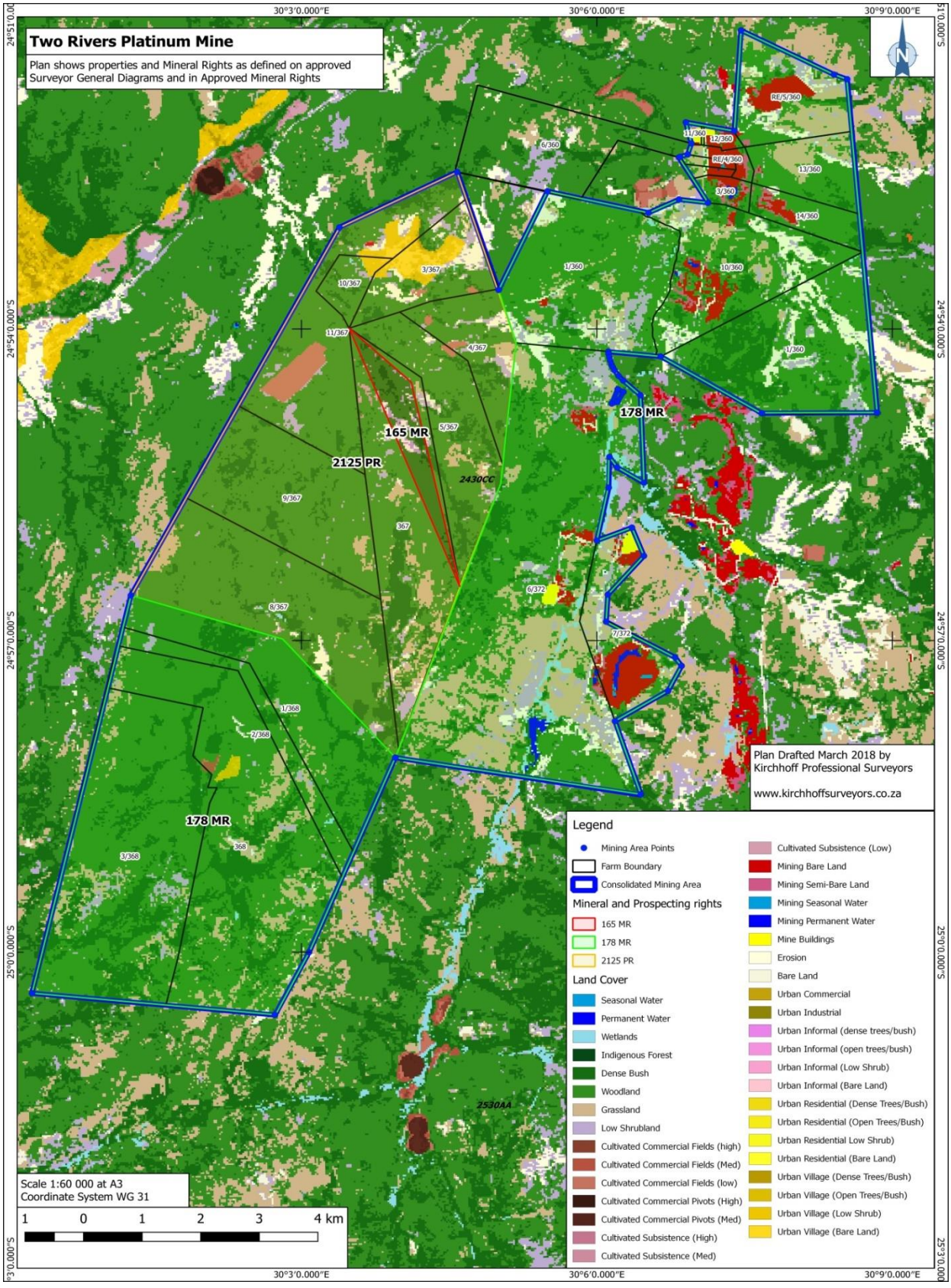

Figure 9-15: Land Cover as done by Kirchhoff Professional Surveyors (2018)

Also refer to Section 9.6 above. The main Land uses and Land Capability is that of Grazing and Wilderness in the areas surrounding the TRP.

Currently the land use associated with TRP is characterised by that of mining activities and all surface infrastructure existing or authorised to be constructed will be contained within the existing mining right area.

By extending the underground sections of the mine into neighbouring properties will not cause the land use to be altered, and no additional impacts will occur to cultural and heritage resources, as these have been already demarcated and protected as part of the existing mine.

9.16 DESCRIPTION OF SPECIFIC ENVIRONMENTAL FEATURES AND INFRASTRUCTURE ON THE SITE

9.16.1 Environmental Features

From the description of the baseline environment above, it is clear that some significant sensitive environmental features occur on the study area. The Klein Dwars River is runs through the existing mining area and a number of river crossings have been constructed as approved in the Water Use License. The confluence of the Klein and Groot Dwars River is 3.5km to the west of the project area. The flow from these rivers contributes to the Steelpoort River, which is a tributary of the Olifants River.

Some fifteen Red Data plants were confirmed to occur on the site. Three of these are significantly threatened and are in urgent need of conservation attention. The vegetation, on a regional scale, is however classified as 'Least Threatened' implying that the habitat types encountered in the study site, is highly likely well represented in the general region. Based on various ecological and biodiversity considerations the following faunal sensitivities are estimated for the terrestrial faunal habitats of the study area:

- Kirkia – Triaspis Woodland: medium-high floral/faunal sensitivity;
- Lydenburgia – Vitex Open Woodland: medium-high floral/faunal sensitivity; and
- Tristachya – Loudetia Grassland Slopes: medium-high floral/faunal sensitivity.

The areas covered, from the existing mine, indicated both Iron Age and historical occupation, but no sites of heritage significance. Graves were found in these areas but have since been relocated prior to the start of trial mining, in consultation with the affected community.

9.16.2 Existing Infrastructure on the study area and in close proximity

The mine infrastructure presently consists of, *inter alia*, the following structures and infrastructure – Approved in the 2015 (GCS) EMP/EIA. The mine is a fully operational mine with two declines and associated processing infrastructure.

- Storm water dams, Drying Beds, Settling Dams and a treatment facility.
- Dirty Water Handling Infrastructure – RWD, Cut off trenches

- Overland ore conveyance
- Waste material stockpiles.
- High mast lighting. 10-15 high mast lights at each new shaft, in high traffic and security critical areas.
- Ore silo to provide surge capacity for the overland conveyor system.
- Office blocks
- Change houses – change facilities, ablution and storage lockers for 350 – 400 people at each shaft.
- Lamp and crush facility at each shaft
- Roads
- Haul Roads
- Bus stop and parking for personnel and visitors
- Security and access control
- Cable storage and salvage yard
- Sewage (treatment plants included as vendor supplied units, sized according to personnel complement
- Firefighting and prevention (fire hydrants and hose reels, electric and diesel pumps to operate the deluge systems in the main substations of both shafts)
- Storm Water Management (cut off drains and berms at the Main and North shafts)
- General stores at each shaft for rock drills, rotary equipment, batteries and gas cylinders
- Explosive stores (a local explosives magazine to cater for daily usage, filled daily from the primary storage)
- Bulk fuel and lubricant storage (to receive store and dispense a week's consumption of each product).
- Miscellaneous facilities: portal rainwater sump and drain, dirty water sump and drain, covered walkways, brake test ramp, refuse disposal facilities, electrified fencing around the perimeter of the infrastructure
- Processing plants (UG 2 and Merensky)
- ROM Circuits, Silo's and Stockpiles
- Primary processing plant
- Secondary processing plant
- Underground infrastructure (refuge bays, workshops, offices and diesel and lubricant storage)
- Existing Tailing Storage and Waste Rock Disposal Facilities; and
- New Tailings Storage Facility and associated pipeline.

9.16.2.1 Roads

The R577 provincial road approximately 1km north of the site and the R555 provincial road is about 5km to the west of the site. Access to the site is obtained from the R577 onto a tared road leading to the processing plant and mining area. There are also haul roads within the mining area.

9.16.2.2 Railway line

No railway lines occur in close proximity to the study area.

9.16.2.3 Powerlines

A number of Eskom servitudes are located on the mining area. The mine is supplied by Eskom from the two 30MVA, 33/11kV transformers.

9.16.2.4 Water

TRP water is supply from the Klein and Groot Dwars Rivers, and the Inyoni dam located within the Klein Dwars river catchment. No additional water supply is required for expansion of the existing UG2 mine.

9.16.2.5 Sewage

Both Shafts have existing sewage treatment plants and will be used as-built without any additions or extensions.

9.16.3 Sensitive landscapes

The occurrence of possible sensitive landscapes at the project site is outlined in the table below.

Table 9-12: Sensitive Landscapes within the Proposed Mining Site

Types of sensitive landscapes	Occurrence at the Proposed Mining Site
Nature conservation or ecologically sensitive areas - indigenous plant communities (particularly rare communities and forests), wetlands, rivers, riverbanks, lakes, islands, lagoons, estuaries, reefs, inter-tidal zones, beaches and habitats of rare animal species.	The Klein Dwars River is runs through the existing mining area. The confluence of the Klein and Groot Dwars River is 3.5km to the west of the project area. The flow from these rivers contributes to the Steelpoort River, which is a tributary of the Olifants River. It is important to note that no additional surface infrastructure or activities are proposed at this stage or as part of this application.
Sensitive physical environments - such as unstable soils and geo-technically unstable areas.	None known. It is important to note that no additional surface infrastructure or activities are proposed at this stage or as part of this application.
Important natural resources - river systems, groundwater systems, high potential agricultural land.	As mentioned above, the Klein Dwars River runs through the existing mining area. The confluence of the Klein and Groot Dwars River is 3.5km to the west of the project area. It is important to note that no additional surface

Types of sensitive landscapes	Occurrence at the Proposed Mining Site
	infrastructure or activities are proposed at this stage or as part of this application.
Sites of special scientific interest	As mentioned in the Ecological baseline section of the report (Section 9.9.2.4). *Pycna sylvia*, South Africa's largest endemic cicada species was thought to be extinct until its recent rediscovery during an EIA survey at Der Brochen in 2001. It has been suggested (Malherbe 2002, Malherbe et al. 2004, Harrison 2005) that *Vitex obovata subsp. wilmsii* may be the main food plant for nymphs of *Pycna sylvia*, and that the adult cicadas also preferentially feed on this tree species, albeit with less fidelity. Subsequent observations by our team suggest that the presumption of a close association of *P. sylvia* with *Vitex obovata* may have been over-hasty and based on inadequate data. It is important to note that no additional surface infrastructure or activities are proposed at this stage or as part of this application.
Sites of social significance - including sites of archaeological, historic, cultural, spiritual or religious importance and burial sites.	The areas covered, from the existing mine, indicated both Iron Age and historical occupation, but no sites of heritage significance. Graves were found in these areas but have since been relocated prior to the start of trial mining, in consultation with the affected community. A specialist letter has been included for this application as requested by SAHRA. It is important to note that no additional surface infrastructure or activities are proposed at this stage or as part of this application.
Sites of outstanding natural beauty, panoramic views and scenic drives	The existing mine falls within the Sekhukhune Centre of Endemism with Thirty-one (31) plants species mentioned as endemic or near-endemic to the Sekhukhuneland Centre of Plant Endemism (27), the Wolkberg Centre of Plant Endemism (1) or Mpumalanga (3). Due the current mining on site as well as other mining related activities within the area, the outstanding natural beauty and panoramic views have been altered to an extent within the area. It is important to note that no additional surface infrastructure or activities are proposed at this stage or as part of this application.
Green belts or public open space in municipal areas	Not applicable.

10 LIMITATIONS AND ASSUMPTIONS

Assumptions and limitations applicable to specific to the assessment process and mitigation measures proposed in specific specialist studies include the following:

10.1 LAND USE & SOIL POTENTIAL

- No updated Land use or soil study was done or required for this application.
- The soil and land use assessment was done for the 2013 EIA/EMPR as submitted for the existing mine and its expansion of the UG2 and Merensky reefs (Approved 2015).

However, since the Two Rivers Platinum mine is an underground mining operation and extention of the existing uderground sections, the baseline information is relevant and no direct surface impacts is expected for the project as part of this application.

10.2 ECOLOGICAL

- No updated Fauna and Flora study was conducted or required for this application.
- The Ecological assessment was done for the 2013 EIA/EMPR as submitted for the existing mine and its expansion of the UG2 and Merensky reefs (Approved 2015).
- However, since the Two Rivers Platinum mine is an underground mining operation and extension of the existing underground sections, the baseline information is relevant and no direct surface impacts is expected for the project as part of this application.

10.3 NOISE ASSESSMENT

- No updated Noise study was conducted or required for this application.
- The Noise assessment was done for the 2013 EIA/EMPR as submitted for the existing mine and its expansion of the UG2 and Merensky reefs (Approved 2015).
- Environments which are recognized as being noise sensitive include residential areas, offices, educational facilities and health and church buildings.
- None of these sensitive environments exist in close proximity to the TRP mining area. However, since the Two Rivers Platinum mine is an underground mining operation and extension of the existing underground sections, the baseline information is relevant and no direct surface impacts is expected for the project as part of this application.

10.4 HYDROGEOLOGICAL ASSESSMENT

- An updated Hydrogeological study was conducted, since underground mining might impact on the groundwater of the immediate and regional environment.

Generally, limitations associated with Hydrogeological assessments include aspects such as

conclusions made in terms of modelling and within the amount of data available/obtained at the time of the assessment.

Efforts have been made to base the model on sound assumptions and has been calibrated to observed data, the results obtained from this exercise should be considered in accordance with the assumptions made. Especially the assumption that a fractured aquifer will behave as a homogeneous porous medium can lead to error. However, on a large enough scale (bigger than the REV, Representative Elemental Volume) this assumption should hold reasonable well.

Assumptions and limitations in terms of modelling utilised in the 2018 report

Model uncertainties arise from uncertainties in the calibrated aquifer parameters of hydraulic conductivity, aquifer external and internal boundary conditions recharge parameters, initial head conditions, and other external stresses.

Uncertainties in the steady state model are:

- Absence of consolidated long-term water level monitoring data to evaluate long-term water level changes in the area prior to mining, during historical mining, and the status for the entire spread of water level points available.
- Absence of regional data representing the entire modelled domain. A model re-calibration should be simulated once this data becomes available.
- Spatial distribution and rate of recharge is not well known. However, the recharge rates of between 3 and 34 mm/a (up to 5% of MAP (650 mm/a)) that were used correlate well with analogue studies of the area and historical models calibrated.
- The biggest uncertainty arises from the modelled storativity values applied for the transient simulations. The values used are an estimation; however, the water balances assist in verifying the data used. The values used as input into the model are closely aligned with similar values indicated in Spitz and Moreno, 1996. The water balance compiled by Golder Associates indicated that the total volume of dewatering from the North Decline (146 569 m^3/annum), the Merensky North Decline (59 953 m^3/annum), the South Decline (379 115 m^3/annum) and the Merensky South Decline (119 907 m^3/annum) equates to 705 544 m^3/annum, or 1933 m^3/d. The transient groundwater flow model was simulated for a period from 2006 to 2017, and the resultant inflows equated to an average of 2160 m^3/d – an error of 10%. The transient model was used to calibrate the storage coefficients of the groundwater flow model.
- The groundwater flow model should be updated as new data becomes available.
- The geology was based on the 1:250 000 published geological map as well as 1:50 000 topographical maps.
- ArcGIS online aerial imagery was used in the layout of the various maps compiled for the current report. The imagery may well be dated and has been used for reference only.
- The extent of regional groundwater usage i.e. private and neighbouring mine use. This abstraction may influence the current calibration and should be quantified in the future and updated in the groundwater flow model.

- The model is used for decision making and should be applied accordingly. Modelled impacts may vary at any point and on-going monitoring is required to actively manage the proposed mining activities and possible impacts.

10.5 SURFACE WATER ASSESSMENT

- No updated Surface water assessment and study was conducted or required for this application.
- The Surface water assessment was done for the 2013 EIA/EMPR as submitted for the existing mine and its expansion of the UG2 and Merensky reefs (Approved 2015).
- Surface water hydrology information available included the use of calculations and methods which all represent potential limitations. However, these are the generally used methods within the surface water field and therefore have been tested and accepted as fairly accurate in terms of results. In order to calculate the peak flows, the Rational, Alternative Rational, Standard Design Flood and an Empirical Method were utilised. The flows were calculated under current conditions (natural and current mining activities) and were determined for a 24-hour rainfall event. The area is not anticipated to have a large potential stream flow reduction impact on the runoff of the immediate and general area. The results of the SDF method were chosen as the best of those calculated.
- However, since the Two Rivers Platinum mine is an underground mining operation and extension of the existing underground sections, the baseline information is relevant and no direct surface impacts is expected.
- Underground mining may have indirect impacts on the water environment, and this may include the pollution of surface water areas by means of leaching and pollution plumes. These have been adequetly assessed as part of the updated hydrogeological report and impacts are epected to be of Medium Significance.

10.6 ARCHAEOLOGICAL/HERITAGE ASSESSMENT

- No updated Heritage study was included for the study.
- SAHRA requested a letter of exemption from a Heritage specialist to warrant the exclusion of an updated Heritage assessment and this was obtained and included within this report.
- However, since the Two Rivers Platinum mine is an underground mining operation and extension of the existing underground sections, the baseline information is relevant and no direct surface impacts is expected for the project as part of this application.
- If any Heritage material is uncovered during the underground mining extensions, activity should not commence until a specialist could be consulted.

10.7 VISUAL ASSESSMENT

- No updated Visual assessment was done or required for this application.
- The underground section is associated with no new surface infrastructure as the project will utilise the existing infrastructure in use, therefore, no impacts on the visual environment is expected.

- No limitations are known or relevant for the baseline information available for the visual environment.

10.8 AIR QUALITY

- No updated Air quality assessment was done or required for this application.
- The sensitive receptors closest to the TRP mine (approximately 3km to the west of the proposed TSF site) are two informal settlements, referred to as Village 1 and Village 2 in the air quality report and the residential areas of Ga-Mampuru, Kokwaneng, Madimola and Didingwe River Lodge.
- It can be assumed the surrounding chrome and platinum mining activities is the largest source contributor in the area. The rock dumps, gravel roads, crushing of ore, possible open pit operations and TSFs associated with these mines produce dust which contributes to the overall atmospheric dust load in the area. These are however all existing structures and activities.
- Underground mining is usually subject to strict Health and Safety guidelines, such as temperature, noise and air quality. Since the mine already has existing underground sections and systems for Health and Safety in place within these areas, the same protocol should be extended to the future underground sections.
- Whether the underground section will add/increase particulates or dust onto the surface and larger area is uncertain, but not expected. Blasting and removal of material from the underground section may have an effect.
- The Two Rivers Platinum mine is an existing mine with existing air quality monitoring and this will aid in the detection of decreased air quality during all phases of the development.

10.9 BLAST IMPACT REPORT

- The Blast impact reports as conducted for the initial Two Rivers Platinum authorisations (2009) indicate that most of the impacts are associated with blasting of portals and declines. Since the underground mining section will utilize existing portals and shafts, the impacts expected due to blasting are expected to be less.
- No assumptions or limitations are known for blasting impacts associated with the underground section at this stage, but blasting mitigation measures and management features will be described within the EMP.

10.10 SOCIO-ECONOMIC

- No updated Socio-economic assessment was done or required for this application.
- Information available at the time of the Scoping stage were that included within the 2013/2015 EIA/EMPR and has been improved by incorporating the latest information regarding the relevant new Local Municipality from the 2016/2017 Integrated Development Plan and used within the baseline of this report.
- Largely positive impacts are expected as the expansion of the underground sections will increase

the Life of Mine.

11 FULL DESCRIPTION OF THE PROCESS UNDERTAKEN TO IDENTIFY, ASSESS AND RANK THE IMPACTS AND RISKS THE ACTIVITY WILL IMPOSE ON THE PREFERRED SITE (IN RESPECT OF THE FINAL SITE LAYOUT PLAN) THROUGH THE LIFE OF THE ACTIVITY

(Including (i) a description of all environmental issues and risks that where identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.)

11.1 IMPACTS IDENTIFIED FOR THE TRP UNDERGROUND EXPANSION PROJECT

The following cultural, environmental and socio-economic impacts associated with the Proposed Project have been assessed in this document. The impacts only relate to the expansion of the underground workings and consolidation of the farms Tweefontein 360KT, Dwarsrivier 372 KT, Kalkfontein 367 KT and Buffelshoek 368 KT.

Associated activities during the construction, operation, decommissioning and post-closer phases will be relevant. Note that many aspects are not relevant in term of potential impacts as the proposed project relating to this application has no additional surface infrastructure.

Potential impacts that may be caused by the proposed development will be identified using input from the following:

- Views of I&APs;
- Existing information;
- Specialist investigations;
- Site visit with the project team; and
- Legislation.

The following potential major direct, indirect and cumulative impacts were identified:

- Land degradation
- Potential to alter the topography
- Loss of soil characteristics - erosion and compaction
- Potential for alien invasive establishment
- Reduced flow to downstream water catchment
- Potential pollution to water resources (surface and groundwater)
- Drawdown cone from dewatering activities (groundwater quantity)
- Increased dust and emissions
- Increased noise levels
- Damage to property/infrastructure from blast events

- Influx of job seekers to the area
- Potential increased traffic – haulage
- Health and safety impacts;
- Potential injury and loss of health and life of humans; and
- Altered Socio-Economic Environment (Positive or negative).

11.2 MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED

No alternatives assessed are deemed feasible since the underground section is located ideally to extract the reserves and utilise the existing infrastructure on the TRP.

Minerals can only be mined where identified and verified, therefore it was not practical to select any other sites. This fact will have guided the existing adit positioning as well as utilising the existing infrastructure of which will limit surface impacts for the project (refer to Section 8 above).

The extension of the current underground operations will increase the life of mine and bring the associated positive socio-economic benefits of extending mine closure. The No-Go alternative is therefore rejected.

11.3 ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

An Issues and Response Report has been compiled as part of the Public Participation Process for the TRP Underground Expansion project. This document records the issues of concern, questions and suggestions contributed by stakeholders during the course of the Environmental Authorisation Process. This report also includes the responses provided by relevant parties. Comments were received at meetings, and by means of written methods (email and text message). Refer to Table 8-4 for the issues raised by IAPs.

11.4 SPECIALIST INVESTIGATIONS

Two updated specialist investigations for the undeground section were described in the Scoping Report and investigated in the EIA Phase of the project.

Table 11-1: Description of aspects assessed by the specialists

Aspect	Specialist Study	Specialist	Terms of Reference
Extended mine area layout	Mine schedule and planning	Two Rivers Platinum – mine planning department	Mine Schedule • Production rates • Underground layout
Geohydrology	Geo-hydrological Study	Noa Agencies	The scope of work was to review available groundwater information from the previous studies and to compile a supporting specialist groundwater report for the expansion of the underground mine area, including:

Aspect	Specialist Study	Specialist	Terms of Reference
			• Detailed site inspection for the mapping of relevant geo-hydrological features; • Data collection of existing information from topographical maps, ortho-photos, geological maps, hydrological information, meteorological information, previous groundwater studies in the area; • Meetings with relevant mine personnel; • Borehole/spring census in the area to assess groundwater utilisation by neighbours and their background water quality; • Evaluation of groundwater potential (quality & quantity); • Groundwater flow using MODFLOW and transport modelling using MODPATH or MT3D to predict the long-term impacts on the receiving environment; • Estimation of Inflows to the mines based on mining plans provided; • Assessment of the possible environmental impacts and to conceptualise mitigation measures; and • Recommendation for a groundwater monitoring network.
Heritage	Heritage Assessment		SAHRA requested a specialist letter to confirm/deny that a heritgae assessment will be required for the underground development. This was inlcuded within this report.

11.5 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

(Provide a discussion in terms of advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties)

11.5.1 Impact on Geology

The Proposed Project may have an impact on the rock masses that influence the groundwater on the project site. Excavation of rock for the underground mining area will influence the underlying geology of the site as a void will be created.

Other possible impacts:

- Resultant impacts from blasting and vibrations may impact on geology. Drilling and blasting may cause unintended collapse of underground workings.
- The extraction of ore and waste rock from the underground workings will result in the permanent removal of geology/ lithology. Disturbance and removal of the geological strata due to excavation and subsequent removal of the reef.
- Apart from specific rock types or outcrops which are of scientific interest or cultural significance,

the direct impact of mining on geology is seldom highly significant unless the long-term effects on groundwater or topography have important ramifications.

11.5.2 Impacts on Land Use and Soil Potential

The impacts given here are derived from previous specialist soil studies for the TRP area and adapted where relevant as expected for the underground section. Since existing infrastructure will be utilised to work the ore removed from underground, new soil impacts will be minimal.

The main impacts associated with the operational phase of the proposed project are:

- The contamination of the in-situ and stored soils by dirty water run-off and or spillage of hydrocarbons from vehicles and machinery or from dust and emissions from the process of mining (blasting dust etc.).
- Erosion that may occur during material movement.

Impacts may possibly occur, but is not expected to a significant degree since surface impacts will be minimal. Intensity will range from low to high as natural functions of the soil will be altered. Impact magnitude will be low since no additional surface infrastructure is foreseen.

11.5.3 Ecological Impacts

In the broadest sense, biodiversity provides value for ecosystem functionality, aesthetic, spiritual, cultural, and recreational reasons. The known ecosystem related value is listed as follows:

- Soil formation and fertility maintenance;
- Primary production through photosynthesis, as the supportive foundation for life;
- Provision of food and fuel;
- Provision of shelter and building materials;
- Regulation of water flows and water quality;
- Regulation and purification of atmospheric gases;
- Moderation of climate and weather;
- Control of pests and diseases; and
- Maintenance of genetic resources (key for medicines, crop and livestock breeding).

The discussions below consider terrestrial and aquatic ecosystems.

Issue: Physical Loss and/or general disturbance of terrestrial biodiversity

The existing habitat units of the project area have been impacted and degraded to some extent as a result of past and current mining and anthropogenic activities; however, the project area still contains habitat units which are considered to be ecologically sensitive. The proposed extension of the underground mining activities will not impact on terrestrial biodiversity. No surface infrastructure will be constructed and the existing surface infrastructure will be utilised.

The significance of this impact is low in the unmitigated scenario. No additional surface impact is anticipated. The processing of RoM will take place at the existing facility and disposal of waste will take place at the existing facilities. Existing mitigation measures will be maintained to ensure that the impact on biodiversity is kept low.

11.5.4 Impacts on Heritage

The underground mining will be accessed from the existing two shafts/declines. As a result the impact above ground will be minimal if any. As mentioned above, the known heritage aspects associated with the TRP are alrady preserved and protected on-site.

An exeption letter from a Hertitage specialist have been obtained and the following was stated:
"The proposed extension of Two Rivers Platinum's underground mining activities to the Tamboti Mining Right Area and Prospecting areas will not include any surface construction activities, only the expansion of underground workings. The existing surface infrastructure will be used to store the ore body and dispose of the waste rock (Figures 3 & 4). In terms of heritage, a Heritage Impact Assessment was done by Pistorius (2009) on various portions of the of the Farms Kalkfontein 367KT and on Buffelshoek 368 KT. It is therefore important that this report be read in conjunction with the existing HIA. The HIA survey revealed several graveyards on Portion 8 of the Farm Kalkfontein 367 KT, located about 1.1 km west of the boundary of the 2017-2022 mining schedule. The previously identified heritage sites, as well as the rough extent of the current mining infrastructure, were plotted on a topographical map (Figure 4 of the Exemption letter).

Because the proposed expansion will consist of underground mining only, it is recommended that the applicant applying for the extension of the underground mining area be exempted from further Phases of archaeological impact assessments, subject to minimum standards: Archaeological and Palaeontological Components of Impact Assessments as set out by the South African Heritage Resources Agency (SAHRA) which states that: *When a property is either very disturbed (e.g. has been quarried or mined) or is very small and the archaeologist can see that it is highly unlikely that any archaeological remains will be found, a 'Letter of Recommendation for Exemption' from a full Phase 1 report may be supplied."*

11.5.5 Impact on Air Quality

Insignificant or low impacts by the proposed underground expansion activities are foreseen in terms of air quality. Usually with mining operations, the two main impacting sources are wind-blown dust from exposed surfaces and vehicle or machine created dust from mining or movement along unpaved roads.

Since the new underground operation will create neither of these and no other additional surface infrastructure, no new air quality impacts are expected. Dust may be generated underground due to

blasting and health and safety regulations will need to apply to ensure the safety of working conditions.

11.5.6 Impact on Noise Environment

Possible impacts were the following:

- Noise is anticipated to be generated from blasting, and underground mining operations may have a negative impact on the surrounding biophysical and socio-economic environment.
- Construction and operational activities may lead to an increase in noise levels of the ambient environment noise levels.
- Vibrations from blasting may impact on the underlying geology of the site and could result in displacement of fauna species, but this should only be temporary in nature.
- Vibrations could cause failure underground which could impact on the health and safety of employees, as well as the subsidence of topography.

11.5.7 Impacts of Blasting and Vibration

The discussion below considers and focuses on possible impact associated with the proposed project.

Issue: Blasting and vibration related impacts

The current mining method involve drill and blasting. Blasting activities have the potential to impact on people, animals and structures located in the vicinity of the proposed project area. The activity will continue from the existing underground mining area. As a result of the dip angle of the ore body mining will only extent deeper below the surface. It is important to note that with the deepening of the mining areas the blasting effects will reduce.

The potential impact could have a medium severity in the unmitigated scenario. In the mitigated scenario, this severity reduces to very low because measures can be taken to control blasts and associated impacts.

11.5.8 Impact on Visual Environment

Visibility is determined by a line of sight where nothing obscures the view of an object. Exposure is defined by the degree of visibility, in other words “how much” of it can be seen. This is influenced by topography and the incidence of objects such as trees and buildings that obscure the view partially or in total. Since no additional surface infrastructure forms part of the application, no new visual impacts are expected.

11.5.9 Impact on Surface Water

The discussion below considers surface water and focus on possible impact associated with the proposed project.

Issue: Reduction in surface water quantity and quality.

The proposed extension of the underground mining area have the potential to negatively impact on water resources. Surface water impacts are associated with the existing processing of ore and disposal of waste onto waste storage facilities. The mine has existing environmental authorisations and water use licenses in place.

It is not anticipated that the extension of the underground mining area will have a negative impact on surface water directly, however the indirect impact associated with processing and disposal will be assessed and mitigation and management measures will be included in the EIA phase. In the absence of mitigation measures will the direct impact on surface resources be low and the indirect impact high. With mitigation measured the significance of the potential impacts can be reduced.

11.5.10 Impact on Groundwater

The discussion below considers groundwater and focus on possible impact associated with the proposed project.

Issue: Reduction in groundwater quantity and quality.

Quantity: Mining projects have the potential to negatively impact on water resources through abstraction for water supply and dewatering activities, regardless of the alternatives that are selected. Mining projects also present a number of emission sources that can have a negative impact on water quality. Contaminants from the project are expected to include operation related consumables, silt, fuels, hydrocarbons, residues, blasting equipment and hazardous wastes. Nitrate pollution associated with the mining method is anticipated.

In the absence of mitigation, given the importance of the groundwater system and based on the mine plan as presented in this report, the severity of unmitigated impacts would be high. The degree of aquifer dewatering depends on the extent and depth of mining below the local groundwater level, and on the hydraulic properties of the aquifer host rock. During the operational phase active underground mining will cause partial dewatering of the deep aquifer(s). The cone of depression is not expected to exceed a maximum distance of ± 1 km along areas of higher hydraulic conductivity (geological structures such as faults).

The depth at which mining is planned to take place will result in minimal impact on the shallow weathered zone aquifer, which is commonly utilised by the groundwater users in the area. With the underground mining not expected to result in surface subsidence, groundwater levels and quality of boreholes in the shallow aquifer are not expected to be affected by the underground mining activities. Numerical flow model simulations also showed minimal to no water level drawdown within the weathered zone aquifer.

Impacts on the shallow aquifer are only expected in isolated instances where geological structures such as dykes and major faults link the underground mining activities with the surface. Localized dewatering may therefore occur if sub-vertical structures occur that are transmissive from surface right through to the underground workings.

Based on this aquifer configuration and the groundwater use in the area, rating of the potential impacts from mining is done for impacts on the shallow aquifer and not for the deep aquifer. No groundwater use or evidence of any discharge from the deep aquifer can be found recorded for the area i.e. the groundwater remains stable although underground mining activities is present. The hydrocensus should be updated accordingly and the monitoring protocol reviewed.

Quality: Mine dewatering will continue throughout the life of mine to ensure dry mining conditions. Groundwater contamination of surrounding users is therefore not expected to take place while the underground workings are still operational. Affected storm water runoff will be contained in the purpose-built containment facilities. Water quality impacts may still be registered on the weathered zone aquifer i.e. nitrates and sulphates. In general, pollution migration will be slow because of low aquifer transmissivities.

11.5.10.1 Predictive modelling

The predictive model simulates and estimates groundwater dewatering volumes from the proposed underground mine extension, for year 0 to year 5, to assist in mine water use planning for re-use.

The mine schedule received from the client indicates the various proposed mining sequences for the North and South Declines. The details of the underground mine extension was included in the numerical groundwater flow model to assess the potential impact associated with the mining for year 0 to 5.

11.5.10.2 Results of predictive modelling

The results of the initial simulation are provided in Figure 11-1. The results indicate the simulated additional dewatering required on top of the current approximate 2000 m^3/d already dewatering. This is mainly due to increased exposed area in the underground mine, as well as the intersection of the mapped fault zone (i.e. conduits for groundwater flow and preferential flow paths). This is due to increasing rock/aquifer surface area exposure during the Life of Mine. Darcy's Law states that flow is directly proportionate to area, hence the increase in possible flow simulated. Storage will deplete over time and steady state flows will continue.

The figure indicates that initially the underground mine workings dewatering rapidly reaches 930 m^3/d and then decreases for the remainder of the 5 years of mining.

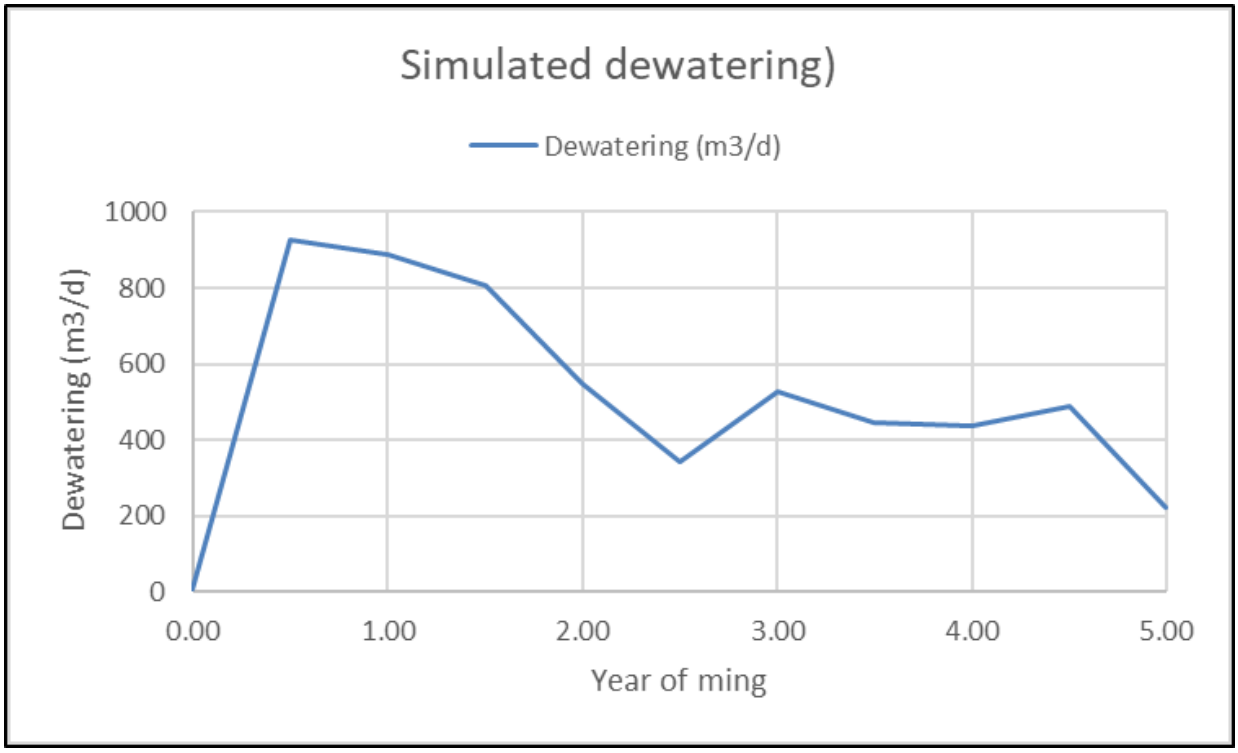

Figure 11-1: Initial dewatering simulation: Year 0 - 5

The volumes simulated here should be regarded as a guideline and not as a target for successful dewatering.

