mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT FOR THE VYGENHOEK PLATINUM ORE MINING RIGHT APPLICATION AND ASSOCIATED LISTED ACTIVITIES

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 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).

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REVISION AND APPROVAL

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Environmental Management Assistance (Pty) Ltd (EMA) ref:	Nomamix (Pty) Ltd Vygenhoek Project
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Reviewers

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Applicant Authorisation	**Walter Murray** **Managing Director at Nomamix (Pty) Ltd**		

EXECUTIVE SUMMARY

Environmental Management Assistance (Pty) Ltd has been appointed as the independent Environmental Assessment Practitioner (EAP) to manage the integrated Scoping and Environmental Impact Assessment (EIA) process associated with the following activities:

- Activities associated to the mining right application; and
- Waste management activities listed under Category B in GNR 633 of 24 July 2015 (GG 39020) in accordance with the 2014 EIA regulations (GN R.982) on behalf of the applicant.

Nomamix (Pty) Ltd (the applicant) is proposing an opencast platinum mining development, hereafter to be referred to as the Vygenhoek Platinum Mine, situated on Portions 3 and 7 of the farm Vygenhoek 10 JT situated in the Thaba Chweu Municipality, Mpumalanga.

Screening and site verification

Upon initiating the Scoping and EIA process, a screening report using the National Screening Tool as referred to in Regulations 16 (1)(v) of the Environmental Impact Assessment Regulations 2014 was generated. The screening report identified various specialist studies to be conducted.

All specialist studies conducted performed a site verification as per the minimum criteria for reporting on identified environmental themes (GN 320 GG 43110 of 20 March 2020 and GN 1150 GG 43855 of 30 October 2020).

The following section summarises the impact assessment outcome of the identified specialist studies:

Air quality (Appendix F)

Based on the modelled proposed emission sources, the overall impact is identified to result in ***medium negative impacts*** in terms of particulates and dust-fall if mitigation measures are implemented. Adherence with the identified mitigation measures stated in the specialist report, there is no reasoned opinion from an air quality perspective opposing the development of the proposed mine.

Climate change (Appendix G)

Based on the impact rating system used , Vygenhoek Platinum Mine's GHG emissions, in terms of a percentage of South Africa's carbon budget, are considered to be ***medium impact*** in terms of the magnitude/severity of the proposed mine's GHG emissions and climate change impacts. The expected GHG emissions for the LoM mine (based on information provided) is 53 671.82 tonnes CO2e (0.0017% of SAs carbon budget, at a 1.5°C scenario). It is however on the lower end of being a ***medium impact***. At a 2°C scenario, the impact will still be ***medium***.

The impacts of climate change on the proposed mine can vary. Mpumalanga Province is expected to experience higher minimum, average and maximum temperatures over the next few decades. These temperature changes would be accompanied by increasing incidence and intensity of drought, possibly even in regions where total rainfall increases (such as along the Mpumalanga escarpment). Total annual rainfall is expected to increase by between 85 and 303 mm per year, with distinct increases along the escarpment (MSDF, 2018). Water demand in Mpumalanga has increased due to rapid industrialisation, mining, urbanization, and population growth, and it is stated that the province is unlikely to meet the water availability due to the climate change impact on the province.

A decision on whether the mining operation should be approved should not rely solely on the climate change impacts. The GHG emissions should be viewed against locally and internationally accepted emission intensity benchmarks for platinum mining. Annexure A of Government Gazette No. 43452 of 19 June 2020, as part of the Carbon Tax Act (Act No. 15 of 2019) provides an SA Industry benchmark value of 0.004 tonnes CO2e/tonne of ore mined, for a shallow depth mine (0-300m) in the Platinum mining sector. In year 1, and intensity ratio of 0.16 tonnes CO2e/tonne of ore is expected. An intensity ratio of 0.03 is calculated for subsequent years 2-10. This is higher that the industry benchmark provided as part of the Carbon Tax Act. The purpose of the emission intensity benchmark is that companies that perform better as compared to a carbon emissions intensity sector benchmark qualify for a higher than default tax-free threshold.

Noise (Appendix H)

Conceptual scenarios were developed for the future construction and operational phases with the output of the modelling exercise indicating a potential ***medium risk*** of a noise impact at one receptor. This relates to mining traffic noises increasing the ambient sound levels at the closest house above a noise level that could be considered disturbing. A decommissioning phase was also assessed considering the findings from the construction scenario.

It is concluded that the noise from the proposed activities can be managed to acceptable levels. It is therefore the recommendation that the proposed activities at the Vygenhoek Platinum be authorized from a noise impact perspective.

Terrestrial biodiversity (Appendix I)

An assessment of the potential and likely impacts on the floristic receiving environment that could reasonably be expected from the proposed mining activity, include the following:

Summary of impact significance on the floristic receiving environment		
Nature	*Before Mitigation*	*After Mitigation*
Impact 1: Direct impacts on/ losses of conservation important and protected plant species (individuals, stands, populations) as well as habitat that is associated with these plants of conservation consideration	23	17.25
Impact 2: Direct losses and deterioration of natural and sensitive habitat types, including essential habitat refugia, atypical and unique/ restricted habitat types	19	13.5

Impact 3: Direct impacts on local diversity patterns and local loss of floristic diversity	18	8.5
Impact 4: Local depletion of biodiversity and floristic diversity	11.25	6.75
Impact 5: Deterioration and changes to untransformed habitat in the surrounds, with specific reference to sensitive habitat types and habitat types of limited representation on a local scale	18	14
Impact 6: Disruption of important ecological processes, services, and infrastructure and altered ecological functionality (including fire, erosion) of surrounding areas and natural habitat	10.5	7
Impact 7: Introduction of exotic and invasive species to the area	15	5.5
Impact 8: Increased decline in the aesthetic appeal of the landscape	15	11
Impact 10: Exacerbation of existing levels of habitat fragmentation and isolation, considering past, present and reasonably foreseeable future anthropogenic disruptive activities in the immediate region, with specific reference to mining activities	19	19
Impact 11: Cumulative impacts on local/ regional and national conservation efforts, targets, and obligations (loss of natural habitat)	16	11

It is therefore the considered opinion of the specialist that, based on key results of this botanical investigation, despite significant reservations, no explicit objections to the project are raised. While the proposed activity will result in unavoidable impacts on a local scale, the mitigated significance is generally within an acceptable range, with the understanding that best practice guidelines are followed, and the recommended mitigation approach is entirely implemented and stringently adhered for the entire life of mine.

Anticipated impacts from the proposed mining activity on the faunal and avian receiving environment include the following:

Summary of impact significance on the faunal and avian receiving environment		
Nature	*Before Mitigation*	*After Mitigation*
Impact 1: Direct and permanent loss of natural fauna habitat within the development/mining footprints during the construction, operational and the decommissioning phases	17.25	13.5
Impact 2: Indirect loss of threatened and near threatened bird and mammal species due to the displacement from the area during the construction and operational phases	18.0	6.5
Impact 3: Decreased habitat quality of surrounding areas due to peripheral impacts such as spillages, litter, increased erosion, contaminants, etc.	14.25	6.5
Impact 4: Indirect ecological impacts at all phases pertaining to the loss of the ecological connectivity across the study site and regional habitat fragmentation associated negative impacts on population viability	23.0	9.0
Impact 5: Increased plundering of natural resources and poaching of wildlife due to increased human encroachment and accessibility to the site	13.5	4.0

Impact 6: Subsequent habitat change and changes to the local fauna community structure and composition (mainly generalists and secondary species) during decommissioning/rehabilitation	9.0	9.0
Impact 7: Cumulative impacts on local/ regional and national conservation targets and obligations (e.g. loss of natural grassland habitat) and expansion of mining operations in the wider study area	18.0	9.5

It was concluded that the faunal assemblages along the mature mixed woodland continuum are spatially autocorrected with a high overlap of similar taxa and similar functional groups occurring in these different habitat types, thereby emphasising an intact "functionality". Therefore, the study site represents an exceedingly healthy and natural habitat, expressing intact ecological processes and functionalities.

It is predicted that the unmitigated mining activity will have severe and unacceptable negative impacts on the animal and bird constituents and communities (notably species of conservation concern) on a scale larger than the site, with the potential to disrupt the natural movement/dispersal of fauna from upland habitat along the escarpment down into the Dwars River Valley. The comprehensive implementation of the suggested mitigation approach is expected to result in amelioration of the anticipated impacts to an acceptable level, although still considered (unavoidably) devastating on a local scale. No specific objections to the project are raised, but with the understanding that the suggested mitigation protocol is timeously and comprehensively implemented.

Any impacts on species of conservation concern are subject to a stringent mitigation approach. While avoidance of any impact is preferred, unavoidable impacts often result from development in natural areas. These impacts on conservation important plant species are subject to permitting requirements from leading authorities, notably Department of Environmental, Forestry and Fisheries (DEFF), the National Forest Act (NFA), and Mpumalanga Tourism and Parks Agency (MTPA).

While in situ conservation of conservation important plant species is preferred to translocation, it is acknowledged that, should the project receive an Environmental Authorisation (EA), unavoidable impacts will result. The removal and/ or relocation of certain species will form part of the mitigation approach, and these activities, or any other impacts on these plants, are subject to permitting authorisation.

Aquatic biodiversity (Appendix J)

The following potential impacts have been identified and assessed throughout the life cycle of the proposed mine:

- Sedimentation of aquatic habitats: The potential impact to the aquatic habitats due to sedimentation resulting from various activities related to the proposed mine was determined to be a ***high significance***. However if mitigation measure proposed by the specialist as well as the measures defined in the EMPr (**Part B**) are implemented, this impact can be mitigated to a ***low to moderate significance***.

- Water quality deterioration: Water quality deterioration due to various activities associated with the proposed mine are likely to have a ***high significance*** impact if not mitigated. However, if the mitigation measures proposed are implemented, the impact can be mitigated to a ***low to moderate significance***.
- Loss of unique biodiversity features: The loss of aquatic biodiversity within the western tributary as a result of proposed mining activities poses several concerns and has particular relevance to the confirmed presence of what appears to be an undescribed fish species with a very narrow distribution range. Therefore, if activities are not managed, the proposed mine poses a ***high significance impact*** on various aquatic biodiversity features. By implementing mitigation measures identified specific to the identified aquatic biodiversity features, the potential impacts are expected to be of a ***low to moderated significance***.
- Aquatic ecosystem fragmentation: The construction of crossings across various watercourses within the study area, most notably the access/haul road crossing of the western tributary, has the potential to disrupt movement patterns of aquatic and terrestrial fauna within the associated catchment, limiting both upstream as well as downstream movement (***moderate significance impact***). While it is acknowledged that natural barriers to fish movement do exist within the western tributary that will limit the upstream migration of many species, the placement and design of the structures may still have an impact on those species with reach-scale or habitat-scale movement patterns (***low to moderate significance impact***).
- Invasive alien plant species encroachment: Unvegetated and disturbed areas due to the proposed mine, poses a ***moderate to high significant*** risk to the encroachment of invasive alien plant species. However, if mitigation measures defined in the EMPr (Part B) are implemented this risk, from an aquatic point of view, can be mitigated to a ***low to moderate significant*** impact.
- Impact on provincial freshwater conservation targets: The proposed activity is expected to impact on national protected areas targets as well as provincial freshwater conservation targets, both of which are expected to be cumulative if the impact is to be considered with other regional impacts that have or are expected to have on such areas (***moderate to high significance*** if not mitigated, ***low to moderate*** if mitigated).

Adherence with the identified mitigation measures, there is no reasoned opinion from an aquatic perspective opposing the development of the proposed mine.

Soils (Appendix K)

The results of the Impact Assessment for the proposed mine will have a ***medium to low*** impact on the immediate and surrounding soil systems. Implementation and management of proposed mitigation measures will minimize loss of topsoil, prevent contamination of topsoil and stockpiled soil and prevent overall soil erosion.

It is recommended that the proposed project be approved subjected to the mitigation measures stipulated in the Impact Assessment and Environmental Management Programme.

Hydrology (Appendix L)

Hydrological impacts associated with the proposed operation which have been identified in this assessment include the sedimentation and siltation of water courses, alteration of drainage patterns and associated stream flow volumes, as well as the contamination of water resources (including hydrocarbons). The site visits confirmed green-field conditions with an associated pristine hydrological environment. As such, the proposed operation (with the development of infrastructure and associated mining practices) will have a negative impact on receiving water resources.

In terms of the Environmental Assessment (EA) and Environmental Management Program (EMPr), the following should be noted:

- Where possible, relocate infrastructure outside of the 1:100 year flood-line and 100m stream buffers to reduce flood risk and preserve natural vegetation associated with riparian areas as far as possible. The revised layout (this draft) showed a significant improvement compared to the previous layout and iterations thereof. Where this is not possible ensure appropriate flood protection and correct design of infrastructure such as bridges and culvert.
- Ensure the SWMP progresses to detailed design phase ensuring compliance with GN704 and Best Practice Guideline G1 for Storm Water Management (BPG1). The proposed infrastructure footprint and associated area of disturbance (dirty areas) should be minimised as far as practically possible.
- Ensure the water quality monitoring program is appropriate and implemented as soon as practically possible to ensure an adequate baseline can be established prior to disturbance through development and mining. It is recommended that monitoring takes place quarterly (at minimum), ensuring a comprehensive analysis is undertaken at an appropriately accredited laboratory. It is further recommended that water from within the dirty water process circuit such as the PCD and pit be included in the monitoring program.
- Ensure dirty water generated on site is contained and reused in the process water circuit as far as possible. To this end, there is a need for further investigation into the re-use, or treatment and discharge of dirty water at the operation as highlighted by the static water balance, particularly in the summer months. Dust suppression can be considered, water quality dependant.
- A dynamic water balance simulation model should be developed to represent water reticulation more accurately on site, which can also be used as a decision support tool at both planning and operational levels.
- The mitigation measures associated with this project will reduce the impact of the proposed operation on receiving water resources considerably, and as such are considered imperative.

Geo-hydrology (Appendix M)

Based on the outcome of the geohydrological study, no avoidance areas have been identified. Moreover, the study did not identify major risks associated with the preparation (construction), operational and closure phase of the proposed mine. Opencast mining the UG2 seam is feasible from a geohydrological perspective as long as mitigation measures are implemented.

The following recommendations are made, in terms of EA requirements:

- Dedicated groundwater monitoring boreholes should be drilled before pit expansion to obtain baseline water quality and quantity data. Drilling log data should be recorded and can supplement any future geohydrological work for the site (i.e. will help to better understand the local geohydrology).
- Additional rock samples should be collected during mining, to maintain a clear understanding of the AMD potential of the rock being mined. It is important to use ABA and NAG as pre-emptive tools to determine if any AMD may occur.

The following can be done to improve the assumptions and understanding of the groundwater aquifer and hence improve the numerical groundwater model confidence:

- All new exploration boreholes drilled in the area should note groundwater occurrences as well as strike depths. The data can be used to update the conceptual hydrogeological model which is incorporated into the numerical flow model.
- Water levels of dedicated monitoring boreholes that will be drilled, as well as any new boreholes which are discovered in the area during routine hydrocensus updates, should be monitored bi-annually.
- Dewatering volumes (during mining) should be recorded daily and reported bi-monthly.

It is recommended that the numerical groundwater model and transport model be updated annually, to:

- Recalibrate the flow system based on the dedicated monitoring boreholes drilled and routine water level monitoring data gathered for the site.
- Confirm preferential flow paths and groundwater migration velocities as new geological data is attained via mining.
- Evaluate the spatial impact (i.e. TDS plume) calibrated with the proposed monitoring borehole data.
- Confirm long term liabilities associated with the workings (i.e. predict likely changes in flow fields etc.); and
- Ensure no monitoring network gaps exist (i.e. check if the monitoring network is representative of the site).

Human Health (Appendix N)

The key Environmental Health Area (EHA) risks (summarised) in order of priority as identified during the risk assessment include:

EHA Risk Categories	Pre-Mitigation	Post Mitigation
EHA#7 Accidents & Injuries	Very High (14)	High (12)
EHA#2 Respiratory & Housing Issues (including covid-19)	High (12)	Medium (9)
EHA#4 Sexually Transmitted Infections	High (11)	Medium (8)
EHA#5 Soil & Water Sanitation Related Diseases	High (11)	Low (5)
	Low (5)	Medium (8)
EHA#6 Food & Nutrition Related Issues	Medium (8)	Low (5)
	Medium (9)	Very High (14)
EHA#8 Exposure to Potentially Hazardous Materials	Medium (8)	Low (5)
EHA#9 Social Determinants of Health (SDH)	Medium (8)	Low (5)
	Medium (9)	Very High (14)
EHA#3 Veterinary Medicine & Zoonotic Issues	Low (5)	Very Low (2)
EHA#11 Health Services Infrastructure & Capacity	Low (5)	Very Low (2)

	Medium (9)	Very High (14)
EHA#12 Noncommunicable Diseases (NCDs)	Low (5)	Very Low (2)
EHA#1 Vector-Related Diseases	Very Low (2)	Very Low (2)
EHA#10 Cultural Health Practices	Very Low (1)	Very Low (1)

Key:

Negative Impacts	*Very Low*	*Low*	*Medium*	*High*	*Very High*
Positive Impacts	*Very Low*	*Low*	*Medium*	*High*	*Very High*

The following statements reflect the professional opinion of the appointed specialist:

- In relation to the receiving landscape, which already includes numerous mining activities, most of which are substantially larger than this project – it can be deemed that this project is very-small to small in comparison and thus the comparable impacts are minor, however the Project in question will naturally add to the accumulated impacts and effects of mining in the surrounding landscape and communities which reside in this area.
- That said, the positive socio-economic impacts of a project such as this, at a time in South Africa's economy which has been hard hit by covid-19 and other economic challenges and which is in dire need of job creation and social upliftment - should not be overlooked when analysing the various health related impacts, many of which can be mitigated.
- As such, the proposed project, and related activities (from a health-related perspective) does not indicate any reason for not being authorised in conjunction with the various environmental, social and health related mitigation measures as specified during the Scoping-EIA process.

Socio-economic (Appendix O)

The anticipated socio-economic impacts are likely to vary from local to the regional level, as the macro-economic benefits are likely to be realised on a regional level, while most of the negative impacts are anticipated to be localised. The area of direct impact of the Proposed Project is anticipated to be primarily within the Farm Vygenhoek, with immediately surrounding farms receiving indirect impacts.

The communities within the study area (local) comprise primarily low-income households, with marginal (subsistence) livelihoods. Low levels of skills and education, as well as limited access to urban centres, means that high unemployment is a key characteristic. These communities are dependent on natural resources for their livelihoods, including open veld for grazing and collection of firewood and medicinal plants, as well as local surface water resources. While the Vygenhoek Farm is currently under state ownership and the subject of land claims, the resident community established in the 1960s, possibly as farm tenants, and so is considered established, despite having few rights (apart from permission) on the land.

The proposed mine is unlikely to improve the overall economic characteristics of the local communities, however, will have the potential to provide individuals and households with an increase in employment, income, and improved socio-economic conditions.

It is the opinion of the specialist that the proposed Vygenhoek Platinum Mine should be authorised within the context of the socio-economic assessment, as the mine is anticipated to be of economic benefit for the local area, as well as contributing to regional mining and economic development opportunities. Although the mine is not considered a major mining development (medium scale and extraction only), employment opportunities and the multiplier effect could improve the opportunities for currently unemployed individuals and low-income households within the local area. However, the manner in which the operations are carried out, must be done in line with best practice, including the Social and Labour Plan and the Social Management Plan. It is possible that not every eventuality of the potential socio-economic impacts have been detailed by this study, due to the complexity of socio-economic environment. It is, therefore, crucial that ongoing and transparent engagement and management of issues as they arise through the recommendations of the Social Management Plan is carried out. This is likely to ensure that the host community and other stakeholders remain in support of the mine, and that negative impacts on the host community are minimised and benefits are maximised.

Heritage and Palaeontology (Appendix P)

In anticipation of other mining activities in the greater study area, archaeologists have completed numerous heritage surveys (e.g., Huffman & Schoeman 2001, 2002 a and b; van Schalkwyk 2005; Roodt 2003a, 2003b, 2003c, 2005, 2008a, 2008b; Van der Walt & Fourie 2006; Van der Walt & Celliers 2009; Van der Walt 2009; 2016 and Pistorius 2007, 2010, 2011) for various EIA's and EMP's. These studies provide a good understanding of the archaeology of the area and use of the wider landscape and more than 240 sites are on record for the greater study area, ranging from the Middle Stone Age and Iron Age to recent households of farm labourers and tenants. A Heritage assessment by Du Piesanie and Higgitt (2012) that assessed the current study area recorded 50 features in the Vygenhoek project area. The survey design of was to revisit selected sites previously recorded and to assess areas not covered during the previous assessments that could be of interest. Based on these surveys more than 50 heritage features are now on record for the immediate study area. According to the SAHRA Paleontological map the area is of low and insignificant paleontological sensitivity and no further studies are required.

The overall impact of the preferred alternative layout on heritage resources is medium and can be mitigated to an acceptable level based on the recommendations in this report and approval from SAHRA prior to development. The socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures are implemented for the project.

Traffic (Appendix Q)

In conclusion of the findings as part of the investigations, it is of the opinion of the specialist that the proposed mining development would have a manageable impact on the relevant road network if the mitigation measures are implemented as recommended. In this case, it is therefore recommended that authorisation be granted.

Visual assessment (Appendix R)

The development and operation of the proposed Vygenhoek Platinum Mine and its associated infrastructure, may have a visual impact on the study area, especially within (but not restricted to) a 3km radius of the proposed mine. The post mitigation significance of these visual impacts is expected to range from ***moderate to low***.

The anticipated visual impacts on sensitive visual receptors (if and where present) in close proximity to the proposed mining facility are not considered to be fatal flaws for the proposed mine. It is however recommended that the project proponent engage with the residents of the settlements south of the Vygenhoek farm, in order to discuss potential visual impact concerns, to investigate potential visual screening solutions, or to offer reasonable compensation for potential inconvenience experienced.

Considering all factors, it is recommended that the Vygenhoek Platinum Mine as proposed be supported; subject to the implementation of the recommended mitigation measures and management programme.

Waste classification and characterisation (Appendix T)

One waste and one residue stream were identified for classification, nl. Overburden and RoM Material. A total concentration (TC) analysis and leachable concentration (LC) analysis were undertaken on a composite sample of the Overburden made according to the expected overburden rock composition (32% Anorthosite and 68% Pyroxene).

Both materials classified as Type 3 waste/residues, requiring, at least, a Class C, or equivalent, containment barrier for storage.

Waste / Material	Classification	Landfill class
Overburden	Type 3	Class C
RoM material (UG2 ore)	Type 3	Class C

Despite the exceedances of Copper and Flouride in the TC analysis of overburden, the exceedances for overburden were marginal and could potentially be ‘re-classified’ (re-run of lab analysis) or ‘declassified’ as Type 4 waste.

RoM Material, however, due to its various exceedances, and especially the dominance of Chromium in both TCT 1 and LCT 1 exceedances, will remain as Type 3 waste and must be appropriately contained during storage to prevent leachate and runoff of material entering groundwater, waterways or water bodies.

Assessment of alternatives

Following the assessment as conducted by the specialist studies several alternatives with reference to the site layout plan as submitted as part of the scoping report, was assessed. The preferred option was selected based on various impact factors and reduced the total footprint, as presented during the scoping phase, with approximately 29 ha.

At the time of submitting this report to the I&AP for comment the following conceptual infrastructures forms part of the site layout:

- Storm water infrastructure; and
- Location of PCD's.

The conceptual plans will be finalised following the geotechnical survey before submitting this document to the competent authority for authorising the activity as per the site layout plan provided in **Appendix C**.

No property alternatives have been considered as the envisaged mining operations will occur on properties already utilised for the prospecting operations and where Nomamix (Pty) Ltd is in process to apply for mining rights.

Environmental Impact Statement

It is the EAP's opinion that due process has been followed in terms of identifying impacts found to be potentially significant. Various mitigation measures to manage and monitor the impacts of the proposed Vygenhoek Platinum Mine have been proposed. **Appendix U** provides for addressing the requirements stipulated in GNR 1147 dealing with the financial provisions for the proposed mining operation as well as commitment to rehabilitation measures that must be implemented once authorisation has been granted.

The Vygenhoek Platinum Mine's conceptual Liability Estimation and Final Rehabilitation, Decommissioning and Mine Closure Plan (LRDCP) (**Appendix U**) has been completed during the time of finalising this document. However, this document is considered to be a living document and is subject to an annual review.

Therefore, in consideration of all facts presented by this final EIR, the proposed activities may only commence with the following conditions:

- The identified reduced footprint associated to the preferred alternative site layout plan as presented in **Appendix C** is adhered with;
- All existing informal access roads as presented in **Appendix C** (with specific reference to the coordinates provided) are maintained. For the purpose of this application, any upgrades to the existing roads must not exceed the maximum width of 8m. Should the upgrade require a road reserve larger than 8 m, authorisation subject to the relevant listed activities must be obtained;
- The southern portion of the mining pit only be mined once SAHRA grants authorisation for the disturbance of the identified historical Choma village;
- The findings and recommendations stipulated in the Vygenhoek Platinum Mine's LRDCP (**Appendix U**) be implemented;
- A annual rehabilitation be developed and reviewed as per the requirements stipulated by GNR 1147;
- The identified aspects for inclusion of conditions in the EA (as per **section 1) n)**) are adhered with;

- The comments received by the registered I&AP be incorporated into the final EMPr; and
- That the recommended mitigation measures must be strictly implemented and compliance be monitored and reported in order to minimise the impacts and ensuring compliance with current legislative requirements.

It is recommended that the proposed Vygenhoek Platinum Mine is allowed to proceed on the assumption that the environmental and social management commitments are adhered to, the scope of the mining operation remains as per the description provided in the final EIR & EMPr and considering the positive social impacts associated with the mine.

1. 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.

2. OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

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

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

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

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

(d) determine the—-

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

(ii) degree to which these impacts—

(aa) can be reversed;

(bb) may cause irreplaceable loss of resources, and

(cc) can be avoided, managed or mitigated;

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

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

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

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

PART A: SCOPE OF ASSSSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

3. Contact Person and correspondence address

Environmental Management Assistance (Pty) Ltd has been requested to complete the Scoping and EIA process associated with the application required for a mining right and associated listed activities in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) and the National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (NEMWA) to the Mpumalanga Department of Mineral and Resources and Energy (DMRE) on behalf of Nomamix (Pty) Ltd (applicant) for the proposed Vygenhoek Platinum Mine situated in the Thaba Chweu Municipality, Mpumalanga.

In addition to the application for a mining right the applicant have also applied for associated activities as listed in Listing notice 1, 2, and 3 of the 2014 EIA regulations (GG38282 GNR 982 of 2014).

a) Details of

i) Details of the EAP

Name of the Practitioner:	Environmental Management Assistance (Pty) Ltd
Contact person:	Anandi Alers
Tel No.:	+27 (0) 72 604 0455
Fax No. :	+27 (0) 86 226 7324
E-mail address:	anandi.alers@emassistance.co.za

ii) Expertise of the EAP

Environmental Management Assistance (Pty) Ltd (EMA) has appointed Mrs. Anandi Alers (EAP registration no. 2019/1514) as the EAP to manage the application process on behalf of Nomamix (Pty) Ltd.

A detailed portfolio of the team members associated with the management of this project can be found in **Appendix A**.

(1) **The qualifications of the EAP**

(with evidence)

Mrs. Anandi Alers completed a Master of Science degree in Environmental Management and Geography in 2015 at the North West University (Potchefstroom) under the guidance of Prof. Luke Sandham.

She holds a Bachelors of Science Honours degree in environmental sciences, specialising in Environmental Management and Geography, and a Bachelors of Science degree in Tourism, Zoology, and Geography.

(2) **Summary of the EAP's past experience**.

(In carrying out the Environmental Impact Assessment Procedure)

Mrs Anandi Alers has extensive knowledge of the South African EIA process and holds a Master of Science degree in Environmental Management on the subject of EIA follow-up. Her practical experience includes, but is not limited to the following:

- Environmental Management of a number of construction, mining, and industry related projects;
- Environmental auditing of a number of projects against the approved EMPr's and EA (Environmental Authorisations);
- The development and management of an ISO 14001 EMS (Environmental Management Systems) on a number of construction, mining and industry related projects;
- Development and implementation of policies and procedures managing environmental impacts; and
- Managing applications for a number of permits and licences.

A detailed description of all past experiences is available in **Appendix A**.

b) Description of the property

Farm Name:	Portions 3 and 7 of farm Vygenhoek 10 JT
Application area (Ha) :	720.65 ha
Magisterial district:	Ehlanzeni District
Distance and direction from nearest town:	Mashishing is the nearest town, 45km east from the Vygenhoek Project, Mpumalanga Province
21 digit Surveyor General Code for each farm portion:	T0JT00000000001000003 T0JT00000000001000007

c) Locality map

(show nearest town, scale not smaller than 1:250000)

Find **Appendix B** indicating the locality of the proposed activity.

d) Description of the scope of the proposed overall activity

(Provide a plan drawn to 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.)

The detailed site layout plan indicating the location, the area (hectares) of all the main listed activities, and infrastructures to be placed on the associated properties can be found in **Appendix C**.

The section to follow will provide a detailed scope on the proposed activity.

i) Listed and specified activities

A number of listed activities in terms of GNR 983 (Listing notice 1), GNR 984 (Listing notice 2), and GNR 985 (Listing notice 3) have been applied for, resulting in this report. These activities are highlighted in Table 1 below.

Table 1: Listed and specified activities associated to the proposed mining operation

NAME OF ACTIVITY (*All activities including activities not listed) (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.)*	**Aerial extent of the Activity Ha or m²**	**LISTED ACTIVITY Mark with an X where applicable or affected.**	**APPLICABLE LISTING NOTICE (***GNR 544, GNR 545 or GNR 546)/NOT LISTED*
All infrastructure areas, development footprints and associated activities.	71 ha	x	GNR983 - Activities 22 & 28 GNR984 - Activities 6, 15, 17 and 21 GNR985 - Activities 12 and 14
Opencast excavations	38 ha	x	GNR983 - Activities 22 & 28 GNR984 - Activities 6, 15, 17 and 21 GNR985 - Activities 12 and 14
Ablutions & change house with conservancy tank	160 m²	x	GNR983 - Activities 10 and 25 OR GNR984 - Activities 6 and 25
Topsoil & subsoil stripping & stockpiling	71 ha (2 ha stockpiling)	x	GNR984 - Activity 15 GNR985 - Activity 12
Residue stockpiles	22 ha	x	GNR984 - Activities 6 & 15 GNR985 - Activity 12 GNR 633 - Activity 11 GNR 633 - Category B activity 11
Fuel storage	<1 ha	x	GNR984 - Activity 4 GNR985 - Activity 10
RoM & product stockpiling	0.3 ha	x	GNR984 - Activity 6 GNR985 - Activity 12
Access and hauling along roads	8 ha	x	GNR983 - Activity 24 GNR985 - Activities 4, 14 and 18
Mobile screening plant	<1 ha	x	GNR984 - Activities 6, 15, and 21
Water supply (potable & process)	< 1 ha	x	GNR983 - Activity 9 GNR985 - Activity 14
Water storage (reservoirs / tanks)	< 1 ha	x	GNR983 - Activity 13 GNR984 - Activity 6 GNR985 - Activity 2
Discard disposal (backfilling)	38 ha	x	GNR983 - Activity 22 GNR984 - Activity 6
Storm water runoff management features	< 1 ha	x	GNR983 - Activity 9 GNR984 - Activity 6 GNR985 - Activity 14
Rehabilitation	71 ha	x	GNR983 - Activity 22 GNR921 - Activities B(7) & B(9)

			GNR 633 - Category A activity 14
Stores, workshops &wash bays	< 1 ha	x	Not listed
Waste generation & storage	< 1 ha	x	Expected waste generation under threshold

ii) 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)

The surface sub-outcrop of the proposed Vygenhoek Platinum Mine is planned to be mined using an advancing open pit mining method which allows for concurrent filling of the pit. The pit will be used to develop portals which will allow the remainder of the ore to be potentially exploited using underground mining methods. The open pit planned applies a conventional opencast truck and shovel mining philosophy including the following steps:

- Removal of topsoil and storing it at a designated position;
- Removal of the overburden and stockpiling of residue material in designated storage areas;
- Drilling and blasting will be required to break the hard overburden;
- Once the removal of ore has been completed, the pits will be backfilled with the overburden (residue material) behind the advancing face where possible with the remainder placed at the designated residue stockpile areas, separate from the topsoil;
- Drilling and blasting of the ore; and
- Loading and hauling of the ore for stockpiling at the Run-of-Mine (ROM) pad or for transport to the preferred Concentrator.

A portion of the residue is proposed to be used in the construction of haul roads, depending on the outcome from the waste classification. Topsoil will be placed on top of backfill for the purpose of rehabilitation. The ore will be stockpiled on a ROM pad and transported to the Concentrator Plant by trucks. The open pit mining philosophy is based on a contractor-operated operation. A production shift cycle operating 9 hours a day, 6 days a week will be adopted. The open pit layout and the life of mine schedule is presented in **Figure 1** below.

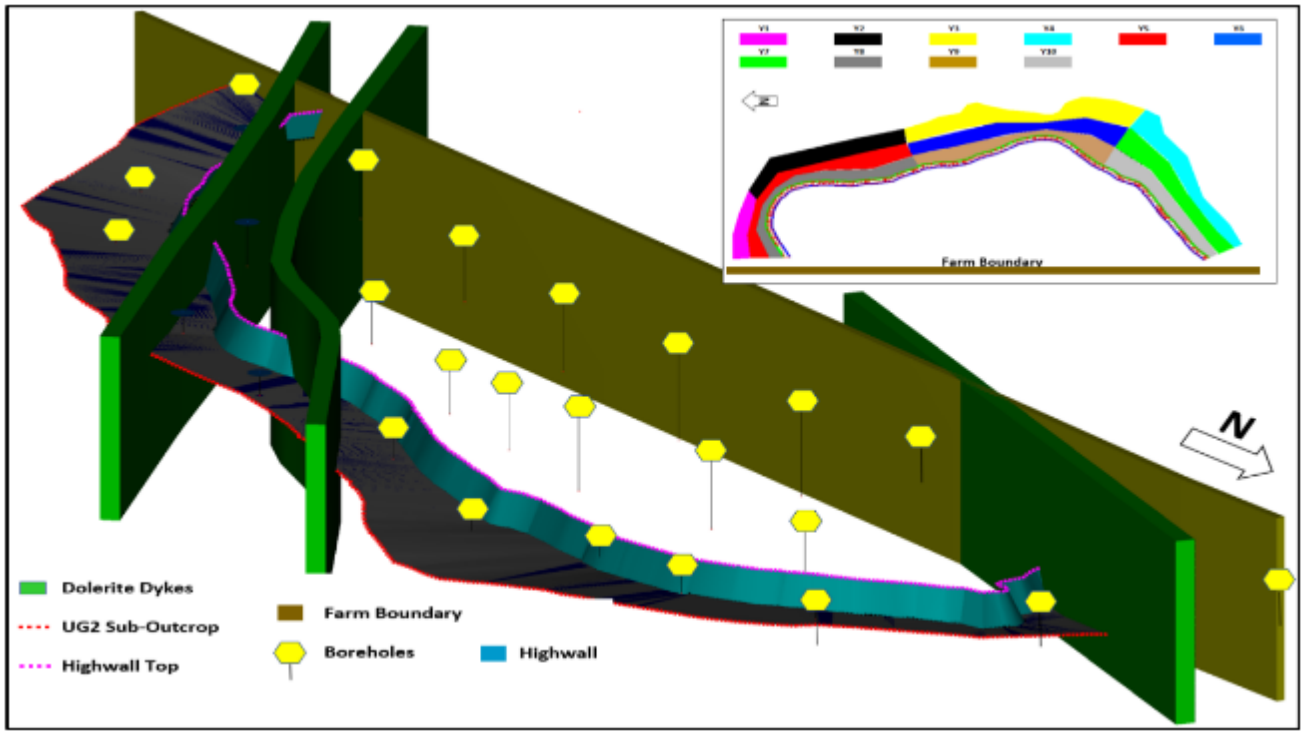

Figure 1: Vygenhoek UG2 pit layout (wireframe) and mining schedule

Resource particulars

The following table summarises the resource particulars:

Item	Detail
Type of Mineral (s)	Platinum Group Metals and all minerals and metals found in mineralogical association therewith and are mined out of necessity together with the Platinum Group Metals, including but not limited to: **Platinum Group Metals:** Platinum (Pt), Palladium (Pd), Rhodium (Rh), Iridium (Ir), Ruthenium (Ru) and Osmium (Os) **Other Precious Metals:** Gold (Au) and Silver (Ag) **Base Metals:** Nickel (Ni), Copper (Cu), Cobalt (Co), Iron (Fe), Vanadium (V) and Chromite (Chrome Ore)
Depth of mineral below surface	The economical layers sub-outcrop on surface to a depth of approx. 150m below surface.
Geological Formation	The proposed Vygenhoek Platinum Mine is located within the Eastern Limb of the Bushveld Ignious Complex (BIC) Chromitite Layers are situated in the Middle Group (MG) and Upper Middle Group (UMG) being UG2, UG1, MG4, MG3, MG2, MG1 and MG0 which occur in the Upper and Lower Critical zones of the BIC. The UG2

	Chromitite Layer will be the main target horizon for mining, with UG1 and MG layers as secondary horizons.