Once mining commences, monitoring of the flows from the underground mines will confirm the dewatering rates and the model should be updated accordingly. The simulated changes in hydraulic head due to mining and related activities for the boreholes used in the calibration process are provided in Table 11-2**.** The maximum simulated change in hydraulic head is at the abstraction borehole TRPGWM16D (~1.91m change in simulated head). The average change in head simulated is 0.43 m.

Table 11-2: Simulated change in heads due to mining and related activities

Site No.	Latitude	Longitude	X	Y	Z	BH	Sim head (mamsl)	Simulated head after mine extension 5 years)	Simulated change in head due to mining (m)
1	30.100510	-24.914100	-90869	-2756839	917.62	TRPGWM04S	917.63	916.63	0.99
2	30.100520	-24.914050	-90868	-2756834	917.62	TRPGWM04D	917.55	916.60	0.95
3	30.104450	-24.950300	-90445	-2760847	965.98	TRPGWM06S	960.45	960.42	0.03
4	30.099380	-24.951340	-90956	-2760966	941.41	TRPGWM09S	942.28	942.20	0.07
5	30.099410	-24.951400	-90953	-2760972	941.41	TRPGWM09D	942.29	942.22	0.07
6	30.103850	-24.907790	-90536	-2756138	908.48	TRPGWM10S	910.29	910.29	0.00
7	30.103840	-24.907820	-90537	-2756141	908.48	TRPGWM10D	910.22	910.22	0.00
8	30.101280	-24.921110	-90786	-2757615	917.13	TRPGWM12S	910.84	910.35	0.49
9	30.101280	-24.921050	-90786	-2757609	917.13	TRPGWM12D	910.82	910.33	0.49
10	30.097930	-24.957000	-91098	-2761594	944.17	TRPGWM14S	943.52	943.47	0.05
11	30.097930	-24.957030	-91098	-2761597	944.17	TRPGWM14D	943.67	943.61	0.06
12	30.092700	-24.961850	-91623	-2762134	937.20	TRPGWM16S	937.63	935.83	1.80
13	30.092610	-24.961800	-91632	-2762129	937.20	TRPGWM16D	937.49	935.58	1.91
14	30.097560	-24.956210	-91136	-2761506	940.32	TRM04	938.78	938.77	0.01
15	30.092390	-24.959800	-91656	-2761907	938.71	TRM06	935.34	934.05	1.29
16	30.096080	-24.963790	-91280	-2762347	946.50	TRM09	945.44	945.33	0.11
17	30.099690	-24.948680	-90927	-2760671	936.05	TRM10	940.79	940.70	0.10
18	30.100710	-24.953400	-90820	-2761193	944.01	TRM12	945.41	945.40	0.01
19	30.100020	-24.958480	-90886	-2761756	951.95	TRM13	959.13	959.04	0.09
20	30.098290	-24.954640	-91064	-2761332	942.84	TRM	939.76	939.73	0.03
Avg		**934.47**			**934.04**			**0.43**	
Min		**910.22**			**910.22**			**0.00**	
Max		**960.45**			**960.42**			**1.91**	
Correl									

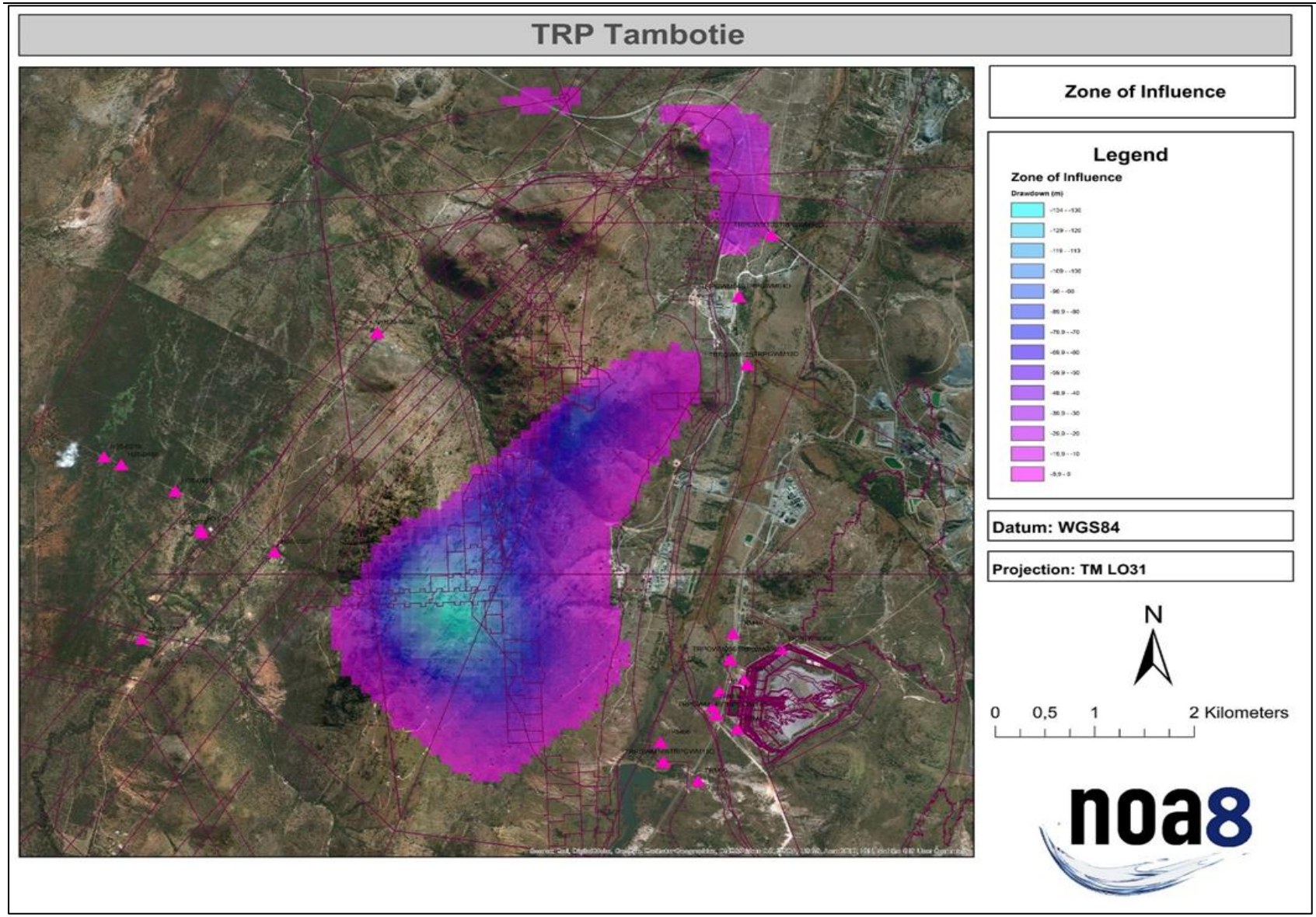

Figure 11-2: Potential zone of influence (ZOI) associated with the extended underground mine

11.5.11 Impacts on Socio-Economic Environment

The discussion below considers and focuses on possible impact associated with the proposed project.

Issue: Positive and negative socio-economic impacts

Mining projects have the potential to have positive and/or negative impacts on the following, regardless of the alternatives that are selected:

- employment for local communities;
- the local and national economy;
- social structures within communities;
- increased pressure on basic services;
- quality of life and health related issues
- livelihoods of businesses

Socio-economic impacts would occur during all project phases. In the absence of mitigation that focuses on enhancing positive impacts and reducing negative impacts, the severity of unmitigated impacts would be medium for negative impacts and medium (positive) for positive impacts. The related unmitigated significance could be medium. Where the project planning takes into account and applies the necessary mitigation to avoid, minimises or remedy impacts in line with the mitigation hierarchy, the significance of potential negative impacts can be reduced and potential positive impacts can be increased.

11.5.12 Cumulative Impacts

A cumulative impact may result from an additive impact i.e. where it adds to the impact which is caused by other similar impacts or an interactive impact i.e. where a cumulative impact is caused by different impacts that combine to form a new kind of impact. Interactive impacts may either be countervailing (net adverse cumulative impact is less than the sum of the individual impacts) or synergistic (net adverse cumulative impact is greater than the sum of the individual impacts).

The assessment of cumulative impacts on a study area is complex; especially if many of the impacts occur on a much wider scale than the site being assessed and evaluated. It is often difficult to determine at which point the accumulation of many small impacts reaches the point of an undesired or unintended cumulative impact that should be avoided or mitigated. There are often factors which are uncertain when potential cumulative impacts are identified.

The anticipated impacts resulting from the expansion of the underground mine could potentially result in cumulative effects of the current operation in the following areas:

- Additional risk of soil and water pollution due to current activities on the TRP.
- Cumulative noise impacts: There exists other noise generating sources within the study area e.g. transportation networks.

Regarding the hydrological environment, cumulative impacts in association with adjacent mines in the region will be mitigated by the implementation of appropriate management measures to ensure sensitive downstream water users are not detrimentally impacted.

11.6 METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

The Environmental Impact Assessment (EIA) 2014 Regulations [as amended] promulgated in terms of Sections 24 (5), 24M and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) [as amended] (NEMA), requires that all identified potential impacts associated with the proposed project be assessed in terms of their overall potential significance on the natural, social and economic environments. The criteria identified in the EIA Regulations (2014) include the following:

- Nature of the impact;
- Extent of the impact;
- Duration of the impact
- Probability of the impact occurring;
- Degree to which impact can be reversed;
- Degree to which impact may cause irreplaceable loss of resources;
- Degree to which the impact can be mitigated; and
- Cumulative impacts.

Malan Scholes Consulting has developed an impact assessment methodology (as defined below) whereby the Significance of a potential impact is determined through the assessment of the relevant temporal and spatial scales determined of the Extent, Magnitude and Duration criteria associated with a particular impact.

This method does not explicitly define each of the criteria but rather combines them and results in an indication of the overall significance.

Malan Scholes Consulting Impact Assessment Methodology

The impact assessment methodology used to determine the significance of impacts prior and after mitigation is presented below.

Extent of the impact

The EXTENT of an impact is the physical extent/area of impact or influence.

Score	Extent	Description
1	Footprint	The impacted area extends only as far as the actual footprint of the activity.
2	Site	The impact will affect the entire or substantial portion of the site/property.
3	Local	The impact could affect the area including neighbouring properties and

		transport routes.
4	Region	Impact could be widespread with regional implication.
5	National	Impact could have a widespread national level implication.

Duration of the impact

The DURATION of an impact is the expected period of time the impact will have an effect.

Score	Duration	Description
1	Short term	The impact is quickly reversible within a period of less than 2 years, or limited to the construction phase, or immediate upon the commencement of floods.
2	Short to medium term	The impact will have a short term lifespan (2–5 years).
3	Medium term	The impact will have a medium term lifespan (6 – 10 years)
4	Long term	The impact will have a medium term lifespan (10 – 25 years)
5	Permanent	The impact will be permanent beyond the lifespan of the development

Intensity of the impact

The INTENSITY of an impact is the expected amplitude of the impact.

Score	Intensity	Description
1	Minor	The activity will only have a minor impact on the affected environment in such a way that the natural processes or functions are not affected.
2	Low	The activity will have a low impact on the affected environment.
3	Medium	The activity will have a medium impact on the affected environment, but function and process continue, albeit in a modified way.
4	High	The activity will have a high impact on the affected environment which may be disturbed to the extent where it temporarily or permanently ceases.
5	Very High	The activity will have a very high impact on the affected environment which may be disturbed to the extent where it temporarily or permanently ceases.

Reversibility of the impact

The REVERSIBILITY of an impact is the severity of the impact on the ecosystem structure

Score	Reversibility	Description
1	Completely reversible	The impact is reversible without any mitigation measures and management measures
2	Nearly completely reversible	The impact is reversible without any significant mitigation and management measures. Some time and resources required.
3	Partly reversible	The impact is only reversible with the implantation of mitigation and management measures. Substantial time and resources required.
4	Nearly irreversible	The impact is can only marginally be reversed with the implantation of significant mitigation and management measures. Significant time and resources required to ensure impact is on a controllable level.
5	Irreversible	The impact is irreversible.

Probability of the impact

The PROBABILITY of an impact is the severity of the impact on the ecosystem structure

Score	Probability	Description
1	Improbable	The possibility of the impact occurring is highly improbable (less than 5% of impact occurring).
2	Low	The possibility of the impact occurring is very low, due either to the circumstances, design or experience (5% to 30% of impact occurring).
3	Medium	There is a possibility that the impact will occur to the extent that provision must be made therefore (30% to 60% of impact occurring).
4	High	There is a high possibility that the impact will occur to the extent that provision must be made therefore (60% to 90% of impact occurring).
5	Definite	The impact will definitely take place regardless of any prevention plans, and there can only be relied on migratory actions or contingency plans to contain the effect (90% to 100% of impact occurring).

Calculation of Impacts – Significance Rating of Impact

Significance is determined through a synthesis of the various impact characteristics and represents the combined effect of the Irreplaceability (Magnitude, Extent, Duration, and Intensity) multiplied by the Probability of the impact. The significance of an impact is rated according the scores a presented below:

Equation 1:

Significance = Irreplaceability (Reversibility + Intensity + Duration + Extent) X Probability

Significance Rating

Score	Significance	Colour Code
1 to 20	Very low	
21 to 40	Low	
41 to 60	Medium	
61 to 80	High	
81 to 100	Very high	

Degree to which the impact can be mitigated: *The effect of mitigation measures on the impact and its degree of effectiveness:*

Equation 2:

Significance Rating (WM) = Significance Rating (WOM) x Mitigation Efficiency

Mitigation Efficiency (ME)	
High	0,2
Medium to High	0,4
Medium	0,6
Low to Medium	0,8
Low	1,0

Confidence rating: *Level of certainty of the impact occurring*.

- **Certain**
- **Sure**
- **Unsure**

Cumulative impacts: *The effect the combination of past, present and "reasonably foreseeable" future actions have on aspects.*

- Very Low cumulative impact
- Low cumulative impact
- Medium cumulative impact
- High cumulative impact

12 IMPACTS AND RISKS IDENTIFIED INCLUDING THE NATURE, SIGNIFICANCE, CONSEQUENCE, EXTENT, DURATION AND PROBABILITY OF THE IMPACTS, INCLUDING THE DEGREE TO WHICH THESE IMPACTS

(Provide a list of the potential impacts identified of the activities described in the initial site layout that will be undertaken, as informed by both the typical known impacts of such activities, and as informed by the consultations with affected parties together with the significance, probability, and duration of the impacts. Please indicate the extent to which they can be reversed, the extent to which they may cause irreplaceable loss of resources, and can be avoided, managed or mitigated)

12.1 ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK

(This section of the report must consider all the known typical impacts of each of the activities (including those that could or should have been identified by knowledgeable persons) and not only those that were raised by registered interested and affected parties).

Please refer to discussions on identified impacts as well as to Table 12-1 and relevant Management Objectives and Mitigation types for each aspect is provided within Table 12-2. Mitigation measures are prescribed within the Environmental Management Programme (EMPR).

Impacts during the Construction phase are not included and relevant. The TRP is already existing and operational and therefore, no impacts are expected as a result of Construction.

Table 12-1: Impact Assessment Table (Complete with Ratings used to obtain Significance)

Activity	Aspects Affected	Potential Impact	Phase	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability		Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
Operational Phase																				
Extending of the underground mining sections; Blasting and Drilling	**Soils**	Soil compaction by heavy duty vehicles.	Operational Phase	Site	2	Long term	4	Low	2	Nearly completely	2	10	Medium	3	Low	30	High	0.2	Very Low	6
Extending of the underground mining sections; Blasting and Drilling	**Soils**	Contamination of soils through: -Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints.	Operational Phase	Site	2	Long term	4	Low	2	Nearly completely	2	10	Medium	3	Low	30	High	0.2	Very Low	6
Underground mining; Blasting and Drilling	**Land Capability and Land Use**	Possibility of mining activities and workers causing veld fires destroying veld and animals on the study area and on adjacent land, impacting on the livelihood of surrounding land owners and users.	Operational Phase	Local	3	Long term	4	Low	2	Nearly completely	2	11	Low	2	Low	22	High	0.2	Very Low	4.4
Underground mining; Blasting and Drilling	**Blasting**	Blasting hazard, specifically Ground vibration	Operational Phase	Local	3	Long term	4	Low	2	Nearly completely	2	11	Medium	3	Low	33	Medium	0.6	Very Low	19.8
Underground mining; Blasting and Drilling	**Ecological Impacts**	Disturbance and loss of fauna through noise, light and dust pollution	Operational Phase	Site	2	Long term	4	Medium	3	Nearly completely	2	11	Medium	3	Low	33	Medium	0.6	Very Low	19.8

Activity	Aspects Affected	Potential Impact	Phase	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability		Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
		and hunting, trapping and killing of fauna.																		
Underground mining; Blasting and Drilling	**Ecological Impacts**	Spreading of alien invasive species and bush encroachment of indigenous species.	Operational Phase	Site	2	Long term	4	Low	2	Nearly completely	2	10	Medium	3	Low	30	Medium	0.6	Very Low	18
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the operational phase.	Operational Phase	Local	3	Long term	4	Medium	3	Partly reversible	3	13	Medium	3	Low	39	Medium	0.6	Low	23.4
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from construction vehicles; - Other chemicals from maintenance activities e.g. paints; and - Effluent discharges, due to a lack of stormwater management and system maintenance.	Operational Phase	Regional	4	Long term	4	Medium	3	Partly reversible	3	14	Medium	3	Medium	42	Medium	0.6	Low	25.2
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and**	Impact of Nitrate based explosives used during mining on groundwater quality.	Operational Phase	Regional	4	Long term	4	Medium	3	Partly reversible	3	14	High	4	Medium	56	Medium	0.6	Low	33.6

Activity	Aspects Affected	Potential Impact	Phase	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability		Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
	Groundwater	Contamination plume can affect the groundwater resource.																		
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the operational phase.	Operational Phase	Regional	4	Long term	4	Medium	3	Partly reversible	3	14	High	4	Medium	56	Medium	0.6	Low	33.6
Loading, hauling and conveying RoM to the Processing Plant, Processing of the RoM	**Hydrological Aspects; Surface water and Groundwater**	Possible impact on surface and groundwater from contaminated process water.	Operational Phase	Regional	5	Long term	5	Medium	3	Partly reversible	3	16	Medium	3	Medium	48	High	0.2	Very Low	9.6
Loading, hauling and conveying RoM to the Processing Plant, Processing of the RoM	**Hydrological Aspects; Surface water and Groundwater**	Possible impact of spills and overflows from pollution control dams and facilities.	Operational Phase	Regional	5	Long term	5	Medium	3	Partly reversible	3	16	Medium	3	Medium	48	High	0.2	Very Low	9.6
Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Hydrological Aspects; Surface water and Groundwater**	Seepage from waste management activities e.g. waste rock dumps, could cause a contamination plume affecting the underground water resources.	Operational Phase	Regional	5	Long term	5	Medium	3	Partly reversible	3	16	High	4	High	64	Low	0.8	Medium	51.2
Deposition of waste rock and tailings onto waste rock	**Hydrological Aspects; Surface**	Discharge from Tailing Storage facilities and associated water	Operational Phase	Regional	5	Long term	5	Medium	3	Partly reversible	3	16	Medium	3	Medium	48	Medium	0.6	Low	28.8

Activity	Aspects Affected	Potential Impact	Phase	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability		Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**water and Groundwater**	handling infrastructure can cause contamination of surface water resources.																		
Underground mining; Blasting and Drilling	**Air Quality**	Increased dust pollution (soil and ore fines), vehicles on gravel roads and storage of tailings and waste rock, as well as other mining and processing activities.	Operational Phase	Site	2	Long term	4	Low	2	Nearly completely	2	10	Medium	3	Low	30	Medium	0.6	Very Low	18
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Air Quality**	Increased windborne dust (soil and ore fines), vehicle fumes and particulate matter PM10, altering air quality.	Operational Phase	Site	2	Long term	4	Low	2	Nearly completely	2	10	Medium	3	Low	30	Medium	0.6	Very Low	18
Loading, hauling and conveying RoM to the Processing	**Air Quality**	Increased dust pollution (soil and ore fines), vehicles on gravel roads and transport of RoM	Operational Phase	Site	2	Long term	4	Low	2	Nearly completely	2	10	Medium	3	Low	30	Medium	0.6	Very Low	18

Activity	Aspects Affected	Potential Impact	Phase	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability		Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
Plant																				
Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of the mining activities and processing.	Operational Phase	Site	2	Long term	4	Medium	3	Nearly completely	2	11	Medium	3	Low	33	Low	0.8	Low	26.4
Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Disturbance due to vibrations caused by vehicles.	Operational Phase	Site	2	Long term	4	Low	2	Nearly completely	2	10	Medium	3	Low	30	Low	0.8	Low	24
Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Impact of security lighting on surrounding landowners and animals.	Operational Phase	Site	2	Long term	4	Low	2	Nearly completely	2	10	Medium	3	Low	30	Low	0.8	Low	24
Underground mining; Blasting and Drilling	**Sites of archaeological and cultural interests**	None expected	Operational Phase												N/A				N/A	
Underground mining; Blasting and Drilling	**Visual aspects**	Visibility from sensitive receptors / visual scarring of the landscape and impact on 'Sense of Place' as a result of the visibility of the mining site including the waste management facilities and mining activities.	Operational Phase	Local	3	Long term	4	Low	2	Nearly completely	2	11	Medium	3	Low	33	Low	0.8	Low	26.4
Underground mining; Blasting and Drilling	**Visual aspects**	Visibility of solid domestic and operational waste.	Operational Phase	Local	3	Long term	4	Low	2	Nearly completely	2	11	Medium	3	Low	33	Low	0.8	Low	26.4
Underground mining; Blasting and Drilling, Loading,	**Waste**	Generation and disposal of general waste, litter and hazardous material	Operational Phase	Local	2	Long term	4	Medium	3	Partly reversible	3	12	High	4	Medium	48	Medium	0.6	Low	28.8

Activity	Aspects Affected	Potential Impact	Phase	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability		Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
hauling and conveying RoM to the Processing Plant, Processing of RoM		during the operational phase and operational waste i.e. waste rock, tailings etc.																		
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Waste (Including Hazardous Waste)**	Generation and disposal of additional hazardous operational waste i.e. waste rock, tailings, etc.	Operational Phase	Local	2	Long term	4	High	4	Partly reversible	3	13	High	4	Medium	52	Medium	0.6	Low	31.2
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of	**Services**	Need for services e.g. water, electricity and sewerage systems, causing additional strain on natural resources and service infrastructure.	Operational Phase	Regional	3	Long term	4	Medium	3	Nearly completely	2	12	High	4	Medium	48	Low	0.8	Low	38.4

Activity	Aspects Affected	Potential Impact	Phase	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability		Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
the tailings dams and waste rock dumps.																				
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Traffic**	The change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic.	Operational Phase	Regional	3	Long term	4	Low	2	Nearly completely	2	11	High	4	Medium	44	Low	0.8	Low	35.2
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock	**Traffic**	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Operational Phase	Regional	3	Long term	4	Low	2	Nearly completely	2	11	High	4	Medium	44	Low	0.8	Low	35.2

Activity	Aspects Affected	Potential Impact	Phase	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability		Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
dumps.																				
Underground mining; Blasting and Drilling	**Health and Safety**	Possibility of mining activities and workers causing veld fires, which can potentially cause injury and or loss of life to mine workers and surrounding landowners, visitors and workers.	Operational Phase	Regional	3	Long term	4	Medium	3	Nearly completely	2	12	Medium	3	Low	36	Medium	0.6	Low	21.6
Underground mining; Blasting and Drilling, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Health and Safety**	Increased risk to public health and safety: Dangerous areas including the waste management activities and waste poses health risks and possible loss of life to mine workers and visitors to the site.	Operational Phase	Site	2	Long term	4	Medium	3	Partly reversible	3	12	Medium	3	Low	36	Medium	0.6	Low	21.6
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of	**Health and Safety**	Increased risk to public and worker health and safety	Operational Phase	Site	2	Long term	4	Medium	3	Partly reversible	3	12	Medium	3	Low	36	Medium	0.6	Low	21.6

Activity	Aspects Affected	Potential Impact	Phase	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability		Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
the tailings dams and waste rock dumps.																				
Underground mining; Blasting and Drilling	**Socio-Economic**	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Operational Phase	Regional	4	Long term	4	Low	2	Nearly irreversible	4	14	Medium	3	Medium	42	Medium	0.6	Low	25.2
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM	**Socio-Economic: Positive Impacts**	Extended employment provision due to the implementation of the extension of the mining activities, allowing mining activities to continue for additional years.	Operational Phase	Regional	4	Long term	4	High	4	Partly reversible	3	15	Medium	3	Medium	45	N/A	1	Medium	45
Underground mining; Blasting and Drilling	**Socio-Economic: Positive Impacts**	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Operational Phase	Regional	4	Long term	4	High	4	Nearly irreversible	4	16	Medium	3	Medium	48	N/A	1	Medium	48
Closure and Rehabilitation	**Geology and Soils**	Soil compaction by heavy duty vehicles.	Closure Phase	Site	2	Short term	1	Low	2	Nearly completely	2	7	Medium	3	Low	21	High	0.2	Very Low	4.2
Closure and Rehabilitation	**Geology and Soils**	Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils	Closure Phase	Site	2	Short term	1	Low	2	Nearly completely	2	7	Medium	3	Low	21	High	0.2	Very Low	4.2

Activity	Aspects Affected	Potential Impact	Phase	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability		Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
		or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints.																		
Rehabilitation of site, removal of infrastructure, sealing of shafts and closure of waste facilities	**Geology and Soils**	Soil erosion	Closure Phase	Site	2	Short term	1	Low	2	Nearly completely	2	7	Medium	3	Low	21	High	0.2	Very Low	4.2
Closure and Rehabilitation	**Land Capability and Land Use**	Possibility of mining activities and workers causing veld fires destroying veld and animals on the study area and on adjacent land, impacting on the livelihood of surrounding land owners and users.	Closure Phase	Local	3	Short term	1	Low	2	Nearly completely	2	8	Low	2	Very Low	16	High	0.2	Very Low	3.2
Closure and Rehabilitation	**Ecological Impacts**	Disturbance and loss of fauna through noise, light and dust pollution as well as hunting, trapping and killing of fauna.	Closure Phase	Site	2	Short term	1	Medium	3	Nearly completely	2	8	Medium	3	Low	24	Medium	0.6	Very Low	14.4
Closure and Rehabilitation	**Ecological Impacts**	Spreading of alien invasive species and bush encroachment of indigenous species.	Closure Phase	Site	2	Short term	1	Low	2	Nearly completely	2	7	Medium	3	Low	21	Medium	0.6	Very Low	12.6
Closure and Rehabilitation	**Ecological Impacts - Positive Impact**	Rehabilitation of area with natural vegetation and re-establishment of local biodiversity	Closure Phase	Site	2	Long term	4	Low	2	Nearly completely	2	10	Medium	3	Low	30	Medium	0.6	Very Low	18
Closure and	**Hydrologi**	Stormwater, erosion	Closure	Regio	4	Short	1	Medium	3	Partly	3	11	High	4	Medium	44	Mediu	0.6	Low	26.4

Activity	Aspects Affected	Potential Impact	Phase	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability		Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
Rehabilitation	**cal Aspects; Surface water and Groundwater**	and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the closure phase.	Phase	nal		term				reversible							m			
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from heavy duty vehicles; - Effluent discharges, due to a lack of stormwater management.	Closure Phase	Regional	4	Short term	1	Medium	3	Partly reversible	3	11	Low	2	Low	22	Medium	0.6	Very Low	13.2
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the closure phase.	Closure Phase	Regional	4	Short term	1	Medium	3	Partly reversible	3	11	Medium	3	Low	33	Medium	0.6	Low	19.8
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Impaction groundwater from the pollution plume associated with the waste storage facilities.	Closure Phase	Local	3	Short term	1	Medium	3	Partly reversible	3	10	Medium	3	Low	30	Low	0.8	Low	24
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundw**	Contamination plume stemming from the underground sections could be affecting the	Closure Phase	Regional	5	Long term	4	Medium	3	Nearly irreversible	4	16	High	4	High	64	Low	0.8	Medium	51.2

Activity	Aspects Affected	Potential Impact	Phase	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability		Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
	ater	underground water resources.																		
Closure and Rehabilitation	**Air Quality**	Dust (soil and ore fines) pollution due to rehabilitation activities and heavy duty vehicles.	Closure Phase	Site	2	Long term	4	Low	2	Nearly completely	2	10	Medium	3	Low	30	Mediu m	0.6	Very Low	18
Closure and Rehabilitation	**Air Quality**	Windborne dust (soil and ore fines) and vehicle fumes and particulate matter PM10, altering air quality.	Closure Phase	Site	2	Long term	4	Low	2	Nearly completely	2	10	Medium	3	Low	30	Mediu m	0.6	Very Low	18
Closure and Rehabilitation	**Air Quality**		Closure Phase	Site	2	Long term	4	Low	2	Nearly completely	2	10	Medium	3	Low	30	Mediu m	0.6	Very Low	18
Closure and Rehabilitation	**Noise, Vibration and Lighting**	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of heavy duty vehicles and equipment.	Closure Phase	Site	2	Short term	1	Medium	3	Nearly completely	2	8	Medium	3	Low	24	Low	0.8	Very Low	19.2
Closure and Rehabilitation	**Noise, Vibration and Lighting**	Disturbance due to vibrations caused by heavy duty vehicles.	Closure Phase	Site	2	Short term	1	Low	2	Nearly completely	2	7	Medium	3	Low	21	Low	0.8	Very Low	16.8
Closure and Rehabilitation	**Noise, Vibration and Lighting**	Impact of security lighting on surrounding landowners and animals.	Closure Phase	Site	2	Short term	1	Low	2	Nearly completely	2	7	Medium	3	Low	21	Low	0.8	Very Low	16.8
Closure and Rehabilitation	**Sites of archaeological and cultural interests**	None expected	Closure Phase												N/A				N/A	
Closure and Rehabilitation	**Visual aspects**	Visibility from sensitive receptors / visual scarring of the landscape as a result of the closure	Closure Phase	Local	3	Short term	1	Low	2	Nearly completely	2	8	High	4	Low	32	Low	0.8	Low	25.6

Activity	Aspects Affected	Potential Impact	Phase	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability		Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
		and rehabilitation activities.																		
Closure and Rehabilitation	**Visual aspects**	Visibility of solid domestic and operational waste.	Closure Phase	Local	3	Short term	1	Low	2	Nearly completely	2	8	High	4	Low	32	Low	0.8	Low	25.6
Closure and Rehabilitation	**Waste (Including Hazardous Waste)**	Generation and disposal of general waste, litter and hazardous material during the operational phase and operational waste i.e. waste rock, tailings etc.	Closure Phase	Local	2	Short term	1	Medium	3	Partly reversible	3	9	High	4	Low	36	Medium	0.6	Low	21.6
Closure and Rehabilitation, Rehabilitation of site, removal of infrastructure, sealing of shafts and closure of waste facilities	**Waste (Including Hazardous Waste)**	Generation and disposal of additional hazardous operational waste i.e. waste rock, tailings, etc.	Closure Phase	Local	2	Short term	1	High	4	Partly reversible	3	10	High	4	Low	40	Medium	0.6	Low	24
Closure and Rehabilitation	**Services**	Need for additional services i.e. water, electricity and sewerage systems during the closure phase causing additional strain on natural resources and infrastructure.	Closure Phase	Regional	3	Short term	1	Medium	3	Nearly completely	2	9	High	4	Low	36	Low	0.8	Low	28.8
Closure and Rehabilitation	**Traffic**	The change in the traffic patterns as a result of traffic entering and exiting the proposed mine on the surrounding road infrastructure and existing traffic.	Closure Phase	Regional	3	Short term	1	Low	2	Nearly completely	2	8	High	4	Low	32	Low	0.8	Low	25.6
Closure and Rehabilitation	**Traffic**	Nuisance, health and safety risks	Closure Phase	Regional	3	Short term	1	Low	2	Nearly completely	2	8	High	4	Low	32	Low	0.8	Low	25.6

Activity	Aspects Affected	Potential Impact	Phase	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability		Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
		caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.																		
Closure and Rehabilitation	**Health and Safety**	Possibility of closure activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.	Closure Phase	Site	2	Short term	1	Medium	3	Partly reversible	3	9	Medium	3	Low	27	Medium	0.6	Very Low	16.2
Closure and Rehabilitation	**Health and Safety**	Increased risk to public health and safety: Dangerous areas including the waste management facilities poses health risks and possible loss of life to mine workers and visitors to the site.	Closure Phase	Site	2	Short term	1	Medium	3	Partly reversible	3	9	Medium	3	Low	27	Medium	0.6	Very Low	16.2
Closure and Rehabilitation	**Socio-Economic**	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Closure Phase	Regional	4	Short term	1	Low	2	Nearly irreversible	4	11	Medium	3	Low	33	Medium	0.6	Very Low	19.8
Closure and Rehabilitation	**Socio-Economic**	Economic impact should there be an incident of public health and safety.	Closure Phase	Regional	4	Long term	4	High	4	Partly reversible	3	15	Medium	3	Medium	45	Low	0.8	Low	36
Closure and Rehabilitation	**Socio-Economic**	Sourcing supplies from local residents and businesses	Closure Phase	Regional	4	Short term	1	High	4	Nearly irreversible	4	13	Medium	3	Low	39	Low	0.8	Low	31.2

Activity	Aspects Affected	Potential Impact	Phase	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability		Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
		boosting the local economy for an extended period of time.																		
Closure and Rehabilitation	**Socio-Economic**	Reduced period of providing employment for local residents and skills transfer to unskilled and semi-skilled unemployed individuals.	Closure Phase	Regional	4	Short term	1	Medium	3	Nearly completely	2	10	Medium	3	Low	30	Medium	0.6	Very Low	18
NO-GO Option																				
No-Go Option	**Socio-Economic**	Reduced period of development and upliftment of the surrounding communities and infrastructure.	N/A	Regional	4	Long term	4	High	4	Partly reversible	3	15	Medium	3	Medium	45	N/A	1	Medium	45
No-Go Option	**Socio-Economic**	Reduced period of development of the economic environment, by job provision and sourcing supplies for and from local residents and businesses.	N/A	Regional	4	Long term	4	High	4	Partly reversible	3	15	Medium	3	Medium	45	N/A	1	Medium	45
No-Go Option	**Socio-Economic**	Positive: No additional negative impacts on the environment	N/A	Regional	4	Long term	4	High	4	Partly reversible	3	15	Medium	3	Medium	45	N/A	1	Medium	45

The supporting impact assessment conducted by the EAP must be attached as an appendix. **(Considerations used to inform the impact assessment was included in the section above. Please refer to the discussion in Section 11.5).**

12.2 THE POSSIBLE MITIGATION MEASURES THAT COULD BE APPLIED AND THE LEVEL OF RISK

(With regard to the issues and concerns raised by affected parties provide a list of the issues raised and an assessment/ discussion of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered).