Basic overview of the mining method

Open pit mining operation will commence after the site establishment is completed. Initially, the removal of overburden will take place for a period of 6 months before any mining of ore is done. The first ore will be mined in month 8, and ore and waste mining will take place concurrently onwards. The pit will be mined from the North in a southerly direction, with backfilling of the mined-out areas taking place behind as the pit advances.

Factors that had to be taken into account in the mine design strategy included:

- Formal and informal settlements in relation to the planned open pit mining area as well as existing mining activities – a mining restriction zone of mainly 600m was used for design purposes, this correlates to the 600m blast radius;
- Residue stockpiles to be placed away from UG2 sub-outcrop positions, on the highwall side of the maximum highwall position;
- Monthly production of approximately 15,000 tpm of ROM ore;
- The weathering profile of the near-surface material;
- Backfilling of mined out areas as soon as possible to minimize dust and aid in rehabilitation, minimize haulage costs and double handling;
- Operating costs – for mining and administration;
- Selling costs - for the UG2 ROM;
- Mining dilution of 22% were applied after the in-situ resource estimates;
- Due to surface weathering an overall slope angle of 7° from vertical was used to ensure pit stability. The angle could be further steepened in the deeper solid zones, however a safety factor of 7° is preferred with a bench at 20m.

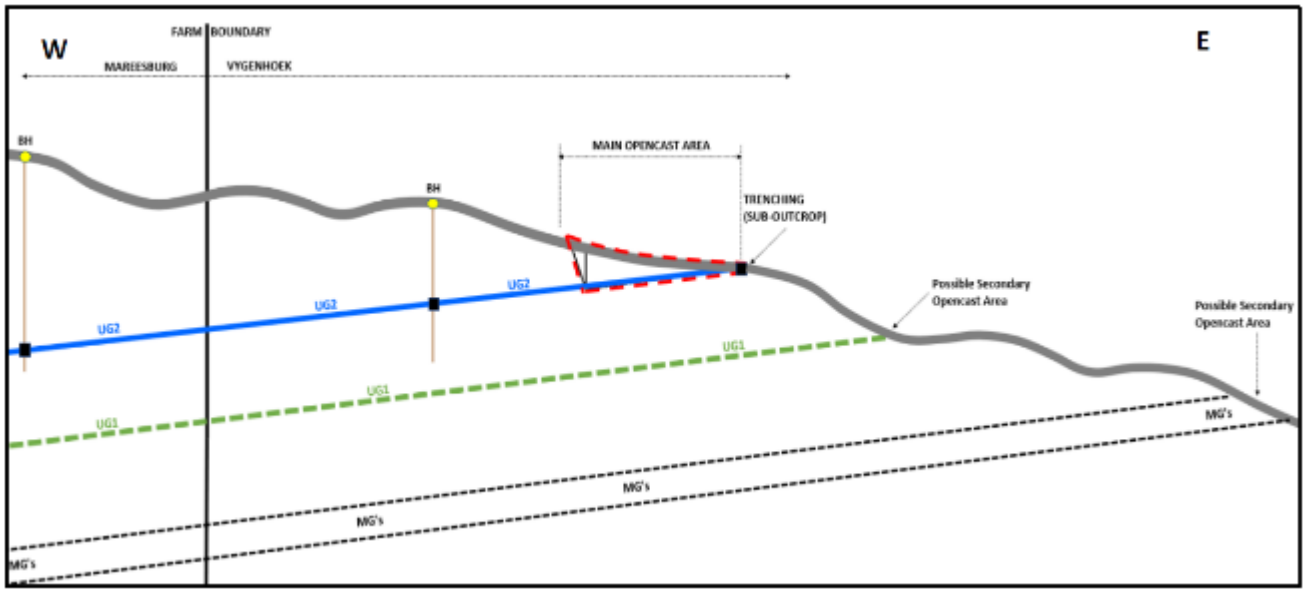

Figure 2: Schematic east-west section

Ramp-up of the mine mainly includes the installation of infrastructure including:

- Workshop
- Administration office
- Lighting of stockpile area and workshop / offices
- Weighbridge

Equipment that will be required to mine ore, includes:

- 5 Dump trucks for the transport of ore from the pit to the stockpile area,
- 2 Utility vehicles for the transport of material and explosives,
- 2 Drill rigs for the drilling of the benches
- 5 Excavators for the stripping of ore and waste
- 2 Bulldozer for the profiling of waste
- 1 Grader for the maintenance of access roads and haul roads
- 1 Water bowser for dust suppression of roads and waste dumps and screening areas.

Maintenance and installation of equipment required to mine in accordance with the health and safety specifications, includes the following:

- Personal Protective Equipment,
- Plant and Equipment,
- Explosives,
- Maintenance of machinery and equipment,

- Rotable spares e.g. axles, engines and electric motors,
- Mining services material,
- Miscellaneous (Lubricants, small tools and consumables) .

The above material and equipment are stored on-site to sustain continuous production in a safe work environment for employees.

e) Policy and Legislative Context

This section will provide the detailed description of the policy and legislative context associated to the proposed Vygenhoek Platinum Mine (Table 5).

Table 2: Detailed Policy and legislative context of the proposed Vygenhoek Platinum Mine

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process);	**REFERENCE WHERE APPLIED (i.e. Where in this document has it been explained how the development complies with and responds to the legislation and policy context)**	**HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT (E.g In terms of the National Water Act:-Water Use Liscence has/has not been applied for).**
National Legislation and regulations		
Section 24 of the Constitution of South Africa Act no. 108 of 1996	Part A: EIA process followed Part B: Requirements included in the EMPr	Adherence with all legislation and regulations that prevents pollution and ecological degradation, promotes conservation, and secures an ecological sustainable development and use of natural resources while promoting justifiable economy and social development.
The Minerals and Petroleum Resources Development Act, 2002 , Act No. 28 of 2002 (MPRDA)	Part A: EIA process followed Part B: Requirements included in the EMPr	• Submission of a mining works programme. • Submission of an application to a mining right. • Application for Environmental Authorisation in process (purpose of this report). • A Liability Estimation and Final Rehabilitation, Decommissioning and Mine Closure Plan (LRDCP) have been developed and are attached as **Appendix U.**
National Environmental Management Act 107 of 1998 (NEMA)	Part A: EIA process followed Part B: Requirements included in the EMPr	• Development of an EMPr for the proposed activities. • Application for authorisation resulting in the submission of this document. • Including emergency response procedures within the submitted EMPr. • Ensuring compliance with a monitoring and audit schedule and plan.
The following regulations in terms of NEMA are applicable:		

GN R. 982: National Environmental Management Act (107/1998): Environmental Impact Assessment Regulations, 2014 (2014 EIA regulations)	Part A: EIA process followed Part B: Requirements included in the EMPr	Independent EAP appointed to ensure adherence with the EIA procedure.
GN R. 983 – 985: Listing notices 1 to 3	Part A: EIA process followed Part B: Requirements included in the EMPr	Application for authorisation of listed activities submitted followed by the submission of the EIR, EMPr, and LRDCP.
GN R. 1147: Regulations pertaining to the financial provision for prospecting, exploration, mining or production	Part A: EIA process followed Part B: Requirements included in the EMPr	Submission of mine LRDCP as **Appendix U** to this report.
GN R. 549: Regulations to phase-out the use of PCB's materials and PCB's contaminated materials	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements incorporated in the EMPr.
National Environmental Management: Air Quality Act 39 of 2004 **(NEMAQA)**	Part A: EIA process followed Part B: Requirements included in the EMPr	• Requirements as stipulated in the Act are incorporated with the EMPr submitted for approval. • Recommendations made by the specialist report (**Appendix E**) incorporated into this report as well as the EMPr.
The following regulations in terms of NEMAQA are applicable:		
GN 893: List of activities which result in atmospheric emissions	Part A: EIA process followed Part B: Requirements included in the EMPr	No licence required at this time of the proposed activity.
GN R. 827: National dust control regulations	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements incorporated in the EMPr.
GN R. 283: National atmospheric emissions reporting regulations	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements incorporated in the EMPr.
GN R. 1210: National ambient air quality standards	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements incorporated in the EMPr.

GN R. 351: Regulations regarding the phasing-out and management of ozone-depleting substances	Part A: EIA process followed Part B: Requirements included in the EMPr	In the event that any PCB containing product will be used on site this regulation will be applicable. Requirements incorporated in the EMPr.
Atmospheric Pollution Prevention Act of 1965 **GN R. 1651:** Regulations concerning the control of noxious or offensive gasses emitted by diesel-driven vehicles	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements incorporated in the EMPr.
National Environmental Management: Waste Act 59 of 208 **(NEMWA)**	Part A: EIA process followed Part B: Requirements included in the EMPr	All waste management activities associated to the proposed mining operation must comply with the requirements set out by the Act. These requirements have been incorporated into the EMPr.
The following regulations in terms of NEMWA are applicable:		
GN R. 634: Waste classification and management regulations	Part A: EIA process followed Part B: Requirements included in the EMPr	Waste classification conducted on the Residue Material as part of the application for a Waste Management Licence (**Appendix T**).
GN R. 921: Activities listed requiring a waste management licence (WML)	Part A: EIA process followed Part B: Requirements included in the EMPr	Listed activity number 11 lists: *"The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right in terms of the MPRDA (Act 28 of 2002)"* An application for a WML forms part of this application.
GN R. 625: National waste information regulations	Part A: EIA process followed Part B: Requirements included in the EMPr	As listed activity 11 of GN R. 921 will be triggered by the proposed mining activities, GN R. 625 will apply. Therefore the Vygenhoek Platinum Mine must register as a waste generator.
GN R. 635: National Norms and Standards for the assessment of waste for landfill disposal	Part A: EIA process followed Part B: Requirements included in the EMPr	This regulation stipulates the requirements to assess generated waste for disposal to specific designed landfills. As a result the requirements stipulated in these regulations have been considered in the EMPr.
GN R. 636: National norms and standards for disposal of waste to landfill	Part A: EIA process followed Part B: Requirements included in the EMPr	This regulation stipulates the general principles associated to the disposal of waste to landfill. As a result the requirements stipulated in these regulations have been considered in the EMPr.

GN R. 926: National norms and standards for storage of waste	Part A: EIA process followed Part B: Requirements included in the EMPr	This regulation describes the general requirements for the management and storage of waste. As a result the requirements stipulated in these regulations have been considered in the EMPr.
Environmental Conservation Act of 1989 **(ECA)** **GN R. 425:** Waste tyre regulations **GN R. 341:** Regulations for the prohibition of the use, manufacturing, import and export of asbestos and asbestos containing materials	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements incorporated in the EMPr.
National Water Act 36 of 1998 (NWA)	Part A: EIA process followed Part B: Requirements included in the EMPr	Application for a Water Use Licence (WUL) is in process. General conditions stipulated in the NWA have been incorporated in the EMPr.
The following regulations in terms of NWA are applicable:		
GN 704: Regulations on use of water for mining and related activities aimed at the protection of water resources	Part B: Requirements included in the EMPr An application for a WUL is in process.	The requirements have been incorporated into the EMPr and final site layout plan.
Explosives Act 26 of 1956 & Regulations	Part A: EIA process followed Part B: Requirements included in the EMPr	• Requirements incorporated into the EMPr. • Requirements to be incorporated into the Vygenhoek Platinum Mine's Health and Safety management plan. • Requirements to be included in the Drilling and Blasting procedure.
Hazardous Substances Act 15 of 1973	Part A: EIA process followed Part B: Requirements included in the EMPr	• Requirements incorporated into the EMPr. • Requirements to be incorporated into the Vygenhoek Platinum Mine's Health and Safety management plan.
Petroleum Products Act of 1977 **GN R. 627:** Regulations regarding petroleum products specification and standards	Part A: EIA process followed Part B: Requirements included in the EMPr	Throughout the construction, operation, and decommissioning phase of the proposed mining activities petroleum products will be used. These requirements have been included in the EMPr.
Mine Health and Safety Act of 1996 **GN R. 1237:** Mines and works regulations	Part A: EIA process followed Part B: Requirements included in the EMPr	The requirements set out by the listed regulations must be incorporated into the Vygenhoek Platinum Mine's Health and Safety Management plan. Some of the requirements associated to the environmental health have been incorporated into the

GN R. 911: Mine health and safety regulations		EMPr. The following specific sections are applicable in this report and the EMPr: • Storage of hazardous substances; • Acquisition of hazardous chemicals; and • Air conditioning and refrigerant equipment.
National Road traffic Act of 1996 **GN R. 225:** National road traffic regulations	Part A: EIA process followed Part B: Requirements included in the EMPr	The requirements set in these regulations have been incorporated into the EMPr. However this should also form part of the Vygenhoek Platinum Mine's Health and Safety Management plan and Traffic management plan. The section specifically considered in the EIR and EMPr are as follows: • Transport of hazardous waste. • Loading and offloading of dangerous goods.
Human Tissue Act 65 of 1983 **GN R. 1935:** **GN R. 2878:** **National Health Act, 2003 – Regulations regarding the general control of human bodies, tissue, blood, blood products and gametes** **Medicines and related substances control Act 101 of 1965 & regulations**	Part A: EIA process followed Part B: Requirements included in the EMPr	• Requirements incorporated into the EMPr. • Requirements to be incorporated into the Vygenhoek Platinum Mine's Health and Safety management plan. • Requirements to be incorporated in the onsite clinic management plan.
Fertilizers, farm feeds, agricultural remedies and stock remedies Act 36 of 1947	Part A: EIA process followed Part B: Requirements included in the EMPr	The requirements specifically related to the use of herbicides and pesticides have been incorporated into the EMPr.
Conservation of Agricultural Resources Act 43 of 1983 (CARA) **GN R. 1048:** Declared Weeds and Invader plants	Part A: EIA process followed Part B: Requirements included in the EMPr	The requirements have been incorporated into the EMPr and final site layout plan. This act also deals with permitting of land zoned as Agriculture.
National Environmental Management: Biodiversity Act, 2002 **(NEMBA)**	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements incorporated into the EMPr. However before the commencement of site clearance an application must be lodged for the removal of protected species as identified in the Terrestrial Ecological Assessment (**Appendix G**).
National Veldt and Forest Fire Act 101 of 1998	Part A: EIA process followed	Measures to prevent the spreading of fires are incorporated into the EMPr.

	Part B: Requirements included in the EMPr	
National Forest Act 84 of 1998	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements incorporated into the EMPr. However before the commencement of site clearance an application must be lodged for the removal of protected species as identified in the Terrestrial ecological assessment (**Appendix G**).
National Heritage Resources Act 25 of 2000	Part A: EIA process followed Part B: Requirements included in the EMPr	The EIR & EMPr document complies with section 38(8) of the NHRA that stipulates that a Heritage Resources Management (HRM) process must be implemented if an evaluation of the impact of a development on heritage resources is required in terms of the NEMA, the integrated environmental management guidelines issued by the Department of Environment Affairs (DEA), the MPRDA, or any other legislation. The consenting authority (in this instance the DMR) must ensure that the evaluation fulfils the requirements of the South African Heritage Resources Agency (SAHRA) and / or the Provincial Heritage Resources Authority of Gauteng (PHRA-G) in terms of section 38(3) of the NHRA. The NID, HSR and HIA reports completed for the project complies with the section. Any comments and recommendations of SAHRA and / or PRHAG must be taken into account prior to the granting of the consent.
Occupational Health and Safety Act (Act 85 of 1993) **GN R.1248**:	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements to be incorporated in the Mine Health and Safety plan.
Government Policies		
Waste Management policies	Part A: EIA process followed Part B: Requirements included in the EMPr	In terms of waste management in South Africa, there are two main policies that have been considered in the development of the EMPr. The two main policies considered were regarding the management and disposal of fluorescent tube disposal and the management of sewage sludge. Best practice principles were incorporated into the EMPr.
National Environmental Health Policy	Part A: EIA process followed Part B: Requirements included in the EMPr	This policy document is intended as a 'broad guideline for the effective implementation and rendering of Environmental Health Services in South Africa'. It incorporates the philosophy of Environmental Health includes principles such as primary prevention, transparency, polluter pays, precautionary principle and cradle to grave.
SANS Standards		

Hazardous substances management	Part A: EIA process followed Part B: Requirements included in the EMPr	The following two SANS standards were incorporated into the EMPr: • SANS 10089-1:2008 - Specifications for above-ground storage facilities for petroleum products • SANS 310: 2011 - Storage tank facilities for hazardous chemicals: Above-ground storage tank facilities for flammable, combustible and non-flammable chemicals.
Provincial Legislation		
Mpumalanga Nature Conservation Act (Act 10 of 1998)	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements incorporated into the EMPr. Protected species identified in the Terrestrial Biodiversity Assessment (**Appendix I**).

f) 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).

Resource desirability and demand

The proposed Vygenhoek Platinum mine is located in the Eastern limb of the Bushveld Complex. In the Eastern Limb, the Critical Zone is developed over about 150 kilometers of strike length in three areas separated by two down-faulted blocks. The Merensky and UG2 Reefs outcrop over about 130 kilometers, but probably also occur in the down-faulted blocks. In the Eastern Limb, the Merensky Reef is far less distinctive compared to the equivalent reef that is developed within the Western Limb. In the Eastern Limb, the mineralization is hosted within the Merensky pyroxenite and immediately in the underlying anorthosite to norite. Narrow, 2mm to 5mm, chromitite stringers are frequently associated with the Merensky Reef horizon. The distinctive pegmatoidal pyroxenite, such as that which frequently comprises a part of the Merensky Reef in the Western Limb, is occasionally present beneath the lower chromitite stringer in the Eastern Limb.

The principal target of the Vygenhoek Project is the UG2 Reef. The emplacement model of the UG2 Reef is crystallization into synclinal structures in the floor rocks in which mineralization has "ponded" such as at AngloPlats neighbouring Mototolo Mine. The Critical Zone, which hosts the UG2 Reefs, was previously shown to occur on the Farm Vygenhoek 10JT and chromitite outcrops associated with the UG2 Reef had previously been traced on this farm. Further detailed studies have confirmed that the project area is almost entirely underlain by lithologies of the Rustenburg Layered Suite. The UG2 Reef as developed in the Vygenhoek Project area is mainly developed in two distinct reef types. The first type of occurrence is a composite chromitite band where the Leader Seam and Main Seam are not separated. In these areas, the distinction between the Leader Seam and Main Seam can only be distinguished based on grades and the Pt: Pd ratio in the individual samples. The second type of occurrence is where UG2 chromitite has been split by an internal waste parting which reaches thicknesses of up to 6.78m.

The Vygenhoek Project will not produce the final metals for marketing. The ROM ore will be sold and then a 4E Platinum Group Metals (PGMs) concentrate, consisting of Platinum (Pt), Palladium (Pd), Rhodium (Rh), and Gold (Au), with Nickel, Copper and Chrome as by products, will be produced:

Platinum uses

In addition to its use in jewelry, platinum has many applications as a catalyst, either in its pure form or as an alloy with rhodium. This allows a large range of chemical reactions such as that of reforming petroleum, producing nitric acid, producing pharmaceutical products, and for removing hydrogen and chlorine (particularly in organic chemical synthesis). Platinum is also used in electronics, while its incorruptibility makes it ideal for crucibles (along with Rhodium and Iridium additions) and retorts used in handling high corrosive chemicals or where resistance to high temperatures is required.

Palladium uses

Almost totally corrosion-free, palladium is used in alloy form with other precious metals in electronics (such as electrical contacts, particularly in telephone systems) and as resistance windings, especially where high precision is required. It is also used in electrothermal fuses, particularly in electric furnaces, as well as thermocouples and as a catalyst for the production of ethylene, vitamins A and E, brazing, welding (particularly jewellery), and other uses.

Rhodium uses

With an extremely high resistance to corrosion, rhodium is used to plate steel and brass in order to prevent corrosion from sea water and other elements. Such coatings must be extremely thin and used only when the cost is justified. As an alloy with platinum (containing about 1% rhodium), it is used in thermocouples, electrical equipment and man-made fiber production. It is used as a catalyst in producing nitric acid from ammonia, along with several other catalytic uses. Rhodium has a very high optical reflectivity, which is particularly useful since it is almost un-tarnishable.

Over the last two decades, the automotive sector has emerged as the principle consumer of Platinum, palladium, and rhodium PGMs

Gold uses

Gold is a dense, soft, shiny, malleable and ductile metal. It is one of the least reactive solid chemical elements. Gold has been a valuable and highly sought-after precious metal for coinage, jewellery, and other arts since long before the beginning of recorded history. Gold standards have been the most common basis for monetary policies throughout human history, being widely supplanted by fiat currency only in the late 20th century. The world consumption of new gold produced is about 50% in jewellery, 40% in investments, and 10% in industry. Besides its widespread monetary and symbolic functions, gold has many practical uses in dentistry, electronics, and other fields. Its high malleability, ductility, resistance to corrosion and most other chemical reactions, and conductivity of electricity led to many uses of gold, including electric wiring, coloured-glass production and even gold-leaf eating.

Nickel uses

Nickel is a transition element that exhibits a mixture of ferrous and nonferrous metal properties. Primarily nickel is produced and used in the form of ferro-nickel, nickel oxides and other chemicals, and pure nickel metal. The International Nickel Study Group (INSG, 2012) estimate that about 65% of nickel is used to manufacture stainless steels, and 20% in other steel and non-ferrous alloys, including super alloys, often for highly specialized industrial, aerospace and military applications. About 9% is used in plating and 6% in other uses including coins and a variety of nickel chemicals.

Copper uses

Copper is a ductile metal with very high thermal and electrical conductivity. Pure copper is soft and malleable; an exposed surface has a reddish-orange tarnish. It is used as a conductor of heat and electricity, a building material, and a constituent

of various metal alloys. The metal and its alloys have been used for thousands of years. The major applications of copper are in electrical wires (60%), roofing and plumbing (20%) and industrial machinery (15%). Copper is mostly used as a metal, but when a higher hardness is required, it is combined with other elements to make an alloy (5% of total use) such as brass and bronze. A small part of copper supply is used in production of compounds for nutritional supplements and fungicides in agriculture. Machining of copper is possible, although it is usually necessary to use an alloy for intricate parts to get good machinability characteristics.

Market and consumer analysis

The ROM ore from Vygenhoek mine will be sold per contract agreement and then processed to produce a 4E PGM and base metal concentrate. The 4E PGM consist of Platinum, Palladium, Rhodium, and Gold.

The product consumer of the ROM tonnages from the Vygenhoek Mine will be an adjacent Concentrator.

The final product consumers are the:

- Autocatalyst industry;
- Jewellery sector;
- Dental sector;
- Electrical / Electronics sector;
- Chemical industry; and
- Investment market.

Due to the small size of the Vygenhoek project, and to ensure the economic success of the project, the mine will only produce ore and will sell and transport this ore to one of the existing processing plants.

Broad-economic demand

There are a number of mines in the vicinity of the Proposed Project that extract platinum group metals (PGMs) of the Eastern Limb of the Bushveld Complex. The Proposed Project will target the Rustenburg Layered Suite (UG2 Reef), which has been identified on the site over the last decade.

The Proposed Project is small in size compared to other PMG mines in the area but will contribute to the overall extractive capacity of the region. Due to the small size of the operation, it is proposed that the ore will not be processed on site but sold on to a third party for processing at an existing plant. The metals that will be obtained from the ore extracted through the Proposed Project are used in a diverse range of industries. Key commodities to be extracted include:

- Platinum Group Metals:
    - Platinum – Pt, Palladium – Pd, Rhodium - Rh

  - Iridium – Ir, Ruthenium – Ru, Osmium – Os

- Other Precious Metals (not part of the PGM's):
  - Gold – Au, Silver – Ag
  - Base Metals:
  - Nickel – Ni, Copper – Cu, Cobalt – Co, Iron – FE
  - Vanadium – V, Chrome

The key metals (4E PGM) consist of Platinum, Palladium, Rhodium, and Gold. The key final product consumers are:

- Autocatalyst industry;
- Jewellery sector;
- Dental sector;
- Electrical / Electronics sector;
- Chemical industry; and
- Investment market.

South Africa is the largest producer of platinum (and associated metals) in the world, most of which is exported for use in the above markets. According to the Minerals Council South Africa (2019), platinum mining generated R124.6 billion in sales, employed over 164 500 people (R52.1 billion in earnings), and generated R1.12 billion in royalties in South Africa. However, with the large number of constraints on the industry, including unreliable power supply, increased electricity prices, and community and labour protests, the industry has seen a decline in recent years. There has, however, been an uptake from smaller, independent companies with international investment into the sector. As the third largest contributor in the mining sector, after coal and gold, platinum remains a key resource for supporting economic development in South Africa. This demand will see local and regional employment and broader economic benefits.

Socio-economic need and desirability

Mining is a key contributor to the provincial, district and local economies. While most of the direct economic benefits are recognised outside of the region, local socio-economic benefits can be developed through strategic planning. The development of smaller companies and mining is an important part of the local economy. These opportunities lead to increased local businesses development and general local economic development, as well as investment in rural communities and infrastructure that would not otherwise be realised. Key opportunities for local economic development through mining initiatives include local investment, skills development, infrastructure, and technology development and broadening of the supplier base (Ehlanzeni, 2020). The Proposed Project is likely to contribute towards the regional economy through direct investment and developing the mining sector.

Platinum Group Metals mining and new entrants into the mainstream industry for Black Economic Empowerment are some of the aspects that could improve regional opportunities identified by the Ehlanzeni Integrated Development Plan (2020). The Proposed Project will comprise moderately sized extractive operation. This provides ore for processing at processing

plants while providing an opportunity for a non-mainstream business to take part in the mining economy by not investing in extensive processing operations. In addition, Nomamix (Pty) Ltd will have a 20% shareholder, which is an all-Black African female-owned company (the majority shareholder is BCR holdings). This level of is a Broad-Based Black Economic Empowerment could potentially contribute to meeting the requirements of the Mining Charter and other economic development objectives in South Africa.

In addition to direct and indirect economic benefits, the social development through the implementation of the SLP is critical. The rural communities have little or no infrastructure or employment currently. The investment in infrastructure could provide substantial upliftment for local communities. Skills development, employment and increased household income could also provide opportunities for these communities to improve their quality of life and livelihoods.

Finally, the community representatives who were interviewed during the Social Impact Assessment (**Appendix O**) study indicated a desire for the project to go ahead, as long as it provides opportunities and investment in their communities (skills, employment, infrastructure, and facilities). The high unemployment rate, low education and lack of basic infrastructure and services, means that these local communities would benefit from almost any opportunities that could be provided. It must be noted, however, that these opportunities are a trade-off for the likely degradation of the land and loss of sense of place (amongst other aspects in this rural environment). Any opportunity must be provided in a sustainable manner to ensure long-term benefits and prevent negative impacts on livelihoods and social structure.

g) Motivation for the preferred development footprint within the approved site

(Full description of the process followed to reach the proposed development footprint within the approved site. NB!! – 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.)

Alternatives in terms of the site layout was determined, as guided by the DEAT (2004) Criteria for determining Alternatives in EIA, Integrated Environmental Management, Information Series 11.

A comprehensive comparison of all potential impacts, both direct, indirect, and cumulative have been considered during the impact assessment process. Reasonable and feasible alternatives have been considered during the EIA phase to determine the most suitable alternatives. The alternatives described in the sections to follow, included the assessment of the following:

- Location alternatives;
- Site layout alternatives;
- Scheduling alternatives;
- Routing alternatives; and
- Design alternatives.

The consideration of alternatives considered significant constraints such as social, financial, and environmental issues during the evaluation process. The preferred option is highlighted in ***section g) x)*** and will be presented to the stakeholders to ensure that their views are also taken into account during the Public Participation Process. All the alternatives have been identified, and the best option is presented. The elimination process is well documented and substantiated, with an explanation of why certain alternatives are not being considered in detail. A detailed analysis of potential environmental impacts, as well as a consideration of technical and financial aspects, are provided for each of the remaining preferred alternatives.

i) Details of the development footprint alternatives considered

(With reference to the site plan provided as Appendix C and the location of the individual activities on site, provide details of the alternatives considered with respect to:)

Following the assessment as conducted by the specialist studies (summarised in ***section g) 1) (a)***), several alternatives with reference to the site layout plan as submitted as part of the scoping report, was assessed.

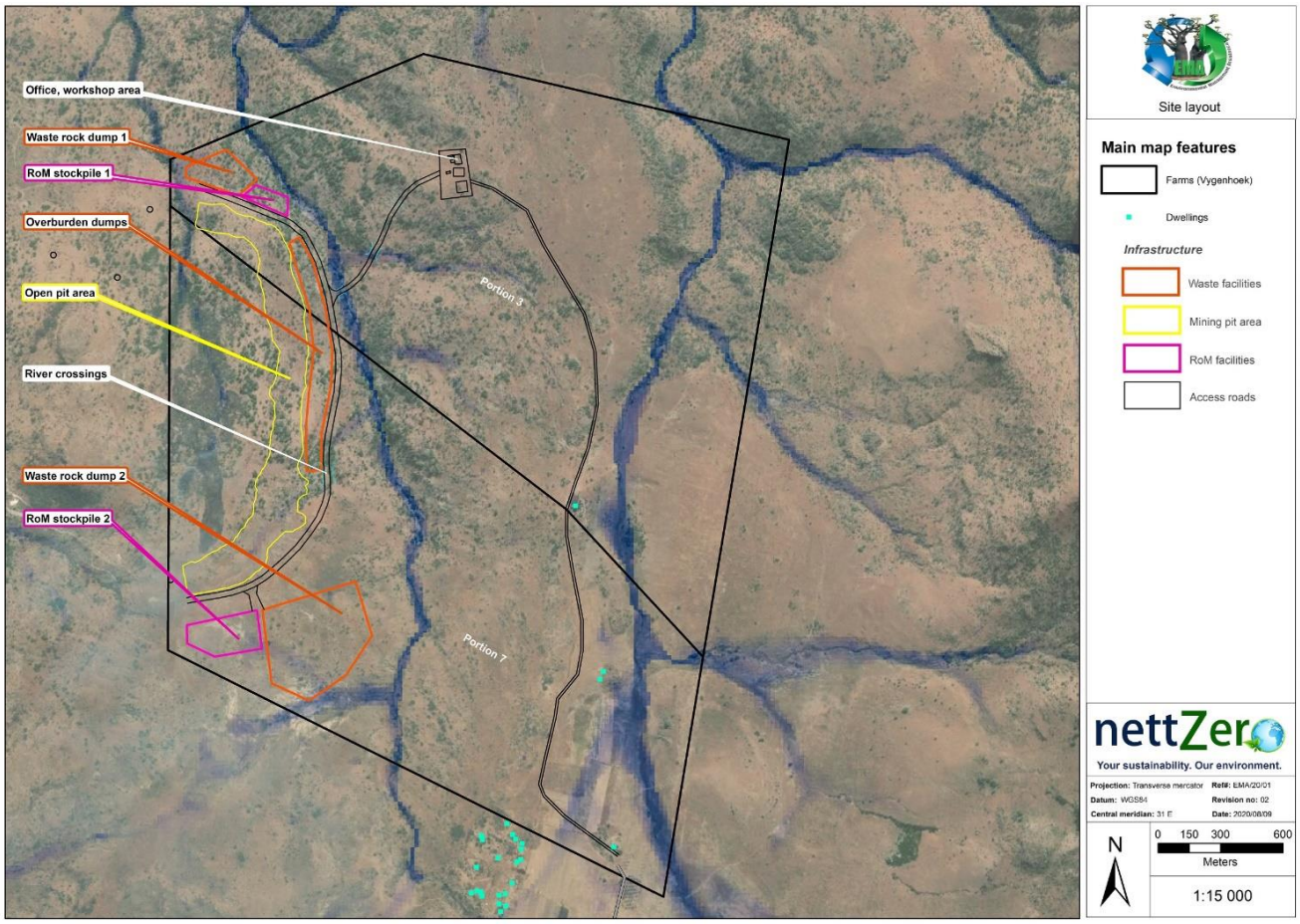

Figure 3: Proposed site layout as presented during the scoping phase of the project (pre-alternatives)

The following sections will provide more details.

(a) Property on which or location where it is proposed to undertake the activity

No property alternatives have been considered as the envisaged mining operations will occur on properties already utilised for the prospecting operations and where Nomamix (Pty) Ltd is in process to apply for mining rights.

(b) Type of activity to be undertaken

The proposed mining activity relates to the open cast mining of Platinum Group Metals (PGM), particularly the following:

- Platinum group metals: Platinum (Pt), Palladium (Pd), Rhodium (Rh), Iridium (Ir), Ruthenium (Ru) and Osmium (Os);
- Precious metals: Gold (Au) and Silver (Ag); and
- Base metals: Nickel (Ni), Copper (Cu), Cobalt (Co), Iron (Fe), Vanadium (V) and Chromite (Chrome Ore)

No alternatives to mining the material listed have been considered associated to the proposed mining activity.

However, the mining method as described in ***section d) ii)*** has been carefully considered. Due to the environmental sensitivities identified, the phased roll over mining method has been considered as an alternative. This will require careful planning of which areas of the pit will be mined with clear buffer zones to protect sensitive areas. These areas are highlighted in the sections to follow with clear buffer zones.

(c) Design or layout of the activity

The site layout, as attached in **Appendix C**, in terms of the positioning of haul roads, RoM product stockpile areas, offices, workshops, topsoil and subsoil stockpiles, mobile screening plant, and residue stockpiles (waste rock) was determined by considering both spatial and practical mining operation aspects.

The following factors are considered in planning the lay down area:

- Visual distance from local communities;
- Haul distance; and
- Sensitive environmental and social areas.

At the time of submitting this report to the I&AP for comment, the following conceptual infrastructures forms part of the site layout:

- Storm water infrastructure; and
- Location of PCD's.

Following the geotechnical investigation for the facilities mentioned above, the site layout plan provided in **Appendix C** will be revised and submitted to the competent authority for approval, indicating the details of all infrastructures associated to the proposed mining development.

An alternative assessment matrix (***Table 3***) was developed by the EAP and provided to the appointed specialist to assess the alternatives based on the information provided by the applicant.

Table 3: Alternative's assessment rating matrix

Alternative assessment rating matrix

		Likelihood				
	Environmental	Almost certain to have irreversible consequence to the environment (fatally flawed significance)	Likely to have irreversible consequence to environment (verry high significance)	Possible to have a irreversible consequence to the environment (high significance with implementation of mitigation measures)	Unlikely to have a irreversible consequence to the environment (medium significance with implementation of mitigation measures)	Rare to have a irreversible consequence to the environment (low significance with the implementation of mitigation measures)
	Heritage	Almost certain to have irreversible loss of sites of high historical importance or destruction of graves (fatally flawed significance - sites cannot be relocated)	Likely to have irreversible loss of sites of high historical importance or destruction of graves (verry high significance - sites cannot be relocated/in-situ conservation)	Possible to have irreversible loss of sites of medium historical importance or destruction of graves (high significance - possibility of relocation/in-situ conservation)	Unlikely to have irreversible loss of sites of medium/low historical importance or destruction of graves (medium significance - possibility of relocation/moving heritage artifacts or sites)	Rare to have irreversible loss of sites of medium/low historical importance or destruction of graves (low significance - not compromising any sites or graves)
	Social	Almost certain to have irreversible consequence to the social context (fatally flawed significance). Unavoidable visual and vibrational impact.	Likely to have irreversible consequence to the social context (verry high significance - relocation of communities will be required, high possibility of community unrest). Unavoidable visual and vibrational impact.	Possible to have a irreversible consequence to the social context (high significance with implementation of mitigation measures - relocation of communities, compensation to communities). Visual and vibrational impacts could possibly be managed. Noise generation high possibility of affecting the surrounding community.	Unlikely to have a irreversible consequence to the social context (medium significance with implementation of mitigation measures - no relocation required, agreement with communities). Visual and vibrational impacts could be managed. Noise generation medium possibility of affecting the surrounding community.	Rare to have a irreversible consequence to the social context (low significance with the implementation of mitigation measures - safe distance from communities, communities support operation). No visual and vibrational impacts. Noise generation low possibility of affecting the surrounding community.
	Operational	Almost certainly not feasible to mine (compared with the original proposed site layout)	Likely not feasible to mine (compared with the original proposed site layout)	Possible to mine profitable (compared with the original proposed site layout)	Unlikely that proposed alternative would affect the mine's profitability (compared with the original proposed site layout)	No effect on the mine's profitability (compared with the original proposed site layout)
		Almost Certain	**Likely**	**Possible**	**Unlikely**	**Rare**
Consequence	**Insignificant**	6	5	4	3	2
	Negligible	7	6	5	4	3
	Moderate	8	7	6	5	4
	Extensive	9	8	7	6	5
	Significant	10	9	8	7	6

	Environment	**Heritage**	**Social**	**Operational**
	Development has a insignificant impact or consequence on the environment.	No sites (high importance) will be impacted by the development footprint.	Development footprint has an insignificant impact to the social context. No visual and vibrational impacts. Noise generation low possibility of affecting the surrounding community.	1% increase in operational cost compared to original proposed site layout (as per scoping report)
	Development has a negligible impact or consequence on the environment.	Sites (high importance) located within close proximity to the development footprint.	Development footprint has a negligible impact to the social context. Manageable visual and vibrational impacts. Noise generation low to medium possibility of affecting the surrounding community.	2-5% increase in operational cost compared to original proposed site layout (as per scoping report)
	Development has a moderate impact or consequence on the environment. Reversable consequences with the implementation of mitigation measures and rehabilitation. Offsetting possible.	Sites (high importance) located within close proximity to the development footprint. In-situ conservation prevents impact on identified sites.	Development footprint has a moderate impact to the social context. Manageable visual and vibrational impacts. Noise generation medium to high possibility of affecting the surrounding community.	5-10% increase in operational cost compared to original proposed site layout (as per scoping report)
	Development has an extensive impact or consequence on the environment. Irreversible consequences even with implementation of mitigation measures or rehabilitation. Offsetting possible.	Sites (high importance) located within the development footprint. In-situ conservation not possible. Relocation required.	Development footprint has an extensive impact to the social context. Manageable visual and vibrational impacts. Noise generation high possibility of affecting the surrounding community.	>10% increase in operational cost compared to original proposed site layout (as per scoping report)
	Development has significant impact or consequence to the environment (fatally flawed). No offsetting possible.	Sites (high importance) located within the development footprint. In-situ conservation not possible. Relocation not possible.	Development footprint has a significant impact to the social context. Irreversible visual and vibrational impacts. Noise generation high possibility of affecting the surrounding community.	>30% increase in operational cost compared to original proposed site layout (as per scoping report)

*	***Environmental***	*Includes impacts related to the aquatic, terrestrial, soil, surface and groundwater*
*	***Social***	*Includes impacts related to the social context of the community and visual and noise impacts in relation to the localised community.*
*	***Heritage***	*Includes impacts on sites of historical importance and graves*

Proposed mining pit

The total pit area identified are calculated at 37.6 ha. The heritage impact assessment identified the southern portion of the pit (8.2 ha) is falling within the historical Choma village. Mining in a site of such historical importance will require authorisation from the South African Heritage Resources Agency (SAHRA).

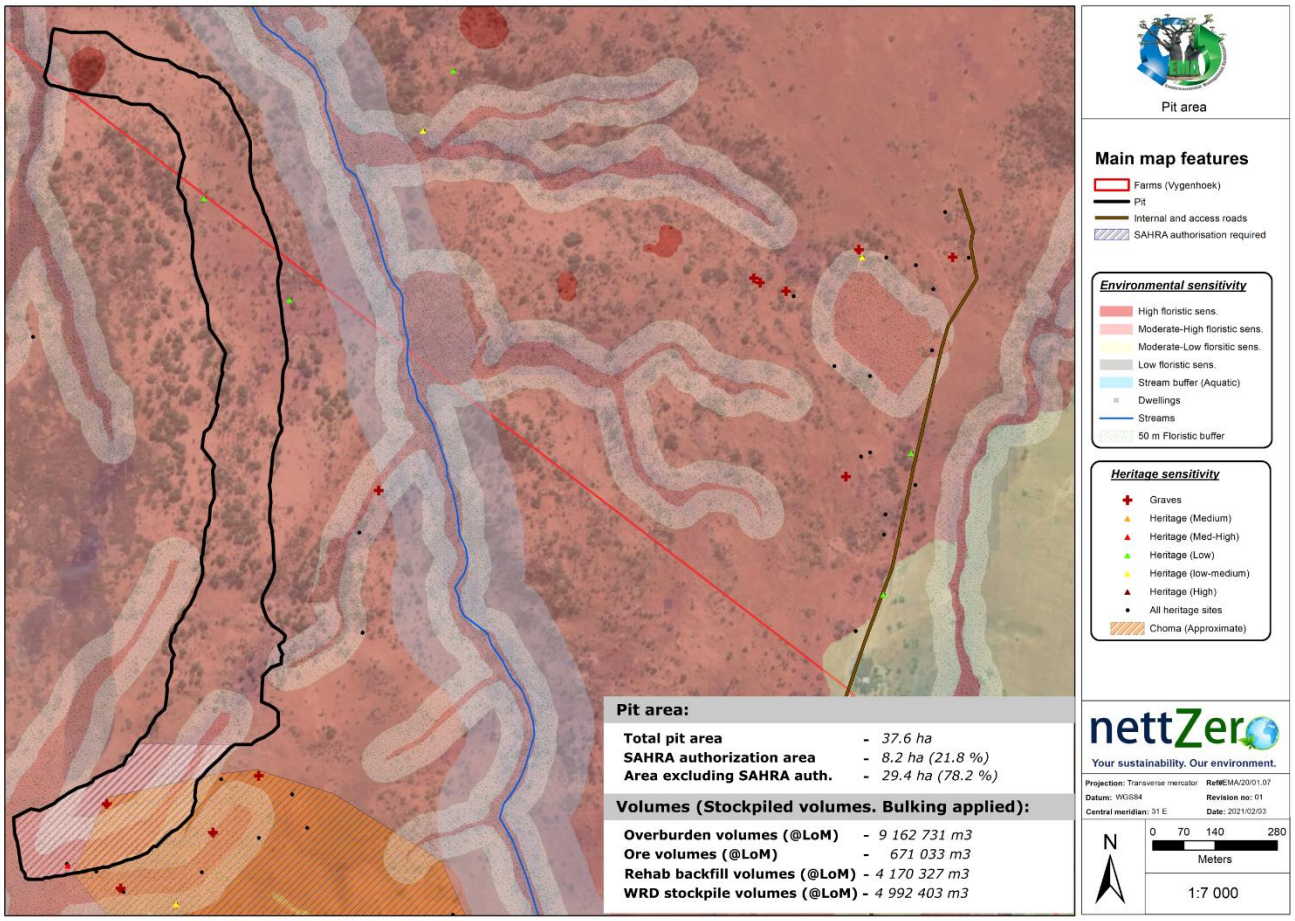

Figure 4: Consideration of the proposed mining pit

Proposed residue stockpiles (waste rock)

As part of the scoping report, the original site layout included a total of two waste rock stockpiles west of the stream (see **Figure 3**).

After careful consideration of all environmental and social sensitivities (**Table 4**), various alternative location options for the waste rock stockpiles (WRD) where considered and rated as per the alternatives assessment matrix (**Table 3**). In addition, after calculating the volumes of waste rock that will be generated during the life of mine, only one WRD are preferred.

Table 4: Alternative assessment of the WRD as presented in Figure 5

Alternative	Specialist	Positive	Negative	Rating	Specific mitigation

WRD 1	Socio-economic, Noise & Visual	1.1 km to closest dwelling (Vygenhoek Community) and 2.1 to Helena Settlement, and so would have little impact from noise and dust.	Visual impacts may occur as the community is elevated above the WRD 1 site	4	None
	Aquatic biodiversity	Least impact on riverine reach - limits downstream impacts as far as possible, so greater extent of occupancy of fish species.	Concern regarding contaminated runoff diverging between catchments.	5	Containment of dirty water to a single catchment.
	Geohydrological & Hydrological	• 1km from major perennial watercourse; • Estimated water level depth > 25 mbgl; • Aquifer media = low to moderate conductivity (shelter norite) = less susceptibility for long term pollution; and • No groundwater users in proximity. • Relatively flat topography. • GN704 compliance possible PCD adequately sized.	• Need to establish dirty water containment berms/channels/PCD. • Intersects various catchments.	8	Containment of dirty runoff through appropriately sized and positioned storm water berms/channels/PCD.
	Heritage	Little impact on heritage resources.	None	4	None
	Terrestrial	None. Least preferred alternative.	Significant impacts on habitat of restricted regional presence, potential impacts on sensitive riparian and woodland slopes. Habitat that comprises unique and sensitive faunal habitat. Will require extensive haul roads. Dilution of impacts towards northern part of site.	9	Mitigation approach detailed in EIA report. Mitigation likely to be costly, stringent and significant, with adverse impacts nonetheless anticipated.
	Operational	None	• Hauling distance from operation to waste management facility unaffordable.	10	Not a feasible option.
WRD 2	Socio-economic, Noise & Visual	None	• Remarkably close to community and crop fields and other activities – constant noise, dust, and visual impacts for the 10-year duration is considered a high impact due to the change in nature of the area, nuisance and health exposure for the community.	8	Relocation of at least two households and ~20 hectares of crops, or at least compensation for loss of crops and disturbance to households and community activities.

			• Loss of crops due to dust emissions from laydown and loading of waste rock. • Proximity of mine staff to community is not ideal, as this could increase interactions and potentially perpetuate the development of social ills in the community.		
	Aquatic biodiversity	Impacts confined to a single catchment	More of the extent of occupancy for fish species of concern affected than WRD 1 – could potentially impact feasibility of project.	6	Emphasises the need for the upstream reaches to be managed as a fish sanctuary (i.e., possible biodiversity offset)
	Geohydrological & Hydrological	• Drainage is only towards non-perennial stream. (The river is perennial so maybe not a positive). • Drainage towards east is unlikely (due to topography). • Groundwater depth estimated > 31mbgl. • No groundwater users in proximity. • GN704 compliance possible with PCD adequately sized.	• Likely presence of quaternary sand deposits which have > conductivity than underlying rock = higher risk of pollutant movement (if it occurs). • Steep banks and exposed soils may cause perched water tables during rainfall events. • Need to establish dirty water containment berms/channels/PCD.	8	Containment of dirty runoff through appropriately sized and positioned storm water berms/channels/PCD.
	Heritage	None	Close to possible grave sites.	5	None
	Terrestrial	Situated in habitat that exhibits slight deterioration. Will allow for the use of preferred haul roads, offices, and RoM alternatives. Third preferred alternative.	Moderately significant impacts on species of conservation concern. Dilution of impacts towards northern part of site.	7	Mitigation approach detailed in principal ecological report. Mitigation approach is likely to be moderately costly and effective compared to other options.
	Operational	None	Hauling distance from operation to waste management facility unaffordable.	10	Not a feasible option.
WRD 3	Socio-economic, Noise & Visual	None	• Remarkably close to community and crop fields and other activities – constant noise, dust, and visual impacts for the 10-year duration is considered a high impact due to the change in nature of the area, nuisance and health	8	Relocation of at least two households and ~20 hectares of crops, or at least compensation for loss of crops and disturbance to households and community activities.

			exposure for the community. • Loss of crops due to dust emissions from laydown and loading of waste rock. • Proximity of mine staff to community is not ideal, as this could increase interactions and potentially perpetuate the development of social ills in the community.		
	Aquatic biodiversity	Impacts confined to a single catchment	More of the extent of occupancy for fish species of concern affected than WRD 1 and WRD 2 - could potentially impact feasibility of project	7	Very strongly emphasises the need for the upstream reaches to be managed as a fish sanctuary (i.e., possible biodiversity offset)
	Geohydrological & Hydrological	• Drainage is only towards non-perennial stream. (The river is perennial so maybe not a positive). • Drainage towards east is unlikely (due to topography). • Groundwater depth estimated > 31mbgl. • No groundwater users in proximity. • GN704 compliance possible with PCD adequately sized.	• Likely presence of quaternary sand deposits which have > conductivity than underlying rock = higher risk of pollutant movement (if it occurs). • 260m to closest stream = less time to implement mitigation measures and leaves more room for things to go wrong. • Steep banks and exposed soils may cause perched water tables during rainfall events. • Need to establish dirty water containment berms/channels/PCD.	8	Containment of dirty runoff through appropriately sized and positioned storm water berms/channels/PCD.
	Heritage	None	Direct impact on stone walled site.	7	Will require phase two mitigation in terms of SAHRA process.
	Terrestrial	Situated in habitat that exhibits existing deterioration. Will allow for the use of preferred haul roads, offices, and RoM alternatives. Preferred alternative.	Affected habitat exhibit highest (comparatively) level of deterioration, situated in proximity to existing deteriorated habitat, shortest access routes.	5	Mitigation approach detailed in principal ecological report. Mitigation approach is likely to be the least stringent compared to other options.
	Operational	None	Hauling distance from operation to waste management facility unaffordable.	10	Not a feasible option.
WRD 4	Socio-economic, Noise & Visual	1.9 km from Vygenhoek Community and livelihood activities and would not be as easily affected by noise	• May affect visual landscape as the	**5**	None

		and dust impacts, as prevailing wind direction is south-easterly.	Vygenhoek Community and Helena Settlement. • 1.5 km from Helena Settlement and so may have dust and noise impacts due to prevailing south-easterly wind direction.		
	Aquatic biodiversity	Impacts confined to a single catchment	More of the extent of occupancy for fish species of concern affected than WRD 1 and WRD 2 - could potentially impact feasibility of project	7	Very strongly emphasises the need for the upstream reaches to be managed as a fish sanctuary (i.e., possible biodiversity offset).
	Geohydrological & Hydrological	• Unlikely that main perennial stream to the east (east of pit) will be significantly impacted by WRD • Impact more localized. • Groundwater depth estimated > 31mbgl. • No groundwater users in proximity. • The open cast mining pit will form a cone of depression which will intercept any poor-quality infiltration.	• Need to establish dirty water containment berms/channels/PCD • Very steep topography and high runoff potential. • Insufficient space for adequately sized PCD. • Potential for runoff to run from WRD into Pit. • 500m to closest stream = less time to implement mitigation measures and leaves more room for things to go wrong. However, the open cast pit will intercept the main flow path. Reduces contaminant transport during operation of the mine. • Steep banks and exposed soils may cause perched water tables during rainfall events.	8	Containment of dirty runoff (as far as possible) through appropriately sized and positioned storm water berms/channels/silt traps
	Heritage	None	Close to possible grave sites.	5	None
	Terrestrial	Although it is situated in comparatively sensitive habitat, the potential collaboration with nearby mine in terms of product storage, treatment, and beneficiation, will lower potential impact significance on local scale. Second preferred alternative.	Moderate to significant losses of conservation important plant species and sensitive faunal habitat.	6	Mitigation approach detailed in principal ecological report. Mitigation approach is likely to be the least stringent compared to other options.
	Operational	• Significant reduction in hauling distance.	• Difficult terrain, however manageable with engineering solutions.	5	Detailed engineering designs.

WRD 5	Socio-economic, Noise & Visual	• 1.7 km from Vygenhoek Community and livelihood activities and would not be easily affected by noise and dust impacts, as prevailing wind direction is south-easterly. • 2.4 km from Helena Settlement and so less likely to have dust and noise impacts despite the prevailing south-easterly wind direction.	May affect visual landscape as the Vygenhoek Community is elevated above the proposed WRD 5 site.	**4**	None
	Aquatic biodiversity	Runoff from WRD can be captured by Pit if dirty water containment fails; PCD not located in same immediate catchment as reach of concern.	Located in the extreme upper portion of the catchment.	4	None
	Geohydrological & Hydrological	• Unlikely that main perennial stream to the east (east of pit) will be significantly impacted by WRD • Impact more localized. • Groundwater depth estimated > 31mbgl. • No groundwater users in proximity. • 700m to closest stream = more time to mitigate poor quality GW migration (if it takes place). Open cast mining pit will intercept the main flow path. Reduces contaminant transport during operation of the mine. • The open cast mining pit will form a cone of depression which will intercept any poor quality infiltration.	• Need to establish dirty water containment berms/channels/PCD. • Very steep topography and high runoff potential. • Insufficient space for adequately sized PCD. • Potential for runoff to run from WRD into Pit.	8	Containment of dirty runoff (as far as possible) through appropriately sized and positioned storm water berms/channels/silt traps
	Heritage	None	Close to possible grave sites.	5	None
	Terrestrial	None. Least preferred alternative.	Spatially situated in highly sensitive natural woodland habitat that is characterised by numerous plants and animals of conservation concern. Also situated in proximity to sensitive non-perennial drainage line on	9	Mitigation approach detailed in EIA report. Mitigation likely to be costly, stringent and significant, with adverse impacts nonetheless anticipated.

			western perimeter that comprise sensitive and unique avian and plant habitat types.		
	Operational	• Significant reduction in hauling distance.	• Difficult terrain, however manageable with engineering solutions.	5	Detailed engineering designs.

From a social and environmental impact perspective, WRD option 1 has the least impact. However, from an operational perspective, the hauling distance between the stockpile areas and the pit will consequently have a significant cost implication for both the operational phase as well as the implementation of a roll over rehabilitation plan.

Although, the terrestrial impact associated with WRD 4 and WRD 5 is considered significant, with the strict implementation of a search and rescue programme as well as establishing a nursery, rehabilitation with protected and rescued flora species allows for the impact to be remediated.

Both WRD 4 and WRD 5 have the least social impact (taking into consideration noise and visibility to the surrounding communities).

The impact associated with the aquatic ecosystem are manageable by implementing the detailed storm water management plan as per the detailed engineering designs.

Therefore, the combined construction of WRD 4 and WRD 5 appears to be the most sustainable preferred alternative.

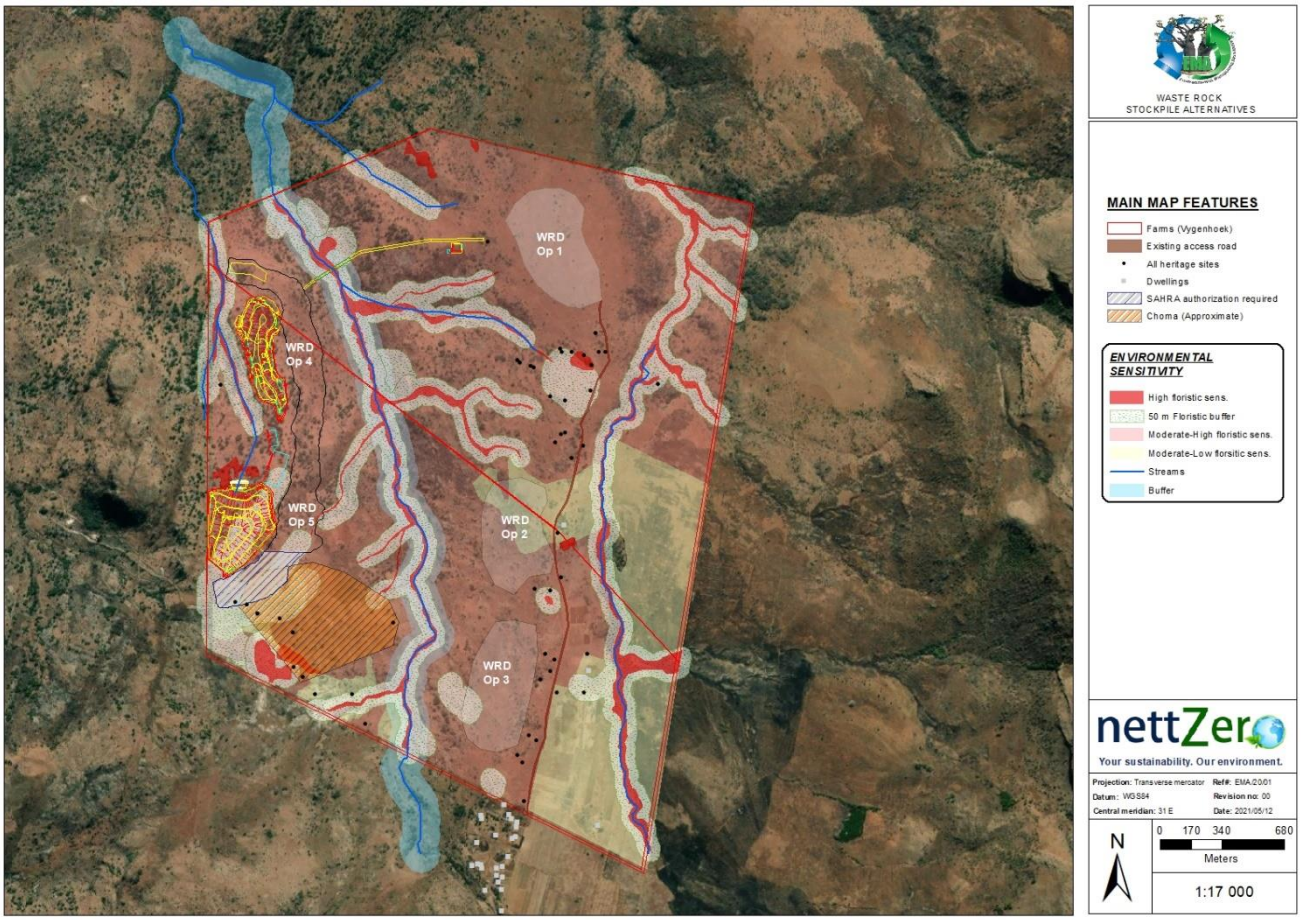

Figure 5: Alternative locations considered for the Waste Rock Stockpiles (Residue stockpiles)

Table 5: Facility height and area information of alternatives assessed

Facility	Max Height	Area (ha)
WRD Op 1	28 m	22
WRD Op 2	28 m	19
WRD Op 3	28 m	22
WRD Op 4	50 m	12
WRD Op 5	80 m	10

Proposed Run of Mine stockpiles (ROM), offices and workshops

The original footprint proposed for the two ROM stockpiles, also situated west of the identified stream, was calculated at 8 hectares (ha). By reconsidering the footprint (1 ha) to only one stockpile and relocating the ROM stockpile (including the mobile screening plant) to the north, reduces the impact to a manageable level.

Table 6 summarises the motivation for option 1 as the preferred alternative.

Table 6: Alternative assessment of ROM, Offices and workshops as presented in Figure 6

Alternative	Specialist	Positive	Negative	Rating	Specific mitigation

ROM 1	Socio-economic, Noise & Visual	Far from communities so less noise and dust disturbance – 1.4 km from Vygenhoek and 2.4 km from Helena.	None	2	None
	Aquatic biodiversity	Least impact on riverine reach - limits downstream impacts as far as possible, so greater extent of occupancy of fish species.	Steep gradients = possible erosion, concern regarding contaminated runoff (must be kept to a single catchment).	5	None
	Geohydrological & Hydrological	• 1km from major perennial watercourse; • Estimated water level depth > 25 mbgl; • Aquifer media = low to moderate conductivity (shelter norite) = less susceptibility for long term pollution; and • No groundwater users in proximity.	• Need to establish berm to prevent dirty runoff towards the north-west drainage line. • Intersects various catchments.	4	Containment of dirty runoff towards the north-west drainage line.
	Heritage	Little impact on heritage resources.	None	4	None
	Terrestrial	Slightly lower losses of plant species of conservation concern compared to other alternatives.	Higher impact and ecological significance due to the distance from disturbed land. Situated in expansive areas of natural grassland habitat that has limited representation in surrounds. Requires longer access roads, will facilitate deterioration of sensitive habitat in the north of the study area. Required/ associated haul route (Options 1 and 2) will result in significant impacts on sensitive riparian environment. Also situated closer to sensitive riparian environment and woodland slopes in east of site.	7	Mitigation approach detailed in principle ecological report. Mitigation approach is likely to comprise costly contribution to limit impacts in surrounding natural habitat, notably along access road. Ensure protection of eastern woodland slopes and riparian habitat, investigate possible relocation slightly to the west to allow for additional protection.
ROM 2	Socio-economic, Noise & Visual	None	Noise and dust from laydown and loading of materials and trucks could disrupt community, and cause dust nuisance and potential cumulative health and crop impacts.	7	Noise barriers, dust suppression, strict security control.
	Aquatic biodiversity	Less steep, so likely less erosion potential.	More of the riverine reach affected.	5	Emphasises the need for the upstream reaches to be managed as a fish sanctuary (i.e.,

					possible biodiversity offset)
	Geohydrological & Hydrological	• Drainage is only towards non-perennial stream. • Drainage towards east is unlikely (due to topography). • Groundwater depth estimated > 31mbgl. • No groundwater users in proximity.	• Likely presence of quaternary sand deposits which have > conductivity than underlying rock = higher risk of pollutant movement (if it occurs). • Steep banks and exposed soils may cause perched water tables during rainfall events.	4	None
	Heritage	Little impact on heritage resources.	None	4	None
	Terrestrial	Situated closer to existing areas of deterioration, shorter access routes, also spatially separated from sensitive northern parts of site.	Impacts on protected plants and sensitive habitat, albeit limited and controllable.	5	Mitigation approach detailed in principle ecological report.
ROM 3	Socio-economic, Noise & Visual	Far from communities so less noise and dust disturbance – 1.4 km from Vygenhoek and 1.9 km from Helena.	None	2	None
	Aquatic biodiversity	Least impact on riverine reach - limits downstream impacts as far as possible, so greater extent of occupancy of fish species.	Steep gradients = possible erosion, concern regarding contaminated runoff (must be kept to a single catchment).	5	None
	Geohydrological & Hydrological	• 1km from major perennial watercourse; • Estimated water level depth > 25 mbgl; • Aquifer media = low to moderate conductivity (shelter norite) = less susceptibility for long term pollution; and • No groundwater users in proximity.	• Need to establish berm to prevent dirty runoff towards the north-west drainage line. • Intersects various catchments.	4	Containment of dirty runoff towards the north-west drainage line.
	Heritage	Little impact on heritage resources.	None	4	None
	Terrestrial	Slightly lower losses of plant species of conservation concern compared to other alternatives, shorter linear impacts, terrain topographically less challenging, limiting erosion and impact dilution. Crossing of river higher up in system with lower anticipated impacts.	Higher impact and ecological significance due to the distance from disturbed land. Situated in expansive areas of natural woodland habitat where numerous plant and animal taxa of conservation occur. Requires longer access roads, will facilitate deterioration of sensitive habitat in the north of the study area. Highly likely to result in indirect	8	Mitigation approach detailed in principle ecological report. Mitigation approach is likely to comprise costly contribution to limit impacts in surrounding natural habitat, notably along access road.

			and peripheral impacts on riparian habitat downslope from office and RoM sites.		
Office 1	Socio-economic, Noise & Visual	Far from communities so less noise and dust disturbance – 1.4 km from Vygenhoek and 2.4 km from Helena.	None	2	None
	Aquatic biodiversity	Least impact on riverine reach - limits downstream impacts as far as possible, so greater extent of occupancy of fish species.	Steep gradients = possible erosion, concern regarding contaminated runoff (must be kept to a single catchment).	5	None
	Geohydrological & Hydrological	• Drainage is only towards non-perennial stream. • Drainage towards east is unlikely (due to topography). • Groundwater depth estimated > 31mbgl. • No groundwater users in proximity.	• Likely presence of quaternary sand deposits which have > conductivity than underlying rock = higher risk of pollutant movement (if it occurs). • 260m to closest stream = less time to implement mitigation measures and leaves more room for things to go wrong. • Steep banks and exposed soils may cause perched water tables during rainfall events.	4	None
	Heritage	Little impact on heritage resources.	None	4	None
	Terrestrial	Slightly lower losses of plant species of conservation concern compared to other alternatives.	Higher impact and ecological significance due to the distance from disturbed land. Situated in expansive areas of natural grassland habitat that has limited representation in surrounds. Requires longer access roads, will facilitate deterioration of sensitive habitat in the north of the study area. Required/ associated haul route (Options 1 and 2) will result in significant impacts on sensitive riparian environment. Also situated closer to sensitive riparian environment and woodland slopes in east of site.	7	Mitigation approach detailed in principle ecological report. Mitigation approach is likely to comprise costly contribution to limit impacts in surrounding natural habitat, notably along access road. Ensure protection of eastern woodland slopes and riparian habitat, investigate possible relocation slightly to the west to allow for additional protection.
Office 2	Socio-economic, Noise & Visual	Opportunities for informal trade (e.g. selling food to mine workers)	Very close to community and could promote close interactions between mine staff / labour and community (e.g. workers being dropped off /picked up for shifts),	7	Strict security and labour protocols to minimise interactions and prevent

			which could promote the development of social ills and disrupt daily community activities.		community health and safety risks.
	Aquatic biodiversity	Less steep, so likely less erosion potential.	More of the riverine reach affected.	5	Emphasises the need for the upstream reaches to be managed as a fish sanctuary (i.e., possible biodiversity offset)
	Geohydrological & Hydrological	• Drainage is only towards non-perennial stream. • Drainage towards east is unlikely (due to topography). • Groundwater depth estimated > 31mbgl. No groundwater users in proximity.	• Likely presence of quaternary sand deposits which have > conductivity than underlying rock = higher risk of pollutant movement (if it occurs). • 260m to closest stream = less time to implement mitigation measures and leaves more room for things to go wrong. Steep banks and exposed soils may cause perched water tables during rainfall events.	4	None
	Heritage	Little impact on heritage resources.	None	4	None
	Terrestrial	Situated closer to existing areas of deterioration, shorter access routes, also spatially separated from sensitive northern parts of site.	Impacts on protected plants and sensitive habitat, albeit limited and controllable.	5	Mitigation approach detailed in principle ecological report.
Office 3	Socio-economic, Noise & Visual	Far from communities so less noise and dust disturbance – 1.4 km from Vygenhoek and 1.9 km from Helena.		2	None
	Aquatic biodiversity	Least impact on riverine reach - limits downstream impacts as far as possible, so greater extent of occupancy of fish species.	Steep gradients = possible erosion, concern regarding contaminated runoff (must be kept to a single catchment).	5	None
	Geohydrological & Hydrological	• Drainage is only towards non-perennial stream. • Drainage towards east is unlikely (due to topography). • Groundwater depth estimated > 31mbgl. No groundwater users in proximity.	• Likely presence of quaternary sand deposits which have > conductivity than underlying rock = higher risk of pollutant movement (if it occurs). • 260m to closest stream = less time to implement mitigation measures and leaves more room for things to go wrong.	4	None

			Steep banks and exposed soils may cause perched water tables during rainfall events.		
	Heritage	Little impact on heritage resources.	None	4	None
	Terrestrial	Slightly lower losses of plant species of conservation concern compared to other alternatives, shorter linear impacts, terrain topographically less challenging, limiting erosion and impact dilution. Crossing of river higher up in system with lower anticipated impacts.	Higher impact and ecological significance due to the distance from disturbed land. Situated in expansive areas of natural woodland habitat where numerous plant and animal taxa of conservation occur. Requires longer access roads, will facilitate deterioration of sensitive habitat in the north of the study area. Highly likely to result in indirect and peripheral impacts on riparian habitat downslope from office and RoM sites.	8	Mitigation approach detailed in principle ecological report. Mitigation approach is likely to comprise costly contribution to limit impacts in surrounding natural habitat, notably along access road.

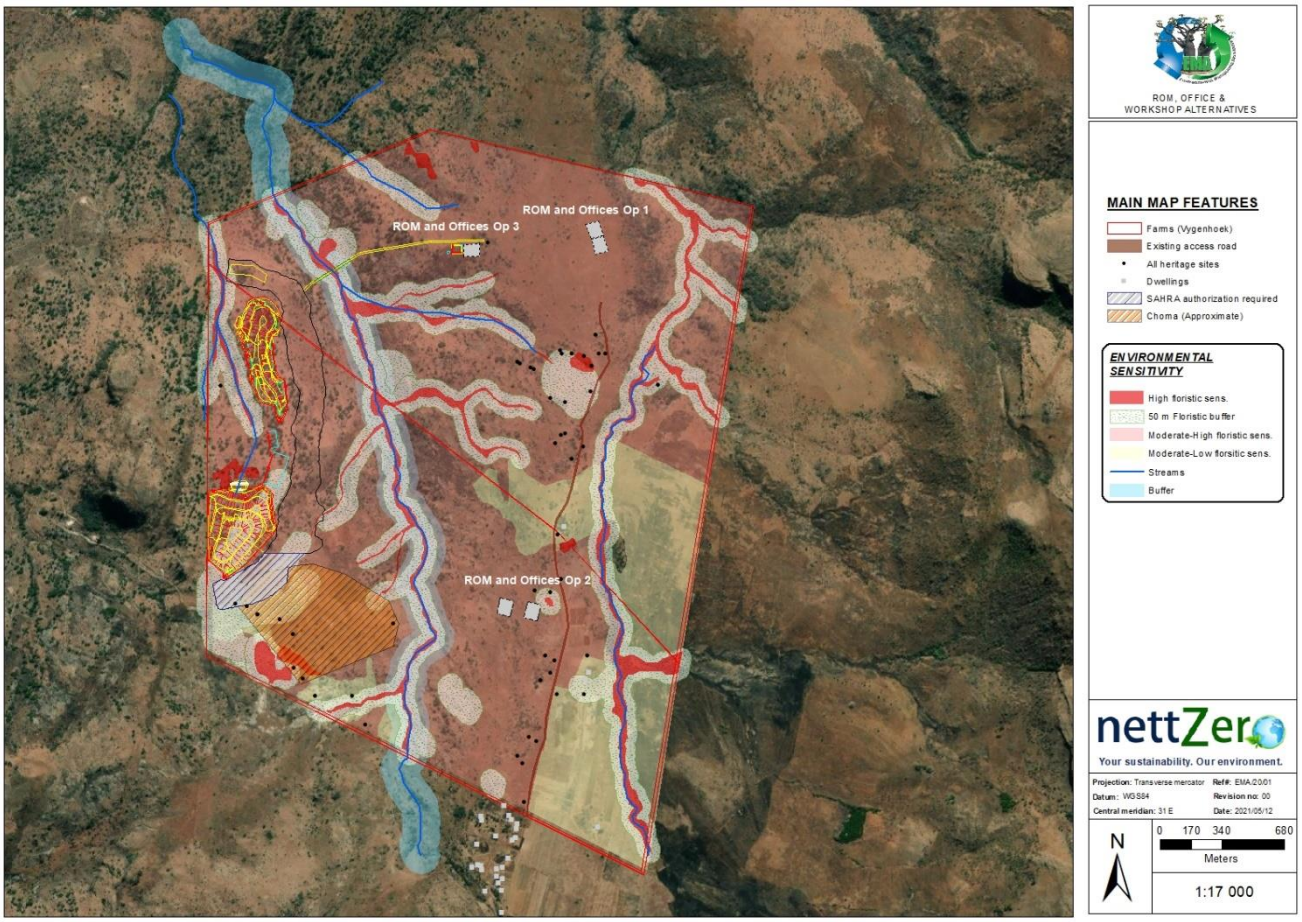

Figure 6: Alternative options associated with the ROM, offices, and workshops

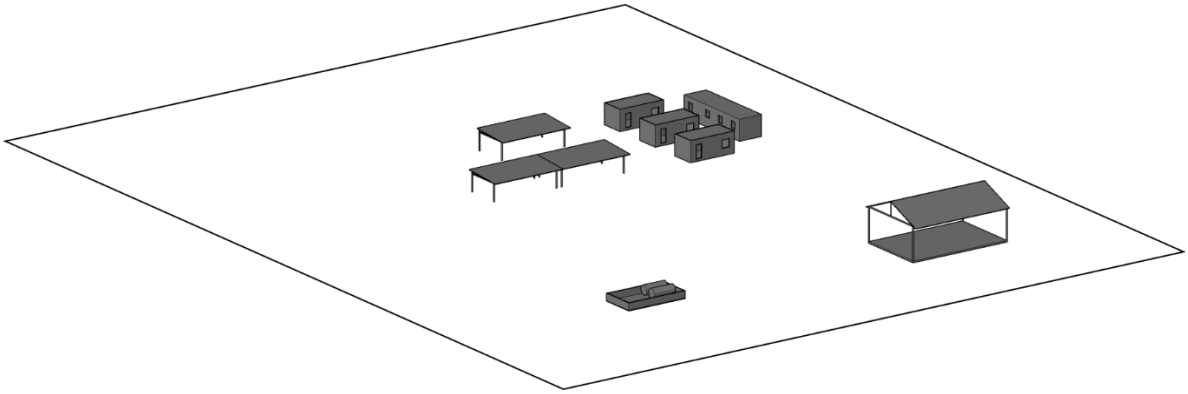

Figure 7: Conceptual layout of the offices and workshops

Access roads and river crossings

Various alternative crossings and access roads was considered. Based on the sensitivities and gradients, hauling option 2 is preferred (***Table 6***). Only one river crossing has been determined. However, before commencing with the activities, micro-siting will be required to identify any other drainage lines.