Management Objectives and Mitigation types for each aspect is provided here. Mitigation measures are prescribed within the Environmental Management Programme (EMPR).

Table 12-2: Summary of the key environmental impacts and Management Objectives and Mitigation Type

Activity	Aspects Affected	Potential Impact	Phase	Management Objectives	Mitigation Type	Residual Risk
Operational Phase						
Extending of the underground mining sections; Blasting and Drilling	**Soils**	Soil compaction by heavy duty vehicles.	Operational Phase	Early detection of impacts and remediation thereof.	Visual inspection/confirmation that no surface impacts are occurring. Management and Rehabilitation (If required)	Very Low
Extending of the underground mining sections; Blasting and Drilling	**Soils**	Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints.	Operational Phase	To prevent contamination of soils.	Remedy through rehabilitation, proper removal and disposal if soils have become contaminated	Very Low
Underground mining; Blasting and Drilling	**Land Capability and Land Use**	Possibility of mining activities and workers causing veld fires destroying veld and animals on the study area and on adjacent land, impacting on the livelihood of surrounding land owners and users.	Operational Phase	Implement concurrent rehabilitation where possible and adhere to TRP Final Closure and Rehabilitation Plan.	Visual inspection/confirmation that no additional surface impacts are occurring. Management and Rehabilitation (If required)	Very Low
Underground mining; Blasting and Drilling	**Blasting**	Blasting hazard, specifically Ground vibration	Operational Phase	To prevent impacts on people and animals and to avoid damage to structures.	Control through management (third-party monitoring) and communication	Very Low
Underground mining; Blasting and Drilling	**Ecological Impacts**	Disturbance and loss of fauna through noise, light and dust pollution and hunting, trapping and killing of fauna.	Operational Phase	Early detection of impacts and remediation thereof.	Visual inspection/confirmation that no additional surface impacts are occurring. Management and Rehabilitation	Very Low

Activity	Aspects Affected	Potential Impact	Phase	Management Objectives	Mitigation Type	Residual Risk
					(If required)	
Underground mining; Blasting and Drilling	**Ecological Impacts**	Spreading of alien invasive species and bush encroachment of indigenous species.	Operational Phase	Early detection of impacts and remediation thereof.	Visual inspection/confirmation that no additional surface impacts are occurring. Management and Rehabilitation (If required)	Very Low
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the operational phase.	Operational Phase	Prevent hydrological impacts and prevent contamination of water resources	Stormwater Management, Monitoring, Infrastructure Design	Low
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from construction vehicles; - Other chemicals from maintenance activities e.g. paints; and - Effluent discharges, due to a lack of stormwater management and system maintenance.	Operational Phase	To limit the impact of infiltration of potentially contaminated leachate to the underlying aquifers.	Infrastructure designs; Management; Monitoring	Low
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Impact of Nitrate based explosives used during mining on groundwater quality. Contamination plume can affect the groundwater resource.	Operational Phase	Prevent hydrological impacts and prevent contamination of water resources	Stormwater Management, Monitoring, Infrastructure Design	Low
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the operational phase.	Operational Phase	Keep record of the dewatering volumes and water levels of the aquifer	Monitoring of water levels and possible impacts on the aquifer	Low
Loading, hauling and conveying RoM to the Processing Plant, Processing of the RoM	**Hydrological Aspects; Surface water and Groundwater**	Possible impact on surface and groundwater from contaminated process water.	Operational Phase	Prevent hydrological impacts and prevent contamination of water resources	Stormwater Management, Monitoring, Infrastructure Design	Very Low

Activity	Aspects Affected	Potential Impact	Phase	Management Objectives	Mitigation Type	Residual Risk
Loading, hauling and conveying RoM to the Processing Plant, Processing of the RoM	**Hydrological Aspects; Surface water and Groundwater**	Possible impact of spills and overflows from pollution control dams and facilities.	Operational Phase	Prevent hydrological impacts and prevent contamination of water resources	Stormwater Management, Monitoring, Infrastructure Design	Very Low
Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Hydrological Aspects; Surface water and Groundwater**	Seepage from waste management activities e.g. waste rock dumps could cause a contamination plume affecting the underground water resources.	Operational Phase	Prevent and monitor seepage	Stormwater Management, Monitoring, Infrastructure Design	Medium
Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Hydrological Aspects; Surface water and Groundwater**	Discharge from Tailing Storage facilities and associated water handling infrastructure can cause contamination of surface water resources.	Operational Phase	Monitor integrity of PCDs and TSF. Keep record of disposal rates and maximum capacity.	Stormwater Management, Monitoring, Infrastructure Design	Low
Underground mining; Blasting and Drilling	**Air Quality**	Increased dust pollution (soil and ore fines), vehicles on gravel roads and storage of tailings and waste rock, as well as other mining and processing activities.	Operational Phase	To limit public exposure to unacceptable health risks.	Monitor conditions underground workers are exposed to.	Very Low
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Air Quality**	Increased windborne dust (soil and ore fines), vehicle fumes and particulate matter PM10, altering air quality.	Operational Phase	To limit public exposure to unacceptable health risks.	Adhere to Dust regulations already implemented on TRP	Very Low
Loading, hauling and conveying RoM to the Processing Plant	**Air Quality**	Increased dust pollution (soil and ore fines), vehicles on gravel roads and transport of RoM	Operational Phase	To limit public exposure to unacceptable health risks.	Adhere to Dust regulations already implemented on TRP	Very Low
Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of the mining	Operational Phase	Responsible blasting and avoiding unnecessary noise and lighting sources.	Be mindful of additional noise sources. Monitoring of Noise levels	Low

Activity	Aspects Affected	Potential Impact	Phase	Management Objectives	Mitigation Type	Residual Risk
		activities and processing.				
Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Disturbance due to vibrations caused by vehicles.	Operational Phase	Responsible blasting and avoiding unnecessary noise and lighting sources.	Be mindful of additional noise sources. Monitoring of Noise levels	Low
Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Impact of security lighting on surrounding landowners and animals.	Operational Phase	Responsible blasting and avoiding unnecessary noise and lighting sources.	Be mindful of additional noise sources. Monitoring of Noise levels	Low
Underground mining; Blasting and Drilling	**Sites of archaeological and cultural interests**	None expected	Operational Phase	To avoid disturbing sites of archaeological and cultural interest. If any new heritage aspects are discovered, a specialist must be called for evaluation. This must be done in accordance with legal requirements.	Management; Conservation; Permitting	N/A
Underground mining; Blasting and Drilling	**Visual aspects**	Visibility from sensitive receptors / visual scarring of the landscape and impact on 'Sense of Place' as a result of the visibility of the mining site including the waste management facilities and mining activities.	Operational Phase	None prescribed at present as no surface infrastructure is envisaged. Implement Visual surface condition monitoring to identify early warning signs of impacts occurring on surface.	Monitoring and Rehabilitation if required	Low
Underground mining; Blasting and Drilling	**Visual aspects**	Visibility of solid domestic and operational waste.	Operational Phase	None prescribed at present as no surface infrastructure is envisaged. Implement Visual surface condition monitoring to identify early warning signs of impacts occurring on surface.	Monitoring and Rehabilitation if required	Low
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM	**Waste**	Generation and disposal of general waste, litter and hazardous material during the operational phase and operational waste i.e. waste rock, tailings etc.	Operational Phase	Adhere to responsible water management practices	Monitor waste	Low
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto	**Waste (Including Hazardous Waste)**	Generation and disposal of additional hazardous operational waste i.e. waste rock, tailings, etc.	Operational Phase	Adhere to responsible water management practices	Monitor waste volumes produced and disposed	Low

Activity	Aspects Affected	Potential Impact	Phase	Management Objectives	Mitigation Type	Residual Risk
waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.						
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Services**	Need for services e.g. water, electricity and sewerage systems, causing additional strain on natural resources and service infrastructure.	Operational Phase	Planning to prevent impacts	Infrastructure designs; Management; Monitoring	Low
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Traffic**	The change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic.	Operational Phase	Planning to prevent impacts	Infrastructure designs; Management; Monitoring	Low
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Traffic**	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Operational Phase	Planning to prevent impacts	Infrastructure designs; Management; Monitoring	Low
Underground mining; Blasting and Drilling	**Health and Safety**	Possibility of mining activities and workers causing veld fires, which can potentially cause injury and or loss of life to mine workers and surrounding landowners, visitors and workers.	Operational Phase	Adhere to Health and Safety Regulations	Infrastructure designs; Management; Monitoring	Low
Underground mining; Blasting and Drilling, Deposition of waste rock and tailings onto	**Health and Safety**	Increased risk to public health and safety: Dangerous areas including the waste	Operational Phase	Adhere to Health and Safety Regulations	Infrastructure designs; Management; Monitoring	Low

Activity	Aspects Affected	Potential Impact	Phase	Management Objectives	Mitigation Type	Residual Risk
waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.		management activities and waste poses health risks and possible loss of life to mine workers and visitors to the site.				
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Health and Safety**	Increased risk to public and worker health and safety	Operational Phase	Adhere to Health and Safety Regulations	Infrastructure designs; Management; Monitoring	Low
Underground mining; Blasting and Drilling	**Socio-Economic**	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Operational Phase	To enhance the socio-economic benefits of the project.	Management; Communication; Strategy implementation	Low
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM	**Socio-Economic: Positive Impacts**	Extended employment provision due to the implementation of the extension of the mining activities, allowing mining activities to continue for additional years.	Operational Phase	Enhance Socio-Economic environment	Management; Communication; Strategy implementation	Medium
Underground mining; Blasting and Drilling	**Socio-Economic: Positive Impacts**	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Operational Phase	Enhance Socio-Economic environment	Management; Communication; Strategy implementation	Medium
Closure Phase						
Closure and Rehabilitation	**Geology and Soils**	Soil compaction by heavy duty vehicles.	Closure Phase	Early detection of impacts and remediation thereof.	Rehabilitation and Monitoring	Very Low
Closure and Rehabilitation	**Geology and Soils**	Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles	Closure Phase	To prevent contamination of soils.	Remedy through rehabilitation, proper removal and disposal if soils have become contaminated	Very Low

Activity	Aspects Affected	Potential Impact	Phase	Management Objectives	Mitigation Type	Residual Risk
		and other chemicals from operational and maintenance activities e.g. paints.				
Rehabilitation of site, removal of infrastructure, sealing of shafts and closure of waste facilities	**Geology and Soils**	Soil erosion	Closure Phase	Prevent and rehabilitate soil erosion	Rehabilitation and Monitoring	Very Low
Closure and Rehabilitation	**Land Capability and Land Use**	Possibility of mining activities and workers causing veld fires destroying veld and animals on the study area and on adjacent land, impacting on the livelihood of surrounding land owners and users.	Closure Phase	Implement Final Land Use / Final Land form of TRP at End of Life	Rehabilitation and Monitoring	Very Low
Closure and Rehabilitation	**Ecological Impacts**	Disturbance and loss of fauna through noise, light and dust pollution as well as hunting, trapping and killing of fauna.	Closure Phase	Restore Land Use and Land Capability	Rehabilitation and Monitoring	Very Low
Closure and Rehabilitation	**Ecological Impacts**	Spreading of alien invasive species and bush encroachment of indigenous species.	Closure Phase	Restore Land Use and Land Capability	Rehabilitation and Monitoring	Very Low
Closure and Rehabilitation	**Ecological Impacts - Positive Impact**	Rehabilitation of area with natural vegetation and re-establishment of local biodiversity	Closure Phase	Restore Land Use and Land Capability	Rehabilitation and Monitoring	Very Low
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the closure phase.	Closure Phase	Prevent hydrological impacts and prevent contamination of water resources during Closure Phase	Infrastructure designs; Management; Monitoring	Low
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from heavy duty vehicles; - Effluent discharges, due to a	Closure Phase	Prevent hydrological impacts and prevent contamination of water resources during Closure Phase	Stormwater Management, Monitoring, Infrastructure Design	Very Low

Activity	Aspects Affected	Potential Impact	Phase	Management Objectives	Mitigation Type	Residual Risk
		lack of stormwater management.				
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the closure phase.	Closure Phase	Keep record of the dewatering volumes and water levels of the aquifer	Monitoring of water levels and possible impacts on the aquifer	Low
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Impaction groundwater from the pollution plume associated with the waste storage facilities.	Closure Phase	Prevent hydrological impacts and prevent contamination of water resources. Prevent and monitor seepage/decant and pollution plumes.	Stormwater Management, Monitoring, Infrastructure Design	Low
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Contamination plume stemming from the underground sections could be affecting the underground water resources.	Closure Phase	Prevent hydrological impacts and prevent contamination of water resources. Prevent and monitor seepage/decant and pollution plumes.	Stormwater Management, Monitoring, Infrastructure Design	Medium
Closure and Rehabilitation	**Air Quality**	Dust (soil and ore fines) pollution due to rehabilitation activities and heavy duty vehicles.	Closure Phase	To limit public exposure to unacceptable health risks.	Adhere to Dust regulations already implemented on TRP	Very Low
Closure and Rehabilitation	**Air Quality**	Windborne dust (soil and ore fines) and vehicle fumes and particulate matter PM10, altering air quality.	Closure Phase	To limit public exposure to unacceptable health risks.	Adhere to Dust regulations already implemented on TRP	Very Low
Closure and Rehabilitation	**Noise, Vibration and Lighting**	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of heavy duty vehicles and equipment.	Closure Phase	To limit public exposure to unacceptable health risks.	Be mindful of additional noise sources. Monitoring of Noise levels.	Very Low
Closure and Rehabilitation	**Noise, Vibration and Lighting**	Disturbance due to vibrations caused by heavy duty vehicles.	Closure Phase	To limit public exposure to unacceptable health risks.	Be mindful of additional noise sources. Monitoring of Noise levels.	Very Low
Closure and Rehabilitation	**Noise, Vibration and Lighting**	Impact of security lighting on surrounding landowners and animals.	Closure Phase	Responsible blasting and avoiding unnecessary noise and lighting sources.	Be mindful of additional noise sources. Monitoring of Noise levels.	Very Low
Closure and Rehabilitation	**Sites of archaeological and cultural interests**	None expected	Closure Phase	To avoid disturbing sites of archaeological and cultural interest. If any new heritage aspects are discovered, a	Management; Conservation; Permitting	None known at present

Activity	Aspects Affected	Potential Impact	Phase	Management Objectives	Mitigation Type	Residual Risk
				specialist must be called for evaluation. This must be done in accordance with legal requirements.		
Closure and Rehabilitation	**Visual aspects**	Visibility from sensitive receptors / visual scarring of the landscape as a result of the closure and rehabilitation activities.	Closure Phase	Rehabilitation and Monitoring	Monitoring and Rehabilitation if required	Low
Closure and Rehabilitation	**Visual aspects**	Visibility of solid domestic and operational waste.	Closure Phase	Rehabilitation and Monitoring	Monitoring and Rehabilitation if required	Low
Closure and Rehabilitation	**Waste (Including Hazardous Waste)**	Generation and disposal of general waste, litter and hazardous material during the operational phase and operational waste i.e. waste rock, tailings etc.	Closure Phase	Rehabilitation and Monitoring. Responsible disposal of waste	Environmental Awareness, Monitoring and Rehabilitation if required	Low
Closure and Rehabilitation, Rehabilitation of site, removal of infrastructure, sealing of shafts and closure of waste facilities	**Waste (Including Hazardous Waste)**	Generation and disposal of additional hazardous operational waste i.e. waste rock, tailings, etc.	Closure Phase	Rehabilitation and Monitoring. Responsible disposal of waste	Environmental Awareness, Monitoring and Rehabilitation if required	Low
Closure and Rehabilitation	**Services**	Need for additional services i.e. water, electricity and sewerage systems during the closure phase causing additional strain on natural resources and infrastructure.	Closure Phase	Planning to prevent impacts	Environmental Awareness, Infrastructure designs; Management; Monitoring	Low
Closure and Rehabilitation	**Traffic**	The change in the traffic patterns as a result of traffic entering and exiting the proposed mine on the surrounding road infrastructure and existing traffic.	Closure Phase	Planning to prevent impacts	Infrastructure designs; Management; Monitoring	Low
Closure and Rehabilitation	**Traffic**	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Closure Phase	Planning to prevent impacts	Infrastructure designs; Management; Monitoring	Low
Closure and Rehabilitation	**Health and Safety**	Possibility of closure activities	Closure	Adhere to Health and Safety	Environmental Awareness,	Very Low

Activity	Aspects Affected	Potential Impact	Phase	Management Objectives	Mitigation Type	Residual Risk
		and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.	Phase	Regulations	Monitoring	
Closure and Rehabilitation	**Health and Safety**	Increased risk to public health and safety: Dangerous areas including the waste management facilities poses health risks and possible loss of life to mine workers and visitors to the site.	Closure Phase	Adhere to Health and Safety Regulations	Environmental Awareness, Infrastructure designs; Management; Monitoring	Very Low
Closure and Rehabilitation	**Socio-Economic**	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Closure Phase	Adhere to Health and Safety Regulations	Infrastructure designs; Management; Monitoring	Very Low
Closure and Rehabilitation	**Socio-Economic**	Economic impact should there be an incident of public health and safety.	Closure Phase	To enhance the socio-economic benefits of the project. Source Local residents during Closure Phase	Management; Communication; Strategy implementation	Low
Closure and Rehabilitation	**Socio-Economic**	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Closure Phase	To enhance the socio-economic benefits of the region as long as possible.	Management; Communication; Strategy implementation	Low
Closure and Rehabilitation	**Socio-Economic**	Reduced period of providing employment for local residents and skills transfer to unskilled and semi-skilled unemployed individuals.	Closure Phase	To enhance the socio-economic benefits of the project. Focus on skill-transfer.	Management; Communication; Strategy implementation	Very Low
NO-GO Option						
No-Go Option	**Socio-Economic**	Reduced period of development and upliftment of the surrounding communities and infrastructure.	Closure Phase	No Additional Management Objectives if Project does not proceed	N/A	Medium
No-Go Option	**Socio-Economic**	Reduced period of development of the economic environment, by job provision and sourcing	Closure Phase	No Additional Management Objectives if Project does not proceed	N/A	Medium

Activity	Aspects Affected	Potential Impact	Phase	Management Objectives	Mitigation Type	Residual Risk
		supplies for and from local residents and businesses.				
No-Go Option	**Socio-Economic**	Positive: No additional negative impacts on the environment	Closure Phase	No Additional Management Objectives if Project does not proceed	N/A	Medium

12.3 SUMMARY OF SPECIALIST REPORTS

(This summary must be completed if any specialist reports informed the impact assessment and final site layout process and must be in the following tabular form):

Table 12-3: Specialist Recommendations Summarised

List Of Studies Undertaken	Recommendations Of Specialist Reports	Specialist Recommendations That Have Been Included In The EIA Report	Reference To Applicable Section Of Report Where Specialist Recommendations Have Been Included.
Surface water	An updated Surface water assessment was not conducted as no surface water will be directly impacted. No additional surface impacts or infrastructure forms part of the TRP Underground application. Existing surface infrastructure on the TRP is utilised and will adhere to the National Water Act, 1998 (Act No. 36 of 1998). *Information regarding the Surface water environment has been sourced from the available information of TRP mine and the 2015 Considated EIA/EMPR and has been included within this report.*	**X**	Section 9.8, Section 10.5, Section 11.5.9, and all impact and management tables
Hydrogeology	**Site Assessment** 1. A hydrocensus was conducted across the Project area during February 2018. The survey included the proposed mining footprint areas and adjacent properties and concentrated on identifying existing boreholes to enhance the knowledge of the groundwater systems and current groundwater use. 2. During the 2018 hydrocensus 51 groundwater sites (boreholes and springs) were identified. 3. The average groundwater level for the area is 12 m bgl with an increase in depth of the water table as the surface elevation increases. Boreholes at higher elevations, close to the pit area, have maximum water levels of 21 m bgl. 4. The static water levels in the site area measured during the 2018 hydrocensus ranged between zero and 54 m. There is a big difference in groundwater level depths between the	**X**	Section 9.7, Section 10.4, Section 11.5.10, As well as all Impact and Management tables.

List Of Studies Undertaken	Recommendations Of Specialist Reports	Specialist Recommendations That Have Been Included In The EIA Report	Reference To Applicable Section Of Report Where Specialist Recommendations Have Been Included.
	Dwars River valley (where the mines are) and the valley towards the west (farm Kalkfontein). The groundwater table in the Kalkfontein area is on average 38 m bgl and for the Dwars River valley area approximately 7 m bgl. The shallow groundwater table potentially relates to the various perennial stream transecting this area / valley. 5. The groundwater level varied from surface at the spring and boreholes TRPGWM06S and TRPGWM06D, to a maximum depth of 54.65 m bgl at borehole H35-0078. Boreholes TRPGWM06S and TRPGWM06D are located downstream from the Richmond Dam. 6. The groundwater in the valley to the west of the Tamboti mining area is defined by the calcium/ magnesium-bicarbonate type water. This area is characterised by agricultural activities and grazing. 7. A high nitrate concentration was measured in one borehole (H35-0177) in this valley. It has been assumed that the elevated nitrate concentration is associated with animal movement around this borehole. 8. The sodium–chloride and sodium/ magnesium-sulphate waters are associated with the valley hosting the Tamboti mining area. Magnesium and calcium concentrations aresimilar to the valley to the west, but elevated concentrations of sulphate, nitrate, chloride, sodium and total chromium were also measured. 9. It was not possible to identify a trend in terms of the shallow and deep aquifer water qualities. Elevated element concentrations were measured in some shallow boreholes, but not in the adjacent deep monitoring borehole. In other areas the opposite was observed and in other borehole sets both measured high concentrations. It has been assumed that groundwater of poor quality is present in the shallow and deep aquifers and that flow along fracture sets contribute to the random water qualities. The remaineder of the salts and metals (based on the various analysis done) were within the SANS drinking water guideline limits. Calcium and total hardness concentrations did however exceed the DWS drinking water guidelines, but relate more to scaling effects that are likely to occur in water heating appliances such as kettles and geysers, and results in low efficiencies and the partial obstruction of pipes. **Groundwater flow model and simulated impacts** 1. The FEFLOW® model was constructed using 441 502 elements and 332 025 nodes, spatially distributed over 2 layers.		

List Of Studies Undertaken	Recommendations Of Specialist Reports	Specialist Recommendations That Have Been Included In The EIA Report	Reference To Applicable Section Of Report Where Specialist Recommendations Have Been Included.
	2. The minimum calibration error is 1.84 m and the maximum error 16.30 m. The standard practice for calibration evaluation is to obtain a Root Mean Square Error (RMSE) of such a value that, when compared with the head difference measured in the modelled area, it should not exceed 10%. In this case the RMSE correlates to approximately 2% measured against the water level changes over the model domain (% of the difference between the maximum and minimum simulated head distribution). 3. The maximum simulated change in hydraulic head is at the abstraction borehole TRPGWM16D (~1.91m change in simulated head). The average change in head simulated is 0.43 m. 4. The figure indicates that initially the underground mine workings dewatering rapidly reaches 930 m^3/d and then decreases for the remainder of the 5 years of mining. 5. There is no management action that will prevent damage to the aquifer structure and avoid the need for aquifer dewatering. Recorded water supply losses could be supplied by the mine to affected 3rd party and/or private water users. Monitoring network installed must be followed diligently.		
Land Use & Soil Potential	An updated Land Use and Soil Potential study was not conducted as no surface areas will directly be impacted. No additional surface impacts or infrastructure forms part of the TRP Underground application. Existing surface infrastructure on the TRP is utilised and will adhere to all relevant Regulations to protect the Environment. *Information regarding the Land Use and Soil environment has been sourced from the available information of TRP mine and the 2015 Considated EIA/EMPR and has been included within this report.*	**X**	Section 9.5, 10.1, Section 11.5.2 and Impact and Management tables.
Ecology	An updated Ecological study was not conducted as no surface areas will directly be impacted. No additional surface impacts or infrastructure forms part of the TRP Underground application. Existing surface infrastructure on the TRP is utilised and will adhere to all relevant Regulations to protect the Environment. *Information regarding the Ecological environment has been sourced from the available information of TRP and the 2015 Considated EIA/EMPR and has been included within this report.*	**X**	Section 9.9, Section 10.2, Section 11.5.3 and Section 11.5.3. As well as all the Impact and Management Tables.
Archaeology and Heritage	An updated Archaeological study was not conducted as no surface areas will directly be impacted. No additional surface impacts or infrastructure forms part of the TRP Underground application. Existing surface infrastructure on the TRP is utilised and will adhere to all relevant Regulations to protect the	**X**	Section 9.13, Section 10.6, Section 11.5.4 as well as all the Impact and Management Tables.

List Of Studies Undertaken	Recommendations Of Specialist Reports	Specialist Recommendations That Have Been Included In The EIA Report	Reference To Applicable Section Of Report Where Specialist Recommendations Have Been Included.
	Environment. *Information regarding the Heritage environment has been sourced from the available information of TRP and the 2015 Considated EIA/EMPR and has been included within this report.* The areas covered, from the existing mine, indicated both Iron Age and historical occupation, but no sites of heritage significance. Graves were found in these areas but have since been relocated prior to the start of trial mining, in consultation with the affected community. SAHRA requested an exemption letter from a Heritage specialist in this regard an this was completed as part of the Scope of the EIA. The specialist findings were as follows: The proposed extension of Two Rivers Platinum's underground mining activities to the Tamboti Mining Right Area and Prospecting areas will not include any surface construction activities, only the expansion of underground workings. The existing surface infrastructure will be used to store the ore body and dispose of the waste rock (Figures 3 & 4). In terms of heritage, a Heritage Impact Assessment was done by Pistorius (2009) on various portions of the of the Farms Kalkfontein 367KT and on Buffelshoek 368 KT. It is therefore important that this report be read in conjunction with the existing HIA. The HIA survey revealed several graveyards on Portion 8 of the Farm Kalkfontein 367 KT, located about 1.1 km west of the boundary of the 2017-2022 mining schedule. The previously identified heritage sites, as well as the rough extent of the current mining infrastructure, were plotted on a topographical map (Figure 4 of the Exemption letter). Because the proposed expansion will consist of underground mining only, it is recommended that the applicant applying for the extension of the underground mining area be exempted from further Phases of archaeological impact assessments, subject to minimum standards: Archaeological and Palaeontological Components of Impact Assessments as set out by the South African Heritage Resources Agency (SAHRA) which states that: When a property is either very disturbed (e.g. has been quarried or mined) or is very small and the archaeologist can see that it is highly unlikely that any archaeological remains will be found, a 'Letter of Recommendation for Exemption' from a full Phase 1 report may be supplied. The following recommendations are made in order to avoid the destruction of heritage remains in the		

List Of Studies Undertaken	Recommendations Of Specialist Reports	Specialist Recommendations That Have Been Included In The EIA Report	Reference To Applicable Section Of Report Where Specialist Recommendations Have Been Included.
	demarcated areas: • Should the need arise to develop any additional surface areas, it is recommended that the area be inspected by a qualified archaeologist. This stems from the fact that Pistorius (2009) stated that additional burial sites that were not observed during the survey, might exist within the study area. • Because only existing mining infrastructure will be utilised for the proposed mining activities, no additional impacts should occur. Therefore, the proposed development may continue, subject to the abovementioned conditions. • Should culturally significant material may be exposed, all activities must be suspended pending further • Archaeological investigations by a qualified archaeologist. Also, should skeletal remains be exposed, all activities must be suspended and the relevant heritage resources authority contacted (See National Heritage Resources Act, 25 of 1999 section 36 (6)).		
Noise Quality, Blasting and Vibrations	An updated Noise study was not conducted as no surface areas will directly be impacted. No additional surface impacts or infrastructure forms part of the TRP Underground extention application. Existing surface infrastructure on the TRP mine is utilised and will adhere to all relevant Regulations to protect the Environment. *Information regarding the Noise environment has been sourced from the available information of TRP and the 2015 Considated EIA/EMPR and has been included within this report.* The recommendation is made that if current monitoring trends show an increase in noise pollution, the mine should consult with a blasting and vibration expert regarding underground mining activities. In terms of noise, the development may be authorised subject to the fact that no new surface infrastructure should be implemented without further acoustical investigations. It is recommended that a Blast specialist should also be consulted if blasting is to occur within 500 m of a sensitive receptor during all phases of the development.	**X**	Section 9.11, Section 10.3, Section 11.5.6 as well as all Impact and Management Tables.
Air Quality	An updated Air quality study was not conducted as no surface areas will directly be impacted. No additional surface impacts or infrastructure forms part of the TRP Underground extention application. Existing surface infrastructure on the TRP is utilised and will adhere to all relevant Regulations to protect the Environment.	**X**	Section 9.10. Section 10.8, Section 11.5.5 as well as Impact and Management Tables.

List Of Studies Undertaken	Recommendations Of Specialist Reports	Specialist Recommendations That Have Been Included In The EIA Report	Reference To Applicable Section Of Report Where Specialist Recommendations Have Been Included.
	Information regarding the Air quality environment has been sourced from the available information of TRP and the 2015 Considated EIA/EMPR and has been included within this report.		
Visual Assessment	An updated Visual assessment study was not conducted as no surface areas will directly be impacted. No additional surface impacts or infrastructure forms part of the TRP Underground extention application. Existing surface infrastructure on the TRP mine is utilised and will adhere to all relevant Regulations to protect the Environment. *Information regarding the Visual environment has been sourced from the available information of TRP and the 2015 Considated EIA/EMPR and has been included within this report.*	**X**	Section 9.12, Section 10.7, Section 11.5.8 as well as all Impact and Management Tables.
Socio-Economic Assessment	An updated Socio-Economic study was not conducted as no surface areas will directly be impacted and the mine is an existing operational mine. No additional surface impacts or infrastructure forms part of the TRP Underground extention application. Existing surface infrastructure on the TRP mine is utilised and will adhere to all relevant Regulations to protect the Environment. Adherence will be in accordance to the TRP Social and Labor Plan and implementation thereof. *Information regarding the Socio-Economic environment has been sourced from the available information of TRP mine and the 2015 Considated EIA/EMPR and has been included within the Scoping Report. However, since the municipal structures have changed slightly in 2016/2017, updated information was included within this report to ensure relevant and up to date data of the municipality in question.*	**X**	Section 9.14, Section 10.10 as well as all Impact and Management Tables

Attach copies of Specialist Reports as appendices.

12.4 ENVIRONMENTAL IMPACT STATEMENT

12.5 SUMMARY OF THE KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

The findings of the specialist studies undertaken for this EIA/EMP process provide an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed and existing project. The findings conclude that, provided that the recommended mitigation and management measures are implemented, there are no environmental fatal flaws that should prevent the proposed project from proceeding.

In order to achieve appropriate environmental management standards and ensure that the findings of the environmental studies are implemented through practical measures, the recommendations from this EIA/EMP will form part of the contract with the contractors appointed to construct and maintain the proposed mine and associated infrastructure. The EIA/EMP would be used to ensure compliance with environmental specifications and management measures. The implementation of this EIA/EMP for key cycle phases (i.e. construction, operation and closure/decommissioning) of the proposed project is considered to be fundamental in achieving the appropriate environmental management standards as detailed for this project.

As described previously, construction based impacts are not expected a the mine is an existing mine within the operational phase. For a detailed impact assessment layout specifying all the ratings used to obtain Significance of impacts with and without mitigation, refer to Table 12-1 above. For a summary giving only the Significance obtained, refer below. Impacts have been discussed in detail within Section 11.5.

Table 12-4: Summary of Key findings in terms of Impact Significance

Activity	Aspects Affected	Potential Impact	Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
Operational Phase								
Extending of the underground mining sections; Blasting and Drilling	**Soils**	Soil compaction by heavy duty vehicles.	Low	30	High	0.2	Very Low	6
Extending of the underground mining sections; Blasting and Drilling	**Soils**	Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints.	Low	30	High	0.2	Very Low	6
Underground mining; Blasting and Drilling	**Land Capability and Land Use**	Possibility of mining activities and workers causing veld fires destroying veld and animals on the study area and on adjacent land, impacting on the livelihood of surrounding land owners and users.	Low	22	High	0.2	Very Low	4.4
Underground mining; Blasting and Drilling	**Blasting**	Blasting hazard, specifically Ground vibration	Low	33	Medium	0.6	Very Low	19.8
Underground mining; Blasting and Drilling	**Ecological Impacts**	Disturbance and loss of fauna through noise, light and dust pollution and hunting, trapping and killing of fauna.	Low	33	Medium	0.6	Very Low	19.8
Underground mining; Blasting and Drilling	**Ecological Impacts**	Spreading of alien invasive species and bush encroachment of indigenous species.	Low	30	Medium	0.6	Very Low	18
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the operational phase.	Low	39	Medium	0.6	Low	23.4
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from construction vehicles; - Other chemicals from maintenance activities e.g. paints; and - Effluent discharges, due to a lack of stormwater management and system maintenance.	Medium	42	Medium	0.6	Low	25.2
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Impact of Nitrate based explosives used during mining on groundwater quality. Contamination plume can affect the groundwater resource.	Medium	56	Medium	0.6	Low	33.6
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the operational phase.	Medium	56	Medium	0.6	Low	33.6
Loading, hauling and conveying RoM to the Processing Plant, Processing of the RoM	**Hydrological Aspects; Surface water and Groundwater**	Possible impact on surface and groundwater from contaminated process water.	Medium	48	High	0.2	Very Low	9.6
Loading, hauling and conveying RoM to the	**Hydrological Aspects; Surface water and**	Possible impact of spills and overflows from pollution control dams and facilities.	Medium	48	High	0.2	Very Low	9.6

Activity	Aspects Affected	Potential Impact	Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
Processing Plant, Processing of the RoM	**Groundwater**							
Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Hydrological Aspects; Surface water and Groundwater**	Seepage from waste management activities e.g. waste rock dumps, could cause a contamination plume affecting the underground water resources.	High	64	Low	0.8	Medium	51.2
Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Hydrological Aspects; Surface water and Groundwater**	Discharge from Tailing Storage facilities and associated water handling infrastructure can cause contamination of surface water resources.	Medium	48	Medium	0.6	Low	28.8
Underground mining; Blasting and Drilling	**Air Quality**	Increased dust pollution (soil and ore fines), vehicles on gravel roads and storage of tailings and waste rock, as well as other mining and processing activities.	Low	30	Medium	0.6	Very Low	18
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Air Quality**	Increased windborne dust (soil and ore fines), vehicle fumes and particulate matter PM10, altering air quality.	Low	30	Medium	0.6	Very Low	18
Loading, hauling and conveying RoM to the Processing Plant	**Air Quality**	Increased dust pollution (soil and ore fines), vehicles on gravel roads and transport of RoM	Low	30	Medium	0.6	Very Low	18
Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of the mining activities and processing.	Low	33	Low	0.8	Low	26.4
Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Disturbance due to vibrations caused by vehicles.	Low	30	Low	0.8	Low	24
Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Impact of security lighting on surrounding landowners and animals.	Low	30	Low	0.8	Low	24
Underground mining; Blasting and Drilling	**Sites of archaeological and cultural interests**	None expected	N/A				N/A	
Underground mining; Blasting and Drilling	**Visual aspects**	Visibility from sensitive receptors / visual scarring of the landscape and impact on 'Sense of Place' as a result of the visibility of the mining site including the waste management facilities and mining activities.	Low	33	Low	0.8	Low	26.4
Underground mining; Blasting and Drilling	**Visual aspects**	Visibility of solid domestic and operational waste.	Low	33	Low	0.8	Low	26.4
Underground mining;	**Waste**	Generation and disposal of general waste, litter and	Medium	48	Medium	0.6	Low	28.8

Activity	Aspects Affected	Potential Impact	Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM		hazardous material during the operational phase and operational waste i.e. waste rock, tailings etc.						
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Waste (Including Hazardous Waste)**	Generation and disposal of additional hazardous operational waste i.e. waste rock, tailings, etc.	Medium	52	Medium	0.6	Low	31.2
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Services**	Need for services e.g. water, electricity and sewerage systems, causing additional strain on natural resources and service infrastructure.	Medium	48	Low	0.8	Low	38.4
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Traffic**	The change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic.	Medium	44	Low	0.8	Low	35.2
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Traffic**	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Medium	44	Low	0.8	Low	35.2

Activity	Aspects Affected	Potential Impact	Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
Underground mining; Blasting and Drilling	**Health and Safety**	Possibility of mining activities and workers causing veld fires, which can potentially cause injury and or loss of life to mine workers and surrounding landowners, visitors and workers.	Low	36	Medium	0.6	Low	21.6
Underground mining; Blasting and Drilling, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Health and Safety**	Increased risk to public health and safety: Dangerous areas including the waste management activities and waste poses health risks and possible loss of life to mine workers and visitors to the site.	Low	36	Medium	0.6	Low	21.6
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Health and Safety**	Increased risk to public and worker health and safety	Low	36	Medium	0.6	Low	21.6
Underground mining; Blasting and Drilling	**Socio-Economic**	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Medium	42	Medium	0.6	Low	25.2
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM	**Socio-Economic: Positive Impacts**	Extended employment provision due to the implementation of the extension of the mining activities, allowing mining activities to continue for additional years.	Medium	45	N/A	1	Medium	45
Underground mining; Blasting and Drilling	**Socio-Economic: Positive Impacts**	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Medium	48	N/A	1	Medium	48
Closure Phase								
Closure and Rehabilitation	**Geology and Soils**	Soil compaction by heavy duty vehicles.	Low	21	High	0.2	Very Low	4.2
Closure and Rehabilitation	**Geology and Soils**	Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints.	Low	21	High	0.2	Very Low	4.2
Rehabilitation of site, removal of infrastructure, sealing of shafts and closure of waste facilities	**Geology and Soils**	Soil erosion	Low	21	High	0.2	Very Low	4.2

Activity	Aspects Affected	Potential Impact	Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
Closure and Rehabilitation	**Land Capability and Land Use**	Possibility of mining activities and workers causing veld fires destroying veld and animals on the study area and on adjacent land, impacting on the livelihood of surrounding land owners and users.	Very Low	16	High	0.2	Very Low	3.2
Closure and Rehabilitation	**Ecological Impacts**	Disturbance and loss of fauna through noise, light and dust pollution as well as hunting, trapping and killing of fauna.	Low	24	Medium	0.6	Very Low	14.4
Closure and Rehabilitation	**Ecological Impacts**	Spreading of alien invasive species and bush encroachment of indigenous species.	Low	21	Medium	0.6	Very Low	12.6
Closure and Rehabilitation	**Ecological Impacts - Positive Impact**	Rehabilitation of area with natural vegetation and re-establishment of local biodiversity	Low	30	Medium	0.6	Very Low	18
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the closure phase.	Medium	44	Medium	0.6	Low	26.4
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from heavy duty vehicles; - Effluent discharges, due to a lack of stormwater management.	Low	22	Medium	0.6	Very Low	13.2
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the closure phase.	Low	33	Medium	0.6	Low	19.8
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Impaction groundwater from the pollution plume associated with the waste storage facilities.	Low	30	Low	0.8	Low	24
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Contamination plume stemming from the underground sections could be affecting the underground water resources.	High	64	Low	0.8	Medium	51.2
Closure and Rehabilitation	**Air Quality**	Dust (soil and ore fines) pollution due to rehabilitation activities and heavy duty vehicles.	Low	30	Medium	0.6	Very Low	18
Closure and Rehabilitation	**Air Quality**	Windborne dust (soil and ore fines) and vehicle fumes and particulate matter PM10, altering air quality.	Low	30	Medium	0.6	Very Low	18
Closure and Rehabilitation	**Noise, Vibration and Lighting**	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of heavy duty vehicles and equipment.	Low	24	Low	0.8	Very Low	19.2
Closure and Rehabilitation	**Noise, Vibration and Lighting**	Disturbance due to vibrations caused by heavy duty vehicles.	Low	21	Low	0.8	Very Low	16.8
Closure and Rehabilitation	**Noise, Vibration and Lighting**	Impact of security lighting on surrounding landowners and animals.	Low	21	Low	0.8	Very Low	16.8
Closure and Rehabilitation	**Sites of archaeological and cultural interests**	None expected	N/A				N/A	
Closure and Rehabilitation	**Visual aspects**	Visibility from sensitive receptors / visual scarring of the landscape as a result of the closure and rehabilitation activities.	Low	32	Low	0.8	Low	25.6
Closure and Rehabilitation	**Visual aspects**	Visibility of solid domestic and operational waste.	Low	32	Low	0.8	Low	25.6

Activity	Aspects Affected	Potential Impact	Significance Without Mitigation		Mitigation Efficiently		Significance With Mitigation	
Closure and Rehabilitation	**Waste (Including Hazardous Waste)**	Generation and disposal of general waste, litter and hazardous material during the operational phase and operational waste i.e. waste rock, tailings etc.	Low	36	Medium	0.6	Low	21.6
Closure and Rehabilitation, Rehabilitation of site, removal of infrastructure, sealing of shafts and closure of waste facilities	**Waste (Including Hazardous Waste)**	Generation and disposal of additional hazardous operational waste i.e. waste rock, tailings, etc.	Low	40	Medium	0.6	Low	24
Closure and Rehabilitation	**Services**	Need for additional services i.e. water, electricity and sewerage systems during the closure phase causing additional strain on natural resources and infrastructure.	Low	36	Low	0.8	Low	28.8
Closure and Rehabilitation	**Traffic**	The change in the traffic patterns as a result of traffic entering and exiting the proposed mine on the surrounding road infrastructure and existing traffic.	Low	32	Low	0.8	Low	25.6
Closure and Rehabilitation	**Traffic**	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Low	32	Low	0.8	Low	25.6
Closure and Rehabilitation	**Health and Safety**	Possibility of closure activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.	Low	27	Medium	0.6	Very Low	16.2
Closure and Rehabilitation	**Health and Safety**	Increased risk to public health and safety: Dangerous areas including the waste management facilities poses health risks and possible loss of life to mine workers and visitors to the site.	Low	27	Medium	0.6	Very Low	16.2
Closure and Rehabilitation	**Socio-Economic**	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Low	33	Medium	0.6	Very Low	19.8
Closure and Rehabilitation	**Socio-Economic**	Economic impact should there be an incident of public health and safety.	Medium	45	Low	0.8	Low	36
Closure and Rehabilitation	**Socio-Economic**	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Low	39	Low	0.8	Low	31.2
Closure and Rehabilitation	**Socio-Economic**	Reduced period of providing employment for local residents and skills transfer to unskilled and semi-skilled unemployed individuals.	Low	30	Medium	0.6	Very Low	18
NO-GO Option								
No-Go Option	**Socio-Economic**	Reduced period of development and upliftment of the surrounding communities and infrastructure.	Medium	45	Low	0.8	Low	36
No-Go Option	**Socio-Economic**	Reduced period of development of the economic environment, by job provision and sourcing supplies for and from local residents and businesses.	Medium	45	Low	0.8	Low	36
No-Go Option	**Socio-Economic**	Positive: No additional negative impacts on the environment	Medium	45	Low	0.8	Low	36

12.6 FINAL SITE MAP

Provide a map at an appropriate scale which superimposes the proposed overall activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers. Attach as Appendix.

Please refer to Appendix 4.

12.7 PROPOSED IMPACT MANAGEMENT OBJECTIVES AND THE IMPACT MANAGEMENT OUTCOMES FOR INCLUSION IN THE EMPR

Based on the assessment and where applicable the recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorization.

Specialist recommendations which could be included as conditions have been discussed in Table 12-3. Specialist management measures as well as the significance of the impacts prior and post mitigation are provided in Table 12-1 and contained in the respective studies.

Table 12-5: Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr

Aspects Affected	Potential Impact	Phase	Management Objectives	Management Outcome
Operational Phase				
Soils	Soil compaction by heavy duty vehicles.	Operational Phase	Early detection of impacts and remediation thereof.	Early detection and prevention of possible impacts.
Soils	Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints.	Operational Phase	To prevent contamination of soils.	Prevention of soil and water pollution.
Land Capability and Land Use	Possibility of mining activities and workers causing veld fires destroying veld and animals on the study area and on adjacent land, impacting on the livelihood of surrounding land owners and users.	Operational Phase	Implement concurrent rehabilitation where possible and adhere to TRP Final Closure and Rehabilitation Plan.	Early detection and prevention of possible impacts. Restoration of Landscape function and Capability
Blasting	Blasting hazard, specifically Ground vibration	Operational Phase	To prevent impacts on people and animals and to avoid damage to structures.	Safe mining environment. Prevention of blasting related impacts.
Ecological Impacts	Disturbance and loss of fauna through noise, light and dust pollution and hunting, trapping and killing of fauna.	Operational Phase	Early detection of impacts and remediation thereof.	Prevent and/or remediate ecological impacts
Ecological	Spreading of alien	Operational	Early detection of	Prevent and/or remediate

Aspects Affected	Potential Impact	Phase	Management Objectives	Management Outcome
Impacts	invasive species and bush encroachment of indigenous species.	Phase	impacts and remediation thereof.	ecological impacts
Hydrological Aspects; Surface water and Groundwater	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the operational phase.	Operational Phase	Prevent hydrological impacts and prevent contamination of water resources	Prevention water pollution and impacts on the natural environment and surrounding water users.
Hydrological Aspects; Surface water and Groundwater	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from construction vehicles; - Other chemicals from maintenance activities e.g. paints; and - Effluent discharges, due to a lack of stormwater management and system maintenance.	Operational Phase	To limit the impact of infiltration of potentially contaminated leachate to the underlying aquifers.	Prevention water pollution and impacts on the natural environment and surrounding water users.
Hydrological Aspects; Surface water and Groundwater	Impact of Nitrate based explosives used during mining on groundwater quality. Contamination plume can affect the groundwater resource.	Operational Phase	Prevent hydrological impacts and prevent contamination of water resources	Prevention water pollution and impacts on the natural environment and surrounding water users.
Hydrological Aspects; Surface water and Groundwater	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the operational phase.	Operational Phase	Keep record of the dewatering volumes and water levels of the aquifer	Prevention decreasing water availability and impacts on the natural environment and surrounding water users.
Hydrological Aspects; Surface water and Groundwater	Possible impact on surface and groundwater from contaminated process water.	Operational Phase	Prevent hydrological impacts and prevent contamination of water resources	Prevention water pollution and impacts on the natural environment and surrounding water users.
Hydrological Aspects; Surface water and Groundwater	Possible impact of spills and overflows from pollution control dams and facilities.	Operational Phase	Prevent hydrological impacts and prevent contamination of water resources	Prevention water pollution and impacts on the natural environment and surrounding water users.
Hydrological Aspects; Surface water and Groundwater	Seepage from waste management activities e.g. waste rock dumps, could cause a contamination plume affecting the underground water resources.	Operational Phase	Prevent and monitor seepage	Prevention water pollution and impacts on the natural environment and surrounding water users.
Hydrological Aspects; Surface water and Groundwater	Discharge from Tailing Storage facilities and associated water handling infrastructure can cause contamination	Operational Phase	Monitor integrity of PCDs and TSF. Keep record of disposal rates and maximum capacity.	Prevent Discharge to the environment

Aspects Affected	Potential Impact	Phase	Management Objectives	Management Outcome
	of surface water resources.			
Air Quality	Increased dust pollution (soil and ore fines), vehicles on gravel roads and storage of tailings and waste rock, as well as other mining and processing activities.	Operational Phase	To limit public exposure to unacceptable health risks.	Ensure health and safety of mine workers within the underground sections as well as the surrounding environment
Air Quality	Increased windborne dust (soil and ore fines), vehicle fumes and particulate matter PM10, altering air quality.	Operational Phase	To limit public exposure to unacceptable health risks.	Ensure health and safety of mine workers within the underground sections as well as the surrounding environment. Conservation of the soil resource
Air Quality	Increased dust pollution (soil and ore fines), vehicles on gravel roads and transport of RoM	Operational Phase	To limit public exposure to unacceptable health risks.	Ensure health and safety of mine workers within the underground sections as well as the surrounding environment. Conservation of the soil resource
Noise, Vibration and Lighting	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of the mining activities and processing.	Operational Phase	Responsible blasting and avoiding unnecessary noise and lighting sources.	Reducing disturbing noise/light and vibration to outside boundaries.
Noise, Vibration and Lighting	Disturbance due to vibrations caused by vehicles.	Operational Phase	Responsible blasting and avoiding unnecessary noise and lighting sources.	Reducing disturbing noise/light and vibration to outside boundaries.
Noise, Vibration and Lighting	Impact of security lighting on surrounding landowners and animals.	Operational Phase	Responsible blasting and avoiding unnecessary noise and lighting sources.	Reducing disturbing noise/light and vibration to outside boundaries.
Sites of archaeological and cultural interests	None expected	Operational Phase	To avoid disturbing sites of archaeological and cultural interest. If any new heritage aspects are discovered, a specialist must be called for evaluation. This must be done in accordance with legal requirements.	No sites will be impacted. Consult a specialist if any heritage aspect is uncovered during any stage of the development.
Visual aspects	Visibility from sensitive receptors / visual scarring of the landscape and impact on 'Sense of Place' as a result of the visibility of the mining site including the waste management facilities and mining activities.	Operational Phase	None prescribed at present as no surface infrastructure is envisaged. Implement Visual surface condition monitoring to identify early warning signs of impacts occurring on surface.	Early detection and prevention of possible impacts.
Visual aspects	Visibility of solid domestic and operational waste.	Operational Phase	None prescribed at present as no additional surface infrastructure is envisaged. Implement Visual surface condition monitoring to identify early warning signs of impacts occurring on surface.	Early detection and prevention of possible impacts.

Aspects Affected	Potential Impact	Phase	Management Objectives	Management Outcome
Waste	Generation and disposal of general waste, litter and hazardous material during the operational phase and operational waste i.e. waste rock, tailings etc.	Operational Phase	Adhere to responsible water management practices	Responsible waste management and prevention of pollution.
Waste (Including Hazardous Waste)	Generation and disposal of additional hazardous operational waste i.e. waste rock, tailings, etc.	Operational Phase	Adhere to responsible water management practices	Responsible waste management and prevention of pollution.
Services	Need for services e.g. water, electricity and sewerage systems, causing additional strain on natural resources and service infrastructure.	Operational Phase	Planning to prevent impacts	Minimise and manage service requirements
Traffic	The change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic.	Operational Phase	Planning to prevent impacts	Traffic Control and prevention of impacts
Traffic	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Operational Phase	Planning to prevent impacts	Traffic Control and prevention of impacts
Health and Safety	Possibility of mining activities and workers causing veld fires, which can potentially cause injury and or loss of life to mine workers and surrounding landowners, visitors and workers.	Operational Phase	Adhere to Health and Safety Regulations	Ensure Health and Safety Compliance and Environment on TRP
Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management activities and waste poses health risks and possible loss of life to mine workers and visitors to the site.	Operational Phase	Adhere to Health and Safety Regulations	Ensure Health and Safety Compliance and Environment on TRP
Health and Safety	Increased risk to public and worker health and safety	Operational Phase	Adhere to Health and Safety Regulations	Ensure Health and Safety Compliance and Environment on TRP
Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Operational Phase	To enhance the socio-economic benefits of the project.	Prevent impacts on farmers labourers and surrounding landowners at all stages of the development.
Socio-Economic: Positive Impacts	Extended employment provision due to the implementation of the extension of the mining activities, allowing	Operational Phase	Enhance Socio-Economic environment	Increased Employment Opportunities in the Long term

Aspects Affected	Potential Impact	Phase	Management Objectives	Management Outcome
	mining activities to continue for additional years.			
Socio-Economic: Positive Impacts	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Operational Phase	Enhance Socio-Economic environment	Supporting, utilising and building local economy
Closure Phase				
Geology and Soils	Soil compaction by heavy duty vehicles.	Closure Phase	Early detection of impacts and remediation thereof.	Closure phase overlapping with the operational phase, adhere to management outcomes as described for Operational phase
Geology and Soils	Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints.	Closure Phase	To prevent contamination of soils.	Prevention of soil and water pollution. Closure phase overlapping with the operational phase, adhere to management outcomes/mitigation measures as described for Operational phase.
Geology and Soils	Soil erosion	Closure Phase	Prevent and rehabilitate soil erosion	Early detection and prevention of possible impacts. Closure phase overlapping with the operational phase, adhere to management outcomes/mitigation measures as described for Operational phase.
Land Capability and Land Use	Possibility of mining activities and workers causing veld fires destroying veld and animals on the study area and on adjacent land, impacting on the livelihood of surrounding land owners and users.	Closure Phase	Implement Final Land Use / Final Land form of TRP at End of Life	Early detection and prevention of possible impacts. Restoration of Landscape function and Capability. Closure phase overlapping with the operational phase, adhere to management outcomes/mitigation measures as described for Operational phase.
Ecological Impacts	Disturbance and loss of fauna through noise, light and dust pollution as well as hunting, trapping and killing of fauna.	Closure Phase	Restore Land Use and Land Capability	Prevent and/or remediate ecological impacts. Closure phase overlapping with the operational phase, adhere to management outcomes/mitigation measures as described for Operational phase.
Ecological Impacts	Spreading of alien invasive species and bush encroachment of indigenous species.	Closure Phase	Restore Land Use and Land Capability	Prevent and/or remediate ecological impacts. Closure phase overlapping with the operational phase, adhere to management outcomes/mitigation measures as described for Operational phase.
Ecological Impacts - Positive Impact	Rehabilitation of area with natural vegetation and re-establishment of local biodiversity	Closure Phase	Restore Land Use and Land Capability	Restore the natural environment to approved Post-Closure Land form
Hydrological	Stormwater, erosion and	Closure	Prevent hydrological	Prevention water pollution and

Aspects Affected	Potential Impact	Phase	Management Objectives	Management Outcome
Aspects; Surface water and Groundwater	siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the closure phase.	Phase	impacts and prevent contamination of water resources during Closure Phase	impacts on the natural environment and surrounding water users.
Hydrological Aspects; Surface water and Groundwater	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from heavy duty vehicles; - Effluent discharges, due to a lack of stormwater management.	Closure Phase	Prevent hydrological impacts and prevent contamination of water resources during Closure Phase	Prevention water pollution and impacts on the natural environment and surrounding water users.
Hydrological Aspects; Surface water and Groundwater	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the closure phase.	Closure Phase	Keep record of the dewatering volumes and water levels of the aquifer	Prevention decreasing water availability and impacts on the natural environment and surrounding water users. Closure phase overlapping with the operational phase, adhere to management outcomes/mitigation measures as described for Operational phase.
Hydrological Aspects; Surface water and Groundwater	Impaction groundwater from the pollution plume associated with the waste storage facilities.	Closure Phase	Prevent hydrological impacts and prevent contamination of water resources. Prevent and monitor seepage/decant and pollution plumes.	Prevention water pollution and impacts on the natural environment and surrounding water users. Monitor for Pollution Plumes
Hydrological Aspects; Surface water and Groundwater	Contamination plume stemming from the underground sections could be affecting the underground water resources.	Closure Phase	Prevent hydrological impacts and prevent contamination of water resources. Prevent and monitor seepage/decant and pollution plumes.	Prevention water pollution and impacts on the natural environment and surrounding water users. Monitor for Pollution Plumes
Air Quality	Dust (soil and ore fines) pollution due to rehabilitation activities and heavy duty vehicles.	Closure Phase	To limit public exposure to unacceptable health risks.	Ensure health and safety of mine workers within the underground sections as well as the surrounding environment
Air Quality	Windborne dust (soil and ore fines) and vehicle fumes and particulate matter PM10, altering air quality.	Closure Phase	To limit public exposure to unacceptable health risks.	Ensure health and safety of mine workers within the underground sections as well as the surrounding environment. Conservation of the soil resource
Noise, Vibration and Lighting	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of heavy duty vehicles and equipment.	Closure Phase	To limit public exposure to unacceptable health risks.	Ensure health and safety of mine workers within the underground sections as well as the surrounding environment
Noise, Vibration and Lighting	Disturbance due to vibrations caused by heavy duty vehicles.	Closure Phase	To limit public exposure to unacceptable health risks.	Reducing disturbing noise/light and vibration to outside boundaries.

Aspects Affected	Potential Impact	Phase	Management Objectives	Management Outcome
Noise, Vibration and Lighting	Impact of security lighting on surrounding landowners and animals.	Closure Phase	Responsible blasting and avoiding unnecessary noise and lighting sources.	Reducing disturbing noise/light and vibration to outside boundaries.
Sites of archaeological and cultural interests	None expected	Closure Phase	To avoid disturbing sites of archaeological and cultural interest. If any new heritage aspects are discovered, a specialist must be called for evaluation. This must be done in accordance with legal requirements.	No sites will be impacted. Consult a specialist if any heritage aspect is uncovered during any stage of the development.
Visual aspects	Visibility from sensitive receptors / visual scarring of the landscape as a result of the closure and rehabilitation activities.	Closure Phase	Rehabilitation and Monitoring	Early detection and prevention of possible impacts.
Visual aspects	Visibility of solid domestic and operational waste.	Closure Phase	Rehabilitation and Monitoring	Early detection and prevention of possible impacts.
Waste (Including Hazardous Waste)	Generation and disposal of general waste, litter and hazardous material during the operational phase and operational waste i.e. waste rock, tailings etc.	Closure Phase	Rehabilitation and Monitoring. Responsible disposal of waste	Responsible waste management and prevention of pollution.
Waste (Including Hazardous Waste)	Generation and disposal of additional hazardous operational waste i.e. waste rock, tailings, etc.	Closure Phase	Rehabilitation and Monitoring. Responsible disposal of waste	Responsible waste management and prevention of pollution.
Services	Need for additional services i.e. water, electricity and sewerage systems during the closure phase causing additional strain on natural resources and infrastructure.	Closure Phase	Planning to prevent impacts	Minimise and manage service requirements
Traffic	The change in the traffic patterns as a result of traffic entering and exiting the proposed mine on the surrounding road infrastructure and existing traffic.	Closure Phase	Planning to prevent impacts	Traffic Control and prevention of impacts
Traffic	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Closure Phase	Planning to prevent impacts	Traffic Control and prevention of impacts
Health and Safety	Possibility of closure activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.	Closure Phase	Adhere to Health and Safety Regulations	Ensure Health and Safety Compliance and Environment on TRP
Health and Safety	Increased risk to public health and safety:	Closure Phase	Adhere to Health and Safety Regulations	Ensure Health and Safety Compliance and Environment on

Aspects Affected	Potential Impact	Phase	Management Objectives	Management Outcome
	Dangerous areas including the waste management facilities poses health risks and possible loss of life to mine workers and visitors to the site.			TRP
Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Closure Phase	Adhere to Health and Safety Regulations	Prevent impacts on farmers, labourers and surrounding landowners at all stages of the development.
Socio-Economic	Economic impact should there be an incident of public health and safety.	Closure Phase	To enhance the socio-economic benefits of the project. Source Local residents during Closure Phase	Prevent impacts on farmers labourers and surrounding landowners at all stages of the development.
Socio-Economic	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Closure Phase	To enhance the socio-economic benefits of the region as long as possible.	Increased Employment Opportunities in the Long term
Socio-Economic	Reduced period of providing employment for local residents and skills transfer to unskilled and semi-skilled unemployed individuals.	Closure Phase	To enhance the socio-economic benefits of the project. Focus on skill-transfer.	Supporting, utilising and building local economy
NO-GO Option				
Socio-Economic	Reduced period of development and upliftment of the surrounding communities and infrastructure.	N/A	No Additional Management Objectives if Project does not proceed	No management possible
Socio-Economic	Reduced period of development of the economic environment, by job provision and sourcing supplies for and from local residents and businesses.	N/A	No Additional Management Objectives if Project does not proceed	No management possible
Socio-Economic	Positive: No additional negative impacts on the environment	N/A	No Additional Management Objectives if Project does not proceed	No management possible

12.8 FINAL PROPOSED ALTERNATIVES

(Provide an explanation for the final layout of the infrastructure and activities on the overall site as shown on the final site map together with the reasons why they are the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment)

Refer to Section 7. The positioning of the extension of the mining areas was informed by the position of the mineable resource and ensuring a feasible access point to the mineable resource. The shafts and all other infrastructure required to extend the underground mine is already in existance and hence the current layout is the most preferred option.

13 ASPECTS FOR INCLUSION AS CONDITIONS OF AUTHORIZATION

Any aspects which have not formed part of the EMPr that must be made conditions of the Environmental Authorization.

Refer to Table 12-3 for conditions which could possibly be included in the Environmental Authorisation. The Mitigation measures as specified within the EMP is to be included in the Environmental Authorisation.

The new underground expansions may require an amendment to the WUL before the onset of activities. TRP already has a water use license, but the results from the predictive modelling indicate a possible simulated additional dewatering required on top of the current approximate 2000 m^3/d already dewatering. ***However, should dewatering activities be required for the new underground section and/or the volume to be pumped may exceed the licensed volume, an application for a water use license should be made to the DWS.***

14 DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE.

(Which relate to the assessment and mitigation measures proposed?)

Please refer to Section 10 giving a description of all the "Limitations and Assumptions" of the study. No other uncertainties are known at this stage relating to the assessment or the mitigation measures proposed.

15 REASONED OPINION AS TO WHETHER THE PROPOSED ACTIVITY SHOULD OR SHOULD NOT BE AUTHORIZED

15.1 REASONS WHY THE ACTIVITY SHOULD BE AUTHORIZED OR NOT

Please refer to Section 12.4 for the impact statements. The findings of the specialist studies undertaken within this EIA/EMP provide an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed project. The findings conclude that, provided that the recommended mitigation and management measures are implemented, there are no environmental fatal flaws that post the provided mitigation, should prevent the proposed project from proceeding.

Infact, since no surface infrastructure or additional impact are expected, the TRP underground section will have minimal additional impacts and most will be adequetly mitigated under the current TRP Environmental Management Programme.

15.2 CONDITIONS THAT MUST BE INCLUDED IN THE AUTHORIZATION

Please refer to Section 13, which states that conditions which could possibly be included is provided in Table

12-3.

15.2.1 Rehabilitation Requirements

For the mining operations, the following closure objectives and goals are proposed:

- To rehabilitate all disturbed land to a state that is suitable for its post closure use;
- To ensure that affected areas are safe and secure for both human and animal activities;
- The physical and chemical stability of the remaining structures underground should be such that risk to the environment through naturally occurring forces is eliminated;
- To rehabilitate all disturbed land to a state where limited or preferably no post closure management is required;
- To rehabilitate all disturbed land to a state that facilitates compliance with current environmental quality objectives (specifically water quality for the underground section as pollution plume and decant may form over time). The Geohydrological study indicated that low chances of pollution plumes and or/decant may be expected, especiallly since the underground mining areas will be pumped throughout the life of mine, but this is always a risk with underground mining and should be monitored continuously;
- ***Seal and close of adits and shafts located on the TRP premises associated with the underground expansion as per DMR Guidelines***; and
- To limit the impact on personnel whose positions may become redundant on decommissioning of the mine.

Removal of surface infrastructure

The environmental management objectives for removal of infrastructure are:

- To ensure that discussions are held with the relevant stakeholders to determine whether any existing infrastructure could be on a social or economic benefit before final removal commences;
- To ensure that the removal of infrastructure is done in a manner which has the smallest possible impact on the environment;
- To limit all rehabilitation activities and the movement of people to within the disturbed area footprint; and
- To ensure that no building rubble or refuse remains after the removal of infrastructure.

Rehabilitation of disturbed areas

The environmental management objectives for the rehabilitation of disturbed areas are to:

- Ensure the removal of all contaminated soils and material;
- Ensure that the RWD and silt traps are desilted and that these are in a good condition;
- Ensure that all compacted areas have been ripped; and
- Ensure that all disturbed areas are topsoiled and vegetated.

After monitoring and maintenance

The environmental management objectives for after care monitoring and maintenance are:

- Ensure that an inspection of the water management infrastructure such as solution trenches, sumps, etc. is undertaken regularly to identify which components need to be replaced to ensure long term functionality, until such time that monitoring indicates that there is no more potential for contamination;
- Ensure that the inspector makes assessment of the presence or extension of slope failures; erosion of slopes, siltation of paddocks, berms, etc; vegetation within paddocks as well as possible erosion damage to ditches and trenches;
- Ensure that monitoring takes place until rehabilitation measures are considered successful; and
- Ensure that storm water management infrastructure is rehabilitated and the area is
- made free-draining only once rehabilitation is completed.

Existing Mine and UG2 & Merensky Expansion

The following activities will be conducted in the closure phase:

- Removal of surface infrastructure and removing the gravel surface of haul roads;
- Removal of building rubble (from demolished infrastructure) for disposal at a suitably licensed waste disposal facility;
- Rehabilitation of disturbed areas:
    - Ripping of soils to reduce compaction;
    - Applying topsoil and gravel mixture to areas which are to be rehabilitated;
    - Re-vegetation disturbed areas; and
- After monitoring and maintenance of rehabilitated areas (to ensure that rehabilitation is successful).

15.3 PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

The expansion of the underground workings aims to extend the Life Of Mine (LOM) and hence the maximum period is therefore requested for the Environmental Authorisation, which is 30 years.

16 FINANCIAL PROVISION

Environmental management infrastructure that is required at the outset will be financed out of the project capital. On-going environmental management and rehabilitation as identified in this document and as set out in the EMP will be funded from working costs during the life of the project.

16.1 EXPLAIN HOW THE AFORESAID AMOUNT WAS DERIVED

The Financial Provisioning as given within the approved EMPR was used and updated to present the Financial Provisioning for the underground expansion as the Sealing of shafts (Item 7 in the Closure Quantum) have already been included in the current TRP Closure Cost.

It is important to note that Section 41 of the Minerals and Petroleum Resources Development Act of 2002 (Act No. 28 of 2002) has been repealed and replaced with Section 24P of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (as amended). In addition, Section 53 and 54 of the Mineral and

Petroleum Resources Development Regulations, 2004 is also repealed due to the promulgation of the Financial Provisioning Regulations, November 2015 (as amended). On 26 October 2016 the transitional period for the review, assessment and adjustment of financial provision in terms of this new regulation has been extended to 20 February 2019.

16.1.1 National Environmental Management Laws Amendment Act of 2014 (Act 25 of 2014)

The requirements in terms of financial provisioning which was originally part of the Minerals and Petroleum Resources Development Act of 2002 (Act No. 28 of 2002), however has been included in the National Environmental Management Laws Amendment Act of 2014 (Act No. 25 of 2014) which commenced on 2 September 2014.

The definition of "Financial Provision has been included within the National Environmental Management Laws Amendment Act of 2014 (Act No. 25 of 2014):

"means the insurance, bank guarantee, trust fund or cash that applicants for an environmental authorisation must provide in terms of this Act guaranteeing the availability of sufficient funds to undertake the—

a) rehabilitation of the adverse environmental impacts of the listed or specified activities;

b) rehabilitation of the impacts of the prospecting, exploration, mining or production activities, including the pumping and treatment of polluted or extraneous water;

c) decommissioning and closure of the operations;

d) remediation of latent or residual environmental impacts which become known in the future;

e) removal of building structures and other objects; or

f) remediation of any other negative environmental impacts"

Section 24P of the National Environmental Management Amendment Act of 2008 (Act No. 62 of 2008) published in Government Gazette No. 32151 of 21 April 2009 has also been amended by the National Environmental Management Laws Amendment Act of 2014 (Act 25 of 2014) resulting as follows:

"(1) An applicant for an environmental authorisation relating to prospecting, exploration, mining or production, before the Minister responsible for mineral resources issues the environmental authorisation, comply with the prescribed financial provision for the rehabilitation, closure and ongoing post decommissioning management of negative environmental impacts.

(2) If any holder or any holder of an old order right fails to rehabilitate or to manage any impact on the environment, or is unable to undertake such rehabilitation or to manage such impact, the Minister of Minerals and Energy may, upon written notice to such holder, use all or part of the financial provision contemplated in subsection (1) to rehabilitate or manage the environmental impact in question.

(3) Every holder must annually

(a) assess his or her environmental liability in a prescribed manner and must increase his or her financial provision to the satisfaction of the Minister responsible for mineral resources; and

(b) submit an audit report to the Minister responsible for mineral resources on the adequacy of the financial provision from an independent auditor.

(4) (a) If the Minister of Minerals and Energy is not satisfied with the assessment and financial provision contemplated in this section, the Minister of Minerals and Energy may appoint an independent assessor to conduct the assessment and determine the financial provision.

(b) Any costs in respect of such assessment must be borne by the holder in question.

(5) The requirement to maintain and retain the financial provision contemplated in this section remains in force notwithstanding the issuing of a closure certificate by the Minister responsible for mineral resources in terms of the Mineral and Petroleum Resources Development Act, 2002 to the holder or owner concerned and the Minister responsible for mineral resources may retain such portion of the financial provision as may be required to rehabilitate the closed mining or prospecting operation in respect of latent, residual or any other environmental impacts, including the pumping of polluted or extraneous water, for a prescribed period.

(6) The Insolvency Act, 1936 (Act No. 24 of 1936), does not apply to any form of financial provision contemplated in subsection (1) and all amounts arising from that provision.

(7) The Minster, or an MEC in concurrence with the Minister, may in writing make subsections (1) to (6) with the changes required by the context applicable to any other application in terms of this Act."

Section 24R of the National Environmental Management Amendment Act of 2008 (Act No. 62 of 2008) published in Government Gazette No. 32151 of 21 April 2009 has also been amended by the National Environmental Management Laws Amendment Act of 2014 (Act No. 25 of 2014) resulting as follows:

"1) Every holder, holder of an old order right and owner of works remain responsible for any environmental liability, pollution or ecological degradation, the pumping and treatment of polluted or extraneous water, the management and sustainable closure thereof notwithstanding the issuing of a closure certificate by the Minister responsible for mineral resources in terms of the Mineral and Petroleum Resources Development Act, 2002, to the holder or owner concerned.

2) When the Minister responsible for mineral resources issues a closure certificate, he or she must return such portion of the financial provision contemplated in section 24P as the Minister may deem appropriate to the holder concerned, but may retain a portion of such financial provision referred to in subsecti0on (1) for any latent, residual or any other environmental impact, including the pumping of polluted or extraneous water, for a prescribed period after issuing a closure certificate."