Table 6: Alternative assessment of hauling options as presented in Figure 7

Alternative	Specialist	Positive	Negative	Rating	Specific mitigation
Haul option 1	Socio-economic, Noise & Visual	1-2.1 km from the Vygenhoek Community and livelihood activities and likely to have little impact	Closer (1.2 to 2.7 km) the Helena Settlement, and could have low noise and dust impacts on this community	4	None
	Aquatic biodiversity	Least impact on riverine reach - limits downstream impacts as far as possible, so greater extent of occupancy of fish species.	Steep gradients = possible erosion, concern regarding contaminated runoff (must be kept to a single catchment).	6	None
	Geohydrological & Hydrological	• 1km from major perennial watercourse; • Estimated water level depth > 25 mbgl; • Aquifer media = low to moderate conductivity (shelter norite) = less susceptibility for long term pollution; and • No groundwater users in proximity.	• Need to establish berm to prevent dirty runoff towards the north-west drainage line. • Intersects various catchments.	7	Containment of dirty runoff towards the north-west drainage line.
	Heritage	Little impact on heritage resources.	None	4	None
	Terrestrial	None	High impact and ecological significance due to distance from disturbed land. Will terminate in highly sensitive floristic and faunal (avian) habitat and significant impacts are reasonably anticipated. Will cross sensitive riparian habitat in lower parts of river, with exacerbated impacts. Least preferred alternative.	9	Mitigation approach detailed in principle ecological report. Mitigation approach is likely to comprise costly contribution to limit impacts in surrounding natural habitat, notably along access road. Ensure protection of eastern woodland slopes and riparian habitat, investigate possible relocation slightly to the west to allow for additional protection.
Haul option 2	Socio-economic, Noise & Visual	Farther (1.5 – 2.7 km) from the Helena settlement.	Closer (1 – 1.7 km) to the Vygenhoek Community than 1, and so may have low noise and dust impacts on this community.	3	None
	Aquatic biodiversity	Less steep, so likely less erosion potential.	More of the riverine reach affected.	6	Emphasises the need for the upstream reaches to be managed as a fish sanctuary (i.e.,

					possible biodiversity offset)
	Geohydrological & Hydrological	• 1km from major perennial watercourse; • Estimated water level depth > 25 mbgl; • Aquifer media = low to moderate conductivity (shelter norite) = less susceptibility for long term pollution; and • No groundwater users in proximity.	• Need to establish berm to prevent dirty runoff towards the north-west drainage line. • Intersects various catchments.	7	Containment of dirty runoff towards the north-west drainage line.
	Heritage	None	Close to possible grave sites.	4	None
	Terrestrial	None	High impact and ecological significance due to distance from disturbed land. Will cross sensitive riparian habitat in lower parts of river, with exacerbated impacts. Significant impacts on protected plants and sensitive habitat. Second preferred alternative, but with severe reservations	8	Mitigation approach detailed in principle ecological report. Mitigation approach is likely to comprise costly contribution to limit impacts in surrounding natural habitat, notably along access road. Ensure protection of eastern woodland slopes and riparian habitat, investigate possible relocation slightly to the west to allow for additional protection.
Haul option 3	Socio-economic, Noise & Visual	Far from the Helena settlement	Very close (0 – 1.1 km) to the Vygenhoek Community and livelihood activities and is likely to have a high impact in terms of noise and dust emissions.	6	Ongoing intensive dust suppression and engagement with communities at least, and possible need to relocate houses and crops/ fields.
	Aquatic biodiversity	Less steep, so likely less erosion potential.	More of the riverine reach affected.	6	Emphasises the need for the upstream reaches to be managed as a fish sanctuary (i.e., possible biodiversity offset)
	Geohydrological & Hydrological	• 1km from major perennial watercourse; • Estimated water level depth > 25 mbgl;	• Need to establish berm to prevent dirty runoff towards the north-west drainage line.	7	Containment of dirty runoff towards the north-west drainage line.

		• Aquifer media = low to moderate conductivity (shelter norite) = less susceptibility for long term pollution; and No groundwater users in proximity.	• Intersects various catchments.		
	Heritage	None	Direct impact on stone walled site.	4	Will require phase two mitigation in terms of SAHRA process.
	Terrestrial	Situated in (comparative) proximity to disturbed land in southern part of site. Will cross riparian system in upper parts that will allow more effective mitigation. Will allow for shorter access route.	Situated in expansive areas of natural woodland habitat where numerous plant and animal taxa of conservation occur.	5	Mitigation approach detailed in principle ecological report. Mitigation approach is likely to be the least stringent compared to other options.

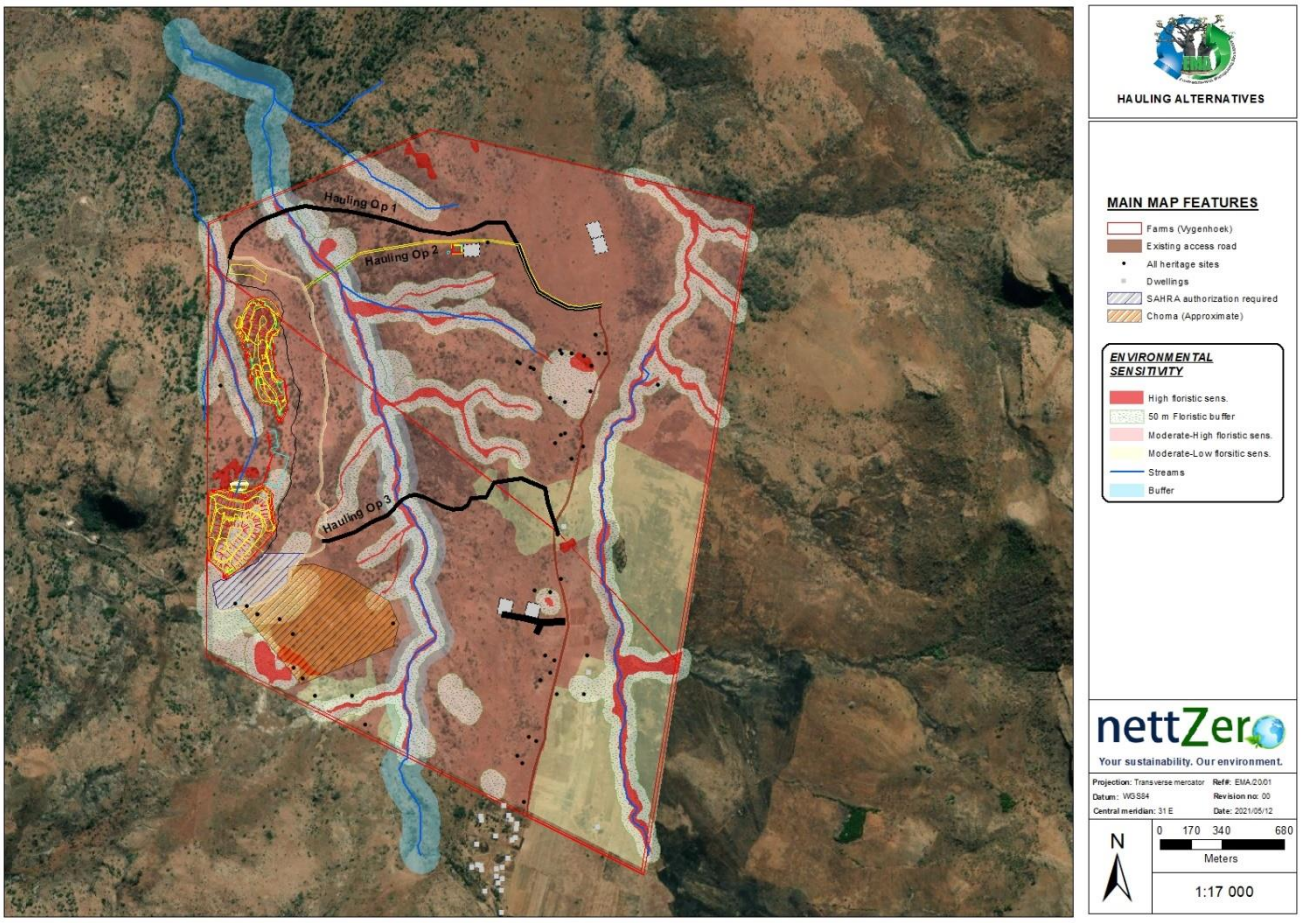

Figure 8: Hauling alternatives considered (including river crossings)

(d) Technology to be used in the activity

No alternatives in terms of the technology to be used have been considered at this stage of the proposed mining operation.

(e) Operational aspects of the activity

The proposed activity relates to the open cast mining of PGM's. The operational aspect entails topsoil and subsoil stripping and stockpiling, drilling and blasting, excavations, RoM product hauling and stockpiling, screening, and bulk transport of end product.

The processing of end product may be considered further down in the life cycle of the mine. However, at the present time no processing will occur.

Depending on the financial feasibility, underground mining may be considered as a mining alternative.

(f) The option of not implementing the activity

The "no-go" option for implementing the activity has been considered, but because operations will lead to job creation, the contribution to the GDP of not only the municipality (the importance of mining development as indicated in the GTM IDP 2015/2016), but also the Province as a whole, it is advisable that the mining activities be authorised with strict adherence to findings and recommendations in this report and its appendices. As a result, from the Public Participation Process, it is clear that the local community has a particular interest with the possibility of generating a financial income and the upliftment as a result from the proposed activity.

ii) Details of the Public Participation Process (PPP) 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.)

A project database will be maintained of all I&APs and stakeholders, i.e. landowner/s; lawful occupiers of affected property, affected community (through ward councillors), traditional leaders if applicable etc.).

Background Information Document (BID) was distributed during scoping phase to all registered and identified I&APs.

Site notices was placed at the proposed site, local municipality notice boards, and at notice boards at nearest town, i.e. Spar at Vygenhoek/ public library (photographic evidence will be provided).

Newspaper adverts has been placed in the Steelburger and Highlands Panorama newspapers to notify public and I&APs of the proposed project as well as commenting period.

Notices has been placed on EAP's website.

A 30 day public participation consultation process will be run during the public commenting period of the EIA & EMPr report. This will remain open for a period of 180 days from commencement of public review date.

Stakeholder and I&AP engagement will take place through Focus Group meetings. Presentation to necessary forums, community engagement, and engagement with local authorities will be undertaken. Minutes will be recorded and included in Scoping and EIA reports.

Land claims on affected property will be checked, communicated and dealt with accordingly.

A comments and response report will be maintained during the DMRE Environmental Impact Assessment process.

All issues raised will be recorded and responded to accordingly.

A public Participation Report will be compiled highlighting all communication and measures undertaken.

iii) Summary of issues raised by I&APs

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

Table 7: Summary of comments and issues raised by the I&AP

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					
Vygenhoek 10JT Portion 7					
Vygenhoek 10JT Portion3 Landowner: Republic of South Africa					
Lawful occupier/s of the land					
No formal occupiers noted. Only informal communities					
Landowners or lawful occupiers on adjacent properties – See Appendix E					
Farm Vygenhoek 10JT Portion 2 Landowner: Republic of South Africa					
Farm Vygenhoek 10JT Portion 1 Landowner: Department of Land Affairs					
Farm Mareesburg 8JT Portion 6 Landowner: Rhodium Reefs Ltd					

Farm Der Brochen 7 JT Portion 1					
Municipal councillor - See Appendix E					
Councillor Jane Malepe Ward Councillor (Ward 5 Thaba Chweu Local Municipality)	x	8 September 2020	Support the project and potential job creation.	Comment noted.	Appendix 9 of the Public Participation Report
Municipality - See Appendix E					
Organs of state *(Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DHSWS etc.)*					
Thaba Chweu Local Municipality Amos Ngomane Environmental Manager	x				
Fetakgomo Tubatse Local Municipality M.A. Mathebula Development Planning					
Ehlanzeni District Municipality Randzu Ntusi	x				
Department of Water Affair and Sanitation-Mpumalanga Mpho Ntshagovhe	x				
South African Heritage Resources Association Philip Hine	x				
Mpumalanga Tourism and Parks Agency: Conservation Permitting Dorothy Makaringe	x				

Mpumalanga Tourism & Parks Agency					
IAIASA – Philip Radford Mpumalanga Branch Chair					
Communities -					
Vygenhoek Local Community	x	7 September 2020	Support the project and potential job creation.	Comment noted.	Appendix 9 of the Public Participation Report
Protea Community Forum	x	7 September 2020	Support the project and potential job creation. Concern about graves and heritage. Want a transparent project communication.	Comment noted. Heritage specialist, socio-economic study and public participation will be furthered in the Impact Assessment phase.	Appendix 9 of the Public Participation Report
Dept. Land Affairs -					
Mpumalanga Agriculture, Rural Development, Land and Environmental Affairs				Land claim.	
Traditional Leaders -					
Vygenhoek Royal Family	x	7 September 2020	Support the project and potential job creation. Concern about graves and heritage resources.	Comment noted. Heritage specialist, and socio-economic study will be furthered in the Impact Assessment phase.	Appendix 9 of the Public Participation Report
Dept. Environmental Affairs					
Mpumalanga Department of Economic Development, Environment and Tourism					
Other Competent Authorities affected -					
OTHER AFFECTED PARTIES					
INTERESTED PARTIES					

Hendrick Mohlahlo	x	7 July 2020	Graves and communication	Regulated Heritage impact assessment and Public Participation to be undertaken as part of the Scoping and Environmental process.	Refer to Appendix E for detailed comments and response report for details comments and responses.
Petruse Jiya	x	16 July 2020	Graves	A Heritage impact assessment to be undertaken as part of the Scoping and Environmental process.	Refer to Appendix E for detailed comments and response report for details comments and responses.
Makgaola Piet Tjia	x	19 July 2020	Interest in project.	Noted, I&AP added to database.	
Matthews Tsie	x	18 July 2020	Interest in project.	Noted, I&AP added to database.	
Tswaledi Florence Tjia	x	20 July 2020	Jobs.	Noted, I&AP added to database.	
Victor Tshoma	x	16 Juy 2020	Jobs	Noted, I&AP added to database.	
Vincent Tshomo,	x	04 July 2020	Jobs and public participation.	I&AP added to database. A regulated Public Participation process will carefully be undertaken under COVID 19 conditions as part of the Scoping and Environmental process.	
Jim Mosotho	x	7 September 2020	Job creation, land claims, graves, clear lines of communication. Project is supported.	A Heritage impact assessment to be undertaken as part of the Scoping and Environmental process. Land Affairs need to provide clarity on the land claims.	Appendix 9 of the Public Participation Report

Find attached **Appendix E** for the details of all registered I&AP.

iv) Environmental attributes associated with the development footprint alternatives

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

The section to follow describes the environmental attributes associated with the development footprint alternatives.

1) Baseline Environment

In order to determine the baseline environment of the proposed location of the Vygenhoek Platinum Mine, a number of specialist investigations were initiated as part of the mining right application. The specialist assessment required associated to the proposed mining activity was identified using the national web-based screening tool as required by GN 960 of GG no. 42561 dated 5 July 2019.

The section to follow summarises the findings from the Impact Assessment undertook by the various appointed specialist. For the purpose of this report, only a summary of the assessments will be presented. The detailed reports are attached as appendices.

All mitigation measures and recommendations proposed are incorporated into the EMPr (Part B) to this report.

(a) Type of environment affected by the proposed activity

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

The information in the following sections has been extracted from the various specialist reports as part of the impact assessment.

I. Rainfall, evaporation, and average climate

Rainfall (Highlands Hydrology, July 2020)

Various weather stations managed by both the South African Weather Services (SAWS) and the Department of Water and Sanitation (DHSWS) are illustrated in **Figure 9**.

The closest SAWS rainfall station is 593419 W (Martenshoop Police Station), located approximately 9km -east of the site and has an altitude of 1365m above mean sea level. This SAWS station has a record length of 90 years with a Mean Annual Precipitation (MAP) of 689mm. The closest DHSWS station is B4E003, located approximately 15km to the north-east of the site with a 43-year record and MAP of 679mm, comparing well to SAWS station 593419 W.

The potential for rainfall distributions to change over distance can be significant. **Figure 9** presents the variation in mean annual precipitation (MAP) in the greater area, indicating a steady decrease in MAP from south to north. An alternative and site-specific source of rainfall data was therefore also used to provide average monthly rainfall values for the site as per Lynch (2004).

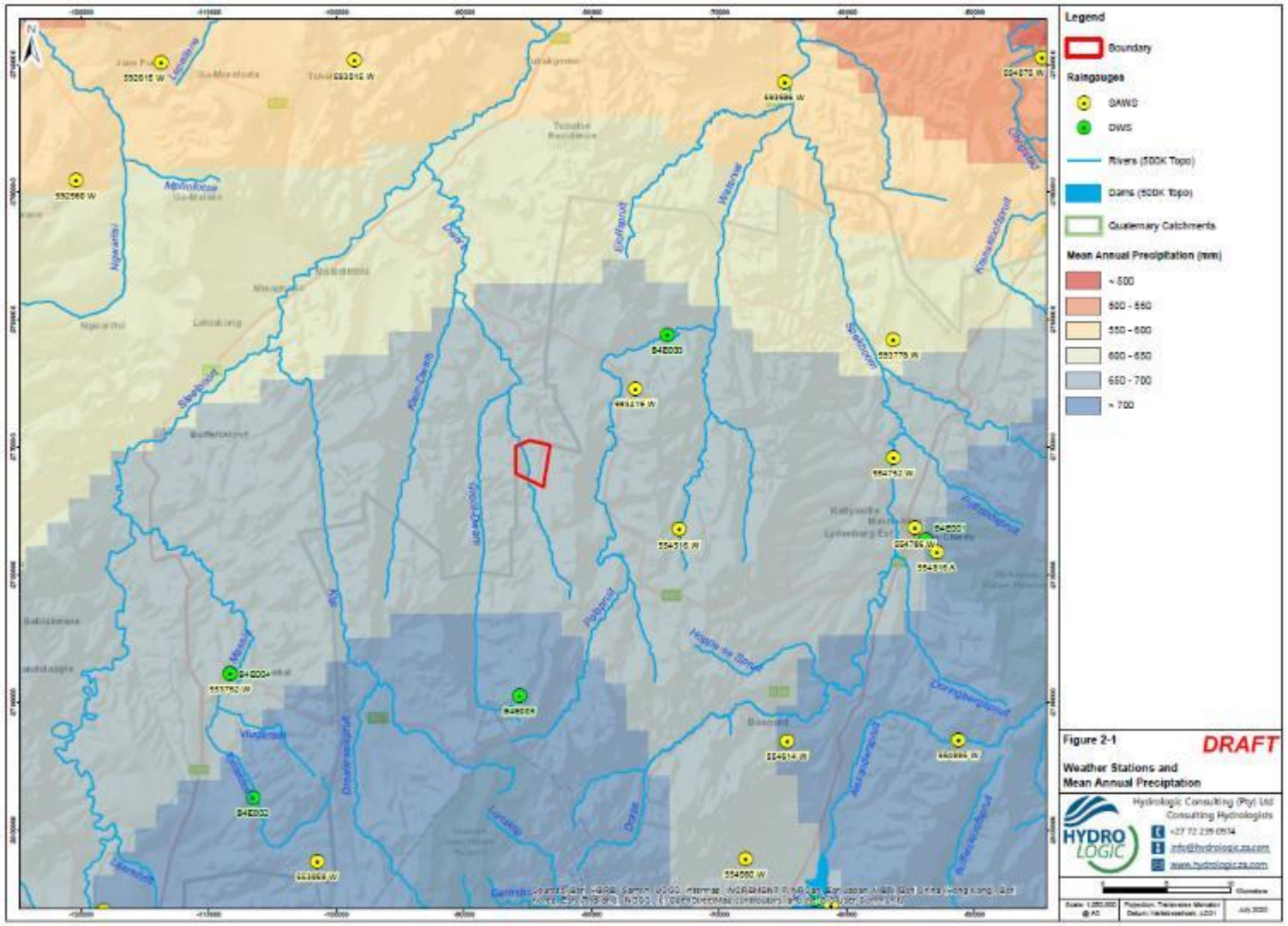

Figure 9: Weather stations and mean annual precipitation

Lynch (2004) includes details on the development of a raster database of monthly rainfall data for Southern Africa. The resultant raster database utilises a geographically weighted regression which took account of factors including latitude, longitude, altitude, slope and distance from the sea when interpolating data from rainfall stations located throughout Southern Africa. **Table 8** presents the average monthly rainfall estimates from Lynch (2004) indicating a MAP of 674mm, comparing well to both SAWS station 593419 W and DHSWS station B4E003.

Table 8: Average monthly rainfall (Lynch, 2004)

Month	Rainfall (mm)
January	113
February	91
March	76
April	43
May	15
June	7
July	6
August	8
September	22
October	60
November	114
December	119
Total	**674**

Evaporation (Highlands Hydrology, July 2020)

Evaporation data was sourced from the South African Atlas of Climatology and Agrohydrology (Schulze and Lynch, 2006) in the form of A-Pan equivalent evaporation. The average monthly evaporation distribution is presented in **Table 9** and shows the site has an annual A-Pan equivalent evaporation of 1981mm which is considered high in comparison to other areas in South Africa.

Table 9: Monthly A-pan equivalent evaporation (Schulze and Lynch, 2006)

Month	Evaporation (mm) A-pan equivalent
January	203
February	164
March	171
April	147
May	133
June	109
July	118
August	154
September	182
October	200
November	197
December	203

Total	**1981**

Average climate (Highlands Hydrology, July 2020)

The average climate for the site is presented in **Figure 10** using the outcome of the investigation into rainfall and evaporation for the site. The combination of rainfall (Pegram, 2016) and evaporation and temperature (Schulze and Lynch, 2006) result in a warm temperate climate with dry winters and hot summers according to the Köppen-Geiger climate classification1. While evaporation is showing as greatly exceeding rainfall, this is representative of the maximum A-Pan equivalent potential evaporation that could occur assuming no limitations are placed on evaporative demand.

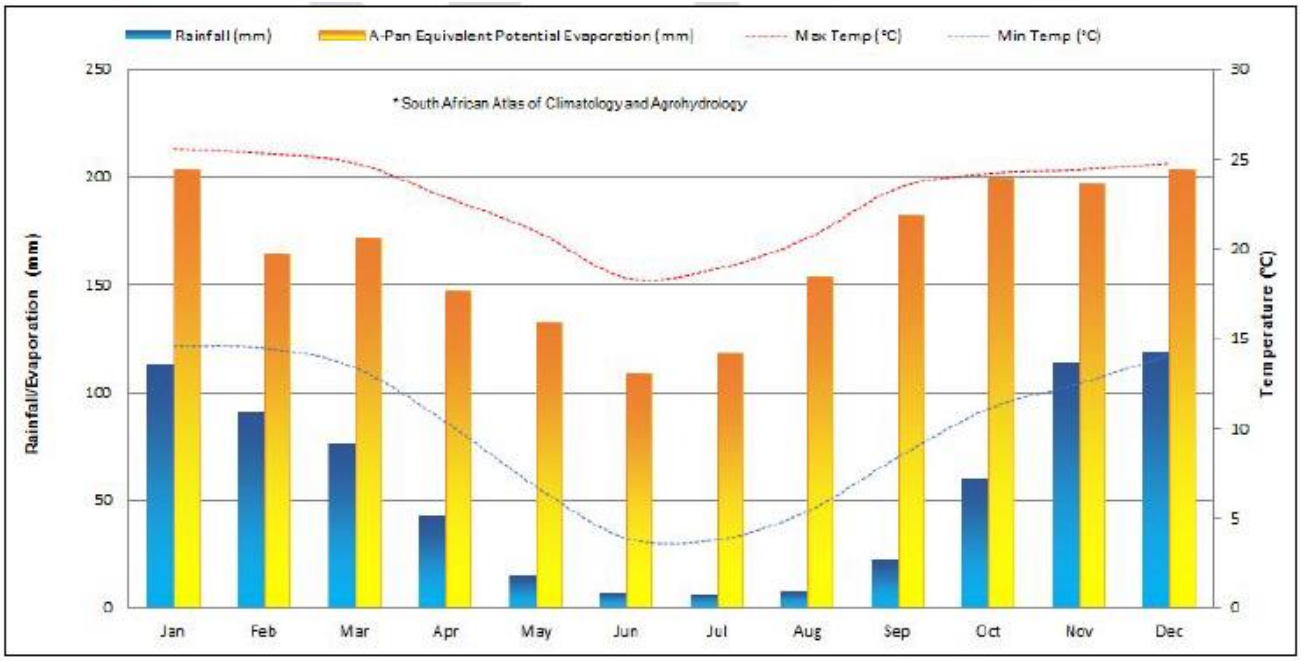

Figure 10: Average monthly climate

II. Regional setting, topography, and sub-catchment

The proposed Vygenhoek Platinum Mine is situated 45 km west of Lydenburg, Mpumalanga Province. The site is situated in Quaternary Catchment B41G of the revised Olifants Water Management Area (WMA 2) (DHSWS, 2016), which now also includes the Letaba River catchment. Accordingly, the main rivers include the Elands River, the Wilge River, the Steelpoort River, the Olifants River, and the Letaba River. The Olifants River originates to the east of Johannesburg and flows in a northerly direction before gently turning to the east. It is joined by the Letaba River before it enters into Mozambique. More specifically, the proposed Vygenhoek Platinum Mine encompasses the Dwars River and the Klein-Dwars River and their tributaries. Watercourses specifically associated with the proposed Vygenhoek Platinum Mine include two unnamed tributaries of the Dwars River, both of which are considered to be non-perennial in nature.

According to the topography of the watercourses, the reach of the western-most tributary present within the study area is classified as mountain stream, with elements of transitional and mountain headwater streams also present.

Of additional relevance is that watercourses associated with the western portion of the proposed Vygenhoek Platinum Mine are classified within the latest National Biodiversity Assessment as being Critically Endangered and Endangered and are largely not sufficiently protected (Van Deventer et al., 2019).

More detail on the aquatic environment, describing the PES and EIS, is provided in section **1 (a) (VIII).**

Elevations on the site typically range from 1 372 to 1 550 metres above mean sea level (mamsl).

Bare riverbed, dense forest & woodland, natural rock surfaces, fallow land, residential, scattered villages, natural grassland and open woodland land types dominate the sub-catchment (DEA, 2019).

III. Geological Environment (GCS, July 2020)

According to 2530 Barberton-1:250 000 Geological map series (DMEA, 1986) the surface geology is characterised by quaternary sand deposits, Valium aged anorthosite, gabbro and norite (pyroxenite) of the Rustenburg Layered Suite; and cross-bedded quartzite with arenite, shale and conglomerate layers of the Pretoria Group, of the Transvaal Sequence (refer to **Figure 11**).

Stratigraphy

The proposed Vygenhoek Platinum Mine is underlain by gently north and north-west dipping layers of the Bushveld Igneous Complex (BIC), which intruded into the Transvaal Supergroup on the Kaapvaal Craton at about 2060 Ma. The Bushveld Complex consists of two lithological distinct units that are mainly intrusive into the Transvaal Supergroup:

- A lower sequence of layered mafic and ultramafic rocks, known as the Rustenburg Layered Suite (RLS); and
- An overlying unit of granite, known as the Lebowa Granite Suite.
- The chromitite and platinum mineralization is located in the RLS. The Rustenburg Layered Sequence comprises five stratigraphic zones:
- The Marginal Zone (with no economic potential);
- The Lower Zone (containing thin, high-grade chromitite seams); The Critical Zone (hosts all the significant PGM and chromite deposits);
- The Main Zone (locally exploited as dimension stone); and
- The Upper Zone (which host magnetite seams, some of which are exploited for Vanadium and iron ore).

The project area is underlain by the upper portion of the Critical Zone which in this area consists dominantly of anorthosite and mottled anorthosite with rare pyroxenite and chromitite layers (Digby Wells, 2012).

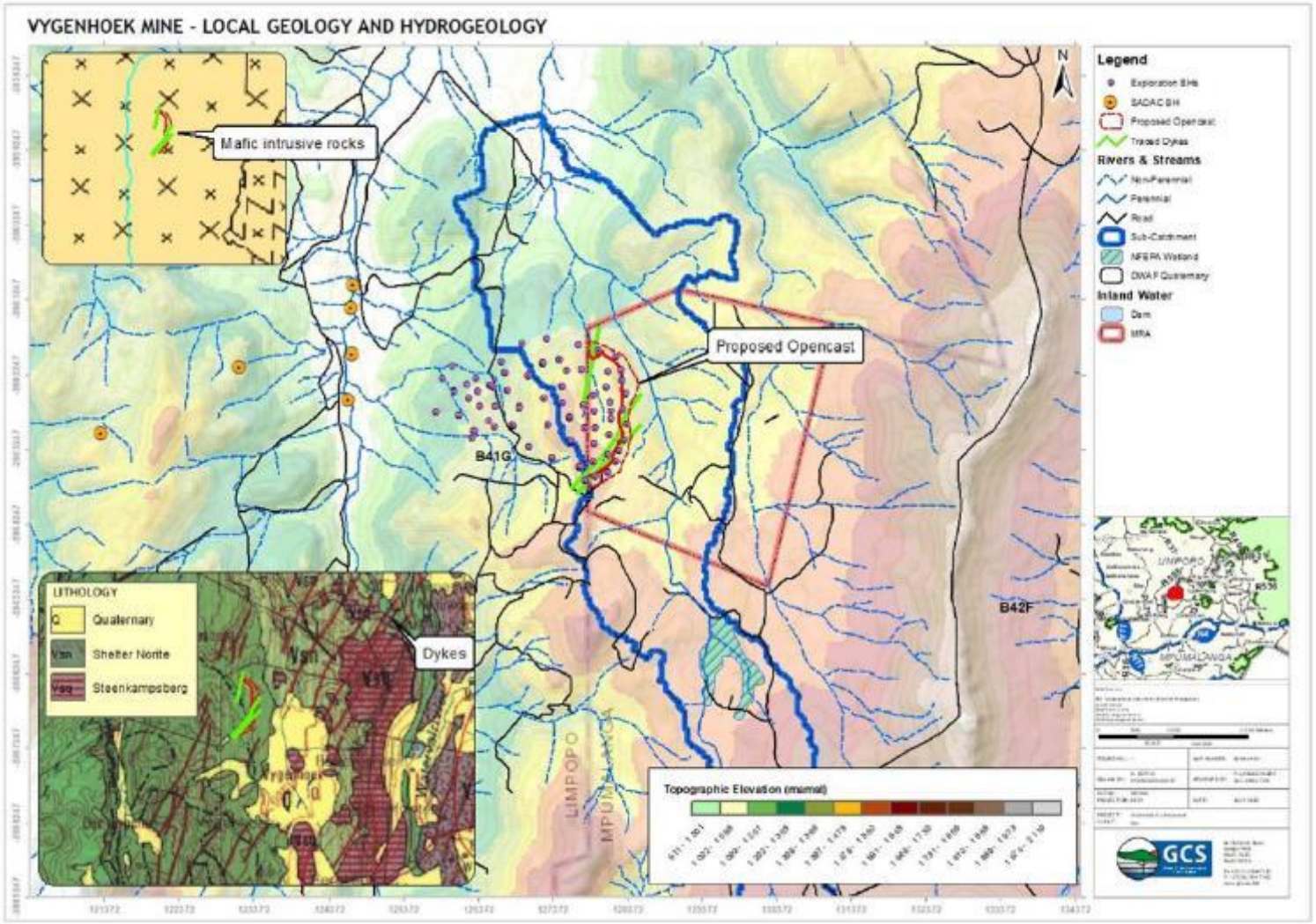

Figure 11: Local geology and hydrogeology

Structural geology

The ore body is an isolated basin-like structure. No major fault zones are expected to occur on the project site. Secondary discontinuities such as joints, shear joints and fault surfaces occur in the area and are likely to be an important control on the direction of groundwater flow (Digby Wells, 2012).

From the aerial magnetic map for the region, published by the Council of Geoscience South Africa (CGS, 2020), several magnetic anomalies associated with intrusive diabase/dolerite is noted (refer to **Figure 12**). The strikes of the magnetic anomalies (rocks) corresponds to NE-SW trending dykes as indicated on the 1:250 000 geological map series for this area and extend underneath Quaternary deposits. The UG2 outcrops are seen from N-S and NW-SE in the western part of the property.