16.1.2 Regulations Pertaining to the Financial Provision for the Prospecting, Exploration, Mining or Production Operations, GN 1147 Dated 20 November 2015

The aim of these regulations is to regulate the determining and making of financial provision for the costs associated with the undertaking of management, rehabilitation and remediation of environmental impacts from prospecting, exploration, mining or production operations through the lifespan of such operations and latent or residual environmental impacts that may become known in the future.

Within the transitional arrangement as specified within the latest Financial Provisioning Regulations, November 2015, it is stated that any financial provision undertaken in terms of Section 53 and 54 of the

Mineral and Petroleum Resources Development Regulations, 2004 must be regarded as having been undertaken in terms of the provision of these new regulations. It however a requirement that any holder of a right has to review and align such approved financial provision with the provisions of the new regulations within three months of its current financial year end or within 15 months after the coming into effect of these regulations (February 2017) and annually thereafter. On 26 October 2016 the transitional period for the review, assessment and adjustment of financial provision in terms of this new regulation has been extended to 20 February 2019.

Important information about the regulation is:

- More certainty on how to calculate the 'financial provision' required of all mining and prospecting rights applicants or rights holders. Each activity listed in the plans must be itemised, and the cost of immediate implementation thereof must be calculated. The financial provision (either in the form of a single vehicle, or a combination of vehicles) must, at any given time, equal the sum of the actual costs of implementing the plans put in place by the rights applicant or holder for a period of at least 10 years going forward.
- Three plans must be included in the Environmental Management Programme: an Annual Rehabilitation Plan; an Environmental Risk Assessment Report; and a Final Rehabilitation, Decommissioning and Mine Closure Plan. The minimum contents for each plan are attached to the Financial Liability Regulations as Appendixes 3, 4 and 5.
- Provision must be made for annual rehabilitation (including a minimum requirement for the annual rehabilitation plan), which must take place on an on-going basis (as opposed to waiting until the closure of a mine).
- Provision made for latent or residual environmental impacts must specifically address the pumping and treatment of extraneous or polluted water. Previously a mining rights holder's liability ended upon the issuing of closure certificates; however NEMA now specifically provides that liability, including the responsibility for extraneous or polluted water, continues after closure. The inclusion of this provision in the regulations setting out how to calculate the financial provision is a clear indication that the quantum of the provision will annually increase.
- The adequacy of the financial provision must be reviewed and assessed annually. The result of this assessment must now also be audited by an independent auditor, and submitted to the Minister. Any excess must be deferred against subsequent assessments, and any shortfall must be remedied by increasing the financial provision, within 90 days from the date of signature of the auditor's report.

16.2 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

Rehabilitation will be done for the expansion of the underground section as soon as the mine reaches the end of life in accordance to the Mining Works Programme, with additional rehabilitation still being required as aftercare, which will include post mining monitoring.

The closure objectives are in line with reaching a post rehabilitation environment similar to a pre-mining environmental condition. The baseline condition described within this document is already that of an impacted environment as the TRP mine is an existing operation and this application represents the underground expansion of that operation within the newly obtained properties included within it's Mining Right.

16.3 CONFIRM SPECIFICALLY THAT THE ENVIRONMENTAL OBJECTIVES IN RELATION TO CLOSURE HAVE BEEN CONSULTED WITH LANDOWNER AND INTERESTED AND AFFECTED PARTIES

The environmental objective in relation to closure which will be made available to all registered I&APs for comment. All comments received and the relevant meeting minutes are appended to this report

16.4 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

The only aspect of the Underground operations which will require rehabilitation to be done at Closure will be the existing adits/shafts that will need to be sealed and concrete capped. These will already be included in the TRP approved Rehabilitation Plan. Also refer to Section 15.2.1 above.

16.5 EXPLAIN WHY IT CAN BE CONFIRMED THAT THE REHABILITATION PLAN IS COMPATIBLE WITH THE CLOSURE OBJECTIVES

The rehabilitation plan will be compiled in accordance with the objectives and goals according to the Mine and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) as amended and GNR 1147 of the National Environmental Management Act, 1988 (Act No. 107 of 1998).

16.6 CALCULATE AND STATE THE QUANTUM OF THE FINANCIAL PROVISION REQUIRED TO MANAGE AND REHABILITATE THE ENVIRONMENT IN ACCORDANCE WITH THE APPLICABLE GUIDELINE

The Closure Quantum of the TRP was done in March 2018 by an appointed specialist (Knight Piesold Consulting (Pty) Ltd, 2018).

The total current or premature closure cost estimate for TRP as at June 2018 is of the order of **R 78.944 million** (including contingency, contractors P&G and VAT). This amount comprises the following three components:

- **R 49.254 million decommissioning cost** for infrastructure, equipment and plant directly linked to the mining operation.
- **R 19.033 million decommissioning cost** for buildings and infrastructure that would most likely be

left in place for other users or which would retain salvage value that would offset the rehabilitation cost.

- **R 11.803 million restoration costs** which will under normal circumstances be met by operating costs during the life of the mine are.

Subject to DMR approval, it is recommended that an amount of **R 61 057 million** be placed in TRP's Trust Fund to cover closure cost of infrastructure directly related to mining operations and restoration costs (R 49.254 million plus R 11.803 million), and a surety bond should then be raised in respect of the remaining R 19.033 million to cover potential decommissioning costs that may not be incurred in practice.

16.7 CONFIRM THAT THE FINANCIAL PROVISION WILL BE PROVIDED AS DETERMINED

The Two Rivers Platinum Mine will provide the amount as specified by DMR.

17 DEVIATIONS FROM THE APPROVED SCOPING REPORT AND PLAN OF STUDY

17.1 DEVIATIONS FROM THE METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF POTENTIAL ENVIRONMENTAL IMPACTS AND RISKS

(Provide a list of activities in respect of which the approved scoping report was deviated from, the reference in this report identifying where the deviation was made, and a brief description of the extent of the deviation).

The following deviations were made to the initial content and methodology used and as outlined within the Scoping study:

- A quantification for Mitigation Efficiency (As *Equation 2*) was added within the Methodology section, as to provde a more realistic quantifiable scale for impacts after mitigation measures has been implemented (refer Section 11.6).
- SAHRA requested a letter of motivation from a Heritage specialist during the Scoping PPP, which was to confirm or dispute whether a specialist investigation would be required for the proposed development. This was done and is included within the contents of this report.

17.2 MOTIVATION FOR THE DEVIATION

The scale introduced has more class-groupings than the one originally proposed (five (5) instead of three (3)) and will aim to give more quantifiable results. Also, high Mitigation Efficiency/Effectiveness will not likely lead to a 100 percent reduced impact, which might have been the result of the previous scale used.

SAHRA made a request during the Public Participation Process and this was addressed by having it done to inform the Environmental Impact Assessment Phase of the project.

18 OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

SAHRA has requested an exemption letter/motivation from a Heritage assessment as to whether an updated Heritage study should be conducted during the process. This was done and is included within this document.

No additional request related to required information has been received from the Competent Authority to date. The comments made by DMR/LDEDET has been satisfied by this document. The DMR requested that the following specialist studies be conducted:

- Geohydrological assessment.

18.1 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, 1998 (ACT NO. 107 OF 1998) THE EIA REPORT MUST INCLUDE THE

18.1.1 Impact on the Socio-Economic Conditions of Any Directly Affected Person

(Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial *diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as Appendix*.

No updated Socio-Economic report was done or required for the compilation of this report. Socio-Economic aspects have been adequetly assessed and addressed within this document and the Environmental Management Programme as mitigation measures. Updated information from the 2016/2017 Integrated Development Plan was used to inform the Baseline assessment as well as the impact prediction. A Social and Labour Plan (SLP) have been developed for the TRP mine.

It is important to keep in mind that the TRP is an existing mine and no sudden large-scale influx of workers or activities are associated or predicted for the activity applied for.

18.1.1.1 Crime, Health and HIV

Influx of foreigners and job seekers and increase in disposable income for local people may create negative social impacts such as crime, alcoholism and prostitution in and around the project area. This will usually result in moderate to high negative impacts to the surrounding communities.

The TRP mine is an existing mine which required approval for extension of its underground activities which will expand as outlined in this report.

Therefore, a large influx of new workers and foreigners is not expected as the mine has been already established. Job-seekers in the area may start to show new interest in the mine as it becomes apparent that operations are extending and new work opportunities may become available. A medium to low or low negative impact is expected, with several positive impacts as well.

18.1.1.2 Land Tenure, Use and Capability

In terms of Land use, the expansion activities and mining operational activities will not significantly add to the existing negative impacts of air pollution due to dust, visual and noise impacts, restricted access, loss of grazing and cultivation land, and loss of land for cultural or traditional practices due to mining.

The impact will be of low to insignificant since the underground application does not propose any additional surface infrastructure and all existing aspects on the TRP will be utilised. The underground section is only an extension current mine's underground activities.

The positive impact of mining and expansion of its current operational capacity and output in the project area will include increased business opportunities, greater demand for goods and services, increased capacity for employment opportunities, etc. The economic and the social and labour plan (SLP) benefits will therefore be of high positive significance. If the TRP underground section is authorised, the Life of Mine will be extended.

The land on the applicable farms will not be significantly impacted on the surface. A visual inspection of the surface was recommended to aid as an early detection and prevention measure, but it is unlikely that any impacts will occur as the underground section will use the existing shafts/declines.

If any surface impacts occur at any stage during the project, it will be rehabilitated as close as practically possible to its pre-mining conditions.

18.1.1.3 Noise

The impact of noise from various aspects and equipment of the mining operation will be of low to insignificant negative significance taking cognizance that blasting and drilling will occur underground as the shafts/declines have already been established and are in use.

Recommendations have been made for mitigation measures to ensure that impacts will be low, managed nd monitored (Table 12-3 above).

18.1.1.4 Air Pollution

The impact is considered low to insignificant negative significance. The dust generated during the expansion activities and operational phase may reduce the air quality of the localised air within the underground sections and therefore Occupational Health monitoring was proposed as no other air quality problems is foreseen which will not be catered for as part of the existing air management programmes and monitoring.

18.1.1.5 Light and Visual Aspects

The visual impact will be insignificant since the extension does not include any surface infrastructure or

impacts. TRP is an existing mine and therefor all light and visual impacts will be of low significance and already in existence.

18.1.1.6 Economic Opportunities, Infrastructure Development and Employment

The impact will be positive to the local and regional economy and those who will get jobs as a result of the expansion of the mining operations into the adjacent sections and the extension of the Life of Mine will also impact favourably on the community. The number of actual jobs and contracts that will be created renders the mining operation to be of medium/high positive significance. This will further be enhanced by the possible secondary economic activities that may arise within the Local Municipality.

Increase in disposable income may create negative social impacts such as crime, alcoholism and prostitution in and around the project area. The significance of this is also thought to be of low consequence, because the area has already been subjected to mining industries over a long period of time and no sudden "boom of activities" is expected.

18.1.2 Impact on Any National Estate Referred To In Section 3(2) of the National Heritage Resources Act

(Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) with the exception of the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act, attach the investigation report as Appendix 2.19.2 and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6.and 2.12.herein).

No significant impacts are expected; refer to the baseline information for the expansion. Also refer to the recommendations made (Table 12-3 above). A letter of exemption has also been included as part of this application, since it was requested by SAHRA (Appendix 8) and it's contents has been included within the report.

18.2 OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4)(A) AND (B) OF THE ACT.

(the EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 22(2)(h), exist.).

Please refer to Sections 7 where alternatives have been discussed. Since the mine is in existance and operational this application represent only the extension of the underground sections, no feasible alternatives exist for this application. All existing surface infrastructure will be utilised and the existing shafts/declines will be used to access the new underground sections.

19 UNDERTAKING

Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the Environmental Impact Assessment Report and the Environmental Management Programme report.

The signed undertaking is included in Section 27 of Part B and is valid for both the Environmental Impacts Assessment (Part A) and the Environmental Management Programme (Part B).

PART B ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

20 DETAILS OF THE EAP

(Confirm that the requirement for the provision of the details and expertise of the EAP are already included in PART A, section 1(a) herein as required).

The information can be found in Section 1.1. Also refer to Appendix 1 and Appendix 2.

21 DESCRIPTION OF THE ASPECTS OF THE ACTIVITY

(Confirm that the requirement to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, section (1)(h) herein as required).

Please refer to Section 3 above. Key aspects that were assessed by specialist studies as part of the EIA include:

- Heritage aspects (Letter of exemption or motivational letter requested from SAHRA during Consultation period) (Appendix 8);
- Geohydrological aspects (Appendix 7); and
- Closure Quantum/Financial Provisioning External Document ((Appendix 9).

No other specialist studies were required for the particular application which has no surface infrastructure or associated surface impacts. Since the TRP mine: underground expansions is an extension of the current operations, specialist studies which was updated for the Consolidated EIA/EMPR (Approved 2015) has been utilised to provide the baseline information and is deemed efficient.

21.1 COMPOSITE MAP

(Provide a map (Attached as an Appendix) at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers)

Refer to Appendix 4.

21.2 DETERMINATION OF CLOSURE OBJECTIVES

(ensure that the closure objectives are informed by the type of environment described in 2.4 herein)

Rehabilitation will be done for the underground section as soon as the mine reaches the end of life in accordance to the Mining Works Programme, with additional rehabilitation still being required as aftercare,

which will include post mining monitoring.

The closure objectives are in line with reaching a post rehabilitation environment similar to a pre-mining environmental condition. The Baseline condition described within this document is already that of an impacted environment as the TRP is an existing operation this application is an underground expansion of that operation.

For the mining operations, the following closure objectives and goals are proposed:

- To rehabilitate all disturbed land to a state that is suitable for its post closure use;
- To ensure that affected areas are safe and secure for both human and animal activities;
- The physical and chemical stability of the remaining structures underground should be such that risk to the environment through naturally occurring forces is eliminated;
- To rehabilitate all disturbed land to a state where limited or preferably no post closure management is required;
- To rehabilitate all disturbed land to a state that facilitates compliance with current environmental quality objectives (specifically water quality for the underground section as pollution plume and decant may form over time). The Geohydrological study indicated that chances for the development of decant and pollution plume movements may be low, sine the underground mining area will be pumped thoughout the Life of Mine, but this is always a risk with underground mining and should be monitored continuously;
- Seal and close of adits and shafts located on the existing TRP operational section; and
- To limit the impact on personnel whose positions may become redundant on decommissioning of the mine.

21.3 THE PROCESS FOR MANAGING ANY ENVIRONMENTAL DAMAGE, POLLUTION, PUMPING AND TREATMENT OF EXTRANEOUS WATER OR ECOLOGICAL DEGRADATION AS A RESULT OF UNDERTAKING A LISTED ACTIVITY

Refer to Table 24-1 for the proposed mitigation measures. No surface impacts or infarstructure is proposed, but monitoring/confirmation was prescribed for environment features to serve as a early detection and prevention method. This is in-line with the Precautionary principle and will serve to protect the environment.

Any activity that results in damage or pollution to the environment will be rated and signed a value to determine the risk. An environmental emergency is defined as an unplanned situation or event resulting in potential pollution of the environment. A pollution incident means an incident or set of circumstances during or as a consequence of which there is or is likely to be a leak, spill or other escape or deposit of a substance, as a result of which pollution has occurred, is occurring or is likely to occur.

Table 21-1: Standard Operating Procedures (SOPs) of TRP

Standard Operation Procedures Available at TRP	Reference number
Waste Management	SOP-ENV-004 (Effective 11/11/2008 – 03/11/2021)

	and as updated hereafter
Environmental External Communication	TRP-SOP-MRM-ENV-001 (Effective 09/09/2011 – 09/11/2019 and as updated hereafter
Surface and Groundwater Monitoring	TRP-SOP-MRM-ENV-002 (Effective 15/08/2011 – 10/11/2019) and as updated hereafter
Hydrocarbon/Chemical Spillage, Handling and Clean-up	TRP-SOP-MRM-ENV-003 (Effective 21/11/2011 – 10/11/2019) and as updated hereafter
Environmental Compliance, Monitoring and Frequency of Application for review	TRP-SOP-MRM-ENV-005 (Effective 18/09/2015 – 17/09/2019) and as updated hereafter
Environmental Non-Compliance and Incident Reporting	TRP-SOP-MRM-ENV-007 (Effective 19/09/2014 – 19/09/2018) and as updated hereafter

21.3.1 Roles and Responsibilities

The Environmental Manager must ensure that regular internal operational inspections and/or are conducted across TRP so that environmental non-compliances and incidents are identified and addressed.

All employees and its contractors working for the mine are responsible for reporting any accident/emergency to their supervisor immediately, and if required notifying the emergency response teams. Personnel must be nominated as response team members and must receive appropriate training to manage emergencies. All other personnel must be made aware of potential emergencies and trained in emergency response. Management must be aware of their responsibilities in case of emergency.

21.3.2 Response to Environmental Emergencies

21.3.2.1 Emergency Plan

An emergency plan must be developed for each potential environmental emergency situation. The emergency plan must give information on:

- Description of the emergency;
- Reference to relevant material safety data sheets;
- Responsibilities for management of emergencies;
- Contact telephone numbers (on-site & off-site);
- Equipment required (including locations); and
- Site plan where applicable.

21.3.2.2 Classification of Emergencies

The following incidents will be classified as an emergency:

- Natural Disasters;
- Damage to radiological/nuclear sources equipment;
- Strikes, protest or unrest;

- Information Management System Failure (plc systems);
- Health and Disease Outbreaks;
- Serous Incident or Fatality;
- High Potential Risk Incidents (Fatality, serious environmental pollution);
- Collapse of underground areas; and
- Other emergencies.

21.3.2.3 Reporting Emergencies

TRP will establish procedures to be included in its current SOPs which will include the underground expansion areas. These procedures will aim to identify the potential for, and response to, incidents and emergency situations and for preventing and mitigating the illness, injury or environmental hazard that may be associated with them. It will review its emergency preparedness and response plans and procedures, in particular, after the occurrence of incidents or emergency situations. The mine shall also periodically test such procedures where and when practicable.

In the event of a serious incident or fatality occurring it is of the utmost importance to not only ensure the Health and Safety of every person involved but also to ensure that certain evidence is protected and gathered for use, with the aim of the prevention of a similar incident/accident occurring in the future.

A “No Blame Fixing” approach to incident investigation will be implemented and it must be stressed that the gathering of information must be seen as preventative action and not as blame fixing. In light of the above, and in addition to the emergency procedure that is relevant to the specific area where the incident/accident occurred, and in relation to the notifying of person and first aid treatment/safety of any person involved, the following steps must be taken immediately after an incident/accident classified above has occurred.

In the event of a reportable/major environmental incident that could lead to danger to the public or the environment (death or sustaining impact on the environment) the appointee of that specific section, in consultation with SHEQ Manager, is responsible for communicating with and drafting an external report (in terms of Section 30 of National Environmental Management Act, 1998 (Act No. 108 of 1998) and Sections 19 and 20 of the National Water Act, 1998 (Act No. 36 of 1998) to the national and provincial department and the municipality containing the:

- Nature of the incident;
- Substances and quantities and accurate effect on persons and environment;
- Initial measures to minimise impacts;
- Causes of the incident;
- Accordance measures;
- When an environmental incident occurs, the following should be adhered to:
    - Report incident as per Incident Reporting Flow Diagram;
    - Measures to clean up any spillage/pollution must be taken as per Emergency Procedure.

  - It is important to ensure that no secondary pollution is caused by incorrect handling of an environmental incident, e.g. incorrect disposal of absorbent material use to clean up a spill; and
- For high potential risk incident (HPRI) / reportable environmental incidents, the SHEQ Manager will conduct a closeout investigation prior to closure of the incident. This will be done one month after all actions has been completed to verify the effectiveness of the actions.

21.3.2.4 Formalise Policies

Since the new underground expansions section will ultimately form part of the TRP operational procedures and measures, it should be aligned as such. The following layout is recommended:

Objectives

To formalise and sign off on company policies.

Actions

Compile Health and Safety Policy; and
Compile Environmental Policy.

When

Before construction starts for the new activities associated with the underground expansion area.

The notification process has six main steps in managing an emergency, from the identification of the situation to final close off. These are as follows:

- Find and identify;
- Ensure human safety;
- Reporting;
- Containment and clean-up;
- Corrective action; and
- Monitoring.

21.3.2.5 Environmental Emergency Incidents

The SHEQ Manager must, within 14 days of the incident, report information on the incident to enable initial evaluation to the following:

- Director-General of DEAT / LEDET;
- Provincial Head of Department (DMR);
- Provincial Head of Department (DWS); and
- Local Municipality.

The report must include:

- Nature of the incident;
- Substance involved and an estimation of quantity released and their possible acute effects on persons and the environment;
- Initial measures taken to minimise impacts;
- Cause of incident, whether direct or indirect; and
- Measures taken to avoid recurrence of such incident.

21.3.2.6 Water Pollution Emergency Incident

Water Pollution Emergency Incident is any accident /incident in which a substance pollutes or has the potential to pollute a water resource or a substance that has or is likely to have a detrimental effect on a water resource.

The responsible person who was in control of the substance involved in the incident at the time or responsible for the section the incident occurred will immediately inform the superior of the area where the incident occurred.

The information with regard to the incident is communicated to the Business Manager, SHEQ Manager and Security Personnel immediately by the superior of the area. The SHEQ Manager and the General Manager must, as soon as reasonably practicable after obtaining the knowledge of the incident, (i.e. within 14 days) report to:

- DWS (Regional Manager);
- South African Police Services or relevant fire department; and
- The Catchment Management Agency.
- The SHEQ Manager and crisis management team must
    - Take all reasonable measures to contain and minimise the effects of the incident;
    - Undertake clean-up procedures;
    - Remedy the effects of the incidents; and
    - Sample the water together with the responsible person of the area.

21.3.2.7 Air Pollution Emergency Incidents

- Non-compliance with the air quality registration certificate condition and requirements.
- Record of any non-compliance is kept;
- The non-compliance with the certificate conditions will be reported telephonically, by fax or by email to the Chief Air Pollution Control Officer as soon as possible but not later than 24 hours after violation will start to occur. The particulars of such violation, including details of measure is put in place to prevent it happening in the future, will be included respective or in the weekly or monthly report;
- If the utilization and/or efficiency of air pollution control fail to meet requirements as specified in the certificate then the process is managed under emergency procedures until such time as it will be possible

to operate in compliance with the conditions of this certificate; and

- Record is kept of periods of upset and abnormal emissions, e.g. off-gas vented directly to the atmosphere or excess thereof due to the faults or limited capacity of air pollution control equipment or limits for process parameters being exceeded, etc. and the Chief Air Pollution Control Officer is notified immediately should it occur.

21.3.2.8 Environmental Impact Register

All non-conformances pertaining to safety, health, environmental, quality of project activities and employees shall be documented as identified by according to documented procedures. The TRP mine will make provision for recording and reviewing the nature and extent of any non-conformance that may be encountered during the Project Execution phase.

21.3.2.9 Records

Records must be kept of all environmental emergencies and non-conformances.

22 ACID MINE DRAINAGE

(Indicate whether or not the mining can result in acid mine drainage)

22.1 POTENTIAL RISK OF ACID MINE DRAINAGE

A Geochemical Evaluation was done by GCS in August 2015 (GCS Environmental ngineering (Pty) Ltd, 2015) and is included within this section.

The National Environmental Management Waste Act, Act No. 59 of 2008, Waste Classification and Management Regulations (Regulation 36784, article 634) require that all waste generated by waste generators, subject to sub regulation (2) of the act, be classified in accordance with SANS 10234 within one-hundred-and-eighty (180) days of generation.

Waste must be assessed in terms of the National Environmental Management Waste Act, Act No. 59 of 2008, National Norms and Standards for the Assessment of Waste for Landfill Disposal (Regulation 36784). Waste is assessed for recommending disposal to landfill by identifying the chemical substances present in the waste by sampling and analysing the total concentrations (TC) and leachable concentrations (LC) of the elements that have been identified in the waste and comparing that to the threshold limits specified in Section 6 of the Norms and Standards.

Four waste stream samples were obtained from the Two Rivers Platinum mine and were sent to Metron Laboratories for the prescribed tests to be performed. Metron Laboratories conducted the analysis on the waste stream samples and GCS did the interpretation of the analysis to classify the waste and recommend the disposal/treatment requirements in terms of Regulation 635 and Regulation 636 respectively, as

promulgated on 23 August 2013 under section 7(1)(c) of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008).

22.1.1 Total Concentration Results

The TC results for the Waste Rock Dump, UG2 stockpile, TRP Merensky Final Tailings, TSP Final Tailings, and TSP Final Tailings samples indicate:

1. All parameters tested for fall below the total concentration threshold (TCT0) limits (<TCT0), except for Copper and Nickel which are greater than TCT0, but less than TCT1 (TCT0<TC<TCT1).

22.1.2 Leach Concentration Results

The findings on LC results for the Waste Rock Dump and TRP Merensky Final Tailings samples indicate:

1. All parameters tested fall below the leachable concentration threshold (LCT0) limits (LC<LCT0).

The findings on LC results for sample UG2 stockpile indicate:

1. All parameters tested fall below the leachable concentration threshold (LCT0) limits (<LCT0), which the exception of Nickel which is equal to LCT0, and Nitrate-N which is greater than LCT0, but less than LCT1 (LCT0<LC<LCT1).

From the ABA and NAG test results the following observations were made (GCS, 2013):

1. The NP/AP indicates the potential for the rock to generate acid drainage, whereas the %S indicates whether this drainage will be over the long term. Based on the data analysis no net acidification is predicted for the tailings material.
2. No sulphides were detected in the tailings (XRD analysis). Pyrite is rarely present in the Merensky and can generate more acidity than the more common pyrrhotite, pentlandite and chalcopyrite found in the Merensky.
3. The neutralisation potential of the tailings (7.5 kg/t $CaCO_3$) is almost four times higher than its acidification potential (2.19 kg/t $CaCO_3$). The tailings sample has a low %S (> 0.07%) and has no potential to generate acidic drainage based on its %S and NP/AP ratio.
4. The NAG test results confirmed that the tailings sample has no potential for acid generation. After oxidation with peroxide the NAG pH was still near-neutral.
5. Overall, the tailings samples have a very low acidification potential even with the worst-case assumptions that a) all sulphur are from sulphides and b) pyrite is the only sulphide present. A very low salt load will be present from the tailings dam.

From the leaching test results:

1. The pH in all extractions was close to 7 which shows that the tailings does not have a ready available net acidity or alkalinity.
2. Al, Ca, Mg, Na, Si and Sr are the only cations that were above the detection limit in the extraction. None of these leached at elevated concentrations.

3. Al is the only metal that leached from the tailings. As it is less soluble than the major cations (Na, Ca, Mg and K) and more susceptible to adsorption, it shows a small difference in concentration between the 1:2 and 1:20 leaches.
4. SO_4 and NO_3-N are the dominant anions that leach out. Both leached out almost exactly 10 times higher in the 1:2 leach compared to the 1:20 leach which shows that these chemicals are very soluble at these low concentrations and conservative.
5. NO_3-N leached out at elevated concentration (23 mg/l) in the 1:2 leach test, but not in the 1:20 test (2.3 mg/l). NO_3 usually originates from the plant process (chemicals added). In both leach tests the NO_3 leached out at 46 mg per 1 kg tailings. The concentration of the NO_3 must be tested in actual tailings water, but it will probably be (like the 1:2 leach test) above the limit (above 11 mg/l) as tailings is usually pumped in a 1:1 to 1:2 water tailings ratio.
6. Seepage from the tailings dam will not become acidic. From the ABA test results it was shown that the tailings do not have a net acidification potential (because of the low sulphide content and because most sulphides will be oxidised during processing), but rather a net neutralization potential.
7. No elevation in metals is expected to occur in the seepage from the tailings dam as seepage will stay at near neutral conditions.

Other non-compliance constituents that were noted under field conditions (existing TSF) and not during the laboratory testing are Na, SO_4 and Cl. These parameters are elevated due secondary processes such as recycling of water (evaporation) and additives in the plant process. It is not expected that these constituents will be of concern in the long term after closure.

22.1.3 Steps Taken To Investigate, Assess, and Evaluate the Impact of Acid Mine Drainage

Section 7 of the National Norms and Standards for the Assessment of Waste for Landfill Disposal Regulations (Government Notice 635 as listed in Government Gazette No 36784), lists the conditions to which the results must be compared to determine the type of waste to ultimately determine the barrier requirements for landfill disposal, for the specific waste type.

The Waste Rock Dump, UG2 stockpile, TRP Merensky Final tailings and TSP Final Tailings samples were classified as a Type 3 Waste based on the results of the TC and LC analysis and the determination of waste types for landfill disposal Section 7(2)(d) that stipulates; Wastes with any element or chemical substance concentration above the LCT0, but below or equal to the LCT1 limits, and all TC concentrations below or equal to the TCT1 limits (LCT0 < LC > LCT1 and TC > TCT1) are Type 3 Wastes.

Regulation 636 of the National Norms and Standards for the Assessment of Waste for Landfill Disposal contains the standard containment barriers for the various waste types, namely Types 1 to 4.

Based on the above and the prescriptions for containment barriers contained in Article 636 of Regulation 36784, the specified barrier for Waste Type 3 waste is a Class C Liner.

Type 3 waste may only be disposed of at a Class C landfill designed in accordance with Section 3(1) and (2)

of these Norms and Standards, or, subject to section 3(4) of these Norms and Standards, may be disposed of at a landfill site designed in accordance with the requirements for a GLB+ landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2nd Ed., DWAF, 1998).

22.1.4 Engineering Or Mine Design Solutions To Be Implemented To Avoid Or Remedy Acid Mine Drainage

Since the TRP mine is an underground development only, with no additional surface infrastructure, no linings are prescribed to be applicable to this type of mining application. However, the surface infrastructure to be utilised on the existing operational section will comply with the appropriate liners and designs.

Usually, the best way to prevent Acid Mine Drainage for underground sections is to flood all mined areas as soon as possible to minimise oxygen from reacting with the remaining pyrite. Closure management of the underground sections in terms of Hydrogeological aspects should be assessed before the onset of Closure.

22.1.5 Measures That Will Be Put In Place to Remedy Any Residual or Cumulative Impact That May Result From Acid Mine Drainage

Acid mine drainage is not anticipated and none was prescribed by the Hydrogeologist at this stage of the application, based on the Waste Classification results, however in the unlikely event that AMD occurs in the future, the responsibility will be with TRP to implement management measures.

- The best way to prevent Acid Mine Drainage in the underground section is to flood all mined areas as soon as possible to minimise oxygen from reacting with the remaining pyrite.
- Where significant water ingress cannot be prevented, measures should be put in place to intercept ingress water as close as possible to the source in order that it can be pumped out of the mine before its quality can deteriorate through contact with sulphide minerals.
- Water quantity and quality data should be collected on a regular, ongoing basis during mine operations. These data will be used to recalibrate and update the mine water management model, to prepare monitoring and audit reports, to report to the regulatory authorities against the requirements of the IWWMP;
- Areas that may have subsided or areas of depressions and/or sinkholes should be filled to create free draining surfaces. Where leachate is generated, it must be contained separately from water which is only slightly polluted through contact with the waste.
- Surface and groundwater quality and quality monitoring should be continued until a steady state is reached. If required, A pollution control dam could be used to intercept polluted seepage water stemming from the underground activities. An interception trench is an additional option to treat the contaminated discharge.
- Implement as many closure measures during the operational phase, while conducting appropriate monitoring programmes to demonstrate actual performance of the various management actions during the life of mine.

- Mining should remove all ore from the underground and separate acid forming and non-acid forming material.

23 WATER

23.1 VOLUMES AND RATE OF WATER USE REQUIRED FOR THE MINING, TRENCHING OR BULK SAMPLING OPERATION

The new underground expansions will not require a WUL at this stage as TRP already has a water use license issued in October 2017. Should dewatering activities related to the new underground sections possibly exceed the licensed volume, an application for a water use license will be made to the DWS.

23.2 HAS A WATER USE LICENCE HAS BEEN APPLIED FOR?

The TRP mine has an existing WUL, Licence No: 06/B41H/AJIGC/6098 (File No: 27/2/2/B741/10/1), dated October 2017, which includes dewatering of underground sections. Refer to Section 23.1 above.

24 IMPACTS TO BE MITIGATED IN THEIR RESPECTIVE PHASES

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

Table 24-1: Mitigation Measures to rehabilitate the environment

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
Operational Phase						
Extending of the underground mining sections; Blasting and Drilling	**Soils**	Soil compaction by heavy duty vehicles.	Operational Phase	• Monitor general condition of surface, rehabilitate if any surface impact occurs. The approved stormwater management plan must be implemented; • Where required the compacted soils should be disked to an adequate depth and re-vegetated with indigenous plants; and • Soils compacted, should be deeply ripped at least to a depth of 300mm to loosen compacted layers and re-graded to even running levels.	N/A	As needed
Extending of the underground mining sections; Blasting and Drilling	**Soils**	Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints.	Operational Phase	• All vehicles and machinery will be regularly serviced to ensure they are in proper working condition and to reduce risk of leaks; • All leaks will be cleaned up immediately using an absorbent material and spill kits, in the prescribed manner; and • The approved Integrated Water and Waste Management Plan to be implemented. <u>Hydrocarbons and hazardous waste:</u> • All hazardous waste generated shall be kept separate and shall not be mixed with general waste; and • All hazardous waste shall be stored within a sealed drum on an impermeable surfaced area within the central waste storage and transition area.	N/A	Continuous
Underground mining; Blasting and Drilling	**Land Capability and Land Use**	Possibility of mining activities and workers causing veld fires	Operational Phase	• Monitor general condition of surface, rehabilitate if any surface impact occurs. • Adhere to final landform plan.	Mine Closure and Rehabilitation Plan	As needed

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
		destroying veld and animals on the study area and on adjacent land, impacting on the livelihood of surrounding land owners and users.		• All workers will be sensitised to the risk of fire; • Smoking is only allowed in designated smoking areas and dispose of cigarette butts safely in sand buckets; • The Applicant shall ensure that the basic fire-fighting equipment is available on the site; and • Extinguishers should be located outside hazardous materials and chemicals storage containers; • Fire response and evacuation • An Emergency Plan (including Fire Protection, Response and Evacuation Plan) is to be prepared by the Applicant and conveyed to all staff on the site; and • Identify major risks to minimise the environmental impacts e.g. air pollution and contaminated effluent runoff.		
Underground mining; Blasting and Drilling	**Blasting**	Blasting hazard, specifically Ground vibration	Operational Phase	• Third party consultation and monitoring should be considered for all ground vibration and air blast monitoring work. This will bring about unbiased evaluation of levels and influence from an independent group. Monitoring could be done using permanent installed stations. • Audit functions may also be conducted to assist the mine in maintaining a high level of performance with regards to blast results and the effects related to blasting operations.	Blasting Regulations of the Explosives Act, 1956 (Act 26 of 1956). Vibration Management Plan	Continuous
Underground mining; Blasting and Drilling	**Ecological Impacts**	Disturbance and loss of fauna through noise, light and dust pollution and hunting, trapping and	Operational Phase	• Visual inspections of surface conditions and if impacts are occurring on surface. • • Environmental awareness training should include that no hunting, trapping or killing	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) [as amended]	Continuous

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
		killing of fauna.		of fauna are allowed; • Any animals rescued or recovered will be relocated in suitable habitat away from the mining operations and associated infrastructure; • Any lizards, snakes or monitors encountered should be allowed to escape to suitable habitat away from disturbance. • No reptile should be intentionally killed, caught or collected during any phase of the project; and • General avoidance of snakes is the best policy if encountered. Snakes should not be intentionally harmed or killed and allowed free movement away from the area.		
Underground mining; Blasting and Drilling	**Ecological Impacts**	Spreading of alien invasive species and bush encroachment of indigenous species.	Operational Phase	• Visual inspections of surface conditions and if impacts are occurring on surface. • An alien vegetation management plan should be drawn up and implemented; • Regular removal of invasive alien species should be undertaken. This should extend right through to the closure phase of the project; and • No spread of alien vegetation onto adjacent properties should be allowed. • Development of an alien invasive management plan.	• Alien and Invasive Species Management Plan • Rehabilitation Objectives and Standards • Alien and Invasive Species Regulations (Government Notice 598 of 2014) and Alien and Invasive Species List, 2014 in terms of NEMBA (Government Notice 599 of 2014) • Notice 2 • Exempted Alien Species in terms of Section 66 (1) Notice 3 National Lists of Invasive Species in terms of Section 70(1) – List 1, 3-9 & 11	Continuous

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
					• Notice 4 Prohibited Alien Species in terms of Section 67 (1) – List 1, 3-7, 9-10 & 12	
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the operational phase.	Operational Phase	• The Site Manager (SM) should ensure that excessive quantities of sand, silt and silt-laden water do not enter the stormwater system; • Appropriate measures, e.g. erection of silt traps, or drainage retention areas to prevent silt and sand entering drainage or watercourses should be taken; • No wastewater may run freely into any of the surrounding naturally vegetated areas; • The loss of topsoil must be minimised; • Erosion and subsequent siltation must be limited; • Any drainage channels shall be suitably designed to ensure that erosion does not occur; • All areas susceptible to erosion shall be protected and stabilisation measures implemented; • Packing of sandbags, gabions, straw bales or brush to reduce the speed of water flow where water is scouring the topsoil and results in the formation of erosion gullies; • Any surface runoff generated which has a high suspended solid content shall be collected at the point source in an appropriate containment facility, then be allowed to settle before discharge into the environment; and • A stormwater management plan must be	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
				compiled; and should be approved by DWS and implemented.		
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from construction vehicles; - Other chemicals from maintenance activities e.g. paints; and - Effluent discharges, due to a lack of stormwater management and system maintenance.	Operational Phase	• All openings to the mine need to be sealed or have adequate berms surrounding the openings to prevent surface water entering. • In accordance with Government Notice 704 (GN 704), the onsite management should: • Keep clean and dirty water separated; • Contain any dirty water within a system; and • Prevent the contamination of clean water. In order to achieve these objectives, the following stormwater management measures must be implemented on the site to ensure that that potential stormwater impacts are kept to a minimum: • Clean and dirty stormwater needs to be separated. Dirty stormwater may not be released into the environment and should be contained and treated on site; • The operation and maintenance of the stormwater and waste water containment facilities shall be done in accordance with the requirements of the Integrated Water Use License and Integrated Water and Waste Management Plan (IWWMP); • All temporary storm water infrastructure (if any) on-site shall be maintained and kept clean throughout the construction period;	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
				• Immediate reporting of any polluting or potentially polluting incidents so that appropriate measures can be implemented; • Fuel and oil spills shall be treated immediately by appropriate mop-up products. Several hydrocarbon absorption/remediation products (i.e. Spill kits) must be placed throughout the site; • Use of bunds or traps to ensure full containment of hydrocarbon and other hazardous materials are mandatory; • Any contaminated material is disposed of in an appropriate manner and the potential risks associated with such spills are limited; • Stormwater leaving the site must in no way be contaminated by any substance, whether such substance is a solid, liquid, vapour or gas or a combination thereof which is produced, used, stored, dumped or spilled on the premises; • All hazardous substances should be stored on impervious surfaces that allow for the containment of spills and leakages (e.g. bunded areas). Should spills occur, these should be reported to the Site Manager. • Liquid hazardous waste shall be contained and stored according to the prescribed measures; • Increased runoff should be managed using berms and other suitable structures as required to ensure flow velocities are reduced; and		

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
				• Removal of spills, rainwater and waste produced during clean-up of the bunds – shall be done in accordance to relevant specifications		
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Impact of Nitrate based explosives used during mining on groundwater quality. Contamination plume can affect the groundwater resource.	Operational Phase	Adhere to all hydrological mitigation measures as prescribed above.	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous and As needed
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the operational phase.	Operational Phase	• Water should be recycled to avoid unnecessary groundwater abstraction. No mitigation is possible for dewatering as the mine must be kept dry in accordance to safety regulations. Maintenance of water and waste management procedures to avoid contaminant seepage to groundwater. • Install flow meters to monitor the amount of water extracted from underground • Monitor of groundwater levels quarterly	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous and As needed
Loading, hauling and conveying RoM to the Processing Plant, Processing of the RoM	**Hydrological Aspects; Surface water and Groundwater**	Possible impact on surface and groundwater from contaminated process water.	Operational Phase	Adhere to all hydrological mitigation measures as prescribed above.	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous
Loading, hauling and conveying RoM to the Processing Plant, Processing of the RoM	**Hydrological Aspects; Surface water and Groundwater**	Possible impact of spills and overflows from pollution control dams and facilities.	Operational Phase	Adhere to all hydrological mitigation measures as prescribed above.	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous
Deposition of waste rock and tailings onto waste rock dumps and tailings storage.	**Hydrological Aspects; Surface water and**	Seepage from waste management activities e.g. waste rock dumps, could cause a	Operational Phase	Adhere to all hydrological mitigation measures as prescribed above. • Storage and classification of hazardous waste to be in accordance with the waste	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
Maintenance of the tailings dams and waste rock dumps.	**Groundwater**	contamination plume affecting the underground water resources.		classification and management regulations GNR 634-635; • The appropriate structures (existing structures) be lined with a liner as determined by waste classification; and • Groundwater should be monitored on a quarterly basis to be able to detect any possible pollution caused by the waste management facilities. Should water quality deteriorate, mitigation measures as specified by a specialist shall be implemented.	• Approved IWWMP • Monitoring programme • Spill procedure	
Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Hydrological Aspects; Surface water and Groundwater**	Discharge from Tailing Storage facilities and associated water handling infrastructure can cause contamination of surface water resources.	Operational Phase	Adhere to all hydrological mitigation measures as prescribed above.	• GNR 704 • Water Use Licence • Groundwater monitoring program • Approved IWWMP • Monitoring programme • Spill procedure	Continuous
Underground mining; Blasting and Drilling	**Air Quality**	Increased dust pollution (soil and ore fines), vehicles on gravel roads and storage of tailings and waste rock, as well as other mining and processing activities.	Operational Phase	• Implement Health and Safety Occupational Monitoring to monitor conditions underground for the safety of the workers. The monitoring should include air quality (dust exposure). • Dust suppression shall be implemented during dry periods and windy conditions; • Minimise travel speed on paved roads; • Implement and actively monitor dust fallout generated in the 8 major wind directions on the borders of the site; and • Implement monthly site inspection to check for possible areas of dust generation not addressed or not effectively managed.	• South Africa National Standard 1929:2005: Ambient Air Quality: Limits for common pollution • Meet the requirements of the National Dust Control regulations, 2013, as published in the Government Gazette (No. 36974) of 1 November 2013 (GNR 827 of 1 November 2013), in terms of the National Environmental Management: Air Quality Act 39 of 2004	Continuous

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
					• Dust fall monitoring programme should be implemented	
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Air Quality**	Increased windborne dust (soil and ore fines), vehicle fumes and particulate matter PM10, altering air quality.	Operational Phase	Adhere to previous dust mitigation measures as prescribed.	Refer above	Continuous
Loading, hauling and conveying RoM to the Processing Plant	**Air Quality**	Increased dust pollution (soil and ore fines), vehicles on gravel roads and transport of RoM	Operational Phase	Adhere to previous dust mitigation measures as prescribed.	Refer above	Continuous
Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of the mining activities and processing.	Operational Phase	• Vehicles will be regularly serviced to ensure acceptable noise levels are not exceeded. Silencers will be utilised where possible; • Heavy vehicle traffic should be routed away from noise sensitive areas, where possible; • Noise levels should be kept within acceptable limits. All noise and sounds generated should adhere to South African Bureau of Standards (SABS) specifications for maximum allowable noise levels for construction sites. No pure tone sirens or hooters may be utilised except where required in terms of SABS	• Blasting Regulations • Vibration management plan as well as Noise Management and Monitoring Programme	Continuous

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
				standards or in emergencies; • The Site Manager (SM) should take measures to discourage labourers from loitering in the area and causing noise disturbance; • Regular monitoring of noise levels at various, pre-determined locations. This will serve as the core of noise mitigation as it will enable the determination of problem areas; • Personal Protective Equipment to all persons working in areas where high levels of noise can be expected; • Signs where it is compulsory; • Proper design of the plant areas and machinery where measures are taken to prevent noise generation such as silencers, mufflers and sound suppressing enclosures for parts/processes which can generate noise; and • Regular inspections and maintenance of equipment, vehicles and machinery to prevent unnecessary noise.		
Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Disturbance due to vibrations caused by vehicles.	Operational Phase	• All vehicles should be regularly serviced and maintained and kept in a good running condition; and • Adequate planning practices should be implemented to avoid any unnecessary trips made by heavy vehicles.	Refer above	Continuous
Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Impact of security lighting on surrounding landowners and animals.	Operational Phase	• Unnecessary lights should be switched off during the day and / or night to avoid light pollution; • If lighting is required, the lighting will be located in such a place and such a manner so as to minimise any impact on	Refer above	Continuous

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
				the surround community; and • Security lighting should be designed in such a way as to minimise emissions onto undisturbed areas on site and neighbouring properties. Light fittings should face downwards.		
Underground mining; Blasting and Drilling	**Sites of archaeological and cultural interests**	None expected	Operational Phase	No impact on the identified heritage resource sites is expected, but the requirements apply in the event that additional sites are discovered.	National Heritage Resources Act, 1999 (Act No. 25 of 1999)	Continuous
Underground mining; Blasting and Drilling	**Visual aspects**	Visibility from sensitive receptors / visual scarring of the landscape and impact on 'Sense of Place' as a result of the visibility of the mining site including the waste management facilities and mining activities.	Operational Phase	• The structures need to be constructed in such a way that they are stable. • The tailings dam (previously authorised) should consider the feasibility of having side slopes vegetated in order to blend in with the surrounding environment and reduce the visual impact.	Final Land form and Mine Rehabilitation Plans as approved.	Continuous
Underground mining; Blasting and Drilling	**Visual aspects**	Visibility of solid domestic and operational waste.	Operational Phase	Monitor general condition of surface, rehabilitate if any surface impact occurs. Housekeeping on site should be enforced.	Refer above	As needed
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM	**Waste**	Generation and disposal of general waste, litter and hazardous material during the operational phase and operational waste i.e. waste rock, tailings etc.	Operational Phase	• Mine management will draw up all rehabilitation plans. After the plans are approved by the competent authority, they will be implemented. Monitoring and modelling of the groundwater will continue until a closure certificate is issued; • The closure strategy will be re-assessed to determine containment, treatment and/or re-use options through the monitoring and calibration of the groundwater model during the operational phase.	Waste Regulations (NEM:WA) National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended]	Continuous
Underground mining;	**Waste (Including**	Generation and disposal	Operational	• Access to the mining area and waste	Waste Regulations	Continuous

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Hazardous Waste)**	of additional hazardous operational waste i.e. waste rock, tailings, etc.	Phase	management facilities to be restricted; • Professional engineers will undertake monitoring of the stability of the existing mine residue deposits.	(NEM:WA); WUL, IWWMP	
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Services**	Need for services e.g. water, electricity and sewerage systems, causing additional strain on natural resources and service infrastructure.	Operational Phase	• Energy savings measures to be implemented at the mine, e.g.: • No lights to be switched on unnecessarily. Only security lights to be switched on at night; • Energy saving bulbs to be installed; and • Water should be recycled as far as possible to avoid any additional water usage.	N/A. Municipal regulations if required	As needed
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Traffic**	The change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic.	Operational Phase	• Where feasible heavy vehicles should not operate on public roads during peak hours; and • Heavy vehicles should adhere to the speed limit of the road.	Traffic Management Plan	Continuous

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Traffic**	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Operational Phase	• Drivers will be enforced to keep to set speed limits. • Trucks will be in a road-worthy condition. • Roads and intersections will be signposted clearly. Only main roads should be used; • Where feasible vehicles should not operate on public roads during peak hours; • Vehicles should adhere to the speed limit of the road; • Heavy vehicles should always travel with their head lights switched on; • Heavy vehicles should not stop on the road to pick up hitchhikers No stopping on the road approaching the mine will be allowed; • Single directional traffic shall be controlled through a stop-go system or any other appropriate traffic control method; • The mine shall be responsible for ensuring that suitable access is maintained for public traffic to all relevant businesses and properties; and • All traffic accommodation measures are to conform to the latest edition of the South African Road Signs Manual.	Refer above	Continuous
Underground mining; Blasting and Drilling	**Health and Safety**	Possibility of mining activities and workers causing veld fires, which can potentially cause injury and or loss of life to mine workers and surrounding landowners,	Operational Phase	• Monitor general condition of surface, rehabilitate if any surface impact occurs. Adhere to final landform plan. • All workers will be sensitised to the risk of fire; • Smoking is only allowed in designated smoking areas and dispose of cigarette	Health and Safety Regulations as described in the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) [as amended]	Continuous

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
		visitors and workers.		butts safely in sand buckets; • The Applicant shall ensure that the basic fire-fighting equipment is available on the site; • Extinguishers should be located outside hazardous materials and chemicals storage containers; • Fire response and evacuation; • An Emergency Plan (including Fire Protection, Response and Evacuation Plan) is to be prepared by the Applicant and conveyed to all staff on the site; and • Identify major risks to minimise the environmental impacts e.g. air pollution and contaminated effluent runoff.		
Underground mining; Blasting and Drilling, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Health and Safety**	Increased risk to public health and safety: Dangerous areas including the waste management activities and waste poses health risks and possible loss of life to mine workers and visitors to the site.	Operational Phase	• A health and safety plan in terms of the Mine Health and Safety Act (Act 29 of 1996) should be drawn up and implemented to ensure worker safety; • A health and safety control officer should monitor the implementation of the health and safety plan for the operational phase; • Regular health and safety audits should be conducted and documented; and a record of health and safety incidents should be kept on site and made available for inspection; • Any health and safety incidents should be reported to the Site Manager (SM) immediately; • First aid facilities should be available on site at all times; • Workers have the right to refuse work in unsafe conditions; and • Material stockpiles or stacks should be	Refer above	Continuous

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
				stable and well secured to avoid collapse and possible injury to site workers.		
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Health and Safety**	Increased risk to public and worker health and safety	Operational Phase	Adhere to mitigation measures as prescribed for Health And Safety Impacts above.	Refer above	Continuous
Underground mining; Blasting and Drilling	**Socio-Economic**	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Operational Phase	Refer to the above-mentioned mitigation measures for noise, dust and other environmental impacts.	N/A	Continuous
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM	**Socio-Economic: Positive Impacts**	Extended employment provision due to the implementation of the extension of the mining activities, allowing mining activities to continue for additional years.	Operational Phase	• Proceed with the proposed activity.	N/A	Continuous
Underground mining; Blasting and Drilling	**Socio-Economic: Positive Impacts**	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Operational Phase	Sourcing supplies and non-core activities from local residents and businesses boosting the local economy. Implement Social and Labour Plan.	N/A	Continuous

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
Closure Phase						
Closure and Rehabilitation	**Geology and Soils**	Soil compaction by heavy duty vehicles.	Closure Phase	• Monitor general condition of surface, rehabilitate if any surface impact occurs. • Adhere to soil compaction mitigation measures as prescribed within Operational phase.	N/A	As needed
Closure and Rehabilitation	**Geology and Soils**	Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints.	Closure Phase	• Monitor general condition of surface, rehabilitate if any surface impact occurs. • Adhere to mitigation measures as prescribed within Operational phase.	N/A	Continuous
Rehabilitation of site, removal of infrastructure, sealing of shafts and closure of waste facilities	**Geology and Soils**	Soil erosion	Closure Phase	• The slopes of the tailings dam and berms will be benched and vegetated as soon as possible. The slopes will be seeded with the recommended seed mix at the onset of the wet season to reduce erosion by wind or water; • The side slopes of tailings dam (existing authorisation) will be vegetated concurrent with its development. After closure, the surface of the tailings dam will be top soiled to a thickness of at least 300mm. The surface area will be re-vegetated with the recommended seed mix; • During decommissioning, the waste rock dump will be capped by placing of a 300 mm clay layer over shaped areas. This	Stormwater management plan, Rehabilitation Plans	As needed

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
				will reduce infiltration of surface water into the dump and will reduce shaping and closure costs of the dump at mine closure; and • Mine management will draw up all rehabilitation plans. After the plans are approved by the competent authority, they will be implemented.		
Closure and Rehabilitation	**Land Capability and Land Use**	Possibility of mining activities and workers causing veld fires destroying veld and animals on the study area and on adjacent land, impacting on the livelihood of surrounding land owners and users.	Closure Phase	• Monitor general condition of surface, rehabilitate if any surface impact occurs. • Adhere to mitigation measures as prescribed within Operational phase.	Mine Closure and Rehabilitation Plan	Continuous
Closure and Rehabilitation	**Ecological Impacts**	Disturbance and loss of fauna through noise, light and dust pollution as well as hunting, trapping and killing of fauna.	Closure Phase	• Monitor general condition of surface, rehabilitate if any surface impact occurs. • Adhere to mitigation measures as prescribed within Operational phase. • Monitor whether rehabilitation practices have been successful	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	Continuous
Closure and Rehabilitation	**Ecological Impacts**	Spreading of alien invasive species and bush encroachment of indigenous species.	Closure Phase	• Monitor general condition of surface, rehabilitate if any surface impact occurs. • Adhere to mitigation measures as prescribed within Operational phase. • Monitor whether rehabilitation practices have been successful	• Alien and Invasive Species Management Plan • Rehabilitation Objectives and Standards • Alien and Invasive Species Regulations (Government Notice 598 of 2014) and Alien and Invasive Species List, 2014 in terms of NEMBA (Government Notice 599 of 2014)	Continuous

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
					• Notice 2 • Exempted Alien Species in terms of Section 66 (1) Notice 3 National Lists of Invasive Species in terms of Section 70(1) – List 1, 3-9 & 11 • Notice 4 Prohibited Alien Species in terms of Section 67 (1) – List 1, 3-7, 9-10 & 12	
Closure and Rehabilitation	**Ecological Impacts - Positive Impact**	Rehabilitation of area with natural vegetation and re-establishment of local biodiversity	Closure Phase	• Monitor general condition of surface, rehabilitate if any surface impact occurs. • Adhere to mitigation measures as prescribed within Operational phase. • Monitor whether rehabilitation practices have been successful	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the closure phase.	Closure Phase	• Monitor as per WUL and rehabilitate/remediate if any impact occurs. • Adhere to mitigation measures as prescribed within Operational phase.	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from heavy duty vehicles; - Effluent discharges, due to a lack of	Closure Phase	• Monitor as per WUL and rehabilitate/remediate if any impact occurs. • Adhere to mitigation measures as prescribed within Operational phase.	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous and As needed

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
		stormwater management.				
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the closure phase.	Closure Phase	• Monitor as per WUL and rehabilitate/remediate if any impact occurs. • Adhere to mitigation measures as prescribed within Operational phase.	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous and As needed
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Impaction groundwater from the pollution plume associated with the waste storage facilities.	Closure Phase	• Storage and classification of hazardous waste to be in accordance with the waste classification and management regulations GNR 634-635; • The appropriate structures (already authorised) is to be lined with a liner as determined by waste classification; and • Groundwater should be monitored on a quarterly basis to be able to detect any possible pollution caused by waste management facilities. Should water quality deteriorate, mitigation measures as specified by a specialist shall be implemented.	• GNR 704 • Water Use Licence • Groundwater monitoring program • Approved IWWMP • Monitoring programme • Spill procedure	Continuous
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Contamination plume stemming from the underground sections could be affecting the underground water resources.	Closure Phase	• Mine management will draw up all rehabilitation plans. After the plans are approved by the competent authority, they will be implemented. Monitoring and modelling of the groundwater will continue until a closure certificate is issued; • The closure strategy will be re-assessed to determine containment, treatment and/or re-use options through the monitoring and calibration of the groundwater model during the operational phase; and • Should monitoring results indicate the	• GNR 704 • Water Use Licence • Groundwater monitoring program • Approved IWWMP • Monitoring programme • Spill procedure	Continuous

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
				formation and movement of a pollution plume in the aquifer, management, containment or treatment measures will be implemented to prevent impact on the receiving surface water and groundwater environment.		
Closure and Rehabilitation	**Air Quality**	Dust (soil and ore fines) pollution due to rehabilitation activities and heavy duty vehicles.	Closure Phase	Monitor and adhere to mitigation measures as prescribed within Operational phase.	• South Africa National Standard 1929:2005: Ambient Air Quality: Limits for common pollution • Meet the requirements of the National Dust Control regulations, 2013, as published in the Government Gazette (No. 36974) of 1 November 2013 (GNR 827 of 1 November 2013), in terms of the National Environmental Management: Air Quality Act 39 of 2004 • Dust fall monitoring programme should be implemented	Continuous
Closure and Rehabilitation	**Air Quality**	Windborne dust (soil and ore fines) and vehicle fumes and particulate matter PM10, altering air quality.	Closure Phase	Monitor and adhere to mitigation measures as prescribed within Operational phase.	Refer above	Continuous
Closure and Rehabilitation	**Noise, Vibration and Lighting**	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated	Closure Phase	Monitor and adhere to mitigation measures as prescribed within Operational phase.	• Blasting Regulations • Vibration management plan. Noise Management and Monitoring Programme	Continuous

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
		with the operation of heavy duty vehicles and equipment.				
Closure and Rehabilitation	**Noise, Vibration and Lighting**	Disturbance due to vibrations caused by heavy duty vehicles.	Closure Phase	Monitor and adhere to mitigation measures as prescribed within Operational phase.	Refer above	Continuous
Closure and Rehabilitation	**Noise, Vibration and Lighting**	Impact of security lighting on surrounding landowners and animals.	Closure Phase	Monitor and adhere to mitigation measures as prescribed within Operational phase.	Refer above	Continuous
Closure and Rehabilitation	**Sites of archaeological and cultural interests**	None expected	Closure Phase	To be prescribed by Specialist if any heritage sensitive aspects are discovered during any phase of the development.	National Heritage Resources Act, 1999 (Act No. 25 of 1999)	Continuous
Closure and Rehabilitation	**Visual aspects**	Visibility from sensitive receptors / visual scarring of the landscape as a result of the closure and rehabilitation activities.	Closure Phase	Monitor general condition of surface, rehabilitate if any impact occurs. Adhere to mitigation measures as prescribed within Operational phase.	Final Land form and Mine Rehabilitation Plans as approved.	Continuous
Closure and Rehabilitation	**Visual aspects**	Visibility of solid domestic and operational waste.	Closure Phase	Monitor general condition of surface, rehabilitate if any impact occurs. Adhere to mitigation measures as prescribed within Operational phase.	Refer above	As needed
Closure and Rehabilitation	**Waste (Including Hazardous Waste)**	Generation and disposal of general waste, litter and hazardous material during the operational phase and operational waste i.e. waste rock, tailings etc.	Closure Phase	Monitor general condition of surface, rehabilitate if any impact occurs. Adhere to mitigation measures as prescribed within Operational phase.	Waste Regulations (NEM:WA) National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended]	Continuous
Closure and Rehabilitation, Rehabilitation of site, removal of infrastructure, sealing of	**Waste (Including Hazardous Waste)**	Generation and disposal of additional hazardous operational waste i.e. waste rock, tailings, etc.	Closure Phase	Monitor general condition of surface, rehabilitate if any impact occurs. Adhere to mitigation measures as prescribed within Operational phase.	Waste Regulations (NEM:WA); WUL, IWWMP	Continuous

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
shafts and closure of waste facilities						
Closure and Rehabilitation	**Services**	Need for additional services i.e. water, electricity and sewerage systems during the closure phase causing additional strain on natural resources and infrastructure.	Closure Phase	Monitor general condition of surface, rehabilitate if any impact occurs. Adhere to mitigation measures as prescribed within Operational phase.	N/A. Municipal regulations if required	As needed
Closure and Rehabilitation	**Traffic**	The change in the traffic patterns as a result of traffic entering and exiting the proposed mine on the surrounding road infrastructure and existing traffic.	Closure Phase	Monitor general condition of surface, rehabilitate if any impact occurs. Adhere to mitigation measures as prescribed within Operational phase.	Traffic Management Plan	Continuous
Closure and Rehabilitation	**Traffic**	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Closure Phase	Monitor general condition of surface, rehabilitate if any impact occurs. Adhere to mitigation measures as prescribed within Operational phase.	Refer above	Continuous
Closure and Rehabilitation	**Health and Safety**	Possibility of closure activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.	Closure Phase	Monitor general condition of surface, rehabilitate if any impact occurs. Adhere to mitigation measures as prescribed within Operational phase.	Health and Safety Regulations as described in the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) [as amended]	Continuous
Closure and Rehabilitation	**Health and Safety**	Increased risk to public health and safety: Dangerous areas including the waste	Closure Phase	Monitor general condition of surface, rehabilitate if any impact occurs. Adhere to mitigation measures as prescribed within Operational phase.	Refer above	Continuous

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
		management facilities poses health risks and possible loss of life to mine workers and visitors to the site.				
Closure and Rehabilitation	**Socio-Economic**	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Closure Phase	Monitor general condition of surface, rehabilitate if any impact occurs. Adhere to mitigation measures as prescribed within Operational phase.	Social and Labour Plan	Continuous
Closure and Rehabilitation	**Socio-Economic**	Economic impact should there be an incident of public health and safety.	Closure Phase	Monitor general condition of surface, rehabilitate if any impact occurs. Adhere to mitigation measures as prescribed within Operational phase.	Social and Labour Plan	Continuous
Closure and Rehabilitation	**Socio-Economic**	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Closure Phase	Monitor general condition of surface, rehabilitate if any impact occurs. Adhere to mitigation measures as prescribed within Operational phase.	Social and Labour Plan	Continuous
Closure and Rehabilitation	**Socio-Economic**	Reduced period of providing employment for local residents and skills transfer to unskilled and semi-skilled unemployed individuals.	Closure Phase	Monitor general condition of surface, rehabilitate if any impact occurs. Adhere to mitigation measures as prescribed within Operational phase.	Social and Labour Plan	Continuous
No-Go Option						
No-Go Option	**Socio-Economic**	Reduced period of development and upliftment of the surrounding communities and infrastructure.	N/A	N/A	N/A	N/A
No-Go Option	**Socio-Economic**	Reduced period of	N/A	N/A	N/A	N/A

Activity	Aspects Affected	Potential Impact	Phase	Management And Mitigation Measures	Compliance With Standards	Time Period For Implementation
		development of the economic environment, by job provision and sourcing supplies for and from local residents and businesses.				
No-Go Option	**Socio-Economic**	Positive: No additional negative impacts on the environment	N/A	N/A	N/A	N/A

Table 24-2: Impact Management Outcomes

Activity	Aspects Affected	Potential Impact	Phase	Mitigation Type	Management Outcome	Standard To Be Achieved
Operational Management Outcomes and Overall Standards						
Extending of the underground mining sections; Blasting and Drilling	**Soils**	Soil compaction by heavy duty vehicles.	Operational Phase	Visual inspection/confirmation that no surface impacts are occurring. Management and Rehabilitation (If required)	Early detection and prevention of possible impacts.	Pre-mining conditions after Closure
Extending of the underground mining sections; Blasting and Drilling	**Soils**	Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints.	Operational Phase	Remedy through rehabilitation, proper removal and disposal if soils have become contaminated	Prevention of soil and water pollution.	Pre-mining conditions after Closure
Underground mining; Blasting and Drilling	**Land Capability and Land Use**	Possibility of mining activities and workers causing veld fires destroying veld and animals on the study area and on adjacent land, impacting on the livelihood of surrounding land owners and users.	Operational Phase	Visual inspection/confirmation that no additional surface impacts are occurring. Management and Rehabilitation (If required)	Early detection and prevention of possible impacts. Restoration of Landscape function and Capability	Pre-mining conditions after Closure
Underground mining; Blasting and Drilling	**Blasting**	Blasting hazard, specifically Ground vibration	Operational Phase	Control through management (third-party monitoring) and communication	Safe mining environment. Prevention of blasting related impacts.	As per Blasting Regulations of the Explosives Act, 1956 (Act 26 of 1956).
Underground mining; Blasting and Drilling	**Ecological Impacts**	Disturbance and loss of fauna through noise, light and dust pollution and hunting, trapping and killing of fauna.	Operational Phase	Visual inspection/confirmation that no additional surface impacts are occurring. Management and Rehabilitation (If required)	Prevent and/or remediate ecological impacts	Pre-mining conditions after Closure

Underground mining; Blasting and Drilling	**Ecological Impacts**	Spreading of alien invasive species and bush encroachment of indigenous species.	Operational Phase	Visual inspection/confirmation that no additional surface impacts are occurring. Management and Rehabilitation (If required)	Prevent and/or remediate ecological impacts	Pre-mining conditions after Closure
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the operational phase.	Operational Phase	Stormwater Management, Monitoring, Infrastructure Design	Prevention water pollution and impacts on the natural environment and surrounding water users.	Water Quality: In line with the specific Integrated Unit of Analysis RQS (Resource Quality Standards) for Environmental water resources and Water Quality as specified in WUL
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from construction vehicles; - Other chemicals from maintenance activities e.g. paints; and - Effluent discharges, due to a lack of stormwater management and system maintenance.	Operational Phase	Infrastructure designs; Management; Monitoring	Prevention water pollution and impacts on the natural environment and surrounding water users.	Water Quality: In line with the specific Integrated Unit of Analysis RQS (Resource Quality Standards) for Environmental water resources and Water Quality as specified in WUL
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Impact of Nitrate based explosives used during mining on groundwater quality. Contamination plume can affect the groundwater resource.	Operational Phase	Stormwater Management, Monitoring, Infrastructure Design	Prevention water pollution and impacts on the natural environment and surrounding water users.	Water Quality: In line with the specific Integrated Unit of Analysis RQS (Resource Quality Standards) for Environmental water resources and Water Quality as specified in WUL
Underground mining;	**Hydrological**	Impacts of dewatering on	Operational	Monitoring of water levels	Prevention decreasing water	Stable aquifer water

Blasting and Drilling	**Aspects; Surface water and Groundwater**	the groundwater aquifer should water be abstracted from ground water during the operational phase.	Phase	and possible impacts on the aquifer	availability and impacts on the natural environment and surrounding water users.	levels and not forming an unrecoverable drawdown cone, thereby impacting on water availability of other water users, Adhere to WUL volume allowed.
Loading, hauling and conveying RoM to the Processing Plant, Processing of the RoM	**Hydrological Aspects; Surface water and Groundwater**	Possible impact on surface and groundwater from contaminated process water.	Operational Phase	Stormwater Management, Monitoring, Infrastructure Design	Prevention water pollution and impacts on the natural environment and surrounding water users.	Water Quality as specified in WUL for process related water. GN 704: Capturing and containing dirty water
Loading, hauling and conveying RoM to the Processing Plant, Processing of the RoM	**Hydrological Aspects; Surface water and Groundwater**	Possible impact of spills and overflows from pollution control dams and facilities.	Operational Phase	Stormwater Management, Monitoring, Infrastructure Design	Prevention water pollution and impacts on the natural environment and surrounding water users.	Water Quality as specified in WUL for process related water. GN 704: Capturing and containing dirty water
Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Hydrological Aspects; Surface water and Groundwater**	Seepage from waste management activities e.g. waste rock dumps, could cause a contamination plume affecting the underground water resources.	Operational Phase	Stormwater Management, Monitoring, Infrastructure Design	Prevention water pollution and impacts on the natural environment and surrounding water users.	Water Quality: In line with the specific Integrated Unit of Analysis RQS (Resource Quality Standards) for Environmental water resources and Water Quality as specified in WUL
Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Hydrological Aspects; Surface water and Groundwater**	Discharge from Tailing Storage facilities and associated water handling infrastructure can cause contamination of surface water resources.	Operational Phase	Stormwater Management, Monitoring, Infrastructure Design	Prevent Discharge to the environment	Water Quality as specified in WUL for process related water. GN 704: Capturing and containing dirty water
Underground mining; Blasting and Drilling	**Air Quality**	Increased dust pollution (soil and ore fines), vehicles on gravel roads and storage of tailings and waste rock, as well as other mining and processing activities.	Operational Phase	Monitor conditions underground workers are exposed to.	Ensure health and safety of mine workers within the underground sections as well as the surrounding environment	Health and Safety Standards. A Safe and Low Risk Environment. Air Quality Standards
Underground mining;	**Air Quality**	Increased windborne dust	Operational	Adhere to Dust regulations	Ensure health and safety of mine	Health and Safety

Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.		(soil and ore fines), vehicle fumes and particulate matter PM10, altering air quality.	Phase	already implemented on TRP	workers within the underground sections as well as the surrounding environment. Conservation of the soil resource	Standards. A Safe and Low Risk Environment. Air Quality Standards
Loading, hauling and conveying RoM to the Processing Plant	**Air Quality**	Increased dust pollution (soil and ore fines), vehicles on gravel roads and transport of RoM	Operational Phase	Adhere to Dust regulations already implemented on TRP	Ensure health and safety of mine workers within the underground sections as well as the surrounding environment. Conservation of the soil resource	Health and Safety Standards. A Safe and Low Risk Environment. Air Quality Standards
Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of the mining activities and processing.	Operational Phase	Be mindful of additional noise sources. Monitoring of Noise levels	Reducing disturbing noise/light and vibration to outside boundaries.	Health and Safety Standards. A Safe and Low Risk Environment. Noise Regulations
Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Disturbance due to vibrations caused by vehicles.	Operational Phase	Be mindful of additional noise sources. Monitoring of Noise levels	Reducing disturbing noise/light and vibration to outside boundaries.	Health and Safety Standards. A Safe and Low Risk Environment. Noise Regulations
Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Impact of security lighting on surrounding landowners and animals.	Operational Phase	Be mindful of additional noise sources. Monitoring of Noise levels	Reducing disturbing noise/light and vibration to outside boundaries.	Health and Safety Standards. A Safe and Low Risk Environment. Noise Regulations
Underground mining; Blasting and Drilling	**Sites of archaeological and cultural interests**	None expected	Operational Phase	Management; Conservation; Permitting	No sites will be impacted. Consult a specialist if any heritage aspect is uncovered during any stage of the development.	No impacts on Heritage Resources
Underground mining; Blasting and Drilling	**Visual aspects**	Visibility from sensitive receptors / visual scarring of the landscape and impact on 'Sense of Place' as a result of the visibility of the mining site including the waste management	Operational Phase	Monitoring and Rehabilitation if required	Early detection and prevention of possible impacts.	Sense of Place. Pre-mining conditions after Closure

		facilities and mining activities.				
Underground mining; Blasting and Drilling	**Visual aspects**	Visibility of solid domestic and operational waste.	Operational Phase	Monitoring and Rehabilitation if required	Early detection and prevention of possible impacts.	Sense of Place. Pre-mining conditions after Closure
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM	**Waste**	Generation and disposal of general waste, litter and hazardous material during the operational phase and operational waste i.e. waste rock, tailings etc.	Operational Phase	Environmental Awareness, Monitor waste	Responsible waste management and prevention of pollution.	Waste Regulations (NEM:WA); WUL, IWWMP
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Waste (Including Hazardous Waste)**	Generation and disposal of additional hazardous operational waste i.e. waste rock, tailings, etc.	Operational Phase	Environmental Awareness, Monitor waste volumes produced and disposed	Responsible waste management and prevention of pollution.	Waste Regulations (NEM:WA); WUL, IWWMP
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Services**	Need for services e.g. water, electricity and sewerage systems, causing additional strain on natural resources and service infrastructure.	Operational Phase	Infrastructure designs; Management; Monitoring	Minimise and manage service requirements	Service Provided Agreements
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings	**Traffic**	The change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic.	Operational Phase	Infrastructure designs; Management; Monitoring	Traffic Control and prevention of impacts	As per Traffic Management Plan

storage. Maintenance of the tailings dams and waste rock dumps.						
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Traffic**	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Operational Phase	Infrastructure designs; Management; Monitoring	Traffic Control and prevention of impacts	As per Traffic Management Plan
Underground mining; Blasting and Drilling	**Health and Safety**	Possibility of mining activities and workers causing veld fires, which can potentially cause injury and or loss of life to mine workers and surrounding landowners, visitors and workers.	Operational Phase	Environmental Awareness, Reporting structures; Monitoring	Ensure Health and Safety Compliance and Environment on TRP	Health and Safety Regulations. A safe and low risk environment
Underground mining; Blasting and Drilling, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Health and Safety**	Increased risk to public health and safety: Dangerous areas including the waste management activities and waste poses health risks and possible loss of life to mine workers and visitors to the site.	Operational Phase	Environmental Awareness, Infrastructure designs; Management; Monitoring	Ensure Health and Safety Compliance and Environment on TRP	Health and Safety Regulations. A safe and low risk environment
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM, Deposition of waste rock and tailings onto waste rock dumps and tailings storage.	**Health and Safety**	Increased risk to public and worker health and safety	Operational Phase	Infrastructure designs; Management; Monitoring	Ensure Health and Safety Compliance and Environment on TRP	Health and Safety Regulations. A safe and low risk environment