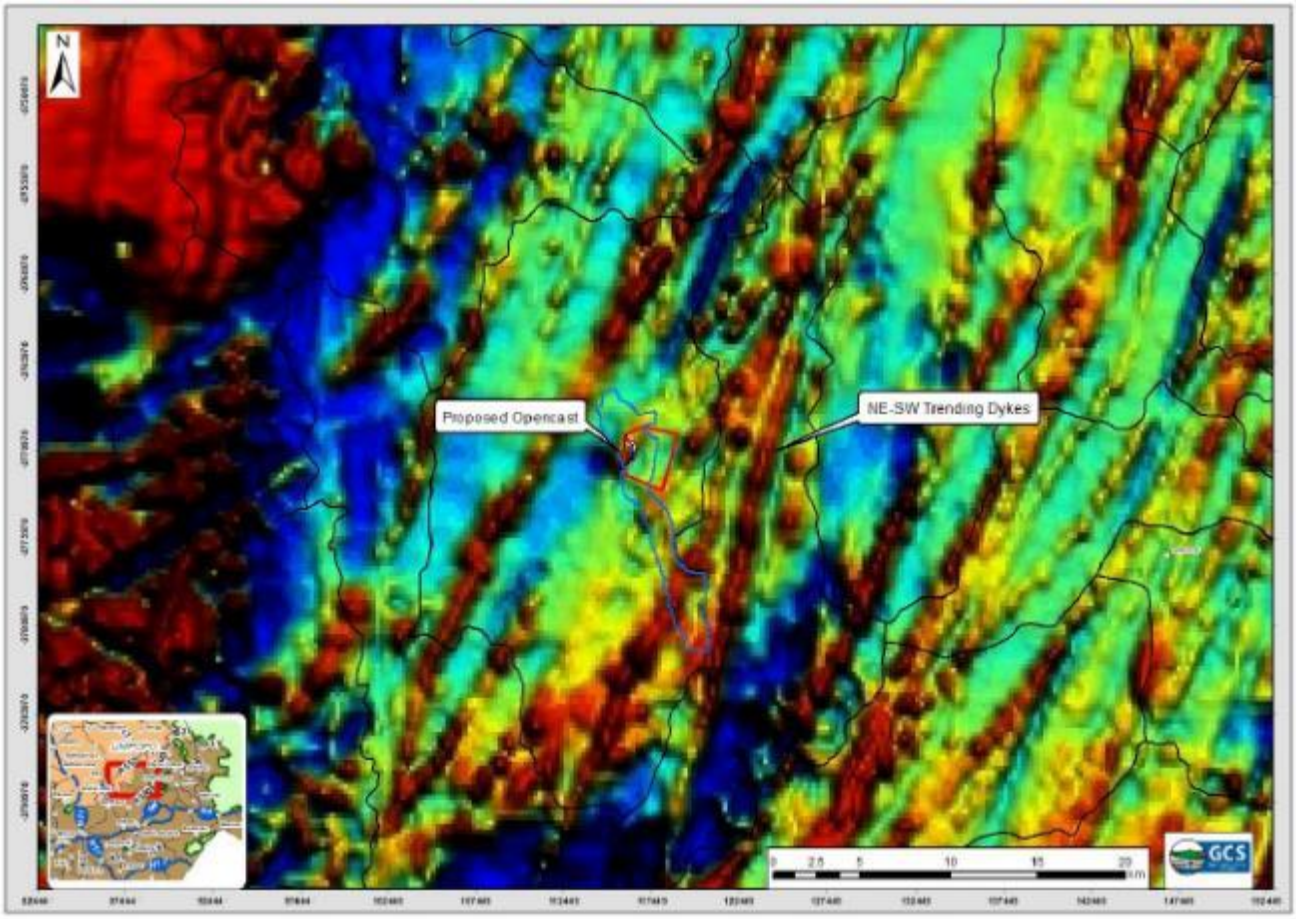

Figure 12: Magnetic map and structural geology (GCS, 2020)

Folding

The stereographic projection of poles to planes of layering illustrates that the Bushveld Complex has been subjected to gentle folding on a NNW-trending fold axis. Field data suggests that the proposed Vygenhoek Platinum Mine area is underlain by an open syncline structure. Such orientated folds may be within the stress field of the generally dextral Steelpoort Fault (Digby Wells, 2012).

Quartzite

Digby Wells (2012) indicated that an inlier of quartzite is found in the Bushveld rocks in the study area, with a sub-circular outcrop approximately 40 m in diameter forming a local topographic high point. The quartzite is presumed to be Pretoria Group, and is fractured in outcrop. Such fractures can be associated with the quartzite itself, or with chilling in the margin of the Bushveld rocks.

Weathering

Feldspars in anorthosite and mottled anorthosite layers are especially prone to chemical weathering, which was found to be particularly intense where surface watercourses flow over the bedrock. It is estimated that the weathered zone may be several metres thick (more than 3 m) in these areas. Weathered areas are characterised by the development of core stones and very soft weathered rock, which is readily eroded into deep (more than 2 m) gullies by flowing surface water. Away from streams, the rocks remain relatively fresh even at the surface (Digby Wells, 2012).

IV. Air Quality (Appendix F: Rayten Environmental, December 2020)

The main objective of the AQIA is to determine the potential impact of emissions associated with the operational activities at the proposed Vygenhoek Platinum Mine on ambient air quality in terms of dust-fall, PM_{10} and $PM_{2.5}$.

As part of the AQIA, a baseline air quality assessment was undertaken to determine the following:

- the prevailing meteorological conditions at the site;
- baseline concentrations of key air pollutants of concern;
- identify existing sources of emissions; and
- identify key sensitive receptors surrounding the project site.

The land use immediately surrounding the proposed Vygenhoek Platinum mine consists mostly of grassland and forested land, with few areas consisting of cultivated land. Built up areas, mines and quarries, waterbodies and wetlands are observed, to a lesser extent, in surrounding areas, within 20km radius. The area is classified as rural in nature, with few existing key sources of airborne emissions surrounding the project site, which have been identified as follows:

- Mining activity (6km south and 3 – 18km north of the proposed mine);
- Forestry activity/plantations (mainly north, north-east, west, north-west, south-west and south of proposed mine);
- Commercial agricultural activity and potential biomass burning (surrounding areas); and
- Vehicle dust entrainment on unpaved roads (surrounding areas).

Meteorological overview

MM5 meteorological data for the project area for the period 01 January 2017 – 31 December 2019 was used. Based on the prevailing wind fields for the period January 2017 to December 2019, emissions from activities at the proposed Vygenhoek Platinum Mine will likely be transported towards the north-westerly and west-north-westerly directions. Moderate to fast wind speeds observed during all the time periods, may result in effective dispersion and dilution of emissions from the proposed Vygenhoek Platinum Mine operations; however, higher wind speeds can also facilitate fugitive dust emissions from open exposed areas such as stockpiles and opencast areas. Removal of particulates via wet depositional processes would be evident during the warmer (wet) seasons (spring – earlyautumn) thus lower ambient concentrations of dust could be expected during these seasons. Over the remainder of the year higher ambient concentrations of particulates could be expected.

There is little variation in terms of prevailing wind direction occurring at the project site. During all seasons, prevailing south-easterly and east-south-easterly winds were observed, with wind speeds being consistent and moderate to fast, which could subsequently facilitate dust emissions from stockpiles, onsite and offsite activities (movement of trucks on unpaved haul roads as they transport ROM ore material to the preferred offsite concentrator plant).

Baseline air quality concentrations

The existing air quality situation is usually evaluated using available monitoring data from permanent ambient air quality monitoring stations and dust-fall networks operated near the project site (i.e. within 20km radius). There was no South African Air Quality Information System (SAAQIS) data available (that could be determined) to present background concentrations for criteria air pollutants at the project site. Further, dust fall data could not be provided in this AQIA report as there are no dust fall networks operated near the project site, that could be determined.

Surrounding sources of air pollution

Dust-fall, PM_{10} and $PM_{2.5}$ are key pollutants of concern associated with operations at the proposed Vygenhoek Platinum Mine and will be emitted from the following key sources:

Dust and Particulate Emissions:

- Drilling and blasting at the opencast pit;
- Bulldozing (profiling of waste);
- Materials handling operations (truck loading/offloading operations);
- Transportation of material on unpaved haul roads (trucks);
- Material storage: Stockpiling;
- Excavators (stripping ore and waste and loading trucks); and
- Wind erosion from exposed areas (i.e. the open cast pit, exposed surfaces, and material stockpile areas).

Construction phase model summary

Based on the dispersion model output plots for the construction phase, predicted incremental dust-fall rates, and PM_{10} and $PM_{2.5}$ concentrations are high but in compliance with applicable limits over most of the project area modelled. Higher concentrations, including exceedances, are observed over the mining right area and beyond the proposed mine boundary within 1.6km, 7.85km and 0.2km radius for dust-fall, PM_{10} and $PM_{2.5}$, respectively. Further, outside the proposed mine boundary, exceedances occur over the north-western and south-eastern sections for dust-fall, as opposed to $PM_{2.5}$ exceedances that occur over the north-western quadrant only. Exceedances in PM_{10} concentrations are observed over all quadrants, except the north-eastern one. Maximum predicted incremental dust-fall rates and PM concentrations at nearby sensitive receptors located within 20km from the proposed mine boundary are low at most discrete receptors, except at discrete receptors DR12 and DR13 (dwellings - located approximately 5km north-north-west of the proposed mine), where exceedances in daily incremental PM_{10} concentrations are predicted. The two discrete receptors could be at high risk as they are also likely exposed to emissions from nearby existing mining activities belonging to other unknown companies. However, with the implementation of dust mitigation measures recommended by the report (**Appendix F**), the impact of predicted daily PM_{10} concentrations from the proposed mine's operations on the two discrete receptors can be significantly reduced and thus, not considered to be a fatal flaw.

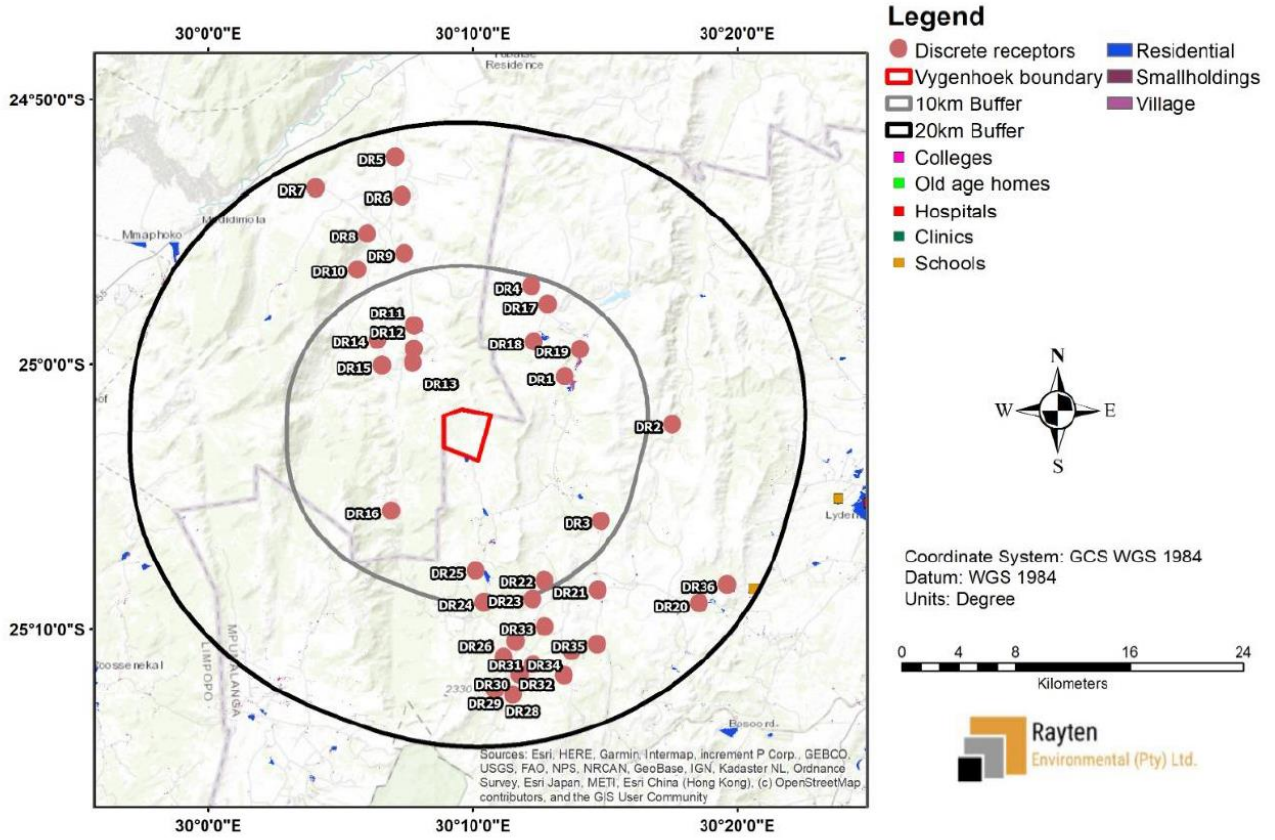

Figure 13: Spatial representation of discrete receptors included in the dispersion model (20 km radius)

Operational phase model summary

Based on the dispersion model output plots for the operational phase, predicted incremental dust-fall rates, and PM_{10} and $PM_{2.5}$ concentrations are high but mostly in compliance with applicable National Dust Control Regulations (NDCR) (for dust-fall) and National Ambient Air Quality Standards (NAAQS) (for PM_{10} and $PM_{2.5}$) over the project area. Higher concentrations, including exceedances, are observed near the proposed surface mining activities and beyond the north-western boundary of the proposed mine within a maximum radius of 0.2km. Predicted incremental dust-fall rates, and PM_{10} and $PM_{2.5}$ concentrations comply with the NDCR, 2013, and NAAQS at all discrete receptors surrounding the mine.

Decommissioning phase model summary

For the decommissioning and closure phase, predicted incremental dust-fall rates, and PM_{10} and $PM_{2.5}$ concentrations are high but compliant with applicable limits over most of the project area modelled. Exceedance patterns are similar to those observed for the construction phase. However, the exceedances do not extend beyond a radius of 1.45km, 0.17km and 5.60km from the proposed mine boundary for dust-fall, $PM_{2.5}$ and PM_{10}, respectively. Maximum predicted incremental dust-fall and PM_{10} and $PM_{2.5}$ concentrations comply with the NDCR, 2013, and NAAQS at all discrete receptors surrounding the mine.

Impact analysis

Based on the modelled proposed emission sources, the overall impact is identified to result in ***medium negative impacts*** in terms of particulates and dust-fall if mitigation measures are implemented.

Mitigation measures considered

Mitigation measures that were considered in this modelling study were limited and included dust suppression using water bowsers on all the waste stockpile areas and unpaved haul routes (i.e. route from pit area to ROM stockpile). As dust is the key pollutant of concern associated with activities at the proposed Vygenhoek Platinum Mine, dust suppression should be conducted at the proposed mine where possible, to reduce additional levels in background concentrations at the site. Furthermore, as high dust-fall rates and PM (PM_{10} and $PM_{2.5}$) concentrations are predicted for the construction, operational and decommissioning/closure phases, it is recommended that an internal dust management plan be compiled and implemented during the entire life-cycle of the proposed mine and that the proposed mine undertake monthly dust-fall monitoring.

Conclusion

In conclusion, the dispersion modelling results indicate high predicted dust-fall rates and incremental $PM_{2.5}$ & PM_{10} concentrations for the construction phase, operational phase, and decommissioning & closure phase. However, dust-fall rates, and PM_{10} and $PM_{2.5}$ concentrations comply with applicable limits over most of the project area, with higher dust-fall rates and PM_{10} and $PM_{2.5}$ concentrations, including exceedances, being observed in near proximity to the proposed surface mining activities for the operational phase and over the mining right area for the construction and decommissioning/closure phases. Exceedances also extend beyond the proposed mine boundary to the north-west within, at most, 0.20km radius for the operational phase. For the construction phase, exceedances outside the proposed mine boundary are observed over most of the wind quadrants (except the north-eastern one), within, at most 7,85 km radius. Two (2) discrete receptors DR12 and DR13 (dwellings - located approximately 5km north-north-west of the proposed mine), where exceedances in daily incremental PM_{10} concentrations are predicted, could be at high risk if dust and PM emissions from the proposed Vygenhoek Platinum Mine during the construction phase are not managed and mitigated. For the decommissioning and closure phase, exceedances outside the proposed mine boundary are observed over most of the wind quadrants (except the north-eastern one), within, at most 5.60 km radius. The implementation of dust mitigation measures at the proposed mine is advised to reduce dust emissions as far as possible. Further, the proposed mine must compile and implement a dust management plan throughout the life cycle of the mine (during construction, operation, and decommissioning/closure).

Recommendation for Environmental Authorisation

Rayten is of the opinion that the proposed activities can be authorised, and that the proposed mine may commence with operations if the recommendations provided in this report are implemented.

All mitigation measures and monitoring requirements have been incorporated into Part B of this report.

The detailed report is attached as **Appendix F**.

V. Climate Change (Appendix G: Rayten Environmental, October 2020)

The main objective of the Climate Change Impact Assessment report is to assess the potential contribution of the project towards climate change, through the emission of Greenhouse Gases (GHGs). GHGs the proposed mine could emit include carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Additionally, the effects that climate change could have on the project will also be assessed.

The terms of reference and scope of work for the climate change impact assessment report (**Appendix G**) are to describe the existing status of the biophysical environmental, in terms of climate, that will be affected by the mining activity, as well as to provide a list and description of potential impacts identified on the biophysical environment in terms of climate (the effect of climate change on the business, and the surrounding environment). A GHG emissions inventory and carbon footprint of the mining activity has been undertaken to determine the proposed mine's impact on climate change.

Sources of GHG emissions

The following activities are expected to be key sources of GHG emissions at the mine:

- Blasting (fugitive emissions resulting from the combustion of a complete explosives mix)
- Truck and mining equipment emissions from combustion of fuels
- Other combustion processes (e.g. gas, diesel & oil combustion)
- Transportation of the ore to the concentrators located offsite
- Conservancy tank for containing sewage and wastewater
- Possible incinerator for treating sewage screenings
- Electricity consumption from the workshop, administrative office, weighbridge, and additional lighting of stockpile areas
- Construction of required infrastructure onsite

Other possible indirect GHG emission sources, include, but are not limited to:

- Employee commute and business travel
- Transportation of conservancy tank sewage waste to Steelpoort Sewage for treatment offsite
- Transportation of general and hazardous waste offsite
- Transportation of fuel to the site, as well as of goods and services used by the mine (such as office equipment, vehicles, IT services and water supply)
- Distribution of the ore to the concentrators in trucks not controlled by the mine or its contractor

A GHG inventory of the proposed Vygenhoek Mine was compiled to assess the impacts of the project on climate change. Scope 1 emissions (direct GHG emissions) were quantified. Scope 2 emissions (energy indirect emissions) were not quantified due to the mine not expecting to use grid-based electricity. Scope 3 emissions (other indirect GHG emissions) were excluded due to information not being available. It should however be noted that only Scope 1 and Scope 2 emission calculations are required in terms of the GHG Reporting Protocol. Scope 3 emissions should however be calculated to obtain a more holistic overview of the total GHG emissions attributable to the mine's operations.

Legislative context

In South Africa, at present, there is no gazetted legislation for conducting Climate Change Impact Assessments, while the Climate Change Bill is still in Draft phase. This Climate Change Impact Assessment has been compiled using international best practice guidelines, while the GHG calculations were undertaken using the GHG Protocol Corporate Accounting and Reporting Standard, as well as ISO/SANS 14064-1.

Calculated carbon footprint

To calculate the GHG emissions, accounting tools were used, namely Greenhouse Gas Protocol Corporate Accounting and Reporting Standard, as well as the SANS 14064-1:2006 standards. The total Scope 1 carbon footprint for Vygenhoek Platinum Mine for Year 1 (based on available information provided during the compilation of this report) is 5 301.91 tonnes CO_{2e}. The total Scope 1 carbon footprint for Year 2 (based on available information provided) is 5 376.87 tonnes CO_{2e}. The total Scope 1 carbon footprint for Years 3-9 (based on available information) is 37 638.96 tonnes CO_{2e} (5 376.99 tonnes CO_{2e} per year). The total Scope 1 carbon footprint for Year 10 (based on available information) is 5 354.08 tonnes CO_{2e}. The total carbon footprint (Scope 1 only) for Vygenhoek Platinum Mine, for years 1-10, is expected to be 53 671.82 tonnes CO_{2e}.

Impact assessment

With calculated GHG emissions of 0.0000537 Gt CO2e (53 671.82 tonnes CO2e) for the LoM, the mine's share of the remaining carbon budget will be 0.0017% (for a 1.5°C scenario) and 0.0006% (for a 2°C scenario). Based on the impact rating system used, Vygenhoek Platinum Mine's GHG emissions, in terms of a percentage of South Africa's carbon budget, are considered to be ***medium impact*** in terms of the magnitude/severity of the proposed mine's GHG emissions and climate change impacts. The expected GHG emissions for the LoM mine (based on information provided) is 53 671.82 tonnes CO2e (0.0017% of SAs carbon budget, at a 1.5°C scenario). It is however on the lower end of being a ***medium impact***. At a 2°C scenario, the impact will still be ***medium***.

Mitigation measures

There are options to mitigate/lower the GHG emissions from the platinum mine, and while these may reduce the amount of diesel used, and subsequent GHG emissions generated, the overall impact of the mining operations is expected to remain a ***medium to high*** negative impact. This is due to the fact that:

- GHG emissions remain in the atmosphere indefinitely,
- Their extent will continue to be at an international / global scale,
- Climate change is irreversible,
- The duration of climate change impacts is permanent,
- The probability of contributing to climate change is definite,
- The impact of the proposed mine on climate change is cumulative in nature,
- The mining activity will contribute to a loss of resource.

Impacts of climate change on proposed mine

The impacts of climate change on the proposed mine can vary. Mpumalanga Province is expected to experience higher minimum, average and maximum temperatures over the next few decades. These temperature changes would be accompanied by increasing incidence and intensity of drought, possibly even in regions where total rainfall increases (such as along the Mpumalanga escarpment). Total annual rainfall is expected to increase by between 85 and 303 mm per year, with distinct increases along the escarpment (MSDF, 2018). Water demand in Mpumalanga has increased due to rapid industrialisation, mining, urbanization, and population growth, and it is stated that the province is unlikely to meet the water availability due to the climate change impact on the province.

Recommendation for Environmental Authorisation

However, a decision on whether the mining operation should be approved should not rely solely on the climate change impacts. The GHG emissions should be viewed against locally and internationally accepted emission intensity benchmarks for platinum mining. Annexure A of Government Gazette No. 43452 of 19 June 2020, as part of the Carbon Tax Act (Act No. 15 of 2019) provides an SA Industry benchmark value of 0.004 tonnes CO2e/tonne of ore mined, for a shallow depth mine (0-300m) in the Platinum mining sector. In year 1, and intensity ratio of 0.16 tonnes CO2e/tonne of ore is expected. An intensity ratio of 0.03 is calculated for subsequent years 2-10. This is higher that the industry benchmark provided as part of the Carbon Tax Act. The purpose of the emission intensity benchmark is that companies that perform better as compared to a carbon emissions intensity sector benchmark qualify for a higher than default tax-free threshold.

All mitigation measures and monitoring requirements have been incorporated into Part B of this report.

The detailed report is attached as **Appendix G**.

VI. Noise (Appendix H: Enviro Acoustic Research, January 2021)

The Department of Environment, Forestry and Fisheries also promulgated Regulation 320, dated 20 March 2020 as published in Government Gazette No. 43110. The Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in Terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation would be applicable to this project.

This regulation defines the requirements for undertaking a site sensitivity verification, specialist assessment and the minimum report content requirements for environmental impact where a specialist assessment is required but no protocol has been prescribed. It requires that the current land use be considered using the national web based environmental screening tool to confirm the site sensitivity available at: https://screening.environment.gov.za.

If an applicant intending to undertake an activity identified in the scope of this protocol for which a specialist assessment has been identified on the screening tool on a site identified as being of:

- "very high" sensitivity for noise, must submit a Noise Specialist Assessment; or
- "low" sensitivity for noise, must submit a Noise Compliance Statement.

On a site where the information gathered from the site sensitivity verification differs from the designation of "very high" sensitivity on the screening tool and it is found to be of a "low" sensitivity, a Noise Compliance Statement must be submitted.

On a site where the information gathered from the initial site sensitivity verification differs from the designation of "low" sensitivity on the screening tool and it is found to be of a "very high" sensitivity, a Noise Specialist Assessment must be submitted.

If any part of the proposed development footprint falls within an area of "very high" sensitivity, the assessment and reporting requirements prescribed for the "very high" sensitivity apply to the entire footprint excluding linear activities for which noise impacts are associated with construction activities only and the noise levels return to the current levels after the completion of construction activities, in which case a compliance statement applies. In the context of this protocol, development footprint means the area on which the proposed development will take place and includes any area that will be disturbed.

The noise assessment conducted was comprehensive and resulted in a Noise Specialist Assessment due to the following reasons:

- There are a number of potential noise-sensitive receptors living within 1 000 m from the proposed mining activities; and,
- The potential access road may pass through or close to the local community.

Description of the closest potential noise sensitive receptors

Residential areas and potential noise-sensitive developments/receptors/communities (NSRs) were identified using aerial images as well as a physical site visit. This revealed:

- An NSR to the north-west, reportedly used by mine employees. There is a hill between the proposed mining area and this NSR. Considering the proximity to an existing mine as well as the topography, it is unlikely that the proposed Vygenhoek mining activities will be audible at this NSR; and
- A number of dwellings used by the local community to the east and south-east. This community have a direct line of sight to the proposed activities and the activities are expected to be audible at times.

Baseline sound levels

Considering the sound levels measured within the community:

- Considering the arithmetic average based on the 10-minute LAeq values (38.5 dBA) as well as the equivalent LAeq values based on the 16-hour daytime periods (43.1 dBA), ambient sound levels are typical of a rural noise district. This is in agreement considering the developmental character of the area;
- Considering the arithmetic average based on the 10-minute LAeq values (27.4 dBA) as well as the equivalent LAeq values based on the 8-hour night-time periods (32.0 dBA), ambient sound levels are typical of an undeveloped rural noise district. This is in agreement considering the developmental character of the area;
- The statistical LA90 levels are very low both day and night, indicating little constant sounds that could raise this statistical indicator; and,
- Spectral data indicate that while community noises does influence the daytime sound levels, nights are quiet with mainly natural noises dominating.

Considering the requirements of the National Noise Control Regulations, the proposed mining activities should not raise the existing ambient sound levels with more than 71 dB (a potential disturbing noise), setting a noise limit of:

- 50 dBA for daytime noise levels; and,
- 39 dBA for night-time noise levels.

Summary of findings

Conceptual scenarios were developed for the future construction and operational phases with the output of the modelling exercise indicating a potential ***medium risk*** of a noise impact at one receptor. This relates to mining traffic noises increasing

[1] When comparing the results of a measurement (minimum duration of 10 minutes) without the noise under investigation with a similar measurement with the noise present.

the ambient sound levels at the closest house above a noise level that could be considered disturbing. A decommissioning phase was also assessed considering the findings from the construction scenario.

Management and mitigation of noise impact

Mitigation measures are required, and it is recommended that the access road be planned (and constructed) further than 50 m from any structure used for residential purposes. The significance of the noise impact will be reduced to low if all access roads are further than 50 m for any structure used for residential purposes. If the recommended mitigation measures are implemented noise monitoring would not be required.

Recommendation for Environmental Authorisation

It is concluded that the noise from the proposed activities can be managed to acceptable levels. It is therefore the recommendation that the proposed activities at the Vygenhoek Platinum be authorized (from a noise impact perspective).

No further investigations or noise monitoring are recommended.

All mitigation measures and monitoring requirements have been incorporated into Part B of this report.

The detailed report is attached as **Appendix H**.

VII. Terrestrial Biodiversity (Appendix I: Bathusi Environmental Consulting, January 2021)

Bathusi Environmental Consulting, in collaboration with Pachnoda Consulting, has been appointed to appraise the biological environment for this EIA report, inclusive of the floristic, ecological and faunal receiving environment (with an emphasis placed on the avifaunal component and relevant references to other faunal disciplines). As part of the project, a Biodiversity Scoping Report was compiled during 2020 and results of this EIA report will take cognisance of relevant aspects and recommendations presented as part of the report.

Site investigations, during which pertinent biological and biodiversity information was collated, was conducted as an instantaneous, austral summer survey between the 16th and 21st November 2020.

Biophysical Environment

The proposed site comprises mostly of natural woodland and grassland habitat. Subsistence agricultural activity and settlements characterise the southern part of the site where slopes are gentle, and soils are deeper and less rocky. Land capability is generally low and not economically sustainable.

The study area is situated within the Ib and Ab land types. Topographic placement is defined by the dominant soil forms, with Mispah and overlying Hutton (brown to reddish-brown, structure-less to weakly structured, sandy clay loam topsoil on

reddish-brown subsoil on rock) forms predominate the higher lying areas, while low lying areas are dominated by dark brown to black, moderately structured crumbly clay topsoil on strongly structured clay subsoils. The geology of the region is complex, also reflected by the generous topographical variability of the region, ranging from plains to mountainous areas. Elevation ranges from the highest point of 1,490 m on top of the spur, to 1,275 m within the valley located at the north-western edge of the project site. General topographical drainage appears to be in a north north-westerly direction from the project site

Rain is received predominantly in the form of showers and thunderstorms between October and March, ranging from 685 to 710 mm per annum. Summers are generally warm and temperatures rarely exceed 30°C and winters are mild with the lowest average temperatures of approximately 9°C occurring in June and July.

The Dwars River (a tributary of the Steelpoort River which eventually flows into the Olifants River) traverses the project area flowing in a northerly direction and is considered to be a critically endangered biophysical attribute. Considering the planned mining activity, significant impacts on the functionality and status of this river can reasonably be anticipated. A second drainage line and small, non-perennial tributaries traverses the eastern part of the site in a northern direction. The nature of these streams are dimorphic, traversing grasslands and plains systems in the southern part of the site, but changing to a woodland/ savanna nature in the northern part of the site where a significant drop in altitude occurs. The location of this small river is such that little effects from the planned mining activity is anticipated.

The Mpumalanga Biodiversity Sector Plan information source categorises the proposed site mostly as 'Other Natural Areas', while deteriorated areas (anthropogenic) are encapsulated in Moderately and Heavily modified areas. The author is in general agreement with this categorisation. However, the local importance of the Vulnerable Sekhukhune Montane Grassland and the critical importance of the Dwars River are not adequately reflected, as is also confirmed by results of this biodiversity assessment report.

A review of available information pertaining to the presence of declared and informal protected areas in the immediate region of the proposed site indicates the general sensitivity and level of conservation efforts, with numerous nature reserves, conservancies and protected areas situated within proximity to the site. The Sekhukhuneland Centre of Plant Endemism (a threatened ecosystem) and De Berg Conservancy (bordering the site to the west) is of particular importance to this site.

Botanical Findings Summary

The following key results were obtained from the botanical EIA assessment:

- The study site is spatially situated across the ecotonal interface of the Grassland and Savanna Biomes, specifically comprising of the Sekhukhune Montane Grassland (Vulnerable) (Gm19, included in the Mesic Highveld Grassland Bioregion) in the western part of the study site and Sekhukhune Mountain Bushveld (Least Concern) (SVcb28, included in the Central Bushveld Bioregion) comprising the eastern part of the study site

- Results of the field survey yielded an Alpha Diversity of 303 plant taxa, which is regarded as representative of the floristic diversity on a regional scale, particularly in view of the high floristic diversity typically associated with grassland and savanna interface/ ecotonal zones. The spatial interaction of numerous topographical and other habitat types also explains the high floristic diversity.
- The species accumulation curve (SAC) for all sample counts indicate that sampling satisfaction has only been achieved at sample point 61 out of 67 samples. However, 90 % of the average predicted species richness (n=362, 90 % = 325) was not achieved during the sampling process, supporting the assumption that the anticipated species richness is considered higher than the recorded richness that were recorded (n=303). 90% of the survey results relates to 273 species, which was achieved at sample 48, after which the species accumulation decreased.
- A total of 23 plant species of conservation consideration has been recorded during the field survey period. The presence of numerous plant species of conservation concern, notably some of which occur abundantly across the study site (specifically within the proposed development footprints), attest to the natural, pristine, and sensitive nature of the floristic receiving environment.
- No species of a threatened category (VU, EN, CR, CR PE), was recorded within the study site, although, the likelihood that other species of conservation concern would occur within the study site cannot be excluded confidently.
- TWNSPAN classification of the dataset indicated the following floristic communities and variations:
  1 *Phragmites mauritianus – Schoenoplectus corymbosus* drainage lines and rivers:
    1.1 *Miscanthus junceus – Juncus* sp. Eastern drainage lines;
    1.2 *Imperata cylindrica – Adiantium cappilus-venerus* western drainage lines; and
    1.3 Intermittent drainage lines and seep areas;
  2 *Searsia keetii – Senecio serratuloides* erosion gulleys;
  3 *Cussonia transvaalensis – Brachiaria serrata* variable woodland and grassland complex:
    3.1 *Heteropogon contortus - Hyparrhenia hirta* grassland plains on red soils;
    3.2 *Vitex obovata - Tristachya leucothrix* wooded grassland on rocky slopes;
    3.3 *Euphorbia ingens - Resnova megaphylla* Boulder Thickets; and
    3.4 *Cussonia transvaalensis - Themeda triandra* variable woodland on rocky slopes;
  4 *Myrothamnus flabellifolius – Xerophyta viscosa* open sheetrocks;
  5 Deteriorated open grassland; and
  6 Agricultural fields.

Botanical Impact Assessment Summary

An assessment of the potential and likely impacts on the floristic receiving environment that could reasonably be expected from the proposed mining activity, include the following:

Summary of impact significance on the floristic receiving environment		
Nature	*Before Mitigation*	*After Mitigation*
Impact 1: Direct impacts on/ losses of conservation important and protected plant species (individuals, stands, populations) as well as habitat that is associated with these plants of conservation consideration	23	17.25
Impact 2: Direct losses and deterioration of natural and sensitive habitat types, including essential habitat refugia, atypical and unique/ restricted habitat types	19	13.5
Impact 3: Direct impacts on local diversity patterns and local loss of floristic diversity	18	8.5
Impact 4: Local depletion of biodiversity and floristic diversity	11.25	6.75
Impact 5: Deterioration and changes to untransformed habitat in the surrounds, with specific reference to sensitive habitat types and habitat types of limited representation on a local scale	18	14
Impact 6: Disruption of important ecological processes, services, and infrastructure and altered ecological functionality (including fire, erosion) of surrounding areas and natural habitat	10.5	7
Impact 7: Introduction of exotic and invasive species to the area	15	5.5
Impact 8: Increased decline in the aesthetic appeal of the landscape	15	11
Impact 10: Exacerbation of existing levels of habitat fragmentation and isolation, considering past, present and reasonably foreseeable future anthropogenic disruptive activities in the immediate region, with specific reference to mining activities	19	19
Impact 11: Cumulative impacts on local/ regional and national conservation efforts, targets, and obligations (loss of natural habitat)	16	11

Recommendation for Environmental Authorisation from a botanical perspective

It is therefore the considered opinion of the specialist that, based on key results of this botanical investigation, despite significant reservations, no explicit objections to the project are raised. While the proposed activity will result in unavoidable impacts on a local scale, the mitigated significance are generally within an acceptable range, with the understanding that best practice guidelines are followed, and the recommended mitigation approach is entirely implemented and stringently adhered for the entire life of mine.

Faunal and Avifaunal findings summary

The following key results were obtained from the faunal and avian EIA assessment:

- The expected mammal richness on the study site and immediate surroundings is approximately 69 species, of which only 16 species have so far been documented for the 2530AA quarter degree grid (QDG) that is sympatric to the study site.
- Approximately 55 species (80 % of the expected richness) have a high probability to be present on the study site, of which 27 of these species (49 % of species with a high probability of occurrence) were confirmed during the survey, which included:
    - six (6) rodents;
    - four (4) bovid antelopes;
    - (1) one equid (zebra);
    - one (1) canid (jackals);
    - two (2) primates (monkeys and baboons);
    - two (2) herpestids (mongoose);
    - two (2) leporids (hares and rabbits);
    - two (2) mustelids (otters and polecats);
    - one (1) macroscelid (sengi);
    - one (1) orycteropid (aardvark);
    - three (3) chiropterans (bats); and
    - one (1) suid (pigs).
- The relative ruggedness and high spatial heterogeneity along with the presence of significant surface outcrops on the study site provide micro-habitat for small mammal taxa with rupicolous affinities as well as large mammal taxa with large home range sizes. These features are responsible for the high observed mammal diversity on the site, which also provides suitable habitat for charismatic and threatened taxa such as Leopard (Panthera pardus) and Southern Mountain Reedbuck (Redunca f. fulvorufula).
- The study site provides habitat for five threatened and four near threatened mammal species. Seven of these species exhibit a high probability of occurrence, of which three species were positively confirmed during the surveys.
- The amphibian richness on the study site is considered low to moderate, with 20 frog species expected to occur. Only 12 of these are regarded to be resident (high probability of occurrence) on the study site, of which six species were confirmed during the survey
- The reptile composition on the study site is poorly known with only 21 species currently known from 2530AA, of which 16 species have a high probability of occurrence. During the site survey, a total of 18 taxa was confirmed, of which 14 species were undocumented for QDS 2530AA, clearly demonstrating the expected reptile richness is critically underestimated for the study site (and surrounds).