Maintenance of the tailings dams and waste rock dumps.						
Underground mining; Blasting and Drilling	**Socio-Economic**	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Operational Phase	Management; Communication; Strategy implementation	Prevent impacts on farmers, labourers and surrounding landowners at all stages of the development.	Prevent impacts on farmers, labourers and surrounding landowners at all stages of the development.
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM	**Socio-Economic: Positive Impacts**	Extended employment provision due to the implementation of the extension of the mining activities, allowing mining activities to continue for additional years.	Operational Phase	Management; Communication; Strategy implementation	Increased Employment Opportunities in the Long term	Increased Employment Opportunities in the Long term
Underground mining; Blasting and Drilling	**Socio-Economic: Positive Impacts**	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Operational Phase	Management; Communication; Strategy implementation	Supporting, utilising and building local economy	Supporting, utilising and building local economy
Closure Management Outcomes and Overall Standards						
Closure and Rehabilitation	**Geology and Soils**	Soil compaction by heavy duty vehicles.	Closure Phase	Rehabilitation and Monitoring	Closure phase overlapping with the operational phase, adhere to management outcomes as described for Operational phase	Pre-mining conditions after Closure
Closure and Rehabilitation	**Geology and Soils**	Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints.	Closure Phase	Remedy through rehabilitation, proper removal and disposal if soils have become contaminated	Prevention of soil and water pollution. Closure phase overlapping with the operational phase, adhere to management outcomes/mitigation measures as described for Operational phase.	Pre-mining conditions after Closure
Rehabilitation of site,	**Geology and**	Soil erosion	Closure	Rehabilitation and	Early detection and prevention of	Pre-mining conditions

removal of infrastructure, sealing of shafts and closure of waste facilities	**Soils**		Phase	Monitoring	possible impacts. Closure phase overlapping with the operational phase, adhere to management outcomes/mitigation measures as described for Operational phase.	after Closure
Closure and Rehabilitation	**Land Capability and Land Use**	Possibility of mining activities and workers causing veld fires destroying veld and animals on the study area and on adjacent land, impacting on the livelihood of surrounding land owners and users.	Closure Phase	Rehabilitation and Monitoring	Early detection and prevention of possible impacts. Restoration of Landscape function and Capability. Closure phase overlapping with the operational phase, adhere to management outcomes/mitigation measures as described for Operational phase.	Pre-mining conditions after Closure
Closure and Rehabilitation	**Ecological Impacts**	Disturbance and loss of fauna through noise, light and dust pollution as well as hunting, trapping and killing of fauna.	Closure Phase	Rehabilitation and Monitoring	Prevent and/or remediate ecological impacts. Closure phase overlapping with the operational phase, adhere to management outcomes/mitigation measures as described for Operational phase.	Pre-mining conditions after Closure
Closure and Rehabilitation	**Ecological Impacts**	Spreading of alien invasive species and bush encroachment of indigenous species.	Closure Phase	Rehabilitation and Monitoring	Prevent and/or remediate ecological impacts. Closure phase overlapping with the operational phase, adhere to management outcomes/mitigation measures as described for Operational phase.	Pre-mining conditions after Closure
Closure and Rehabilitation	**Ecological Impacts - Positive Impact**	Rehabilitation of area with natural vegetation and re-establishment of local biodiversity	Closure Phase	Rehabilitation and Monitoring	Restore the natural environment to approved Post-Closure Land form	Pre-mining conditions after Closure
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the closure phase.	Closure Phase	Infrastructure designs; Management; Monitoring	Prevention water pollution and impacts on the natural environment and surrounding water users.	Water Quality: In line with the specific Integrated Unit of Analysis RQS (Resource Quality Standards) for Environmental water resources and Water Quality as specified in WUL
Closure and Rehabilitation	**Hydrological Aspects; Surface water**	Contamination of stormwater runoff and ground water, caused by:	Closure Phase	Stormwater Management, Monitoring, Infrastructure Design	Prevention water pollution and impacts on the natural environment and surrounding	Water Quality: In line with the specific Integrated Unit of

	and Groundwater	- Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from heavy duty vehicles; - Effluent discharges, due to a lack of stormwater management.			water users.	Analysis RQS (Resource Quality Standards) for Environmental water resources and Water Quality as specified in WUL
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the closure phase.	Closure Phase	Monitoring of water levels and possible impacts on the aquifer	Prevention decreasing water availability and impacts on the natural environment and surrounding water users. Closure phase overlapping with the operational phase, adhere to management outcomes/mitigation measures as described for Operational phase.	Stable aquifer water levels and not forming a unrecoverable drawdown cone, thereby impacting on water availability of other water users
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Impaction groundwater from the pollution plume associated with the waste storage facilities.	Closure Phase	Stormwater Management, Monitoring, Infrastructure Design	Prevention water pollution and impacts on the natural environment and surrounding water users. Monitor for Pollution Plumes	Water Quality as specified in WUL for process related water. GN 704: Capturing and containing dirty water
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Contamination plume stemming from the underground sections could be affecting the underground water resources.	Closure Phase	Stormwater Management, Monitoring, Infrastructure Design	Prevention water pollution and impacts on the natural environment and surrounding water users. Monitor for Pollution Plumes	Water Quality: In line with the specific Integrated Unit of Analysis RQS (Resource Quality Standards) for Environmental water resources and Water Quality as specified in WUL
Closure and Rehabilitation	**Air Quality**	Dust (soil and ore fines) pollution due to rehabilitation activities and heavy duty vehicles.	Closure Phase	Adhere to Dust regulations already implemented on TRP	Ensure health and safety of mine workers within the underground sections as well as the surrounding environment	Health and Safety Standards. A Safe and Low Risk Environment. Air Quality Standards
Closure and Rehabilitation	**Air Quality**	Windborne dust (soil and ore fines) and vehicle fumes and particulate matter PM10, altering air quality.	Closure Phase	Adhere to Dust regulations already implemented on TRP	Ensure health and safety of mine workers within the underground sections as well as the surrounding environment. Conservation of the soil resource	Health and Safety Standards. A Safe and Low Risk Environment. Air Quality Standards
Closure and Rehabilitation	**Noise,**	Nuisance and health risks	Closure	Be mindful of additional	Ensure health and safety of mine	Health and Safety

	Vibration and Lighting	caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of heavy duty vehicles and equipment.	Phase	noise sources. Monitoring of Noise levels.	workers within the underground sections as well as the surrounding environment	Standards. A Safe and Low Risk Environment. Noise Regulations
Closure and Rehabilitation	**Noise, Vibration and Lighting**	Disturbance due to vibrations caused by heavy duty vehicles.	Closure Phase	Be mindful of additional noise sources. Monitoring of Noise levels.	Reducing disturbing noise/light and vibration to outside boundaries.	Health and Safety Standards. A Safe and Low Risk Environment. Noise Regulations
Closure and Rehabilitation	**Noise, Vibration and Lighting**	Impact of security lighting on surrounding landowners and animals.	Closure Phase	Be mindful of additional noise sources. Monitoring of Noise levels.	Reducing disturbing noise/light and vibration to outside boundaries.	Health and Safety Standards. A Safe and Low Risk Environment. Noise Regulations
Closure and Rehabilitation	**Sites of archaeological and cultural interests**	None expected	Closure Phase	Management; Conservation; Permitting	No sites will be impacted. Consult a specialist if any heritage aspect is uncovered during any stage of the development.	No impacts on Heritage Resources
Closure and Rehabilitation	**Visual aspects**	Visibility from sensitive receptors / visual scarring of the landscape as a result of the closure and rehabilitation activities.	Closure Phase	Monitoring and Rehabilitation if required	Early detection and prevention of possible impacts.	Sense of Place. Pre-mining conditions after Closure
Closure and Rehabilitation	**Visual aspects**	Visibility of solid domestic and operational waste.	Closure Phase	Monitoring and Rehabilitation if required	Early detection and prevention of possible impacts.	Sense of Place. Pre-mining conditions after Closure
Closure and Rehabilitation	**Waste (Including Hazardous Waste)**	Generation and disposal of general waste, litter and hazardous material during the operational phase and operational waste i.e. waste rock, tailings etc.	Closure Phase	Environmental Awareness, Monitoring and Rehabilitation if required	Responsible waste management and prevention of pollution.	Waste Regulations (NEM:WA); WUL, IWWMP
Closure and Rehabilitation, Rehabilitation of site, removal of infrastructure, sealing of shafts and closure of waste facilities	**Waste (Including Hazardous Waste)**	Generation and disposal of additional hazardous operational waste i.e. waste rock, tailings, etc.	Closure Phase	Environmental Awareness, Monitoring and Rehabilitation if required	Responsible waste management and prevention of pollution.	Waste Regulations (NEM:WA); WUL, IWWMP
Closure and Rehabilitation	**Services**	Need for additional services i.e. water, electricity and sewerage systems during the closure	Closure Phase	Environmental Awareness, Infrastructure designs; Management; Monitoring	Minimise and manage service requirements	Service Provided Agreements

		phase causing additional strain on natural resources and infrastructure.				
Closure and Rehabilitation	**Traffic**	The change in the traffic patterns as a result of traffic entering and exiting the proposed mine on the surrounding road infrastructure and existing traffic.	Closure Phase	Infrastructure designs; Management; Monitoring	Traffic Control and prevention of impacts	As per Traffic Management Plan
Closure and Rehabilitation	**Traffic**	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Closure Phase	Infrastructure designs; Management; Monitoring	Traffic Control and prevention of impacts	As per Traffic Management Plan
Closure and Rehabilitation	**Health and Safety**	Possibility of closure activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.	Closure Phase	Environmental Awareness, Monitoring	Ensure Health and Safety Compliance and Environment on TRP	Health and Safety Regulations. A safe and low risk environment
Closure and Rehabilitation	**Health and Safety**	Increased risk to public health and safety: Dangerous areas including the waste management facilities poses health risks and possible loss of life to mine workers and visitors to the site.	Closure Phase	Environmental Awareness, Infrastructure designs; Management; Monitoring	Ensure Health and Safety Compliance and Environment on TRP	Health and Safety Regulations. A safe and low risk environment
Closure and Rehabilitation	**Socio-Economic**	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Closure Phase	Infrastructure designs; Management; Monitoring	Prevent impacts on farmers, labourers and surrounding landowners at all stages of the development.	Health and Safety Regulations. A safe and low risk environment
Closure and Rehabilitation	**Socio-Economic**	Economic impact should there be an incident of public health and safety.	Closure Phase	Management; Communication; Strategy implementation	Prevent impacts on farmers, labourers and surrounding landowners at all stages of the development.	Health and Safety Regulations. A safe and low risk environment

Closure and Rehabilitation	**Socio-Economic**	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Closure Phase	Management; Communication; Strategy implementation	Increased Employment Opportunities in the Long term	Supporting, utilising and building local economy
Closure and Rehabilitation	**Socio-Economic**	Reduced period of providing employment for local residents and skills transfer to unskilled and semi-skilled unemployed individuals.	Closure Phase	Management; Communication; Strategy implementation	Supporting, utilising and building local economy	Increased Employment Opportunities in the Long term
NO-GO Outcomes						
No-Go Option	**Socio-Economic**	Reduced period of development and upliftment of the surrounding communities and infrastructure.		N/A	No management possible	N/A
No-Go Option	**Socio-Economic**	Reduced period of development of the economic environment, by job provision and sourcing supplies for and from local residents and businesses.		N/A	No management possible	N/A
No-Go Option	**Socio-Economic**	Positive: No additional negative impacts on the environment		N/A	No management possible	N/A

25 FINANCIAL PROVISION

25.1 DETERMINATION OF THE AMOUNT OF FINANCIAL PROVISION

Refer to comments made within Section 16.

25.1.1 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

Refer to comments made within Section 16.

25.1.2 Confirm Specifically That the Environmental Objectives In Relation To Closure Have Been Consulted With Landowner and Interested and Affected Parties

Refer to comments made within Section 16.3.

25.1.3 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

Refer to comments made within Section 16.4.

25.1.3.1 Explain Why It Can Be Confirmed That The Rehabilitation Plan Is Compatible With The Closure Objectives.

Please refer to comments made within Section 16.5.

25.2 CONFIRM THAT THIS AMOUNT CAN BE PROVIDED FOR FROM OPERATING EXPENDITURE

(Confirm that the amount, is anticipated to be an operating cost and is provided for as such in the Mining work programme, Financial and Technical Competence Report or Prospecting Work Programme as the case may be).

Since this application is an extension of the current TRP underground sections, the mine will ensure that the amount is made available.

26 MECHANISMS FOR MONITORING COMPLIANCE WITH AND PERFORMANCE ASSESSMENT AGAINST THE ENVIRONMENTAL MANAGEMENT PROGRAMME AND REPORTING THEREON

Including:
a) Monitoring of Impact Management Actions
b) Monitoring and reporting frequency
c) Responsible persons
d) Time period for implementing impact management action
e) Mechanisms for monitoring compliance

Table 26-1: Mechanisms for monitoring (Including Time period, Functional requirements, Roles and responsibilities and Frequency)

Activity	Aspects Affected	Potential Impact	Time Period For Implementation	Functional Requirements For Monitoring	Roles And Responsibilities	Monitoring And Reporting Frequency	Time Period For Implementation
Operational Phase: Mechanisms for Monitoring							
Extending of the underground mining sections; Blasting and Drilling	**Soils**	Soil compaction by heavy duty vehicles.	As needed	Monitoring of the condition of the surface areas and where current existing activities are taking place - Visual inspection	SHEQ	Monthly, Visual	Areas which are concurrently rehabilitated
Extending of the underground mining sections; Blasting and Drilling	**Soils**	Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints.	Continuous	Set up service plan and record services of vehicles. Monitor areas for spills that need to be cleaned.	Workshop manager	As needed	Continuous
Underground mining; Blasting and Drilling	**Land Capability and Land Use**	Possibility of mining activities and workers causing veld fires destroying veld and animals on the study area and on adjacent land, impacting on the livelihood of surrounding land owners and users.	As needed	Monitoring of the condition of the newly included portions in the MR	SHEQ	Monthly	Continuous
Underground mining; Blasting and Drilling	**Blasting**	Blasting hazard, specifically Ground vibration	Continuous	Consult blast specialist as construction begins	SHEQ, Mine Manager	As needed	Continuous
Underground mining; Blasting and Drilling	**Ecological Impacts**	Disturbance and loss of fauna through noise, light and dust pollution and hunting, trapping and killing of fauna.	Continuous	Ecological Monitoring	SHEQ	Annually or as currently prescribed	Continuous
Underground mining; Blasting and Drilling	**Ecological Impacts**	Spreading of alien invasive species and bush encroachment of indigenous species.	Continuous	Ecological Monitoring, Alien and Invasive Management and Monitoring Programme	SHEQ	Annually or as currently prescribed	Continuous
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water**	Stormwater, erosion and siltation impacts due to a lack of implementing measures to	Continuous	Implement IWWMP Monitoring prescribed	SHEQ, Contractor	Monthly for Surface water quality (WUL), Quarterly for	

	and Groundwater	manage stormwater run-off quantity and quality during the operational phase.				Groundwater quality, SASS as currently prescribed	
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from construction vehicles; - Other chemicals from maintenance activities e.g. paints; and - Effluent discharges, due to a lack of stormwater management and system maintenance.	Continuous	Implement IWWMP Monitoring prescribed	SHEQ, Contractor / specialist	Monthly for Surface water quality (WUL), Quarterly for Groundwater quality, SASS as currently prescribed	Continuous
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Impact of Nitrate based explosives used during mining on groundwater quality. Contamination plume can affect the groundwater resource.	Continuous and As needed	Implement IWWMP Monitoring prescribed	SHEQ, Contractor / specialist	Monthly for Surface water quality (WUL), Quarterly for Groundwater quality, SASS as currently prescribed	Continuous
Underground mining; Blasting and Drilling	**Hydrological Aspects; Surface water and Groundwater**	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the operational phase.	Continuous and As needed	Implement IWWMP Monitoring prescribed , water levels	SHEQ, Contractor / specialist	Monthly for Surface water quality (WUL), Quarterly for Groundwater quality, SASS as currently prescribed	Continuous
Loading, hauling and conveying RoM to the Processing Plant, Processing of the RoM	**Hydrological Aspects; Surface water and Groundwater**	Possible impact on surface and groundwater from contaminated process water.	Continuous	Implement IWWMP Monitoring prescribed	SHEQ, Contractor / specialist	Monthly for Surface water quality, Quarterly for Groundwater quality, SASS as currently prescribed	Continuous
Loading, hauling and conveying RoM to the Processing Plant, Processing of the RoM	**Hydrological Aspects; Surface water and Groundwater**	Possible impact of spills and overflows from pollution control dams and facilities.	Continuous	Implement IWWMP Monitoring prescribed	SHEQ, Contractor / specialist	Monthly for Surface water quality (WUL), Quarterly for Groundwater quality, SASS as currently prescribed	Continuous
Deposition of waste rock	**Hydrological**	Seepage from waste	Continuous	Implement IWWMP	SHEQ,	Monthly for Surface	Continuous

and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Aspects; Surface water and Groundwater**	management activities e.g. waste rock dumps could cause a contamination plume affecting the underground water resources.		Monitoring prescribed	Contractor / specialist	water quality (WUL), Quarterly for Groundwater quality, SASS as currently prescribed	
Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Hydrological Aspects; Surface water and Groundwater**	Discharge from Tailing Storage facilities and associated water handling infrastructure can cause contamination of surface water resources.	Continuous	Implement IWWMP Monitoring prescribed	SHEQ, Contractor / specialist	Monthly for Surface water quality (WUL), Quarterly for Groundwater quality, SASS as currently prescribed	Continuous
Underground mining; Blasting and Drilling	**Air Quality**	Increased dust pollution (soil and ore fines), vehicles on gravel roads and storage of tailings and waste rock, as well as other mining and processing activities.	Continuous	Conduct Occupational air quality monitoring. Adhere to current Dust management programme	SHEQ, Contractor / specialist	Occupational Specialist to recommend	Continuous
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Air Quality**	Increased windborne dust (soil and ore fines), vehicle fumes and particulate matter PM10, altering air quality.	Continuous	Conduct air quality monitoring/ Dust buckets.	SHEQ	Monthly	Continuous
Loading, hauling and conveying RoM to the Processing Plant	**Air Quality**	Increased dust pollution (soil and ore fines), vehicles on gravel roads and transport of RoM	Continuous	Conduct air quality monitoring/ Dust buckets.	SHEQ, Contractor	Monthly	Continuous
Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of the mining activities and processing.	Continuous	Conduct noise monitoring and to include any other noise sources not previously assessed as part of current Noise management programme	SHEQ, Contractor	Quarterly	Continuous

Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Disturbance due to vibrations caused by vehicles.	Continuous	Conduct noise monitoring and to include any other noise sources not previously assessed as part of current Noise management programme	SHEQ, Contractor	Quarterly	Continuous
Underground mining; Blasting and Drilling	**Noise, Vibration and Lighting**	Impact of security lighting on surrounding landowners and animals.	Continuous	Investigate complaints when received and mitigate	SHEQ	Quarterly	Continuous
Underground mining; Blasting and Drilling	**Sites of archaeological and cultural interests**	None expected	Continuous	Record occurrences of sites and artefacts if found, contact a specialist immediately.	SHEQ	As needed	Continuous
Underground mining; Blasting and Drilling	**Visual aspects**	Visibility from sensitive receptors / visual scarring of the landscape and impact on 'Sense of Place' as a result of the visibility of the mining site including the waste management facilities and mining activities.	Continuous	Monitor general condition and Implement good housekeeping	SHEQ, Mine Manager	Quarterly	Continuous
Underground mining; Blasting and Drilling	**Visual aspects**	Visibility of solid domestic and operational waste.	As needed	Monitoring of the condition of the surface - Visual inspection	SHEQ, Mine Manager	Monthly	Continuous
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM	**Waste**	Generation and disposal of general waste, litter and hazardous material during the operational phase and operational waste i.e. waste rock, tailings etc.	Continuous	Monitor volumes of waste disposed/ generated and volumes removed by Contractors	SHEQ, Mine Manager	Monthly	Continuous
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Waste (Including Hazardous Waste)**	Generation and disposal of additional hazardous operational waste i.e. waste rock, tailings, etc.	Continuous	Monitor volumes of waste disposed/ generated and volumes removed by Contractors	SHEQ, Mine Manager	Monthly	Continuous

Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Services**	Need for services e.g. water, electricity and sewerage systems, causing additional strain on natural resources and service infrastructure.	As needed	Energy and water saving initiatives	SHEQ, Mine Manager	Continuous	Continuous
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Traffic**	The change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic.	Continuous	As per Traffic Management Plan	SHEQ, Mine Manager	As per Traffic Management Plan	Continuous
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Traffic**	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Continuous	As per Traffic Management Plan	SHEQ, Mine Manager	As per Traffic Management Plan	Continuous
Underground mining; Blasting and Drilling	**Health and Safety**	Possibility of mining activities and workers causing veld fires, which can potentially cause injury and or loss of life to mine workers and surrounding landowners, visitors and workers.	Continuous	Monitor Emergency Preparedness	SHEQ, Mine Manager	Continuous	Continuous

Underground mining; Blasting and Drilling, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Health and Safety**	Increased risk to public health and safety: Dangerous areas including the waste management activities and waste poses health risks and possible loss of life to mine workers and visitors to the site.	Continuous	Health and Safety Occupational Monitoring,	SHEQ, Mine Manager	As per current underground sections	Continuous
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM, Deposition of waste rock and tailings onto waste rock dumps and tailings storage. Maintenance of the tailings dams and waste rock dumps.	**Health and Safety**	Increased risk to public and worker health and safety	Continuous	Health and Safety Occupational Monitoring,	SHEQ, Mine Manager	As per current underground sections	Continuous
Underground mining; Blasting and Drilling	**Socio-Economic**	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Continuous	Complaints should be investigated (if any)	SHEQ	Annually	Continuous
Underground mining; Blasting and Drilling, Loading, hauling and conveying RoM to the Processing Plant, Processing of RoM	**Socio-Economic: Positive Impacts**	Extended employment provision due to the implementation of the extension of the mining activities, allowing mining activities to continue for additional years.	Continuous	Compliance with programme principles / vision	Human Resources	Annually	Continuous
Underground mining; Blasting and Drilling	**Socio-Economic: Positive Impacts**	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Continuous	Keep records of service providers and where they are from	Human Resources/ Procurement	Annually	Continuous
Closure Phase: Mechanisms for Monitoring							
Closure and Rehabilitation	**Geology and Soils**	Soil compaction by heavy duty vehicles.	As needed	Monitoring of the condition of the surface areas and where current existing	SHEQ	Monthly, Visual	Areas which are concurrently rehabilitated

				activities are taking place - Visual inspection			
Closure and Rehabilitation	**Geology and Soils**	Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints.	Continuous	Set up service plan and record services of vehicles. Monitor areas for spills that need to be cleaned.	Workshop manager	As needed	Continuous
Rehabilitation of site, removal of infrastructure, sealing of shafts and closure of waste facilities	**Geology and Soils**	Soil erosion	As needed	Monitoring of the condition of the newly included portions in the MR	SHEQ	Monthly	Continuous
Closure and Rehabilitation	**Land Capability and Land Use**	Possibility of mining activities and workers causing veld fires destroying veld and animals on the study area and on adjacent land, impacting on the livelihood of surrounding land owners and users.	Continuous	Monitoring of the condition of the newly included portions in the MR	SHEQ	Monthly	Continuous
Closure and Rehabilitation	**Ecological Impacts**	Disturbance and loss of fauna through noise, light and dust pollution as well as hunting, trapping and killing of fauna.	Continuous	Ecological Monitoring	SHEQ	Annually or as currently prescribed, including 2/3 years post closure impacts	Continuous
Closure and Rehabilitation	**Ecological Impacts**	Spreading of alien invasive species and bush encroachment of indigenous species.	Continuous	Ecological Monitoring, Alien and Invasive Management and Monitoring Programme	SHEQ	Annually or as currently prescribed, including 2/3 years post closure impacts	Continuous
Closure and Rehabilitation	**Ecological Impacts - Positive Impact**	Rehabilitation of area with natural vegetation and re-establishment of local biodiversity	Continuous	Implement IWWMP Monitoring prescribed	SHEQ, Contractor	Monthly for Surface water quality, Quarterly for Groundwater quality, including 2/3 years post closure monitoring	Continuous
Closure and Rehabilitation	**Hydrological Aspects; Surface water**	Stormwater, erosion and siltation impacts due to a lack of implementing measures to	Continuous	Implement IWWMP Monitoring prescribed	SHEQ, Contractor / specialist	Monthly for Surface water quality (WUL), Quarterly for	Continuous

	and Groundwater	manage stormwater run-off quantity and quality during the closure phase.				Groundwater quality, SASS as currently prescribed, including 2/3 years post closure monitoring	
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from heavy duty vehicles; - Effluent discharges, due to a lack of stormwater management.	Continuous and As needed	Implement IWWMP Monitoring prescribed	SHEQ, Contractor / specialist	Monthly for Surface water quality (WUL), Quarterly for Groundwater quality, SASS as currently prescribed, including 2/3 years post closure monitoring	Continuous
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the closure phase.	Continuous and As needed	Implement IWWMP Monitoring prescribed , water levels	SHEQ, Contractor / specialist	Monthly for Surface water quality (WUL), Quarterly for Groundwater quality, SASS as currently prescribed, including 2/3 years post closure monitoring	Continuous
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Impaction groundwater from the pollution plume associated with the waste storage facilities.	Continuous	Implement IWWMP Monitoring prescribed	SHEQ, Contractor / specialist	Monthly for Surface water quality (WUL), Quarterly for Groundwater quality, SASS as currently prescribed, including 2/3 years post closure monitoring	Continuous
Closure and Rehabilitation	**Hydrological Aspects; Surface water and Groundwater**	Contamination plume stemming from the underground sections could be affecting the underground water resources.	Continuous	Implement IWWMP Monitoring prescribed	SHEQ, Contractor / specialist	Monthly for Surface water quality (WUL), Quarterly for Groundwater quality, SASS as currently prescribed, including 2/3 years post closure monitoring	Continuous
Closure and Rehabilitation	**Air Quality**	Dust (soil and ore fines) pollution due to rehabilitation activities	Continuous	Conduct air quality monitoring/ Dust buckets.	SHEQ	Monthly	Continuous

		and heavy duty vehicles.					
Closure and Rehabilitation	**Air Quality**	Windborne dust (soil and ore fines) and vehicle fumes and particulate matter PM10, altering air quality.	Continuous	Conduct air quality monitoring/ Dust buckets.	SHEQ, Contractor	Monthly	Continuous
Closure and Rehabilitation	**Noise, Vibration and Lighting**	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of heavy duty vehicles and equipment.	Continuous	Conduct noise monitoring and to include any other noise sources not previously assessed as part of current Noise management programme	SHEQ, Contractor	Quarterly	Continuous
Closure and Rehabilitation	**Noise, Vibration and Lighting**	Disturbance due to vibrations caused by heavy duty vehicles.	Continuous	Conduct noise monitoring and to include any other noise sources not previously assessed as part of current Noise management programme	SHEQ, Contractor	Quarterly	Continuous
Closure and Rehabilitation	**Noise, Vibration and Lighting**	Impact of security lighting on surrounding landowners and animals.	Continuous	Investigate complaints when received and mitigate	SHEQ	Quarterly	Continuous
Closure and Rehabilitation	**Sites of archaeological and cultural interests**	None expected	Continuous	Record occurrences of sites and artefacts if found, contact a specialist immediately.	SHEQ	As needed	Continuous
Closure and Rehabilitation	**Visual aspects**	Visibility from sensitive receptors / visual scarring of the landscape as a result of the closure and rehabilitation activities.	Continuous	Monitor general condition and Implement good housekeeping	SHEQ, Mine Manager	Quarterly	Continuous
Closure and Rehabilitation	**Visual aspects**	Visibility of solid domestic and operational waste.	As needed	Monitoring of the condition of the surface - Visual inspection	SHEQ, Mine Manager	Monthly	Continuous
Closure and Rehabilitation	**Waste (Including Hazardous Waste)**	Generation and disposal of general waste, litter and hazardous material during the operational phase and operational waste i.e. waste rock, tailings etc.	Continuous	Monitor volumes of waste disposed/ generated and volumes removed by Contractors	SHEQ, Mine Manager	Monthly	Continuous
Closure and Rehabilitation, Rehabilitation of site, removal of infrastructure, sealing of shafts and	**Waste (Including Hazardous Waste)**	Generation and disposal of additional hazardous operational waste i.e. waste rock, tailings, etc.	Continuous	Monitor volumes of waste disposed/ generated and volumes removed by Contractors	SHEQ, Mine Manager	Monthly	Continuous

closure of waste facilities							
Closure and Rehabilitation	**Services**	Need for additional services i.e. water, electricity and sewerage systems during the closure phase causing additional strain on natural resources and infrastructure.	As needed	Energy and water saving initiatives	SHEQ, Mine Manager	Continuous	Continuous
Closure and Rehabilitation	**Traffic**	The change in the traffic patterns as a result of traffic entering and exiting the proposed mine on the surrounding road infrastructure and existing traffic.	Continuous	As per Traffic Management Plan	SHEQ, Mine Manager	As per Traffic Management Plan	Continuous
Closure and Rehabilitation	**Traffic**	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Continuous	As per Traffic Management Plan	SHEQ, Mine Manager	As per Traffic Management Plan	Continuous
Closure and Rehabilitation	**Health and Safety**	Possibility of closure activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.	Continuous	Monitor Emergency Preparedness	SHEQ, Mine Manager	Continuous	Continuous
Closure and Rehabilitation	**Health and Safety**	Increased risk to public health and safety: Dangerous areas including the waste management facilities poses health risks and possible loss of life to mine workers and visitors to the site.	Continuous	Health and Safety Occupational Monitoring,	SHEQ, Mine Manager	As per current underground management plans	Continuous
Closure and Rehabilitation	**Socio-Economic**	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Continuous	Health and Safety Occupational Monitoring,	SHEQ, Mine Manager	As per current underground management plans	Continuous
Closure and Rehabilitation	**Socio-Economic**	Economic impact should there be an incident of public health and safety.	Continuous	Complaints should be investigated (if any)	SHEQ	Annually	Continuous
Closure and Rehabilitation	**Socio-Economic**	Sourcing supplies from local residents and businesses	Continuous	Keep records of service providers and where they	Human Resources	Annually	Continuous

		boosting the local economy for an extended period of time.		are from			
Closure and Rehabilitation	**Socio-Economic**	Reduced period of providing employment for local residents and skills transfer to unskilled and semi-skilled unemployed individuals.	Continuous	Compliance with programme principles / vision	Human Resources/ Procurement	Annually	Continuous
NO-GO Option							
No-Go Option	**Socio-Economic**	Reduced period of development and upliftment of the surrounding communities and infrastructure.	N/A	N/A	N/A	N/A	N/A
No-Go Option	**Socio-Economic**	Reduced period of development of the economic environment, by job provision and sourcing supplies for and from local residents and businesses.	N/A	N/A	N/A	N/A	N/A
No-Go Option	**Socio-Economic**	Positive: No additional negative impacts on the environment	N/A	N/A	N/A	N/A	N/A

26.1 DETAILED MONITORING PROGRAMMES AS DESCRIBED FOR NEW ACTIVITIES

26.1.1 Geology, Soil and Erosion Monitoring Programme

Soil monitoring will involve the inspection of soil which has been disturbed, compacted, contaminated or eroded. Soil monitoring will assist in determining where soils have not been sufficiently rehabilitated.

Where soils have contaminated by the spillage of hydrocarbon, monitoring must take place on a weekly basis for at least four (4) weeks or until the soil is considered sufficiently rehabilitated. Soils samples should be taken and submitted to a laboratory to test for contaminant content if it is considered necessary.

Soil monitoring should be undertaken during the following periods:

- Areas which have been rehabilitated following construction;
- After remediation soils which have been contaminated by spillages during the operational phase; and
- After the closure and decommissioning phase.

Monitor and Manage soil contamination in accordance with Standard Operational Programmes as listed above (Table 21-1) and Consolidated EIA (Approved 2015) for the existing operations.

All watercourses or riparian areas requiring re-vegetation should be monitored for signs of erosion. In addition, all of the following areas should also be monitored:

- All stormwater discharge points;
- All clean water diversion discharge points; and
- All road and conveyor crossings,

Monitoring activities should consist of fixed point photography as well as a walk through survey to observe for signs of erosion in the field. Monitoring should be done annually at the end of the rainy season. Any erosion damage observed should be repaired immediately.

26.1.2 Surface Water Monitoring Programme

Monitoring of surface water should continue as already prescribed for the existing mine and it's associated extention operations and in accordance with the WUL received in October 2017. This is relevant since all the surface infrastructure to be used for the expansion section is already in existance.

The parameters for water analysis should be those which are currently being tested for at TRP in compliance with the water use licence (WUL), as well as any additional parameters which may be required by the authorities (Department of Water Affairs and/or the Limpopos
Department of Economic Development, Environment and Tourism):

Table 26-2: Surface water monitoring as prescribed by approved EIA/EMPR

Details	Monitoring
Pre-Construction Phase	
TRP SW1 (-24° 56' 18.48"S; 30° 08' 29.71"E)	Quarterly water samples
Construction And Operation Phase	
TRP SW1 (-24° 56' 18.48"S; 30° 08' 29.71"E)	Monthly water samples
Closure And Post-Closure Phase	
Up- and down-gradient samples of all rivers in the vicinity of mining operations, as well as any springs, pans and natural dams.	Bi-annual water samples

- Total Dissolved Solids
- Sulphate, SO4;
- Chloride, Cl;
- Sodium, Na;
- Magnesium, Mg;
- Potassium, K;
- Calcium, Ca;
- Nitrate, NO3; and
- Chrome Hexavalent, (Cr6+).