- The Sekhukhune Flat Lizard (Platysaurus orientalis) was confirmed from the study site where it was widespread to nearly every habitat unit where large boulders and outcrops occur. This species is regarded as a near threatened species in Mpumalanga where it is restricted to the Sekhukhuneland region although its conservation status on national level is regarded as least concern (sensu Bates et al., 2014).
- The species accumulation curve (SAC) for all bird point counts pooled reached an asymptote at approximately 24 counts. The sampling sufficiency captured approximately 75% of the number of species at 24 counts as predicted by the Michaelis-Menten model. Approximately 83 % of the predicted species was captured by the total number of sampling points (n=38).
- Approximately 243 bird species are expected to occur on the wider study area (including adjacent habitat), of which 176 species were observed during the orientation site visit (July 2020) and the austral summer survey (November 2020)
- A total of eight (8) bird species of conservation importance has been recorded in the wider study area (sensu SABAP2 and personal observations) which include five (5) globally threatened species, two (2) regionally threatened species and one (1) regionally near threatened species.
- Two threatened and one near threatened species were observed on the study site, while one globally threatened (currently regionally near threatened) species was observed adjacent to the study site. These include the globally vulnerable Southern Bald Ibis (Geronticus calvus), the globally endangered Cape Vulture (Gyps coprotheres) and the regionally near threatened Half-collared Kingfisher (Alcedo semitorquata).
- The globally vulnerable (regionally near threatened) Blue Crane (Grus paradisea) was observed at a small impoundment on the Farm Schaapkraal 42, approximately 3.7 km south of the study boundary.

Faunal and Avifaunal Impact Assessment Summary

Anticipated impacts from the proposed mining activity on the faunal and avian receiving environment include the following:

Summary of impact significance on the faunal and avian receiving environment		
Nature	*Before Mitigation*	*After Mitigation*
Impact 1: Direct and permanent loss of natural fauna habitat within the development/mining footprints during the construction, operational and the decommissioning phases	17.25	13.5
Impact 2: Indirect loss of threatened and near threatened bird and mammal species due to the displacement from the area during the construction and operational phases	18.0	6.5
Impact 3: Decreased habitat quality of surrounding areas due to peripheral impacts such as spillages, litter, increased erosion, contaminants, etc.	14.25	6.5
Impact 4: Indirect ecological impacts at all phases pertaining to the loss of the ecological connectivity across the study site and regional habitat fragmentation associated negative impacts on population viability	23.0	9.0

Impact 5: Increased plundering of natural resources and poaching of wildlife due to increased human encroachment and accessibility to the site	13.5	4.0
Impact 6: Subsequent habitat change and changes to the local fauna community structure and composition (mainly generalists and secondary species) during decommissioning/rehabilitation	9.0	9.0
Impact 7: Cumulative impacts on local/ regional and national conservation targets and obligations (e.g. loss of natural grassland habitat) and expansion of mining operations in the wider study area	18.0	9.5

This report concludes that the faunal assemblages along the mature mixed woodland continuum are spatially autocorrected with a high overlap of similar taxa and similar functional groups occurring in these different habitat types, thereby emphasising an intact "functionality". Therefore, the study site represents an exceedingly healthy and natural habitat, expressing intact ecological processes and functionalities.

Recommendation for Environmental Authorisation from a fauna and avi-fauna perspective

It is predicted that the unmitigated mining activity will have severe and unacceptable negative impacts on the animal and bird constituents and communities (notably species of conservation concern) on a scale larger than the site, with the potential to disrupt the natural movement/dispersal of fauna from upland habitat along the escarpment down into the Dwars River Valley. The comprehensive implementation of the suggested mitigation approach is expected to result in amelioration of the anticipated impacts to an acceptable level, although still considered (unavoidably) devastating on a local scale. No specific objections to the project are raised, but with the understanding that the suggested mitigation protocol is timeously and comprehensively implemented.

Any impacts on species of conservation concern are subject to a stringent mitigation approach. While avoidance of any impact is preferred, unavoidable impacts often result from development in natural areas. These impacts on conservation important plant species are subject to permitting requirements from leading authorities, notably Department of Environmental, Forestry and Fisheries (DEFF), the National Forest Act (NFA), and Mpumalanga Tourism and Parks Agency (MTPA).

While in situ conservation of conservation important plant species is preferred to translocation, it is acknowledged that, should the project receive an Environmental Authorisation (EA), unavoidable impacts will result. The removal and/ or relocation of certain species will form part of the mitigation approach, and these activities, or any other impacts on these plants, are subject to permitting authorisation.

All mitigation measures and monitoring requirements have been incorporated into Part B of this report.

The detailed report is attached as **Appendix I**.

VIII. Aquatic Biodiversity (Appendix J: Ecology International, January 2021)

The purpose of the study was to determine the aquatic ecosystem baseline conditions associated with the proposed establishment of Vygenhoek Platinum Mine and the likely impacts associated with the proposed mining activities. The study builds on from the freshwater ecosystem scoping assessment conducted by Ecology International (2020) for the proposed mining activities. The field work for the present study was conducted from the 17th of November 2020 to the 19th of November 2020.

Summary of findings

Based on the integration of results obtained during the November 2020 aquatic baseline assessment, it was determined that the western tributary of the Dwars River associated with the proposed mining activities is reflective of a minimally modified state (EcoStatus Category B), whereas the eastern tributary of the Dwars River within the study area is reflective of a moderately modified state (EcoStatus Category C). Accordingly, both watercourses currently meet the Resource Quality Objective (RQO) for Resource Unit 62 as designated by the Department of Water and Sanitation, with the western tributary being in the better state.

Similarly, the Ecological Importance of the western tributary associated with the proposed mining activities was determined to be high, while the Ecological Sensitivity was to be determined to be very high. The eastern tributary was also determined to have a high Ecological Importance and a high Ecological Sensitivity based on the findings from the present study.

Of particular relevance during the present study was the confirmed occurrence of a likely-undescribed fish species within the western tributary, namely Enteromius sp. 'Lowveld-Incomati' (currently regarded as Data Deficient). Available research suggests that the population of this species within the western tributary likely represents a novel lineage of a species complex of the Chubbyhead Barb group. Underestimation of species diversity has been identified as a major impediment to implementation of effective conservation strategies to prevent biodiversity loss. For example, recent studies of populations of Enteromius genus previously thought to be the same species have added to a growing body of evidence that freshwater fish diversity in southern Africa has been underestimated, and that major taxonomic revision is required in order to properly inform on their conservation status and actions required to ensure long-term diversity.

Headstreams such as those present within the study area are ecologically less diverse than lowland rivers and could therefore be expected to support smaller populations, leading to bottlenecks and the erosion of genetic variability. The results of the genetic variability analysis have important implications for the management of the species. If there is indeed genetic sub-structuring between headstream and lowland populations, it is important to conserve headstream populations, as they may be the source of new alleles which may benefit populations further downstream.

Summary of Impact Assessment

The range of potential impacts anticipated because of the proposed activities have been identified in line with the nature of the proposed activities, the proximity of these activities to the watercourses within the study area, as well as according to the baseline conditions and sensitivities identified.

The following potential impacts have been identified and assessed throughout the life cycle of the proposed mine:

- Sedimentation of aquatic habitats: The potential impact to the aquatic habitats due to sedimentation resulting from various activities related to the proposed mine was determined to be a ***high significance***. However if mitigation measure proposed by the specialist (as per **Appendix J**) as well as the measures defined in the EMPr (**Part B**) are implemented, this impact can be mitigated to a ***low to moderate significance***.
- Water quality deterioration: Water quality deterioration due to various activities associated with the proposed mine are likely to have a ***high significance*** impact if not mitigated. However, if the mitigation measures proposed are implemented, the impact can be mitigated to a ***low to moderate significance***.
- Loss of unique biodiversity features: The loss of aquatic biodiversity within the western tributary as a result of proposed mining activities poses several concerns and has particular relevance to the confirmed presence of what appears to be an undescribed fish species with a very narrow distribution range. Therefore, if activities are not managed, the proposed mine poses a ***high significance impact*** on various aquatic biodiversity features. By implementing mitigation measures identified specific to the identified aquatic biodiversity features, the potential impacts are expected to be of a ***low to moderated significance***.
- Aquatic ecosystem fragmentation: The construction of crossings across various watercourses within the study area, most notably the access/haul road crossing of the western tributary, has the potential to disrupt movement patterns of aquatic and terrestrial fauna within the associated catchment, limiting both upstream as well as downstream movement (***moderate significance impact***). While it is acknowledged that natural barriers to fish movement do exist within the western tributary that will limit the upstream migration of many species, the placement and design of the structures may still have an impact on those species with reach-scale or habitat-scale movement patterns (***low to moderate significance impact***).
- Invasive alien plant species encroachment: Unvegetated and disturbed areas due to the proposed mine, poses a ***moderate to high significant*** risk to the encroachment of invasive alien plant species. However, if mitigation measures defined in the EMPr (Part B) are implemented this risk, from an aquatic point of view, can be mitigated to a ***low to moderate significant*** impact.
- Impact on provincial freshwater conservation targets: The proposed activity is expected to impact on national protected areas targets as well as provincial freshwater conservation targets, both of which are expected to be cumulative if the impact is to be considered with other regional impacts that have or are expected to have on such areas (***moderate to high significance*** if not mitigated, ***low to moderate*** if mitigated).

Recommendation for Environmental Authorisation

A functional buffer of 108m from the edge of the macro-channel of the watercourse is proposed for protection of the riverine ecosystem.

The following mitigation measures are seen as conditional should the proposed mining activities within the present study area be considered for approval:

- Redesign the mine layout to place all mining-related activities and infrastructure including (but not limited to) water management infrastructure, waste-rock stockpiles, stock yards, laydown areas, etc. upslope of the proposed pit area so that the active pit can act as a final protection measure for runoff from such areas. No mining activities or construction, including access or haul roads other that a single watercourse crossing, are to be allowed within the final designated buffer zone (a functional buffer of 108m from the edge of the macro-channel of the watercourse was proposed for the present study, but final buffer width will be dependent on inputs from terrestrial faunal specialist and wetland specialist);
- Design of the final water management system (including Pollution Control Dam, clean/dirty water separation facilities, surface runoff and stormwater management facilities, containment of any carbonaceous or contaminant-bearing material, etc.) is to done in consultation with a suitably qualified aquatic ecologist approved by the Mpumalanga Tourism and Conservation Agency to ensure due consideration of the sensitivities associated with the western tributary. The final design is to take further cognisance of any interflow soils that are present and the implication of these soils on contamination transport, and as such should include consultation with the appointed hydropedologist and wetland specialist;
- Given the uncertainty pertaining to the barb species identified within the western tributary associated with the proposed Vygenhoek Platinum Mine, a formal fish sanctuary area within the catchment of the western tributary upstream of the proposed Vygenhoek Platinum Mine area is to be established that will serve to ensure the persistence of the population of Enteromius sp. 'Lowveld-Incomati' until such time as the uncertainties pertaining to the specie are addressed;
- In support of the establishment of the fish sanctuary, an adaptive Aquatic Ecosystem Management Plan is to be developed for the western tributary that takes specific cognisance of the presence of Enteromius sp. 'Lowveld-Incomati' and the fish sanctuary. Such a management plan is to follow the SMART approach in order to ensure that the objectives and targets set within the management plan are Specific, Measurable, Achievable, Relevant and Time-bound, and must include the monitoring of the Enteromius sp. 'Lowveld-Incomati' population within the western tributary. Implementation of the management plan is to be audited by a suitably-qualified aquatic specialist on an annual basis, and reviewed every five years based on audit findings.

All mitigation measures and monitoring requirements have been incorporated into Part B of this report.

The detailed report is attached as **Appendix J**.

IX. Soils (Appendix K: Viljoen & Associates, February 2021)

A soil assessment, that included that assessment of agricultural potential, was conducted. The following sections summarises the findings:

Summary of soil types

The main soil types identified and classified according to the latest version of the South African Taxonomical Soil Classification System, within the study area was determined to be Mispah and Glenrosa soils.

Table 10: Soil types

SOIL TYPE	DIAGNOSTIC HORIZONS	EFFECTIVE DEPTH (MM)
Mispah	Orthic A – Horizon/Rock	<300
Glenrosa	Orthic A – Horizon/Litocutanic B - Horizon	<300

The soils are characterised by neutral pH values (5,3 and 4,2) and low electrical conductivity values (<250mS/m). Under these conditions plant available nitrogen (15-20mg/kg), phosphorus (10-15mg/kg) and potassium (>50mg/kg) are readily available for plant uptake and sustainable plant growth. The Orthic A-Horizon is typically characterised by a low dense structure and texture distribution of approximately 65% sand, 20% silt and 15% clay with drainage properties in order of 10mm/h. The dominant clay mineral in the Orthic A – Horizon is kaolinite (1:1 layer silicate), with a low buffer capacity due to the low cation exchange capacity (<10cmol+/kg).

Evidence of natural soil erosion was observed on the soils during the investigation. Careful consideration should be given during mining to minimise impacts on the soil that could enhance soil erosion. It could be considered as contributing to the surrounding environment for the mine to implement artificial measures to minimise natural soil erosion.

Agricultural potential

According to the Screening Report for an Environmental Authorization or for a Part two amendment of an Environmental Authorisation as Required by the 2014 Regulations – Proposed site Environment Sensitivity for Vygenhoek Project Report 18/06/2020 for Nomamix (Pty) Ltd agriculture potential was identified as a very high sensitivity parameter.

Considering the above an Agricultural Compliance Statement is required for the proposed project. In the case of this report the above is compiled by an accredited SACNASP Soil Scientist (SACNASP Membership Nr. 40013/96). The sensitivity assessment yielded values between 11 – 15 classifying the investigation area to be characterised by potentially irrigated land, horticulture, viticulture and/or demarcated high value agricultural areas. These areas are potentially unsuitable for development due to high agricultural value, preservation importance, high production capability, high capital investment potential and/or unique agricultural land attributes.

The main variables determining the soil's agricultural potential for maize (***Table 11***) include the average rainfall (mm), soil depth (mm) and water management & holding capacity. The yield estimates in ***Table 11*** exclude any other management practices, i.e. fertilisation, cultivar, plant density, etc. that can make a significant difference in yield.

The Mispah and Glenrosa soils have low agricultural potential under dryland and irrigation conditions. However, the main constraint for optimum production is the availability of water for irrigation purposes. Production under dryland conditions of 30,000 plants/ha with average rainfall of 450mm/year will not be sustainable, especially during the summer period with extreme heat units. Production under irrigation conditions would require 6,100m3/ha/year of water for 100,000 plants/ha, which is the equivalent of 30,000l/ha 24hours, 4 days per week. There is also the possibility that water quality could not be sufficient for irrigation purposes. The Mispah soil are not suitable for agricultural purposes.

Table 11: Summary of the agricultural potential of soil

SOIL TYPE	AGRICULTURAL POTENTIAL	
	DRY LAND	IRRIGATION
Mispah	Low	Low
Glenrosa	Low	Low

Determined available topsoil

A conservative estimate of available soil to be stripped, cut & fill for rehabilitation purposes (if necessary) associated with the study area is summarised in **Table 12**.

Table 12: Available topsoil for rehabilitation

Soil Type & Average Effective Depth (mm)	Size (ha)	Available Volume (m^3)
Mispah (250-300)	118,2	307,320
Glenrosa (250-300)	4,9	12,740
TOTAL	123,10	**320,060m^3 @ Bulk Density of 1,850kg/m^3**

- On the mine footprint area (30,76ha) potentially 80,600m2 topsoil (Orthic A – horizon) is available for stripping and stockpiling.
- The waste rock footprint of 18,35ha approximately 46,800m2 topsoil (Orthic A – horizon) is available for stripping and stockpiling.
- The status quo of the soils as reflected by this report should be used and optimised for rehabilitation with final end land use as defined in the updated EMPR, i.e. free flowing grassed surface wilderness areas.

Summary of identified impacts

The following impacts have been identified during the assessment:

- Loss of topsoil due to stripping, handling and placement of soil associated with preconstruction land clearing and rehabilitation without mitigation is ***moderate***. When implementing recommended mitigation measures, to impact can be reduced to ***low***.
- Change of soil's physical, chemical, and biological properties due to loss of topsoil due to erosion, stockpiling, mixing of deep and surface soils during handling, stockpiling and subsequent placement, was determined to be ***moderate*** without mitigation. When implementing recommended mitigation measures, to impact can be reduced to ***low***.
- Change of natural surface topography due to reprofiling of surface after stripping, was determined to be ***moderate*** without mitigation. When implementing recommended mitigation measures, to impact can be reduced to ***low***.

Recommendation for Environmental Authorisation

The results of the Impact Assessment for the proposed mine will have a ***medium to low*** impact on the immediate and surrounding soil systems. Implementation and management of proposed mitigation measures will minimize loss of topsoil, prevent contamination of topsoil and stockpiled soil and prevent overall soil erosion.

It is recommended that the proposed project be approved subjected to the mitigation measures stipulated in the Impact Assessment and Environmental Management Programme.

All mitigation measures and monitoring requirements have been incorporated into Part B of this report.

The detailed report is attached as **Appendix K**.

X. Hydrology (Appendix L: Highlands Hydrology, February 2021)

Baseline Assessment:

Baseline information including rainfall, evaporation, design event rainfall, temperature, as well as site topography and regional and local catchment hydrology have been considered in this hydrological assessment for the proposed Vygenhoek Platinum Mine (discussed in previous sections).

This hydrological assessment, together with first-hand knowledge of the major hydrological flow regimes gained through visiting the site on two occasions indicate that the hydrological environment is presently in its natural state, baring a few cattle grazing in the area.

The site is positioned within quaternary catchment B41G. The rivers at the site drain in a northerly direction joining the Groot-Dwars River approximately 5km downstream, which then joins the Dwars River, which flows into the Steelpoort/Tubatse River, the Olifants River, and ultimately Limpopo River before reaching the Indian Ocean.

There is one perennial river at the site which drains the majority of the site, including areas associated with proposed infrastructure. This perennial river has a network of non-perennial streams associated with it. The second largest stream located on the eastern side of the site is non-perennial (according to the 1:50 000 topographical data) but showed substantial flow emanating from it during the site visits, even in July when flow should have been limited/absent.

The site is steep, particularly in the valleys associated with the streams. There is a fairly large plateau area with gentle slopes located between the perennial stream and eastern non-perennial stream.

Overall, the runoff potential at the site is very high due to the combination of very steep topography, limited soil depth, and limited vegetation cover where parent rock is exposed at the surface. This results in a reduced capacity for water to infiltrate into the soil profile.

Flooding:

The development of a flood model for the site was undertaken to fulfil the requirements of GN 704 and outlined the baseline flood risk to the site. A hydraulic (flood) modelling of relevant rivers potentially intersecting proposed infrastructure, utilised the 0.5m DTM derived from a 1m contour dataset provided by the client. The availability of continuous elevation area about the site allowed for the adoption of a 2D flood model approach.

The 1:50 year and 1:100 year RI hydrographs representative of the design flows in the rivers of interest were estimated prior to the development of a hydraulic (flood) model. These hydrographs were subsequently applied to the hydraulic model, which enabled the estimation of the 1:50 year and 1:100 year RI flood-lines, and associated. depth and velocity flow estimations.

Flooding within the modelled river reaches is typically constrained by site topography given the steep nature of the terrain about the site. The limiting influence of the terrain (with regards to the maximum flood extent) means that the modelled flooding (for both the 1:50 year and 1:100 year RI events) typically does not intersect proposed infrastructure. Notable exceptions, however, include the haul road (which crosses a river) and the opencast pit and haul road alongside it (to the east). A perennial river and non-perennial river intersect the aforementioned infrastructure (respectively) and flooding is consequently inevitable (for both the 1:50 year and 1:100 year RI events).

The spread of flooding as illustrated in the non-perennial river (intersecting the proposed opencast pit) is due to the 0.5m DTM which indicates the absence of a defined channel in this location. The resulting flooding consequently spreads over a larger area versus much of the remainder of the site, where flooding is more constrained by the terrain (as defined by the 0.5m DTM). This flooding (over the proposed opencast pit) is, however, associated with the non-perennial river's headwaters, where upstream catchment area is limited, with flooding consequently limited (with regards to flood peak and volume of water).

Rivers not modelled include four non-perennial rivers within proximity to proposed infrastructure (i.e. a section of the haul road, waste rock dump, RoM and Support Buildings). Modelled flooding in non-perennial rivers is well within the 100m river buffer. This river buffer consequently informs flood risk with regards to the aforementioned, with the likelihood of flooding to this infrastructure (from the 1:100 year RI event) being exceptionally low. Furthermore, much of this infrastructure is along high ground (i.e. watersheds) thereby improving natural flood protection. The only infrastructure intersecting the 100m river buffer (apart from section of the haul road and the opencast pit), is the site's access road, although this is only marginal (by approximately 11m), with this access road located along a primary watershed as is.

Condition 4 of GN704 consequently appears to apply to the haul road stream crossing, opencast pit and sections of the haul road (and associated storm water controls) which both intersect a non-perennial river and associated flood-lines, while the 100m river buffer results in predominantly the aforementioned, also triggering Condition 4.

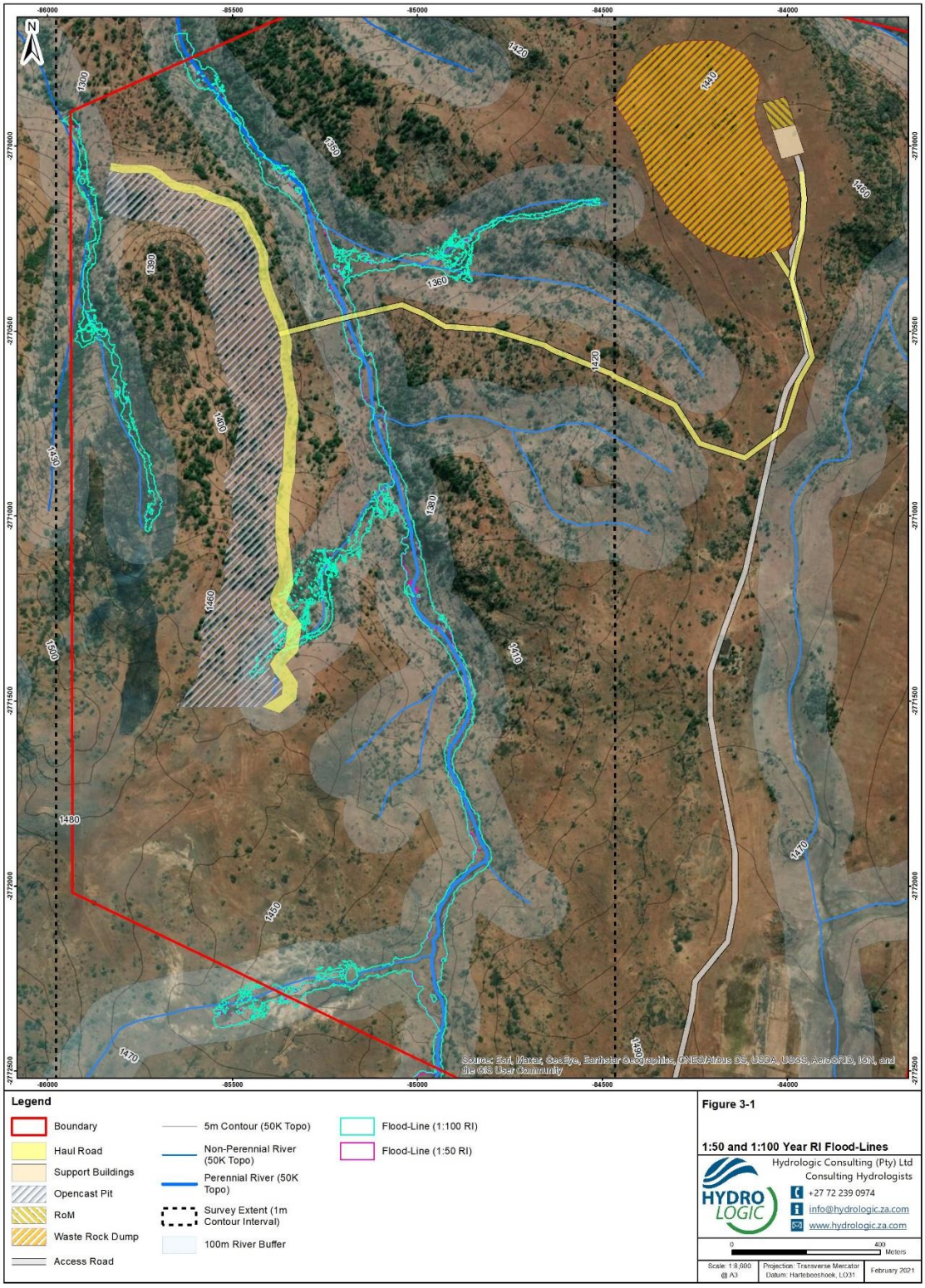

Figure 14: Flood line delineation

Conceptual Storm Water Management Plan (SWMP):

The conceptual SWMP has been developed based upon the requirements of GN 704 and DHSWS Best Practice Guideline G1 for Storm water management (BPG1). This was done by identifying clean and dirty areas and managing them accordingly. Dirty water producing areas have been isolated by diverting upstream clean water around them via clean water diversions and dirty water produced in dirty areas, has been routed to dirty containment facilities (PCD1) via diversions or self-contained, as is the case with the opencast pit. Storm water infrastructure has been developed based on the contributing catchment areas and catchment characteristics, and has been sized to contain and effectively route the 1:50 year flood event. It is recommended that discussions are held with the DHSWS regarding the lining requirements for storm water management infrastructure (channels/PCD etc) and that the flood hydrology calculations are revised accordingly during detailed design and prior to construction of infrastructure. The "recommended volumes" of the proposed PCD1 should be investigated further during the detail design phase to accommodate operational storage volumes, without compromising the ability of the dams to contain the "minimum volumes" as per GN 704 compliance. It is also recommended that, during the detailed design phase, a more detailed elevation survey be undertaken to ensure water can be effectively routed to containment facilities. Priority should be given to the reuse of dirty water within the process water circuit.

Water Quality Monitoring:

Nine proposed surface water quality monitoring positions have been identified for monitoring based on the location of proposed infrastructure relative to receiving surface water resources. It is imperative that water quality monitoring commences prior to the establishment of the proposed mining operation in order to obtain an appropriate seasonal baseline, from which any impact resulting from the proposed operation can be identified. It is recommended that monitoring takes place quarterly (minimum), ensuring a comprehensive analysis is undertaken at an appropriately accredited laboratory. It is further recommended that water from within the dirty water process circuit such as the PCD and pit be included in the monitoring program.

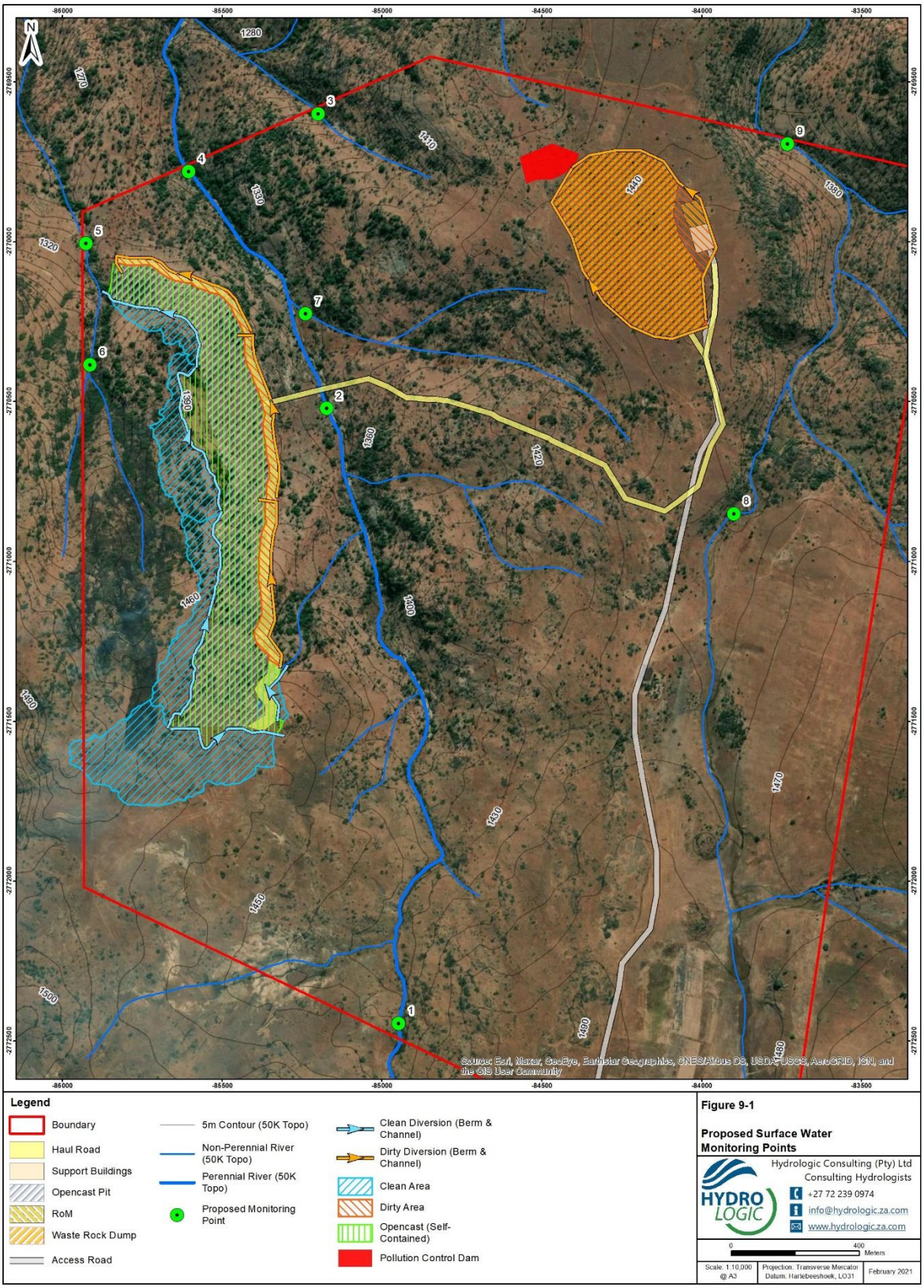

Figure 15: Proposed surface water monitoring points

Mean Annual Runoff:

An analysis of mean annual runoff was undertaken as part of the study using the WR2012 dataset. The WR2012 mean annual estimate of runoff for the site was estimated according to the required dirty area containment. The area to be contained as per the SWMP approximates 0.56km^2, whereas quaternary catchment B41G is 442km^2. This contained area equates to 0.13% of the quaternary with a contained mean annual runoff estimate of 0.03Mm^3 versus the full quaternary's naturalised runoff of 25.5Mm^3.

Water Balance

An average monthly wet and dry season static water balances has been developed for the proposed operation using input data provided by relevant specialists. Based on the model results and associated simplifying assumptions, there will be an excess of approximately 28 604 m^3/month and 4 960m^3/month for the wet and dry seasons respectively (assuming full pit development). This excess water will need to be appropriately managed and if deemed necessary to discharge or used for dust suppression, meet the appropriate discharge quality guidelines and associated discharge/and or WUL conditions. It is recommended that the water balance be updated once more specific domestic and process water reticulation volumes are known and refined annually during the life of the operation. Flow meters should be installed in the domestic and process water circuits to provide actual data on water flows so that the water balance can be updated accordingly. A dynamic water balance simulation model should be developed to more accurately represent water reticulation on site and can also be used as a decision support tool at both planning and operational levels.

Hydrological Impact Assessment:

Hydrological impacts associated with the proposed operation which have been identified in this assessment include the sedimentation and siltation of water courses, alteration of drainage patterns and associated stream flow volumes, as well as the contamination of water resources (including hydrocarbons). The site visits confirmed green-field conditions with an associated pristine hydrological environment. As such, the proposed operation (with the development of infrastructure and associated mining practices) will have a negative impact on receiving water resources.

Recommendation for Environmental Authorisation

In terms of the Environmental Assessment (EA) and Environmental Management Program (EMPr), the following should be noted:

- Where possible, relocate infrastructure outside of the 1:100 year flood-line and 100m stream buffers to reduce flood risk and preserve natural vegetation associated with riparian areas as far as possible. The revised layout (this draft) showed a significant improvement compared to the previous layout and iterations thereof. Where this is not possible ensure appropriate flood protection and correct design of infrastructure such as bridges and culvert.

- Ensure the SWMP progresses to detailed design phase ensuring compliance with GN704 and Best Practice Guideline G1 for Storm Water Management (BPG1). The proposed infrastructure footprint and associated area of disturbance (dirty areas) should be minimised as far as practically possible.
- Ensure the water quality monitoring program is appropriate and implemented as soon as practically possible to ensure an adequate baseline can be established prior to disturbance through development and mining. It is recommended that monitoring takes place quarterly (at minimum), ensuring a comprehensive analysis is undertaken at an appropriately accredited laboratory. It is further recommended that water from within the dirty water process circuit such as the PCD and pit be included in the monitoring program.
- Ensure dirty water generated on site is contained and reused in the process water circuit as far as possible. To this end, there is a need for further investigation into the re-use, or treatment and discharge of dirty water at the operation as highlighted by the static water balance, particularly in the summer months. Dust suppression can be considered, water quality dependant.
- A dynamic water balance simulation model should be developed to more accurately represent water reticulation on site, which can also be used as a decision support tool at both planning and operational levels.
- The mitigation measures associated with this project will reduce the impact of the proposed operation on receiving water resources considerably, and as such are considered imperative.

All mitigation measures and monitoring requirements have been incorporated into Part B of this report.

The detailed report is attached as **Appendix L**.

XI. Geo-hydrology (Appendix M: GCS, January 2021)

The geohydrological study aimed to identify the baseline (pre-mining) geohydrological conditions of the site. High-risk activities in terms of potential groundwater pollution during the construction (i.e. site preparation and clearing), operational phase (i.e. opencast workings, waste stockpiles, explosives and sewage-related infrastructure etc.) and closure phase (i.e. backfilling of the opencast workings and poor quality seepage associated with the backfilled waste rock material) were evaluated. The study was carried out as a once-off assessment and is not seasonally bound.

Summary of findings

Hydrocensus

A review of SADC GIP (2020) and GRIP (2016) data for the study area indicates that there are seven (7) registered boreholes within a 5km radius of the proposed opencast mine. The boreholes plot towards the west of the proposed opencast workings and fall within a different sub-catchment. Limited water quality and quantity data is available for database boreholes.

A hydrocensus within a 2.5km radius of the proposed mine proved fruitless and no field boreholes were discovered. It appears as though domestic and irrigation water is attained from the tributary of the Dwars River. The proposed opencast

area is situated in an isolated area (i.e. on a natural hilltop with limited development) and no existing groundwater uses were identified.