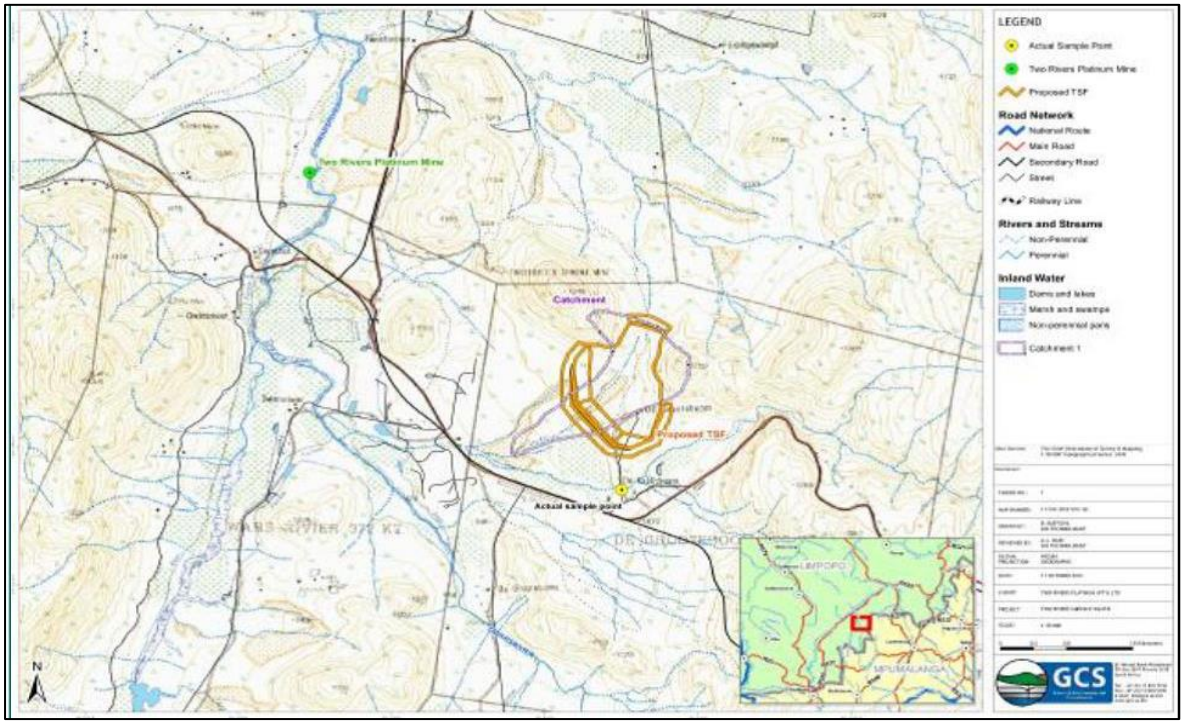

Figure 26-1: Surface water sampling positions

The proposed Merensky infrastructure will be constructed within the existing TRP mining right area for which there is an existing monitoring programme.

Table 26-3: Surface water monitoring network as referenced in GCS EIA/EMPR (Approved 2015)

Point Name	Sampling Schedule	Description	GPS Co-ordinates S	GPS Co-ordinates E
Groundwater - Boreholes				
TRM 05 B D	Quarterly quality data & levels	u/stream of plant in Kleindwars sub-catchment	-24°56'16.6"S	30°6'0.9"E
TRM 05 B S	Quarterly quality data & levels	u/stream of plant in Kleindwars sub-catchment	-24°56'16.7"S	30°6'0.8"E
TRM 11 B D	Quarterly quality data & levels	d/slope of Secondary Crusher next to Kleindwars	24° 56' 0.35"S	30° 06' 0.21"E
TRM 11 B S	Quarterly quality data & levels	d/slope of Secondary Crusher next to Kleindwars	24° 56' 0.35"S	30° 06' 0.21"E
TRP GWM 01 S (TRM17)	Quarterly quality data	Main Decline d/slope of PCDams	24° 56' 35.9"S	30° 05' 45.6"E
TRP GWM 01 D	Quarterly quality data	Main Decline d/slope of PCDams	24 56' 35.9"S	30 05' 45.6"E
TRP GWM 02 S	Quarterly quality data & levels	Concentrator Plant d/slope of PCD	24° 55' 59.9"S	30° 06' 09.0"E
TRP GWM 02 D	Quarterly quality data & levels	Concentrator Plant d/slope of PCD	24° 55' 59.9"S	30° 06' 09.0"E
TRP GWM 04 S	Quarterly quality data & levels	North Decline Area	24° 54' 50.6"S	30° 06' 01.0"E
TRP GWM 04 D	Quarterly quality data & levels	North Decline Area	24° 54' 50.6"S	30° 06' 01.0"E
TRP GWM 06 S	Quarterly quality data & levels	Tailings Dam Complex	24° 57' 01.1"S	30° 06' 16.0"E
TRP GWM 06 D	Quarterly quality data & levels	Tailings Dam Complex	24° 57' 01.1"S	30° 06' 16.0"E
TRP GWM 07 S	Quarterly quality data & levels	Tailings Dam Complex	24° 57' 04.3"S	30° 06' 29.9"E
TRP GWM 07 D	Quarterly quality data & levels	Tailings Dam Complex	24° 57' 04.3"S	30° 06' 29.9"E
TRP GWM 08 S	Quarterly quality data & levels	South Opencast (proposed) area	24° 58' 15.4"S	30° 06' 15.0"E
TRP GWM 08 D	Quarterly quality data & levels	South Opencast (proposed) area	24 58' 15.4"S	30 06' 15.0"E
TRP GWM 09 S	Quarterly quality data & levels	Tailings Dam Complex	24° 57' 05.1"S	30° 05' 58.9"E
TRP GWM 09 D	Quarterly quality data & levels	Tailings Dam Complex	24° 57' 05.1"S	30° 05' 58.9"E
TRM4	Monthly static levels	Tailings Dam Complex	24° 57' 25.0"S	30° 05' 49.3"E
TRM6	received - monthly levels	Inyoni Dam Area	24° 57' 37.6"S	30° 05' 30.8"E
TRM8	Monthly static levels	Inyoni Dam Area	24° 57' 38.5"S	30° 05' 08.5"E
TRM9	Monthly static levels	Inyoni Dam Area	24° 57' 49.6"S	30° 05' 45.8"E
TRM10	Monthly static levels	Tailings Dam Complex	24° 56' 55.2"S	30° 05' 58.8"E
TRM11	Monthly static levels	d/slope of Secondary Crusher next to Kleindwars	24° 56' 04.1"S	30° 05' 57.0"E
TRM12	Monthly static levels	Tailings Dam Complex	24° 57' 14.8"S	30° 06' 02.6"E
TRP13	Monthly static levels	Tailings Dam Complex	24° 57' 30.6" S	30° 06' 0.07" E
TRP14	Monthly static levels	Tailings Dam Complex	24 °57' 50.5" S	30° 05' 59.4" E
TRM69	Monthly static levels	Inyoni Dam Area	24° 58' 3.4" S	30° 05' 13.9" E
TRP46	Borehole Dry - not measured	Dry	24 57' 03.3" S	30 05' 21.6" E
Surface Water - River Sampling				
TRSW1	Monthly quality analysis	Klein Dwars River	24°59' 8.16"S	30° 04' 52.48"E
TRSW2	Monthly quality analysis	Klein Dwars River	24°55' 44.98"S	30° 06' 3.66"E
TRSW3	Monthly quality analysis	Klein Dwars River	24°57'44.70"S	30° 05' 17.88"E
TRSW4	Monthly quality analysis	Dwars River	24°55'41.92"S	30° 06' 30.22"E
TRSW5	Monthly quality analysis	Groot Dwars River	24°54'43.40"S	30° 06' 11.90"E
TRSW6	Monthly quality analysis	Groot Dwars River	24°54'32.00"S	30°06'19.91"E
TRSW7	Monthly quality analysis	Groot Dwars River	24°56'41.51"S	30° 7'20.03"E
Drinking Water				
MD Offices	Monthly bacterial analysis	Main Decline Office Kitchen	24° 56' 38.4" S	30° 05' 32.3 E
ND Change House	Monthly bacterial analysis	North Decline Change House	24° 54' 53.5" S	30° 05'48.8" E
CP Offices	Monthly bacterial analysis	Concentrator Plant Offices	24°56' 02.8" S	30° 06' 18.1" E
Tailings dam offices	Monthly bacterial analysis	Tailings Complex Offices	24° 57' 14.5" S	30° 06' 00.9" E
Farm House Kitchen	Monthly bacterial analysis	Farm/Guest House Kitchen	24° 55' 03.8" S	30° 06' 00.0" E
Crusher Area	Monthly bacterial analysis	Crusher Area	-24°55'58.9"S	30°5'32.4"E
MD Change House	Monthly bacterial analysis	Main Decline Change House	-24°56'39"S	30°5'30.3"E
Pollution control Dams				
NDCD1	Monthly quality analysis	North Decline	24°54'49.00"S	30° 5'56.38"E
NDCD2	Monthly quality analysis	North Decline	24°54'50.01"S	30° 5'56.10"E
NDSWD1	Monthly quality analysis	North Decline	24° 54' 50.6" S	30° 05' 57.6" E
MDCD1	Monthly quality analysis	Main Decline	24° 56`35.1" S	30° 05' 44.1" E
MDCD2	Monthly quality analysis	Main Decline	24°56'38.38"S	30° 5'43.91"E
CD1	Monthly quality analysis	Main Decline	24 56' 33.0"S	30 05' 42.3"E
CD2	Monthly quality analysis	Main Decline	24 56' 33.0"S	30 05' 42.3'E
TRTD1	Monthly quality analysis	Tailings Complex	24 57' 20.9"S	30 06' 1.08"E
TRTD2	Monthly quality analysis	Tailings Complex	24 57' 20.5"S	30 06' 0.90"E
CPCD1	Monthly quality analysis	Concentrator Plant	24° 56' 01.3" S	30° 06' 12.7" E
Sewage Plant Outflows				
SWT1	Monthly quality analysis	Main Decline	24° 56' 33.2"S	30° 05' 39.4"E
SWT2	Monthly quality analysis	Concentrator Plant	24 56' 0.96"S	30 06' 12.5"E
SWT3	Monthly quality analysis	North Decline	24 54' 50.0" S	30 05' 56.3"

The water quality parameters which are tested for (as per the WUL requirements) are:

- Total Dissolved Solids
- Sulphate, SO4;
- Chloride, Cl;
- Sodium, Na;
- Magnesium, Mg;
- Potassium, K;
- Calcium, Ca;
- Nitrate, NO3; and
- Chrome Hexavalent, (Cr6+).

Also ensure compliance with the WUL, License No: 06/B41H/AJIGC/6098 (File No: 27/2/2/B741/10/1) dated October 2017.

26.1.3 Groundwater Monitoring Programme

Monitoring of groundwater should continue as already prescribed for the existing mine and it's associated extention operations and in accordance with the WUL received in October 2017. An updated Hydrogeologist report was done for the expansions and the following was prescribed to incorporate for the new underground sections:

Also ensure compliance with the WUL, License No: 06/B41H/AJIGC/6098 (File No: 27/2/2/B741/10/1) dated October 2017.

26.1.3.1 UG2 and Merensky (Kalkfontein/Tweefontein) underground expansions

The groundwater monitoring program should be conducted to assess the following:

- The impact of mine dewatering on the surrounding aquifers: This will be achieved through monitoring of groundwater levels in the monitoring boreholes. If private boreholes are identified within the zone of impact on groundwater levels, these will be included in the monitoring programme;
- Groundwater inflow into the mine workings. This will be achieved through monitoring of groundwater levels in the monitoring boreholes as well as measuring water volumes pumped from mining areas;
- Groundwater quality trends. This will be achieved through sampling of the groundwater in the boreholes at the prescribed frequency; and
- The rate of groundwater level recovery after mining ceases.

Laboratory analysis techniques should comply with the South African Bureau of Standards (SABS) guidelines. The groundwater monitoring data from the new monitoring boreholes should be included in the monitoring database and updated on a regular basis as information becomes available. The database will be used to analyse the information and evaluate trends noted. It is recommended that the new monitoring boreholes are

included in the quarterly and annual reports generated for mine management.

It is envisaged that the frequency of monitoring remain on a bi-annual basis for quality, while water level monitoring should be conducted on a monthly basis. Two (2) boreholes (KFN2, KFNF1) should be monitored for water quality and water level, while water levels in an additional 5 boreholes (KFNF1, KFN2, KFN3, TRP New1, TRP New2) should be monitored. The proposed monitoring programme is summarized and shown below.

Table 26-4: TRP Monitoring Boreholes (Current approved as per Consolidated EIA/EMPR 2015)

Monitoring Position	Sampling Interval	Analysis	Water Quality Standards
Construction, Operational, Decommissioning And Post Closure Phases			
KFNF1, KFN2, KFN3, TRP New1, TRP New2	Monthly: measuring the depth of groundwater levels	N/A	N/A
KFN2, KFNF1	Biannual: sampling for water quality analysis	• Full analysis in April and October • Groundwater level	South African Water Quality Guidelines: Domestic Use, livestock watering:
Rainfall	Daily at the mine	N/A	N/A

Recording of water balance data for the mine is important when rehabilitation options are considered. This data is critical for the calibration of transient models, which are required to predict future scenarios of impacts at the mine. This data should be recorded and stored for use in future model calibration and predictions.

A water balance is a basic accounting system that summarises volumes of water that enters and leaves the mining system. In this water accounting system inflows and outflows need to be balanced. Inflows are considered as water that enters the opencast and underground areas and is consequently considered as positive. Outflows are considered as water that leaves the opencast or underground areas.

The sources of inflows and outflows that were considered for the basic water balance are as follows:

- Inflows:
- Runoff due to rainfall;
- Groundwater inflow;
- Outflows (or losses):
- Evaporation;
- Make up or re-use water; and
- Use for production (product).

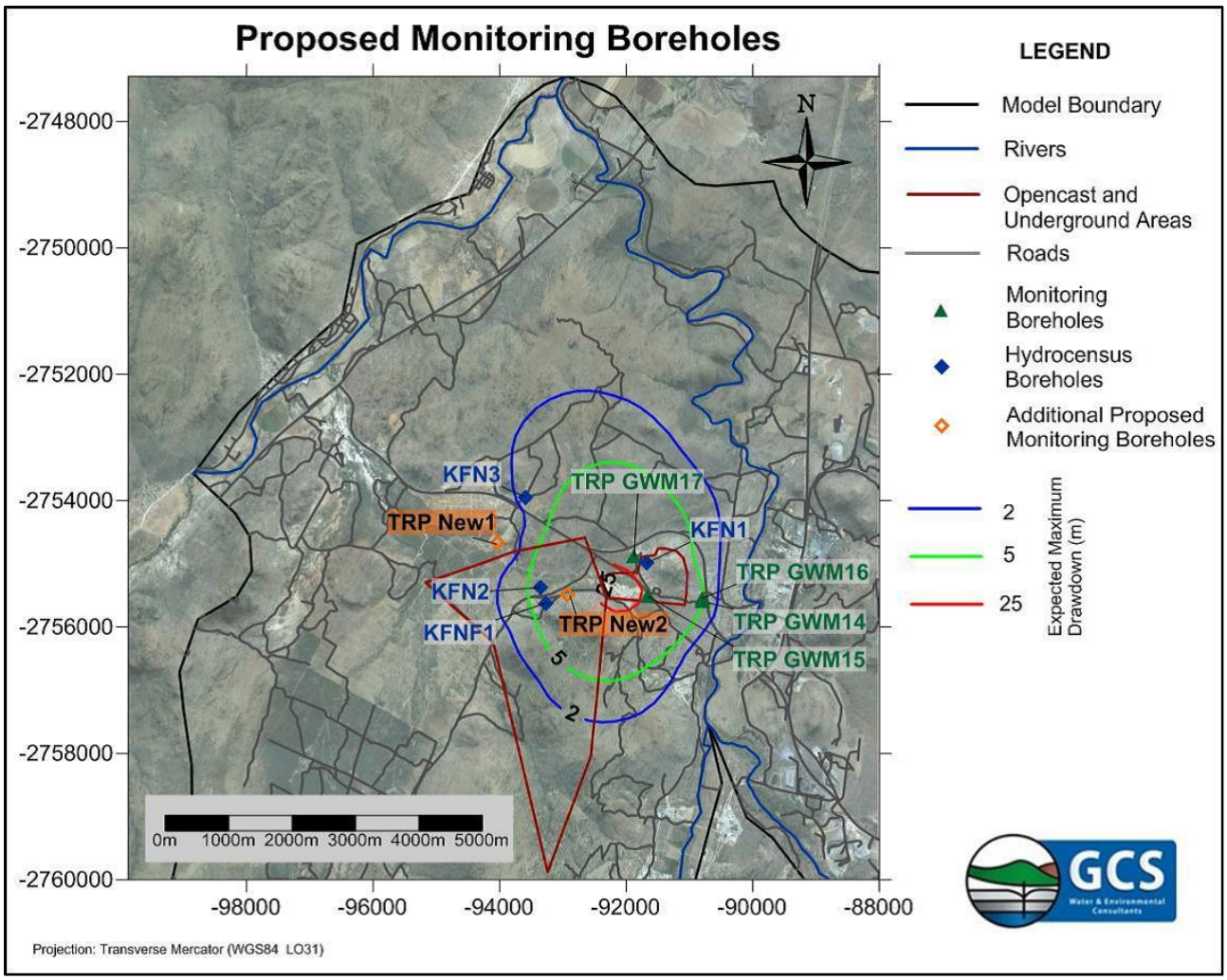

Figure 26-2: Monitoring Borehole positions

26.1.3.2 Wetland, Riparian and Vegetation Establishment

A number of aspects relating to the watercourses or riparian areas on site should be monitored to ensure effectiveness of mitigation and management measures, and to inform improvements where required.

Vegetation re-establishment

Areas re-vegetated following construction activities, decommissioning activities or any activities leading to vegetation removal and disturbance should be monitored following seeding to ensure successful establishment of vegetation. The following broad guidelines should apply, though the site specific details should be determined by a suitably qualified expert:

- Monthly monitoring for the first six (6) months, then annual monitoring during the growing season;
- Monitoring for the first six (6) months should focus on cover;
- 70% cover should be achieved after 3 months;
- Annual monitoring (representative sample of re-vegetated sites only) should be undertaken until the appointed independent specialist is satisfied that a sustainable vegetation cover has been established.

Alien vegetation

An ongoing alien vegetation removal programme should be implemented during and after construction. Alien removal should consider water quality concerns associated with removal of vegetation within a water course (i.e. only approved herbicides or mechanical measures may be used). Biennial monitoring inspections should identify target areas for clearing.

Biomonitoring at TSF

The following assessment should be undertaken at a suitable monitoring point within the vicinity of the TSF monitoring point (TR SW1, refer to Figure 3.1) and the following analysed:

- Macro-invertebrates in terms of the latest South African Scoring System (SASS5) method.
- Habitat integrity indices in terms of the Invertebrate Habitat Assessment System (IHAS, version 2).
- Toxicity in terms of Whole Effluent Toxicity (WET) tests on at least two trophic levels, namely fish and invertebrates.

It is recommended that biomonitoring is undertaken on a quarterly basis.

Existing TRP biomonitoring

Biomonitoring is currently undertaken at the site, on a bi-annual basis. This should be continued as part of the UG2 and Merensky Expansion.

26.1.4 Noise Monitoring Program

It is recommended that the locations of the new underground sections be incorporated into the existing noise monitoring framework to ensure that no additional noise impacts are occurring. Quarterly noise monitoring is recommended.

26.1.5 Blasting Monitoring Programme

Third party consultation and monitoring should be considered for all ground vibration and air blast monitoring work. This will bring about unbiased evaluation of levels and influence from an independent group. Monitoring could be done using permanent installed stations. Audit functions may also be conducted to assist the mine in maintaining a high level of performance with regards to blast results and the effects related to blasting operations.

The ground vibration and air blast levels limits recommended for blasting operations in this area are provided in Table 26-5.

Table 26-5: Recommended ground vibration limits

Structure Description	Ground Vibration Limit (mm/s)	Air Blast Limit (dBL)
National Roads/Tar Roads:	150	N/A
Electrical Lines:	75	N/A
Railway:	150	N/A
Transformers	25	N/A
Water Wells	50	N/A
Telecoms Tower	50	134
General Houses of proper construction	USBM Criteria or 25 mm/s	Shall not exceed 134dB at point of concern but 120 dB preferred
Houses of lesser proper construction	12.5	
Rural building – Traditional Build houses	6	

26.1.6 Heritage Monitoring Program

No specific heritage monitoring program was described within the specialist report. However, should any heritage remains be discovered during any phase of the development, a specialist should be consulted.

26.1.7 Visual Monitoring Program

No surface impacts or infrastructure is proposed for underground sections. However, a Monitoring framework should be instigated and managed by their responsible body and the following system may enforce good practice:

- Implement an “Observe and report” approach which will enable employees to report any disturbance of or degradation that they encounter.
- A monthly visual inspection is recommended for surface impacts related to the underground material movement procedures, which should inspect/confirm that no additional impacts are occurring.

26.1.8 Air/Dust Monitoring Program

Dust deposition measurements should be carried out by method ASTM 1739- 98 recommended in SANS 1929-2004. This involves exposure of a standard bucket for a month, with weighing (and chemical analysis, if necessary) of the dust collected. The changing of dust buckets should be undertaken by trained TRP personnel on a monthly basis and the weighing can be carried out at a suitable off-site or on-site laboratory.

The proposed new underground infrastructure will therefore be included in the existing TRP air quality monitoring programme.

26.1.9 Waste Monitoring

The following wastes needs to be monitored for the proposed project:

- The volumes of waste deposited from the proposed underground sections (All Residue Stockpiles);

and

- The volume of water removed from the new underground sections.

26.2 ENVIRONMENTAL MONITORING AND AUDITING

Department of Environmental Affairs and Tourism (DEAT, 2004) defines environmental auditing as "a process whereby an organisation's environmental performance is tested against its environmental policies and objectives." Monitoring and auditing is an essential environmental management tool which is used to assess, evaluate and manage environmental and sustainability issues:

In order to ensure that the objectives of sustainable development and integrated environmental management are met and in order to obtain data which can inform continuous improvement of environmental practices at the site (adaptive management), monitoring and reporting will be an essential component of the proposed operations.

Monitoring and management actions associated with the project are contained in Section 26.2 of this report as well as in the various specialist reports associated with this project. This section provides a summary of the critical monitoring aspects per specific environmental field.

26.3 GENERAL MONITORING AND MANAGEMENT

The appointment of a suitably qualified on-site Environmental Control Officer (ECO) is essential to the successful implementation of this project, although this role can be fulfilled by the SHE Representative. The ECO will be responsible for the implementation of the EMP, applicable environmental legislation and any stipulations/conditions set by the relevant competent authorities (including but not limited to the DMR and DWS). The Environmental officer will conduct formal monthly site inspections and conduct an internal annual audit during the construction and operational phase.

An external Environmental Auditor should also be appointed to conduct annual audits for the duration of the construction and operational phase. The auditor should monitor the success and effective implementation of the environmental management measures stipulated by applicable legislation, the EIA/EMP , and any conditions set by the competent authorities. Following each site visit, the auditor should submit a report to the DMR documenting the success/failure of the implementation of the management measures at the operations.

Since the proposed underground section is an extension of the existing TRP mine, it is recommended that the new underground expansions are included within the existing annual audits, general inspections and relevant timeframes.

26.3.1 Specific Monitoring Requirements

Monitoring of the proposed development (both on site and where appropriate in the surrounding

environments) should be considered a high priority and should be conducted in accordance with the relevant specialist recommendations as summarized below:

26.3.2 Monitoring Protocol

It is essential that during the implementation and operational phase of the proposed development that the monitoring of certain elements are carried out to ensure compliance with regulatory bodies. A monitoring protocol will be required. The monitoring only includes those activities identified in the EMP and excludes any monitoring that should take place according to the water use license and compliance in terms of the existing WUL is essential.

26.3.3 Monitoring Requirements and Record Keeping

To ensure that the procedures outlined throughout the EMP are implemented effectively, it will be necessary to monitor the implementation of the EMP and evaluate the success of achieving the objectives listed in the EMP. To ensure that all personnel on site are aware of their obligation to protect the environment, induction training will also include environmental awareness.

The audit procedure will include a Compliance audit, conducted by the Environmental Control Officer. Where the objectives of the EMP are not being met the reasons will be determined and remedial action or variation to the tasks will be recommended. Major residual effects shall be documented in a Non-Conformance Report, during the construction and operational phases. Follow-up audits will be conducted as per the audit protocol in the EMP.

26.3.3.1 Implementation Phase

The following monitoring needs to be conducted:

- The TRP existing mine has a current monitoring plan which will provide enough baseline data for comparison against future monitoring of the proposed underground expansion activities, especially since no significant change in monitoring is prescribed.
- The montiroing as prescribed in the updated Hydrogeological study is the only additional features which should be included in the existing monitoring framework.

26.3.3.2 Operational Phase

The following monitoring must be conducted: Please refer to Section 26 and also Table 24-1 regarding mitigation outcomes and Table 26-1 for mechanisms for monitoring.

26.3.3.3 Audit Protocol

It is essential that during the construction and operational phases of the proposed development, the monitoring and auditing of certain elements are carried out to ensure compliance with regulatory bodies. An

Audit Protocol for both the construction phase and the actual operational phase will be required. The auditing only includes those activities identified in the EIA/EMP and excludes any auditing that should take place according to the water use license or any other legislative authorization process if and when they will be authorized.

26.3.3.3.1 Implementation Phase

The following audits need to be completed (valid for this EMP):

- EMP compliance (Continuously/Weekly): to be checked by an on-site ECO, SHE representative or Environmental manager (EM).
- EMP compliance (on a annual basis): to be checked by an independent ECO.

26.3.3.3.2 Operational Phase

The following audits must be completed:

- EMP compliance (Continuously): to be checked by an on-site ECO, SHE representative or Environmental manager (EM).
- External environmental compliance audits (EIA/EMP annually during operations).

26.3.3.4 Environmental Incidents

An environmental incident is defined as any unplanned event that results in actual or potential damage to the environment, whether of a serious or non-serious nature. An incident may involve non- conformance with environmental legal requirements, the requirements of the EMP, or contravention of written or verbal orders given by the ECO or relevant authority.

All details regarding Environmental Incidents and procedures have been described within Section 21.3.2 above and should be handled accordingly.

26.3.3.5 Penalties and Fines for Non-Compliance or Misconduct

This EMP forms part of the contract agreement between the Client and the Principal contractor. As such, non-compliance with conditions of the EMP will amount to a breach of contract. Penalties will be issued directly to the contractor by the applicant in the event of non-compliance to the EMP specifications. The issuing of a penalty will be preceded by a verbal warning by the applicant, as well as strict instruction in at least one monthly ECO report to rectify the situation. The ECO and applicant will communicate with regards to realistic time-frames for possible rectification of the contravention, and possible consequences of continued non-compliance to the EMP.

Penalties incurred do not preclude prosecution under any other law. Cost of rehabilitation and/or repair of environmental resources that were harmed by the actions of the contractor if such actions were in

contravention of the specifications of the EMP will be borne by the contractor himself. Penalties may be issued over and above such costs. The repair or rehabilitation of any environmental damage caused by non-compliance with the EMP cannot be claimed in the Contract Bill, nor can any extension of time be claimed for such works. Penalty amounts shall be deducted from Certificate payments made to the Contractor.

The following categories of non-compliance are an indication of the severity of the contravention, and the fine or penalty amounts may be adjusted depending on the seriousness of the infringement.

- Category One:Acts of non-compliance that are unsightly, a nuisance or disruptive to adjacent landowners, existing communities, tourists or persons passing through the area.
- Category Two: Acts of non-compliance that cause minor environmental impact or localized disturbance.
- Category Three: Acts of non-compliance that affect significant environmental impact extending beyond point source.
- Category Four: Acts of non-compliance that result in major environmental impact affecting large areas, site character, protected species or conservation areas.

26.3.4 Environmental Awareness Plan

Environmental awareness training is critical for two primary reasons:

a) The workforce must understand how they can play a role in achieving the objectives specified in the EMP; and
b) The workforce must understand their obligations in terms of the implementation of the EMP and adherence to environmental-legislative requirements.

This environmental awareness plan is aimed at ensuring that employees, contractors, subcontractors and other relevant parties are aware of and able to meet their environmental commitments. This plan is to be updated on a yearly basis during the construction and operational phases of the project in light of operational changes, learning experiences and identified training needs.

All full-time staff and contractors are required to attend an induction session when they start, which session should include environmental aspects.

It is therefore recommended that the ECO/Environmental Manager be involved in induction training. Since the induction and entry will be located on the existing premises, the induction sessions may be modified/adapted based on the audience attending the specific session, but it should ensure that all employees gain a suitable understanding of:

- Environmental requirements of the project, and how these will be implemented and monitored;
- Including each employee's responsibilities with respect to environmental issues;
- Contents and commitments of the EMP, including no-go areas, employee conduct, pollution prevention (prohibitions against littering, unauthorized fires, loud music, entry to adjacent properties, road conduct etc.);

- Environmentally sensitive areas on and around the proposed development sites, including why these are deemed important and how these are to be managed. Employees will also be made aware of protected species found on the existing and surrounding site and how these are to be conserved, as well as alien invasive species potentially found on the site and how these should be managed; and
- Incident identification, remediation and reporting requirements: what constitutes an environmental incident (spillages, fire etc.) and how to react when such an incident occurs.

Environmental training will not be restricted to induction training sessions alone, but will be conducted on an on-going basis throughout the lifecycle of the project as and when required. Records are to be kept of the type of training given (matters discussed and by whom), date on which training was given and the attendees of each training session.

Action to be taken during an Emergency or Accident has been described in detail for every instance described below, therefore, implement existing Environmental Emergency Response Plan and TRP Emergency Preparedness Plan (TRP Doc TRP-COP-MAN-013).

26.3.4.1 Responsible Persons

Compliance with the emergency response plan and ensuring individual safety will be responsibility of all employees and contractors on the mine. Record keeping, investigation and management of emergencies will be the responsibility of the following persons:

- Mine Manager;
- Environmental Management Representative- this includes the Safety, Health and Environmental (SHE) managers and officers;
- Mine and Tailings Storage Facility Engineer; and
- Plant Manager.

The mine's Environmental Officer, Project Manager for the construction phase, as well as the relevant contractor will be responsible for ensuring that all employees (temporary and permanent) are made aware of their responsibilities, i.e. implementation of the Environmental Awareness Plan.

26.3.4.2 Defining an Environmental 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 Environmental Emergency Response Plan. The plan should be disseminated to all employees and contractors and in the event of an emergency, it should be consulted.

This Environmental Emergency Response Plan should be used together with the TRP Emergency Preparedness Plan (TRP Doc TRP-COP-MAN-013) placed on the mine where it will be easily viewed. The Emergency Response Plan should contain a list of procedures, evacuation routes and a list of emergency

contact numbers.

If the environmental 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 on the mine. A checklist of emergency response units must be consulted and the relevant units notified.

The checklist includes:

- Fire department;
- Police;
- Emergency health services such as ambulances, paramedic teams, poisons centres;
- Hospitals, both local and further afield, for specialist care;
- Public health authorities;
- Environmental agencies, especially those responsible for air, water and waste issues;
- Other industrial facilities in the vicinity with emergency response facilities;
- Public works and highways departments, port and airport authorities; and
- Public information authorities and media organisations.

26.3.4.3 Process for Identifying Environmental Emergency Procedures

The process that will be used to identify emergency situations at the TRP mining operations will be conducted in terms of the Aspects Registers and may include the following emergencies:

- Pollution Control Dam Overflow;
- Pollution Control Dam Breach (on-site);
- Tailings Dam Storage Facility Breach (off-site/neighbouring mining operations);
- Berm Breach/Drain Overflow;
- Hydrocarbon Spill (diesel, oil, grease, etc.); and
- Veld Fires.

The necessary actions required, as well as the responsible person for ensuring that the actions are followed through and the reporting requirements are adhered to, to ensure effective and efficient response to each of the environmental emergency situations listed above are set out in this procedure.

26.3.4.4 Most likely Potential Environmental Emergencies

The following define the most likely potential environmental emergencies:

- Accidents;

- Fires;
- A major hydrocarbon spill or leak;
- A major spill or leak of process water;
- Flooding;
- Subsidence; and
- Explosions.

26.3.4.5 Accidents

In the case of a medical accident or problem, refer to the TRP Emergency Preparedness Plan (Mine Reference TRP-COP-MAN-013).

26.3.5 Indicate the Frequency of the Submission of the Performance Assessment Report

Yearly performance assessment reports are recommended. Refer to details on Auditing procedures (Section 26.3.3.3).

26.3.6 Manner In Which Risks Will Be Dealt With In Order To Avoid Pollution Or The Degradation of The Environment

Refer to Table 24-1 for the recommended mitigation measures to limit environmental impacts. A suitable risk matix may be used to evaluate operational risks during any stage of the development. Ensure compliance with all existing TRP Standard Operational Procedures (SOPs) and that they be updated to include the underground expansion areas.

26.4 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

(among others, confirm that the financial provision will be reviewed annually).

The Immediate Closure Provision as calculated by (Knight Piesold Consulting (Pty) Ltd, 2018) will be updated yearly as part of the annual liability assessment required by the MPRDA and GNR 1147 in terms of the NEMA, once operations commence. The Final Rehabilitation plan for the underground expansions will need to be formalised as soon as Closure planning commences (this should comply with DMR Closure rehabilitation and will include the backfill, seal and concrete caps of the shafts/declines utilised.

27 UNDERTAKINGS

The EAP, ……..Elemental Sustainability (Pty) Ltd / Malan Scholes Consulting……., herewith confirms

a) The correctness of the information provided in the reports;

b) The inclusion of comments and inputs from stakeholders and I&APs;

c) The inclusion of inputs and recommendations from the specialist reports where relevant; and

d) The acceptability of the project in relation to the finding of the assessment and level of mitigation proposed;

Signed at.....on this..... day.....

Signature of applicant .....

Designation.....

COMMITMENT/UNDERTAKING BY THE APPLICANT

I, ……, the undersigned and duly authorised thereto by the Two Rivers Platinum Mine undertake to adhere to the requirements and to the conditions as set out in the EMPR submitted to the Director: Mineral Development and approved on.....

.....

Signed at.....on this..... day.....

Signature of applicant .....

Designation.....

-END-

28 REFERENCES

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29 APPENDICES

Appendix 1: Qualifications and Resume of EAP
Appendix 2: Experience of the EAP
Appendix 3: Locality Plans (A3)
Appendix 4: Master layout plan / Site Layout information (A3 Drawings)
Appendix 5: Land Use Map (A3)
Appendix 6: Public Participation Documents for the Underground activities
Appendix 7: Specialist report (Geohydrological Assessment 2018)
Appendix 8: Specialist report (Heritage Assessment/Exemption Letter 2018)
Appendix 9: Specialist report (Closure Cost 2018)
Appendix 10: DMR Letter of Acknowledgement
Appendix 11: MWP updated