Geophysical survey

A detailed geophysical investigation was conducted as part of the Geohydrological Assessment. The following summarises the findings of the survey:

- Five (5) magnetic profiles were completed. The aim was to trace dolerite dykes, contact zones and/or fault zones based on the magnetic response of the sub-surface geology (i.e. sudden changes in the magnetic intensity observed may relate to the above-mentioned structures).
- The geophysical investigation data suggest that several dolerite dykes and subsequent contact zones occur in the study area and cross the proposed opencast pit.
- The data suggest three (3) dykes which may act as preferential flow paths to hydraulically lower areas.
- Several drilling positions have been identified for monitoring purposes (see ***Table 34 of Part B*** for the location of the monitoring borehole positions).

Aquifer testing

There was sufficient water in exploration borehole VH12 and VH15 to undertake slug testing. The remaining exploration boreholes could not be tested. GCS undertook several aquifer tests on boreholes situated at the Everest South (GCS, 2007) where similar geohydrological conditions exists. The data was used to supplement the limited data gathered during the field investigation.

Aquifer characteristics

Based on available literature and site data, three (3) aquifer types are envisaged:

1. Alluvium Aquifers:

- An unconfined aquifer associated with alluvial deposits (confined to major rivers and floodplain areas).

2. Weathered Aquifers:

- A semi-confined aquifer associated with weathered norite, anorthosite and pyroxenite rocks of the bushveld and Pretoria groups.
- This aquifer has a widespread distribution occurring between 4 and 35 m below surface and is best developed underlying the alluvial aquifer and where overburden is generally greater than 2 m thick.

3. Deep Fractured Aquifers:

- Deeper regional confined fractured bedrock aquifer covers associated with fresh and fractured bedrock below the weathered zone.
- The aquifer's fractured zone is approx. 109 m thick (DWAF, 2006).

The aquifers occurring at study area are moderate yielding aquifers, with reported yields ranging from 0.5 to 2 l/sec.

The aquifer present can be classified as a Minor Aquifer system (Parsons, 1995). These can be fractured or potentially fractured rocks which do not have a high primary permeability or other formations of variable permeability. The aquifer is an important contributor to groundwater baseflow to streams and rivers (King, Maritz, & Jonck, 1998).

Aquifer extent may be limited and water quality variable. Although these aquifers seldom produce large quantities of water, they are important for local supplies and in supplying base flow for rivers.

Groundwater quality

Four (4) groundwater samples were collected. The results are summarised as follows:

- All samples exhibit neutral pH conditions.
- Thee electrical conductance (EC) for all samples are within SANS limits for drinking water. Subsequently, major ions (Ca, Mg, Na, K, Cl, Fl, NO_3, SO_4) fall within the SANS limits for drinking water.
- Trivalent chromium (Cr^{3+}) is above SANS aesthetic limits for all groundwater samples. The high concentration likely relates to the UG2 seam which the boreholes intersects.
- Turbidity is high at all sample points compared to SANS limits. High turbidity is a reflection of high microbial activity in the water.
- Ca is the dominant ion and Na and Mg ion concentrations fluctuate.
- The sample data suggest that bicarbonate (HCO_3^-) is the dominant ion. SO_4, Cl and NO_3 are accessory ions.
- The water at the site can be classified as temporary hardened. This is typical of shallow-fresh groundwaters (i.e. the weathered aquifers).

Groundwater quantity

An Intermediate Groundwater Reserve Determination (IGRD) was conducted for the study area to establish the groundwater reserve. The data used for the calculation was derived from the WRC 90 Water Resources of South Africa 2012 Study (WRC, 2015) and Groundwater Resource Assessment Ver. 2 (GRAII) datasets (DWAF, 2006).

The groundwater balance indicates a surplus-value of approx. + 2 217.53 m³/day available for abstraction on a sub-catchment scale.

Summary of Impact Assessment

Based on the outcome of the geohydrological study, no avoidance areas have been identified. Moreover, the study did not identify major risks associated with the preparation (construction), operational and closure phase of the proposed mine. Opencast mining the UG2 seam is feasible from a geohydrological perspective as long as mitigation measures are implemented.

Recommendation for Environmental Authorisation

The following recommendations are made, in terms of EA requirements:

- Dedicated groundwater monitoring boreholes should be drilled before pit expansion to obtain baseline water quality and quantity data. Drilling log data should be recorded and can supplement any future geohydrological work for the site (i.e. will help to better understand the local geohydrology).
- Additional rock samples should be collected during mining, to maintain a clear understanding of the AMD potential of the rock being mined. It is important to use ABA and NAG as pre-emptive tools to determine if any AMD may occur.

The following can be done to improve the assumptions and understanding of the groundwater aquifer and hence improve the numerical groundwater model confidence:

- All new exploration boreholes drilled in the area should note groundwater occurrences as well as strike depths. The data can be used to update the conceptual hydrogeological model which is incorporated into the numerical flow model.
- Water levels of dedicated monitoring boreholes that will be drilled, as well as any new boreholes which are discovered in the area during routine hydrocensus updates, should be monitored bi-annually.
- Dewatering volumes (during mining) should be recorded daily and reported bi-monthly.

It is recommended that the numerical groundwater model and transport model be updated annually, to:

- Recalibrate the flow system based on the dedicated monitoring boreholes drilled and routine water level monitoring data gathered for the site.
- Confirm preferential flow paths and groundwater migration velocities as new geological data is attained via mining.
- Evaluate the spatial impact (i.e. TDS plume) calibrated with the proposed monitoring borehole data.
- Confirm long term liabilities associated with the workings (i.e. predict likely changes in flow fields etc.); and
- Ensure no monitoring network gaps exist (i.e. check if the monitoring network is representative of the site).

All mitigation measures and monitoring requirements have been incorporated into Part B of this report.

The detailed report is attached as **Appendix M**.

XII. Human Health (Appendix N: Adaptera Strategic Support Services, January 2021)

A Health Impact Assessment (HIA) is a systematic approach to predicting and managing the potential positive and/or negative health effects of policies, plans, programs and projects on local communities and the wider society (International Council for Mining and Metals, 2010). According to the International Council for Mining and Metals (2010), the assessment and management of community health, safety and well-being impacts is increasingly considered part of the risk management and social responsibility of mining and metals operators. A range of industrial sectors e.g. oil and gas, chemical manufacturing and transportation are increasingly looking to embed HIA within their organizational and project management structures.

Most communities have existing health problems and health assets. Similarly, all development projects have the potential to generate positive and negative health and well-being impacts. It is within this wider context that the community health impacts of mining operations should be considered. Both positive and negative impacts occur because a project can change the economic, social, sanitary, and natural environments within which communities live and work, however good design and management can help to maximize the positive health and safety impacts and avoid or minimize the negative ones (International Council for Mining and Metals, 2010).

The core activity of an HIA is the prediction, evaluation, and mitigation of impacts (IFC, 2009) and according to Winkler *et al.* (2010), the significance of identified health impacts can be evaluated by drawing on:

i. the available health data from the literature review
ii. the information generated through stakeholder consultation
iii. the knowledge of the project context and developments
iv. input from other specialist studies that inform the elements of the ESIA
v. experience of previous HIAs in similar settings

To ensure consistency across the different EHAs, a standardised impact assessment guideline was adopted for this study (IFC, 2009). The field work was performed by an EHS Consultant from Adaptera Strategic Support Services during the end of September 2020 which followed an initial desktop study and finalised with the desktop review and analysis being completed in November 2020 (**Appendix N**).

Key Risks identified during HIA

The key Environmental Health Area (EHA) risks (summarised) in order of priority as identified during the risk assessment include:

EHA Risk Categories	Pre-Mitigation	Post Mitigation
EHA#7 Accidents & Injuries	Very High (14)	High (12)
EHA#2 Respiratory & Housing Issues (including covid-19)	High (12)	Medium (9)
EHA#4 Sexually Transmitted Infections	High (11)	Medium (8)
EHA#5 Soil & Water Sanitation Related Diseases	High (11)	Low (5)
	Low (5)	Medium (8)
EHA#6 Food & Nutrition Related Issues	Medium (8)	Low (5)
	Medium (9)	Very High (14)
EHA#8 Exposure to Potentially Hazardous Materials	Medium (8)	Low (5)
EHA#9 Social Determinants of Health (SDH)	Medium (8)	Low (5)
	Medium (9)	Very High (14)
EHA#3 Veterinary Medicine & Zoonotic Issues	Low (5)	Very Low (2)
EHA#11 Health Services Infrastructure & Capacity	Low (5)	Very Low (2)
	Medium (9)	Very High (14)
EHA#12 Noncommunicable Diseases (NCDs)	Low (5)	Very Low (2)
EHA#1 Vector-Related Diseases	Very Low (2)	Very Low (2)
EHA#10 Cultural Health Practices	Very Low (1)	Very Low (1)

Key:

Negative Impacts	*Very Low*	*Low*	*Medium*	*High*	*Very High*
Positive Impacts	*Very Low*	*Low*	*Medium*	*High*	*Very High*

Key HIA Findings and Recommendations

- The surrounding environment already has numerous small, medium, and large-scale mining operations across the region.
- The current state (condition) of the local and regional healthcare facilities are poor to mediocre. This may also present an opportunity for the Project to support the improvement/refurbishment of key healthcare infrastructure.
- An influx of people into the proposed Project area can be expected in relation to people seeking employment. This could impact the already strained localised health care facilities, housing situation, water and sanitation, and food availability and inflation.
- The potential for an increase in accidents and injuries due to increased and/or changes in road traffic, may significantly and adversely affect levels of accidents in the area.
- The coronavirus pandemic (Covid-19) remains a significant risk to both the people engaged with the Project, as well as the Project achieving its objectives within anticipated timeframes.
- The risk of work stoppages as a result of frequent and often violent protest action in the area remains a high risk.

- A positive impact of the Project is the opportunity for job creation at a time when it is desperately needed. As such an investment into local socio-economic environment will be a positive impact to the area.

Recommendation for Environmental Authorisation

It is proposed that the following requirements be included into the EMPr and/or EA respectively:

Proposed Requirements	EMPr	EA
1. The Project should develop and implement a Health Action Plan (HAP) for construction and operational phases. This can either be a separate document or be included into the EMPr (incl. monitoring, evaluation, and reporting requirements as per section 6.4 above).	√	√
2. The Project should prepare and implement a specific covid-19 management plan for construction and operational phases. This should be aligned to the World Health Organisation (WHO) and South African Covid-19 Regulations.	√	√
3. The Project should appoint a suitably qualified and experienced EHS practitioner whose responsibility should include managing, implementing, and reporting on the Health Action Plan. The EHS practitioner should be registered with SACPCMP at an appropriate level (as per 8(6) of the Construction Regulations) which will outline qualification and experience requirements.	√	
4. Develop and implement an integrated waste management plan (incl. hazardous and non-hazardous waste).	√	
5. Develop and implement an integrated water management plan (incl. surface and groundwater).	√	
6. The Project should investigate (and where feasible implement) the opportunity to support the local healthcare facilities that will be integral to the Projects direct and indirect stakeholders.	√	
7. Develop and implement an appropriate occupational health and safety management plan (incl. community safety initiatives, OHSE awareness campaigns at schools, churches, and social events).	√	
8. The Project should ensure that a suitable/recognised food safety management system (e.g. HACCP/ISO22000) is implemented and monitored during construction and operations.	√	
9. The Project should ensure that an HIV/AIDS policy, awareness campaign is developed and implemented throughout the construction and operational phases of the Project.	√	

The following statements reflect the professional opinion of the appointed specialist:

- In relation to the receiving landscape, which already includes numerous mining activities, most of which are substantially larger than this project – it can be deemed that this project is very-small to small in comparison and thus the comparable impacts are minor, however the Project in question will naturally add to the accumulated impacts and effects of mining in the surrounding landscape and communities which reside in this area.
- That said, the positive socio-economic impacts of a project such as this, at a time in South Africa's economy which has been hard hit by covid-19 and other economic challenges and which is in dire need of job creation and social upliftment - should not be overlooked when analysing the various health related impacts, many of which can be mitigated.
- As such, the proposed project, and related activities (from a health-related perspective) does not indicate any reason for not being authorised in conjunction with the various environmental, social and health related mitigation measures as specified during the Scoping-EIA process.

All mitigation measures and monitoring requirements have been incorporated into Part B of this report.

The detailed report is attached as **Appendix N**.

XIII. Socio-economic (Appendix O: Envital, January 2021)

The scope of the Social Impact Assessment was to determine the potential positive and negative impacts of the proposed Vygenhoek Platinum Mine and alternatives on the local and regional socio-economic landscape. The study assessed the potential direct, indirect, and cumulative impacts (in relation to other activities), and how this may affect the current and future socio-economic environment.

The approach to the study included the collection of primary data in the form of focus groups and observational data from within the study area, and a review of secondary information sources, including other specialist studies, previous reports, and socio-economic statistics and research. The study was undertaken over a two-month period and included all comments for scoping phase public participation.

Summary of findings

The anticipated socio-economic impacts are likely to vary from local to the regional level, as the macro-economic benefits are likely to be realised on a regional level, while most of the negative impacts are anticipated to be localised. The area of direct impact of the Proposed Project is anticipated to be primarily within the Farm Vygenhoek, with immediately surrounding farms receiving indirect impacts.

The communities within the study area (local) comprise primarily low-income households, with marginal (subsistence) livelihoods. Low levels of skills and education, as well as limited access to urban centres, means that high unemployment is a key characteristic. These communities are dependent on natural resources for their livelihoods, including open veld for grazing and collection of firewood and medicinal plants, as well as local surface water resources. While the Vygenhoek Farm is currently under state ownership and the subject of land claims, the resident community established in the 1960s, possibly as farm tenants, and so is considered established, despite having few rights (apart from permission) on the land.

Summary of Impact Assessment

The key negative impacts, that are likely to affect the Vygenhoek Community and to a certain extend other neighbouring communities, include:

- Reduced access to livelihood resources – grazing land, firewood, medicinal herbs;
- Increased pressure on resources – influx of jobseekers and informal settlements;
- Increased community conflict – over employment and resources;
- Increased social pathologies – due to an influx of jobseekers and labour;
- Increased nuisance and disruption – from dust, noise, traffic and increased people and activities; and
- Indirect damage to/loss of assets – structural damage to houses, theft, conflict, and damage to crops.

The trade-off for local communities is therefore the potential for positive economic impacts, which will assist with offsetting any losses and disruption, which also apply on a regional level, namely:

- Increased employment opportunities – directly and indirectly through the mine, contractors, and suppliers; and
- Increased local economic development opportunities – through local procurement and direct investment in community projects (rural agricultural hub project).

The proposed mine is unlikely to improve the overall economic characteristics of the local communities, however, will have the potential to provide individuals and households with an increase in employment, income, and improved socio-economic conditions.

The No-Go Alternative is likely to maintain the status quo, which is currently low-income with no formal basic services and marginal subsistence livelihoods. No opportunities or investment would occur in the area, and these communities would not benefit from income and economic development in the local area.

The key mitigation measures required include the following:

- Implementation of the Social Management Plan (provided in this study);
- Development of Community Plans (communications, complaints, health and safety);
- Maximising benefits, including the prioritisation of local employment and appointment of local service providers, and community development initiatives;
- Ensuring transparent, equitable and comprehensive engagement with local communities and other stakeholders throughout the Proposed Project life cycle.

It is important to note that social impacts can be felt on an actual or perceptual level, and therefore it is not always possible, or at least straightforward, to measure the impacts in a quantitative manner. It should therefore not be assumed that indirect opportunities for business and employment are sufficient to acquire social license to operate in the host community. The structure and history of the local communities is such that unrest is likely to be an ongoing issue for the operations if stakeholders and communities are not properly engaged.

The study determined that there are likely to be negative social and physical environmental impacts on the Vygenhoek Community (host community); however these can largely be mitigated or tolerated, and as a result are likely to be considered acceptable by the local communities as a trade-off for economic development and opportunities.

Recommendation for Environmental Authorisation

It is the opinion of the specialist that the proposed Vygenhoek Platinum Mine should be authorised within the context of the socio-economic assessment, as the mine is anticipated to be of economic benefit for the local area, as well as contributing to regional mining and economic development opportunities. Although the mine is not considered a major mining

development (medium scale and extraction only), employment opportunities and the multiplier effect could improve the opportunities for currently unemployed individuals and low-income households within the local area. However, the manner in which the operations are carried out, must be done in line with best practice, including the Social and Labour Plan and the Social Management Plan. It is possible that not every eventuality of the potential socio-economic impacts have been detailed by this study, due to the complexity of socio-economic environment. It is, therefore, crucial that ongoing and transparent engagement and management of issues as they arise through the recommendations of the Social Management Plan is carried out. This is likely to ensure that the host community and other stakeholders remain in support of the mine, and that negative impacts on the host community are minimised and benefits are maximised.

All mitigation measures and monitoring requirements have been incorporated into Part B of this report.

The detailed report is attached as **Appendix O**.

XIV. Heritage and Palaeontology (Appendix P: HCAC, January 2021)

A Heritage Impact Assessment (HIA) for the project and the study area was assessed on desktop level and by a field survey. The field survey was conducted as a non-intrusive pedestrian survey, key findings of the assessment include:

- The study area was previously assessed by Pistorius (2006) and later by Du Piesanie and Higgitt (2012). Both studies highlighted the heritage significance of the area;
- During the current assessment, selected sites from previous surveys was revisited and in addition several new sites were recorded and the combined surveys recorded in excess of 50 heritage features for the study area (Figure 8-1 & Table 7);
- Sites recorded range from the Middle Stone Age (MSA) to the Iron Age and historical/recent periods, highlighting the cultural significance of the area;
- The Choma settlement with associated intangible features occur within the study area and is of social and cultural significance;
- Numerous burial sites were recorded and undoubtedly more can be expected and poses the biggest risk to the proposed project. Graves should ideally be preserved in-situ or alternatively relocated according to existing legislation;
- In terms of the palaeontological component, the area is indicated as of insignificant to low palaeontological sensitivity on SAHRIS and no further studies are required in this regard;
- The layout assessed during the field survey will have a medium to high impact on heritage resources and will require extensive mitigation. Because of environmental and cultural sensitivities an alternative layout was proposed that results in a much lower impact to heritage resources. From a heritage perspective the alternative is acceptable if the recommendations made in this report are adhered to based on approval from SAHRA.

Summary of findings

In anticipation of other mining activities in the greater study area, archaeologists have completed numerous heritage surveys (e.g., Huffman & Schoeman 2001, 2002 a and b; van Schalkwyk 2005; Roodt 2003a, 2003b, 2003c, 2005, 2008a, 2008b; Van der Walt & Fourie 2006; Van der Walt & Celliers 2009; Van der Walt 2009; 2016 and Pistorius 2007, 2010, 2011) for various EIA's and EMP's. These studies provide a good understanding of the archaeology of the area and use of the wider landscape and more than 240 sites are on record for the greater study area, ranging from the Middle Stone Age and Iron Age to recent households of farm labourers and tenants. A Heritage assessment by Du Piesanie and Higgitt (2012) that assessed the current study area recorded 50 features in the Vygenhoek project area. The survey design of was to revisit selected sites previously recorded and to assess areas not covered during the previous assessments that could be of interest. Based on these surveys more than 50 heritage features are now on record for the immediate study area. According to the SAHRA Paleontological map the area is of low and insignificant paleontological sensitivity and no further studies are required.

Table 13: Heritage feature that is expected to be impacted by the proposed mine

Number	Longitude	Latitude	Type Site	Description	Alternative Impact	Direct/ Indirect	Mitigation Measures
HCAC 1	30° 09' 09.3059" E	25° 02' 12.7860" S	Stone walling	Ephemeral partly disturbed walling	Pit	Direct	Record the site prior to destruction. Apply for a destruction permit
HCAC 13	30° 09' 58.8349" E	25° 02' 34.9727" S	Stone walling	Rectangular wall next to rocky outcrop	30 m west of New Access Road	Indirect	Site should be monitored during construction. The area should be demarcated and indicated on development plans. Record the extent of the site and determine level of impact and if required application for destruction permit from SAHRA.
HCAC 16	30° 09' 15.5268" E	25° 02' 19.4785" S	Stone walling	Multiple ephemeral packed stone walls and terraces built between a ridge and natural outcrop.	Pit Haul Road	Direct	Adjust lay out to retain the site as far as feasible. Heritage Mitigation Document the extent of the site through surface collection, photographs and mapping. Apply for a destruction Permit.
HCAC 27	30° 09' 58.7951" E	25° 02' 38.9256" S	Stone walling	Ephemeral wall – Linear Impacted by Haul road	On Existing Access Road	Direct	Record the site prior to destruction. Apply for a destruction permit
HCAC 28	30° 09' 56.7685" E	25° 02' 41.3341" S	Stone walling	Ephemeral wall Impacted by Haul road.	25 m east of Existing Access Road	Indirect	Site should be monitored during construction. The area should be demarcated and indicated on development plans. Record the extent of the site and determine level of impact and if required application

							for destruction permit from SAHRA.
DW004	30.164651	25.05525	Iron Age	Stone walling on rise, some terraced walling. Associated communal grinding areato the south of the stone walls. Close to site DW003.	11 m west of existing Road	Probable Direct Impact	Adjust planned haul road to retain the site as far as feasible. Heritage Mitigation Document the extent of the site through surface collection, photographs and mapping. Apply for a destruction Permit.
DW006	30.165661	25.053150	Iron Age	Stone features, including walling, circles and mounds. Potsherds noted at site.	11 m east of the existing access road	Probable Direct Impact	Adjust planned haul road to retain the site as far as feasible. Heritage Mitigation Document the extent of the site through surface collection, photographs and mapping. Apply for a destruction Permit.
DW013	30.165876	25.048023	Stone walling	Stone Walling with possible communal grinding area in close proximity.	19 m East of Existing Access Road	Probable Direct Impact	Record the site prior to destruction. Apply for a destruction permit
DW014	30.165699	25.046040	Stone walling	Stone walling around natural boulders. Walls are large and well preserved, with an enclosure approximately 15 m in diameter.	14 m East of Existing Access Road	Probable Direct Impact	Record the site prior to destruction. Apply for a destruction permit
DW018	30.166973	25.042140	Stone Walling	Stone Walling - natural boulders packed with stone. Not substantial.	10 m east of new access road	Probable Direct Impact	Record the site prior to destruction. Apply for a destruction permit
DW020	30.167313	25.039673	Stone walling	Stone walling. Not extensive.	18 m West of New Access Road	Probable Direct Impact	Record the site prior to destruction. Apply for a destruction permit
DW022	30.168057	25.037975	Stone walling	Stone walling - double walling, straight and approximately 10 m long.	10 m west of Access Road	Probable Direct Impact	Record the site prior to destruction. Apply for a destruction permit
Possible Grave	25° 02' 21.4872" S,	30° 09' 49.0752" E	Burial site	Possible Burila Site	Hauling option 2 (20 m south)	Probable Direct Impact	Confirm that the site is a grave, if so possible micro adjustment of the haul road to retain site in Situ with an adequate buffer zone and safe access for family members

Recommendation for Environmental Authorisation

The following recommendations for Environmental Authorisation apply and the project may only proceed based on approval from SAHRA:

- Social consultation with the Choma representatives is required to adequately record intangible and tangible resources that could be impacted on by the proposed project;
- The Choma Village will be preserved based on the preferred alternative layout, however it is recommended that consultations with the Choma representatives should determine conservation thresholds and to ensure that indirect and secondary impacts are acceptable;
- With the preferred alternative, the Mine Plan was amended as far as feasible to avoid damage to the recorded heritage resources. Where this is not possible phase 2 mitigation is recommended based on approval from SAHRA;
- The aerial extent of recorded heritage resources must be mapped in relation to the mine layout to finalise mitigation measures (sites that will require monitoring or phase 2 mitigation);
- A heritage specialist should assess any material change to the conceptual layout plan and a heritage walkdown of the final layout must be conducted prior to construction. Note that time should be allowed for mitigation if additional sites are identified during the walk down;
- A possible grave site was identified during the mapping process and it should be confirmed whether the site is a grave, if so possible micro adjustment of the haul road to retain site in-situ with an adequate buffer zone and safe access for family members is recommended;
- Implementation of a chance find procedure for the project.

The overall impact of the preferred alternative layout on heritage resources is medium and can be mitigated to an acceptable level based on the recommendations in this report and approval from SAHRA prior to development. The socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures are implemented for the project.

All mitigation measures and monitoring requirements have been incorporated into Part B of this report.

The detailed report is attached as **Appendix P**.

XV. Traffic Assessment (Appendix Q: Siyazi Limpopo Consulting Services (Pty) Ltd, January 2021)

Vehicle access to and from the proposed mining development site is currently by means of a local gravel road which intersects with Road D874 (Point B, **Figure 17**). Broader access to Road D874 is mainly obtained from Road D212 which provides access from the north (Road R555 - Steelpoort) and the south (Road R577 - Lydenburg).

The local road is a two lane gravel road (one lane per direction) for the first 460 meters from the intersection with Road D874 (Point B) and then narrows to a single lane gravel road for most of the road section up to the proposed mining development site. This section of the Local Road is shared by vehicle traffic in both directions, has limited passing opportunities on most sections and in general is suitable for light vehicle traffic only.

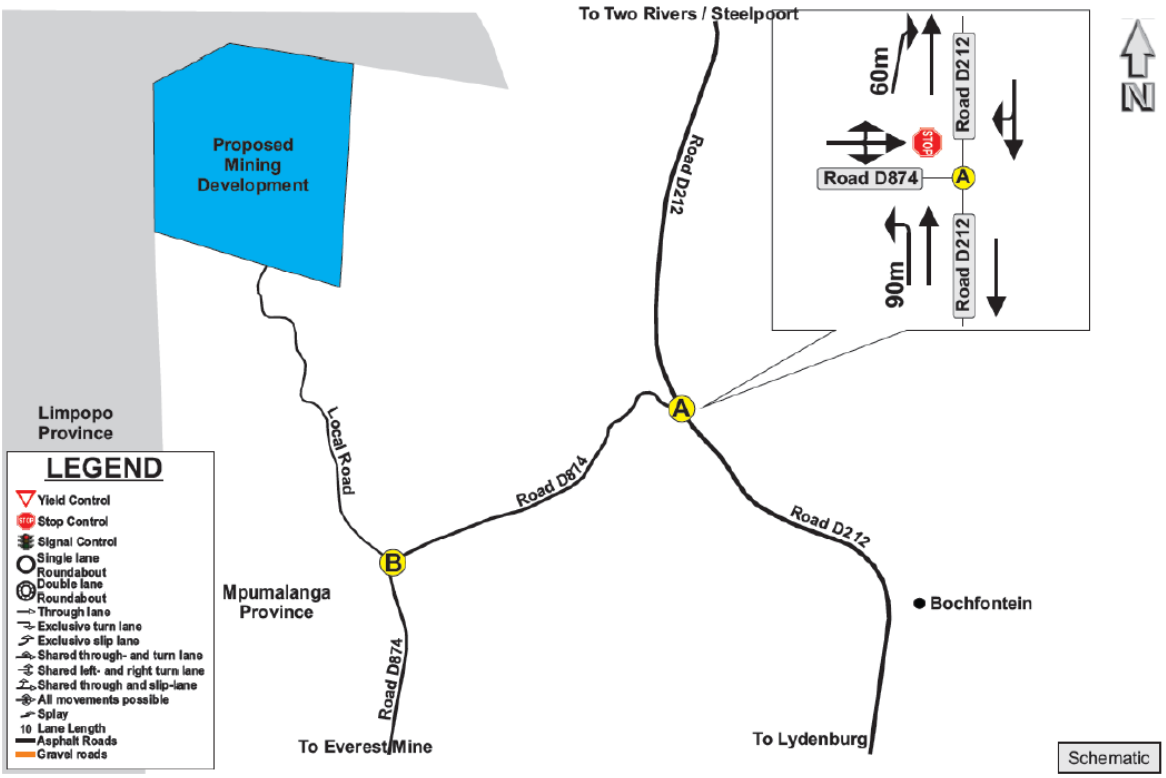

Figure 16:Existing road network layout

Sensitive road section and intersections

The following figures are presented as part of the sensitive road sections without and with the proposed mining development:

a) **Figure 18**: Sensitive road sections and intersections indicating existing sensitive areas and intersections without the proposed mining development (Status Quo);

b) **Figure 19:** Sensitive road sections and intersections indicating existing sensitive areas and intersections without the proposed mining development (With recommended mitigating measures regardless of the proposed mining development);

c) **Figure 20**: Sensitive road sections and intersections indicating anticipated sensitive areas and intersections with the proposed mining development without mitigating measures; and

d) **Figure 21**: Sensitive road sections and intersections indicating anticipated sensitive areas and intersections with the proposed mining development with mitigating measures.

It can be concluded from **Figures 18 to 21** that:

a) Improvements at the intersection of Roads D212 and D874 (Point A) would be required regardless of the proposed mining development in order to mitigate the impact that existing non-mine related vehicle traffic have on the existing relevant road

network and that the proposed mitigating measures as recommended without the proposed mining development as part of this report would have a positive impact; and

b) The proposed mining development would have an impact on the Local Road that provides access from Road D874 to the proposed mining development due to the Local Road mostly being a single lane road and not suitable for mine related vehicle traffic. The mitigating measures recommended as part of this report would have a positive impact.

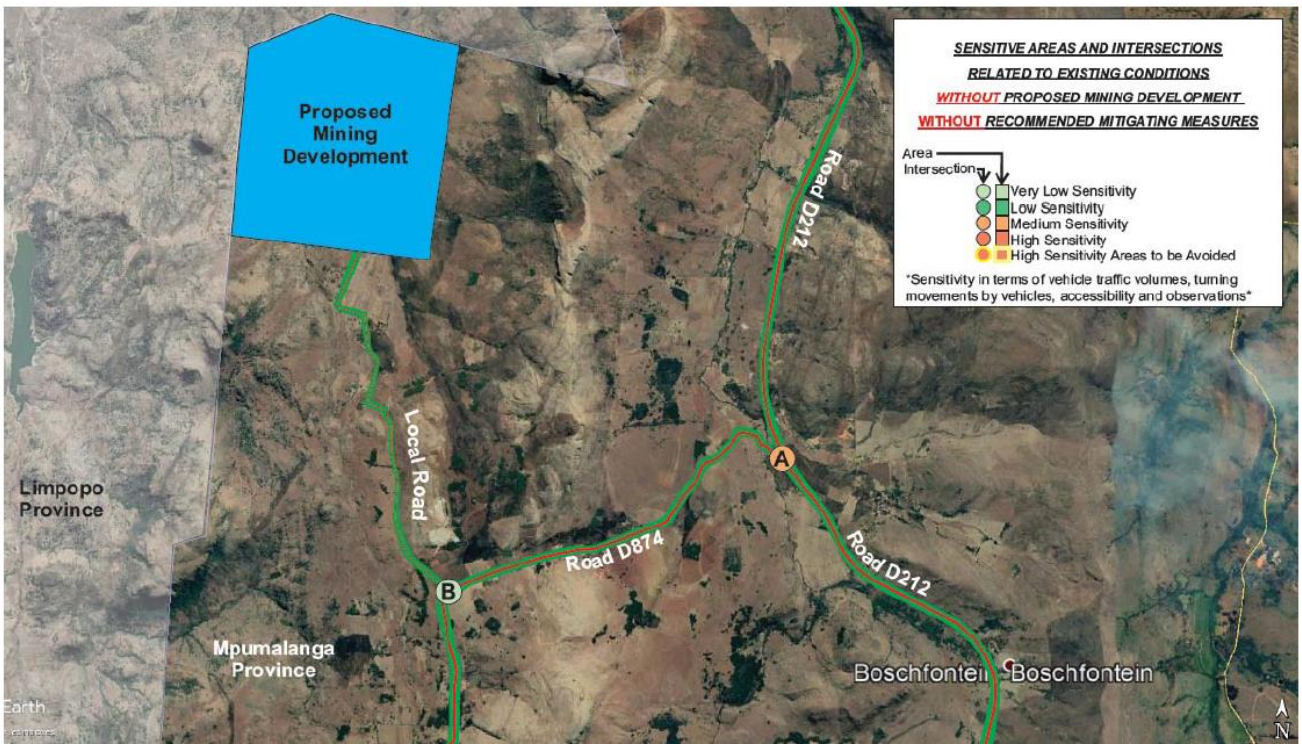

Figure 17: Sensitive road section and intersections indicating existing sensitive areas and intersections without the proposed mining development (status quo)

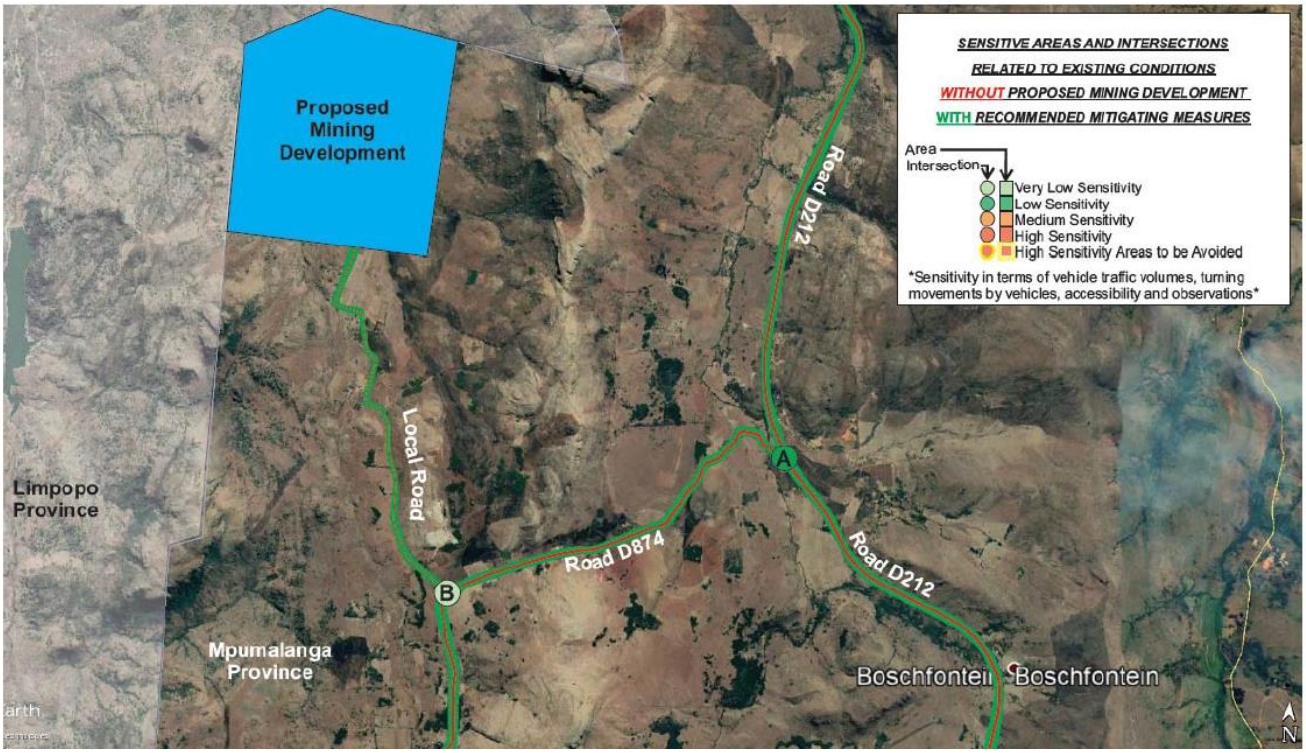

Figure 18:Sensitive road sections and intersections indicating existing sensitive areas and intersections without the proposed mining development (with recommended mitigation measures regardless of the proposed mining development)

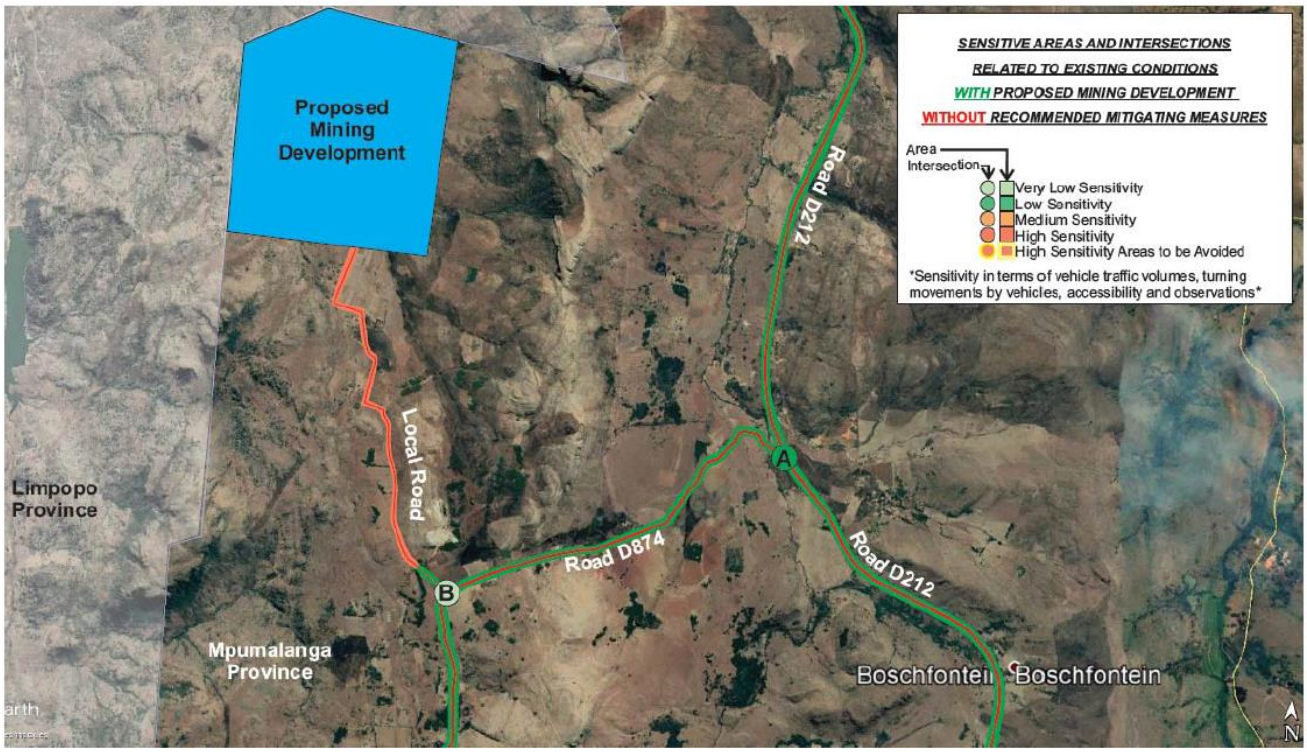

Figure 19:Sensitive road sections and intersections indicating anticipated sensitive areas and intersections with the proposed mining development without mitigation measures

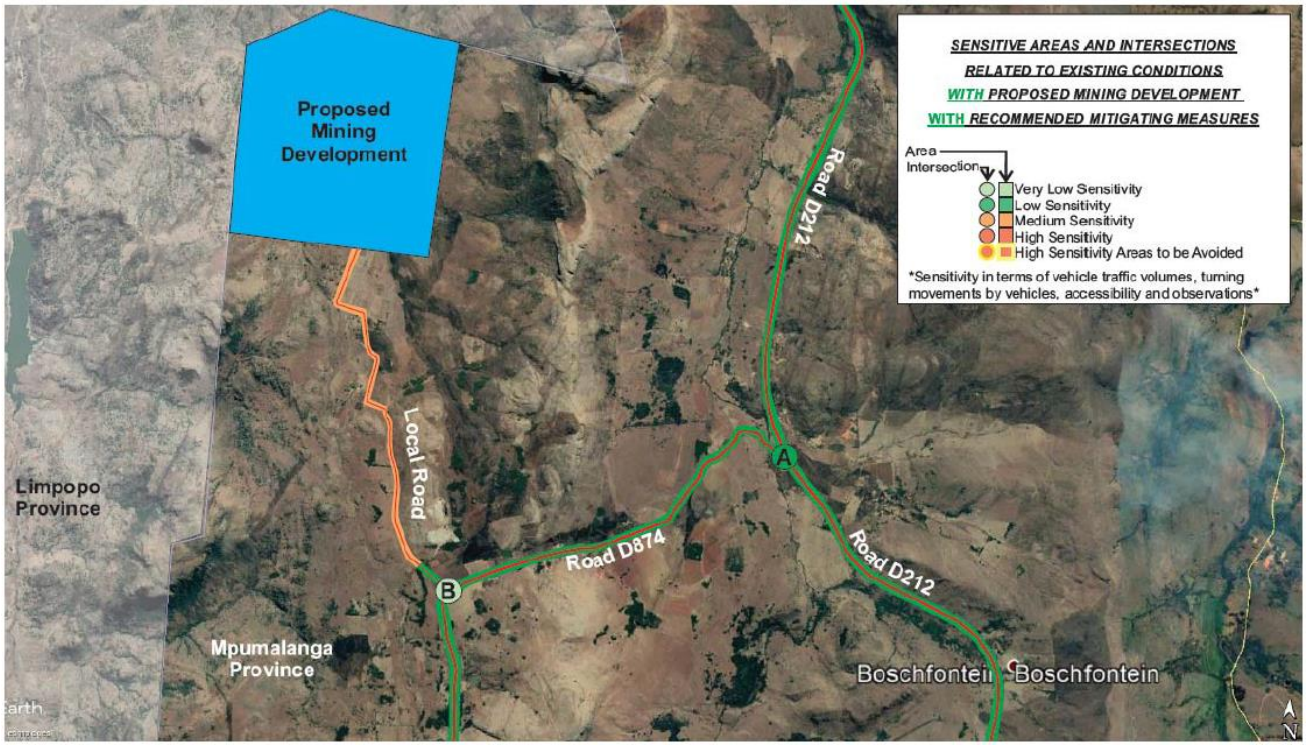

Figure 20: Sensitive road sections and intersections indicating anticipated sensitive area and intersections with the proposed mining development with mitigation measures

Summary of findings

In terms of the anticipated vehicle traffic to be generated by the proposed mining development:

a) That the road related impact from a road capacity perspective would have a medium consequence and a medium significance and that no road capacity related mitigating measures would be required due to the proposed mining development;

b) That due to the proposed mining development the road related impact from a road safety perspective would have a medium consequence and that no road safety related mitigating measures would be required as long as mitigating measures at Point A (**Figure 17**) of the proposed mining development is implemented; and

c) That due to the proposed mining development the road related impact from a road safety perspective would have a medium significance and that no road safety related mitigating measures would be required.

It is furthermore possible to conclude that owing to the type and nature of the proposed mining development, it is expected that the proposed mining development will have a manageable impact on vehicle traffic during all phases, provided that road infrastructure improvements are implemented.

Recommendations

It is recommended that the following mitigation measures should be implemented for the current situation in terms of road safety, regardless of the proposed mining development:

a) Provide a dedicated right-turn lane on the northern approach of the intersection of Roads D212 and D874 (Point A);

b) Provide reflective road studs at the intersection of Roads D212 and D874 (Point A) in order to improve the intersection geometry visibility at night time.

The following recommendations are made from a traffic engineering perspective as part of the proposed mining development:

a) The existing Local Road that provides access to the proposed mining development from Road D874 is deemed to not be suitable in the current state for mine related vehicle traffic with specific reference to heavy vehicles. With no viable identified alternatives for access to the proposed mining development for workers and delivery vehicles, and the fact that workers are expected to also reside east and south of the proposed mining development and will make use of the Local Road to gain access, it is recommended that the Local Road be upgraded to a two lane gravel road with at least a 7 meter wide compacted roadway. The last mentioned should be determined as part of the detail design phase and the standards would also be dependent on potential alternative mined product transport routes;

b) From a road safety perspective, dust suppression on the Local Road (gravel road) should be conducted if and when required in order to avoid road visibility issues caused by dust from vehicles making use of the road, especially mine related heavy vehicles, which could lead to vehicle and pedestrian accidents;

c) A road safety training program should be developed by the proposed mining development safety officer to form part of an initiative of community upliftment with the aim of educating the local community and making them aware of road safety risks which is associated with roads and includes but is not limited to pedestrian safety and children playing within road reserves. Staff of the proposed mining development should also form part of the training program;

d) A dedicated loading and off-loading area should be provided on-site of the proposed mining development as close as possible to the operation area of the proposed mining development where workers can be loaded and off-loaded in a safe environment;

e) Rehabilitation of some sections of Road D874 could from time to time be required to ensure that workers, consumable deliveries and mined product could be transported at all times to and from the proposed mining development. It is recommended that the proposed mining development should monitor the conditions of the relevant section of Road D874

that is proposed to be used to transport workers, consumables and mined product and collaborate with the roads authority when repairs are required;

f) Further investigation with regards to a single lane water stream crossing on Road D874 near Point A (**Figure 14**) should be conducted in order to determine whether this crossing would be suitable for an increase in heavy vehicle traffic in the long-term.

The following recommendations are made in terms of the detailed design phase of roads for the proposed mining development:

a) Detailed investigations should be conducted in conjunction with the relevant road authority and other mining developments in terms of the existing quality and potential life span of the existing road surface layers where consumables, mined ore and workers will be transported.

b) A road maintenance plan should be prepared in conjunction with the relevant road authority and other mining developments on public roads where trucks will operate as soon as the proposed mining development has been approved to ensure that the consumables, mined ore and workers can be transported at all times.

Recommendation for Environmental Authorisation

In conclusion of the findings as part of the investigations, Siyazi Limpopo Consulting Services (Pty) Ltd is of the opinion that the proposed mining development would have a manageable impact on the relevant road network if the mitigation measures are implemented as recommended. In this case, it is therefore recommended that authorisation be granted.

All mitigation measures and monitoring requirements have been incorporated into Part B of this report.

The detailed report is attached as **Appendix Q**.

XVI. Visual Assessment (Appendix R: Logis, November 2020)

The determination of the potential visual impacts is undertaken in terms of nature, extent, duration, magnitude, probability and significance of the construction and operation of the proposed infrastructure.

The study area for the visual assessment encompasses a geographical area of 462km² from the mining footprint. The study area does not include any major roads or towns and is located within a relatively remote area along the border between the Mpumalanga and Limpopo Provinces.

Anticipated issues related to the potential visual impact of the proposed Vygenhoek Platinum Mine include the following:

- The visibility of the facility to, and potential visual impact on, observers travelling along the secondary roads within the study area.
- The visibility of the facility to, and visual impact on residents of homesteads within the study area.
- The potential visual impact of the facility on the visual character or sense of place of the region.
- The potential visual impact of the facility on tourist routes or tourist destinations (if present).
- The potential visual impact of the construction of ancillary infrastructure (i.e. internal access roads, buildings, etc.) on observers in close proximity to the facility.
- The visual absorption capacity of the natural vegetation (if applicable).
- Potential cumulative visual impacts (or alternately, consolidation of visual impacts) with specific reference to the location of the Vygenhoek Platinum Mine within an area with existing mining activity.
- The potential visual impact of operational, safety and security lighting of the facility at night on observers residing in proximity of the facility.
- Potential visual impacts associated with the construction phase.
- The potential to mitigate visual impacts and inform the design process.

It is envisaged that the issues listed above may constitute a visual impact at a local and/or regional scale.

Visual baseline environment

The project site falls within the Steenkampsberge and is relatively remote and not easily accessible from any major roads within the region. The physical geography is characterised by low mountains and parallel hills with incised river valleys separating the mountains. Due to the steep slopes and shallow soils of the region, the study area is largely unsuitable for agriculture. The predominant natural land cover types are grassland, open woodland and dense forest and woodland (along the steeper slopes).

There are a considerable number of active mines located within the region. Some of these include the Ba-Choma Silica Mine, the Booysendal Mine, the Mototolo Mine, Everest Platinum Mine, Thorncliffe Mine and Dwarsrivier Mine. Besides the mining activities, the majority of the study area is sparsely populated (less than 10 people per km2) and is generally considered to have a high scenic quality due to the mountainous terrain and undeveloped nature of the region.

Impact assessment

The proposed Vygenhoek Mine may have a fairly contained area of potential visual exposure due to its location within a valley, flanked by mountains on both the western and eastern sides. The mine, mining activities and equipment may however be visible from settlements and homesteads south-east of the site, potentially resulting in a visual impact on residents. Other than these potentially sensitive visual receptors, there are very limited potential observers in the area.

In terms of cumulative visual exposure, the proposed Vygenhoek Platinum Mine is quite isolated in comparison to the other mines within the region and will predominantly be viewed in isolation, due to its enclosed location and limited visual exposure.

In the grassland sections of the study area, the Visual Absorption Capacity (VAC) of the receiving environment is deemed ***low*** by virtue of the nature of the vegetation and the low occurrence of urban development.

The following potential impacts were identified:

Nature of Impact	Without mitigation	With mitigation
Primary Impacts		
Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed mine	Moderate	Low
Visual impact on observers and residents at homesteads within a 2 - 3km radius of the mine	High	Moderate
Visual impact on observers travelling along the roads and residents at homesteads within the region (3 – 6km radius of the mine)	Moderate	Moderate
Visual impact of lighting at night on sensitive visual receptors in close proximity to the proposed mine.	Moderate	Low
Visual impact of the ancillary infrastructure during the operational phase on observers in close proximity to the structures.	Low	Low
Secondary Impacts		
The potential visual impact of the proposed mine on the sense of place of the region	Low	Low
The potential cumulative visual impact of the mining activities on the visual quality of the landscape	Moderate	Moderate

Concluding remarks

The development and operation of the proposed Vygenhoek Platinum Mine and its associated infrastructure, may have a visual impact on the study area, especially within (but not restricted to) a 3km radius of the proposed mine. The post mitigation significance of these visual impacts is expected to range from ***moderate to low***.

The anticipated visual impacts on sensitive visual receptors (if and where present) in close proximity to the proposed mining facility are not considered to be fatal flaws for the proposed mine. It is however recommended that the project proponent engage with the residents of the settlements south of the Vygenhoek farm, in order to discuss potential visual impact concerns, to investigate potential visual screening solutions, or to offer reasonable compensation for potential inconvenience experienced.

Recommendation for Environmental Authorisation

Considering all factors, it is recommended that the Vygenhoek Platinum Mine as proposed be supported; subject to the implementation of the recommended mitigation measures and management programme.

All mitigation measures and monitoring requirements have been incorporated into Part B of this report.

The detailed report is attached as **Appendix R**.

XVII. Waste Classification (Appendix T: Nettzero (Pty) Ltd, January 2021)

One waste and one residue stream were identified for classification, nl. Overburden and RoM Material. A total concentration (TC) analysis and leachable concentration (LC) analysis were undertaken on a composite sample of the Overburden made according to the expected overburden rock composition (32% Anorthosite and 68% Pyroxene). Details of the methodology is provided in section 5. The RoM Materials composition and make-up were derived from a detailed study (McCall, 2016) that was done on the neigbouring Booysendal UG2 reef and contains detailed assay results and mineralogy, much more detailed than would have been possible through sampling of the outcrop on site. The Booysendal UG2 reef is nearly identical to the Vygenhoek projects reef. Booysendal is, when following the reef contours, less than 1km down-dip from the project.

Mineralogy

The Overburden mineralogy is composed of predominantly Anorthite (49.27%), Enstatite (39.3%), Chromite (10.17%) and minor Pigeonite (1.3%). The RoM Material mineralogy is composed of predominantly Anorthite (45.1%), Enstatite (20%), and Chromite (31.9%). Both RoM Material and Overburden had Anorthite, Enstatite and Chromite, but each in different quantities. RoM Material had much higher quantities of Chromite and Enstatite, hence the darker brown to black colour of the material, while the overburden had higher Anorthite and Enstatite quantities, hence the lighter colour. Anorthite is a light grey to white mineral with a Calcium-Aluminium Silicate ($CaAl_2Si_2O_8$) chemical structure, Enstatite is a dark brown mineral with a Magnesium Silicate ($MgSiO_3$) chemical structure, Chromite is a dark grey to black mineral of a Iron-Magnesium Chromium(III)Oxide ($(Fe, Mg)Cr_2O_4$) chemical structure. The main catioins identified were thus Iron (Fe), Magnesium (Mg), Aluminium (Al), Calcium (Ca) and Silica (Si).

Chemical composition (Total concentrations and Leachable concentrations)

In the RoM material, due to the main ore zone being dominated by Chromitite units and also containing a thick Pyroxenite layer the chemical composition is dominated by the cations Chromium (15.54%), Iron (13.78%), Silica (11.79%), Magnesium (7.56%), Calcium (7.84%), and Al (2.38%). The other cations below 1% are Potassium, Manganese, Sodium, Titanium, Vanadium, the Platinum Group Minerals and Gold (PGM+Au), and Copper, Nickel, and Zinc. Not all these elements are listed in the total concentration thresholds (TCT) of the waste classification and management regulations. Of the elements listed in the TCT, Chromium, Copper, Manganese and Nickel are exceeding the TCT 0 threshold but still below the TCT 1 threshold, thus classifying the material as type 3. The leachable concentration results were all below Leachable Concentration Thresholds (LCT) 1 except for Chromium, which exceeded LCT 0 but were below LCT 1. In both the TC results and LC results Chromium were identified as a Type 3 element and were also highlighted in the GHS classification as it could cause potential long-term harm to aquatic environment (chronic).

In the Overburden, due to the material being dominated by Anorthite and Enstatite the chemical composition is dominated by the cations Calcium, Iron, Aluminium, Silica, and Magnesium and, to a lesser extent, the cations Potassium, Manganese, Sodium, Titanium, Vanadium, Chromium, Copper, Nickel, and Zinc. Not all these elements are listed in the total concentration thresholds (TCT) of the waste classification and management regulations. Of the elements listed in the TCT, only Copper and Flouride are exceeding the TCT 0 threshold but are still below the TCT 1 threshold, thus also classifying the material as type 3. The exceedances of Copper and Flouride in the overburden is very marginal and could potentially be declassified as Type 4. None of the leachable concentration results exceeded the LCT 1 values and the material classifies as a type 4 in terms of its leachable concentrations, further supporting the potential risk-based declassification of the overburden as a type 4. The GHS classification did not identify any hazards associated with the material.

Summary

Both materials classified as Type 3 waste/residues, requiring, at least, a Class C, or equivalent, containment barrier for storage.

Waste / Material	Classification	Landfill class
Overburden	Type 3	Class C
RoM material (UG2 ore)	Type 3	Class C

Despite the exceedances of Copper and Flouride in the TC analysis of overburden, the exceedances for overburden were marginal and could potentially be ‘re-classified’ (re-run of lab analysis) or ‘declassified’ as Type 4 waste.

RoM Material, however, due to its various exceedances, and especially the dominance of Chromium in both TCT 1 and LCT 1 exceedances, will remain as Type 3 waste and must be appropriately contained during storage to prevent leachate and runoff of material entering groundwater, waterways or water bodies.

The detailed report is attached as **Appendix T**.

The conceptual designs for the Waste Management Facilities are attached as **Appendix X**.

(b) Description of current land uses

Land use can be defined as the arrangements, activities and inputs people undertake in a certain land cover type to produce, change or maintain, *i.e.* the human use of land. Land use involves the management and modification of natural environment or wilderness into built environment such as settlements and semi-natural habitats such as dams, infrastructure, natural veld, pans, ploughed land, settlements, wetlands, pastures, and managed woods.

Land capability classification shows the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management.

Table 14: Criteria for determination of land capability

Summarised description of land capability criteria	
Wetlands, Pans, Drainage Lines	Land with organic soils or supporting hygrophilous vegetation where soil and vegetation processes are water determined.
Arable (>600mm)	Land that does not qualify as wetland. Soil is readily permeable to depth of 750mm. Soil has pH value between 4 and 8.4. Soil has low salinity and SAR. Soil has less than 10% (by volume) rocks or pedocrete fragments larger than 100mm in the upper 750mm. Has a slope (%) and erodibility factor (k) such that their product is <2.0. Occurs under a climate of crop yields that are at least equal to the current national average for these crops.
Grazing (250 – 600mm)	Land which does not qualify as wetland or arable land. Has soil, or soil-like material, permeable to roots of native plants, that is more than 250mm thick and contains less than 50% by volume of rocks or pedocrete fragments larger than 100mm. Supports, or is capable of supporting a stand of native or introduced grass species or other forage plants used by domesticated livestock or game animals on a commercial basis.
Wilderness (<250mm)	Land which does not qualify as wetland, arable or grazing land.

Figure 21: Land use of the proposed Vygenhoek Platinum Mine

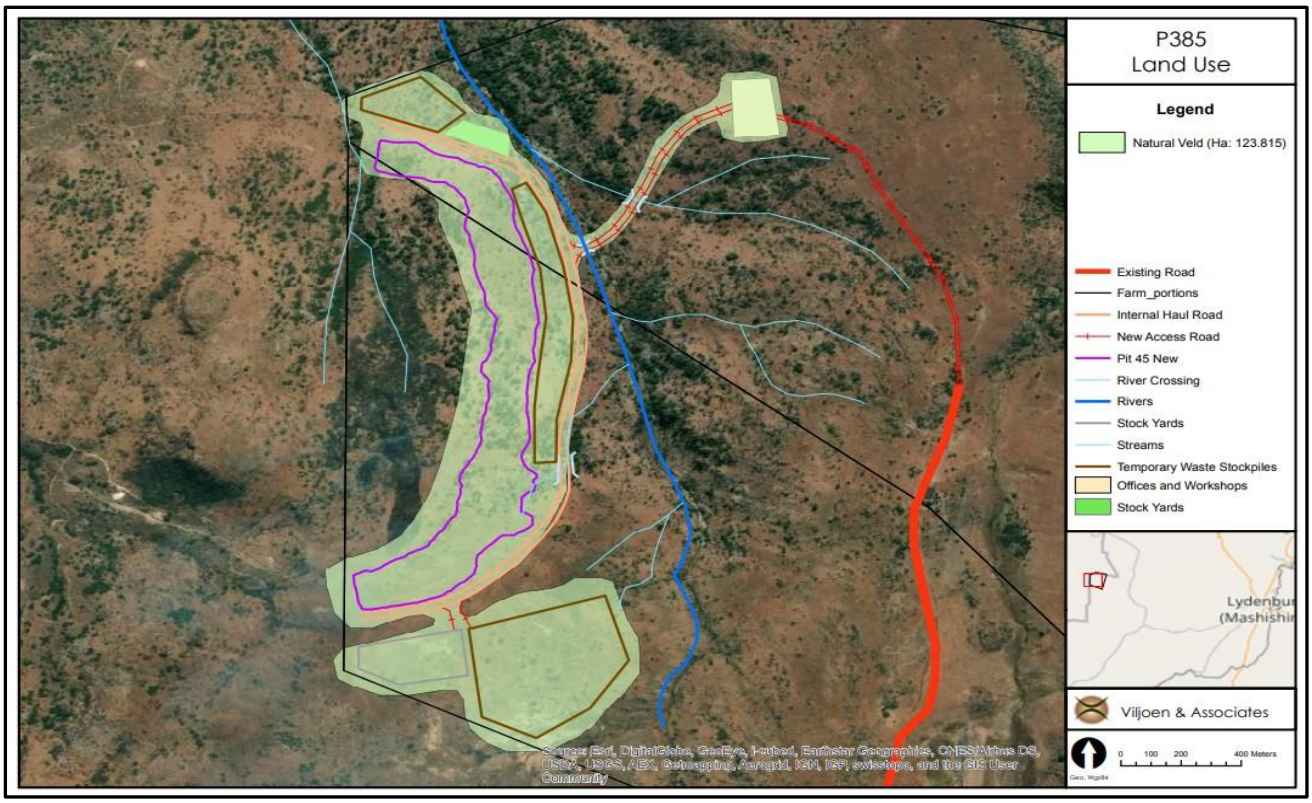

Figure 22: Defined land use of Portions 3 and 7 of Farm Vygenhoek

Table 15 summarises the *land use* (**Figure 21**) of the area investigated:

Table 15: Land use associated to the proposed layout

Area	Land Use	Surface Area (ha)	% of Total
Portions 3 and 7 Farm Vygenhoek	Natural Veld	123	100
	Total	**123**	**100**

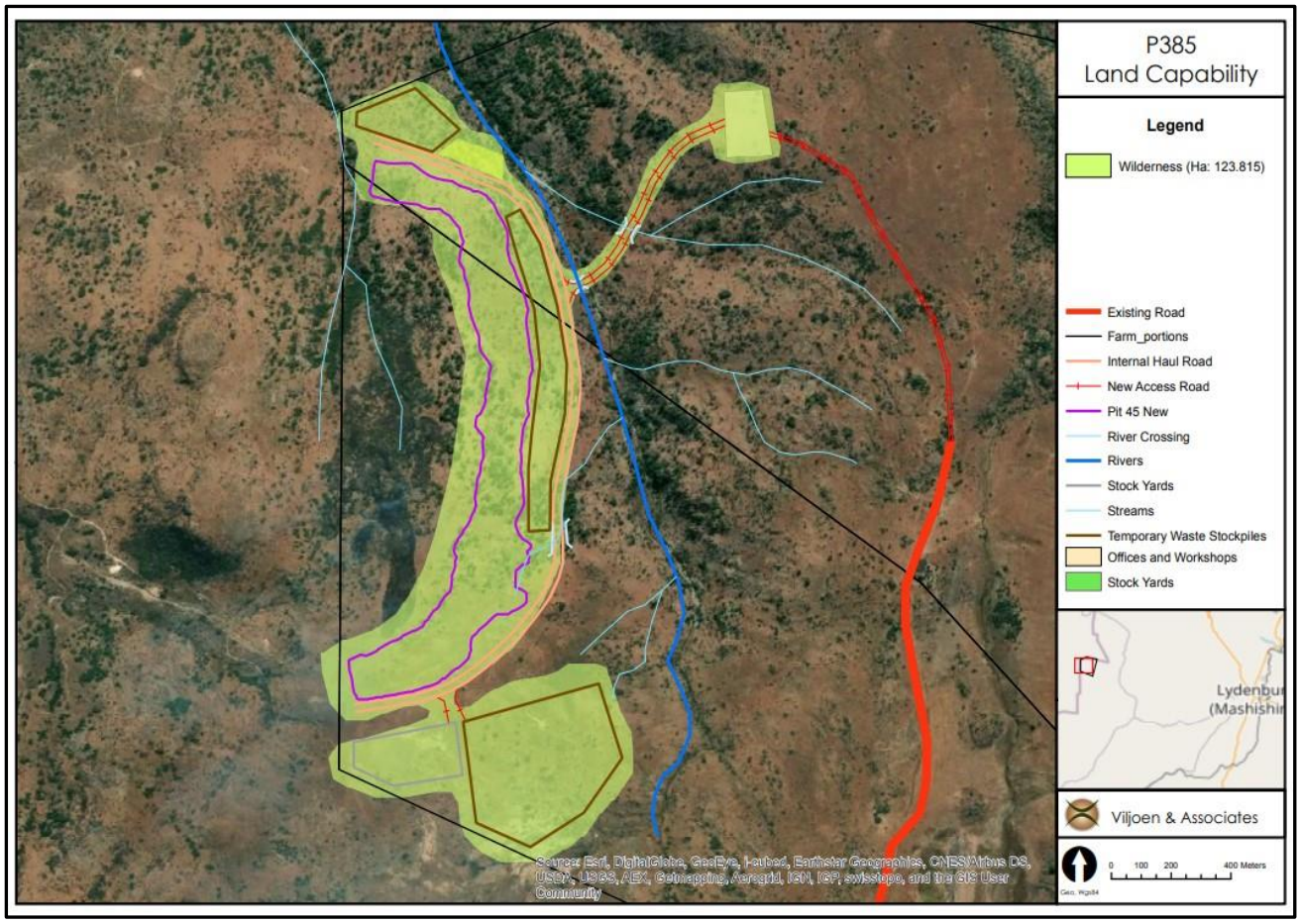

Figure 23: Land capability associated with the proposed layout plan

Table 16 summarises the *land capability* (**Figure 23**) of the area investigated:

Table 16: Land capability associated with the proposed layout

Area	Land Capability	Surface Area (ha)	% of Total
Portions 3 and 7 Farm Vygenhoek	Wilderness	123	100
	Total	**123**	**100**

(c) Description of specific environmental features and infrastructure on site

Throughout the process of determination the potential environmental impacts, the site layout for the proposed activities were considered.

Infrastructures associated to the proposed Vygenhoek Platinum Mine are as follows:

- Waste management: temporary handling and storage of general and hazardous waste, on-site change houses/ablution facilities with conservancy tank and chemical toilets;
- Surface Water Management: pollution control dams, clean and dirty storm water controls, and river crossings (as per the conceptual storm water management plan);
- Storage and handling of hazardous substances: fuel, lubricants, various process input chemicals, raw material stockpiles/bunkers, gas, burning oils, explosives;
- Security and access control;
- Lay down and storage yard areas;
- Workshops and wash bays;
- Offices;
- RoM and product stockpile lay down areas;
- Screening lay down areas;
- Vehicle/Equipment/Plant parking bay;
- Residue stockpile areas;
- Contractor camps;
- Medical station; and
- Diesel Generator.

Apart from the infrastructures associated to the mining development, a number of environmentally and socially sensitive receptors were identified. **Appendix S** provides the detailed site lay out plan in relation to the sensitive receptors.

(d) Environmental and current land use map

(Show all environmental and current land use features)

Find **Appendix S**.

v) Environmental impacts and risks

(Include 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)

This section summarises the potential impacts associated to the three different phases of the proposed mining activities. The potential impacts and risks are explored by investigating each aspect (i.e. air quality, soil quality, water quality etc.) associated to the proposed activities. The significance of each potential impact is then rated by considering the probability, the duration of the impact/activity, the extend of the impact, and the magnitude according to the methodology described in section **vi)** of this document.

For the purpose of this section, the mitigation measures recommended will only summarise the approach taken to manage each risk. A detailed mitigation plan is provided in Part B of this report.

Construction Phase

Aspect	Air Quality & Climate							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
			D	**E**	**M**	**P**	**S**	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. Several recommendations resulted from the Air Quality Assessment (**Appendix F**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix F**) prior to the commencement of operations. There are also several legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Construction of training centres, offices, ablution facilities and kitchen facilities • Transport of construction material, mobile plant, and equipment to the site	**Fugitive and ambient dust generation** **Direct Impacts:** • Road construction, preparation of laydown areas and the construction of infrastructures involves the removal of rock and earth by grading or digging during construction. • Vegetation is removed, grading and paving takes place using a range of road construction equipment. This often leads to the generation of fugitive dust comprising TSP, PM_{10} and $PM_{2.5}$ from the dirt roads. **Indirect Impacts:** • Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities. **Cumulative Impacts:** • Continuous generation of fugitive and ambient dust generation during construction activities poses a high risk in the overall degradation of local air quality conditions posing a health risk to both the human and ecological surroundings.	**Pre-Mitigation**	1	2	6	5	**45**	
		Post-Mitigation	1	1	2	3	**12**	
			D	**E**	**M**	**P**	**S**	
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Stores, workshops &wash bays • Fuel operating power generators • Transport of construction material, mobile plant and equipment to the site • Onsite Clinic • Construction of training centres, offices, ablution facilities and kitchen facilities	**GHG & CO_2 emissions (direct and indirect)** **Direct Impact:** • The usage of diesel operated mobile equipment being used during the construction and operational activities contributes directly to Nomamix (Pty) Ltd carbon footprint. • Diesel fuel price volatility due to increased oil prices, results in a higher energy cost, therefore requiring the use of the most profitable energy efficient measure (incentive for using or not using a green energy). **Indirect Impact:** • During the construction phase, it is expected that some clearing of land may be required in terms of removing vegetation. This will result in the loss of carbon sink capacity due to vegetation not being available to convert the CO_2 emitted to oxygen. • The proposed mine will have 2 stationary generators (with 1 being a back-up generator). The proposed mine expects to consume about 4 000 litres of diesel per month in these generators, which it is assumed will be used to electrify the infrastructure (workshop, administration office, weighbridge, and additional lighting of the stockpile area). • Fossil fuel combustion is a major source of CO_2 emissions. CH_4 and N_2O are related to vehicle km travelled rather than fuel consumption and account for 5% of diesel engine emissions in terms of CO_2 equivalent (Amoako, et al. 2018). **Cumulative Impact:** • Changing climatic conditions will have both direct (operational and performance-based) and indirect (securing of supplies and rising energy costs) impacts on the mining sector. These include but are not limited to water-related impacts (droughts, floods, storms, etc); heat-related impacts (bush fires and heat strokes); and sea level rise.	**Pre-Mitigation**	2	4	4	4	**40**	GHG & CO_2 emissions can be ***controlled*** in the following ways: (1) Develop and maintain GHG & CO_2 emissions reporting policy; (2) Investigate alternative energy efficient measures; and (3) Monitor the GHG & CO_2 emissions throughout the entire life cycle of the Vygenhoek Platinum Mine; Several recommendations resulted from the Air Quality Assessment (**Appendix G**). These recommendations are included in Part B of this report. GN R. 1651 published in terms of section 39 of the Atmospheric Pollution Prevention Act of 1965 stipulated a list of requirements in terms of regulating emissions form diesel operated vehicles/plant/equipment.
		Post-Mitigation	3	3	2	3	**21**	

Aspect	Terrestrial Biodiversity							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Storm water runoff management features • Construction of training centres, offices, ablution facilities and kitchen facilities	**Vegetation and habitat loss** **Direct Impact:** • Clearing the area for construction of infrastructures leads to the loss of vegetation and habitats of macro and micro-organisms. • The loss of vegetation also affects the surrounding Fauna and Flora. • Increased human-animal conflict and accidental killings. **Indirect Impact:** • If areas surrounding the storm water features are not rehabilitated properly or features installed are not constructed according to the storm water management model, these areas are prone to erosion. **Cumulative Impact:** • Loss of vegetation and habitat leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding protected areas are affected and may lead to the degradation of the protected area's ecology.		**D**	**E**	**M**	**P**	**S**	The loss of vegetation can be ***remedied*** in the following ways: (1) Development and implementation of a Liability Estimation and Final Rehabilitation, Decommissioning and Mine Closure Plan (see **Appendix U**). (2) Develop and implement a plant species search and rescue management plan. Several recommendations resulted from the Terrestrial Biodiversity Assessment (**Appendix I**). These recommendations are included in Part B of this report.
		Pre-Mitigation	5	3	10	5	**90**	
		Post-Mitigation	3	1	6	5	**50**	
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Storm water runoff management features • Construction of training centres, offices, ablution facilities and kitchen facilities	**Influx of alien invasive vegetation** **Direct Impact:** • Site clearing for roads, lay down areas, and mining area exposes the un-vegetated area to the influx of alien invasive vegetation causing irreversible damage to the native fauna and flora species and loss of habitats. **Indirect Impact:** • Disturbed areas are likely to act as seed areas that will ultimately facilitate the invasion of associated watercourses and riparian areas. • Alien species generally out-compete indigenous species for water, light, space and nutrients as they are adaptable to changing conditions and are able to easily invade a wide range of ecological niches, posing an ecological threat as they alter habitat structure, lower biodiversity (both number and "quality" of species), change nutrient cycling and productivity, and modify food webs. **Cumulative Impact:** • Loss of vegetation and habitat leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding protected areas are affected and may lead to the degradation of the protected area's ecology.		**D**	**E**	**M**	**P**	**S**	The influx of alien invasive vegetation can be ***controlled*** in the following ways: (1) Development and implementation of an alien and invasive control plan. (2) Awareness training on the identification of weeds and alien species to employees responsible for the management of these species. Several recommendations resulted from the Terrestrial Biodiversity Assessment (**Appendix I**). These recommendations are included in Part B of this report.
		Pre-Mitigation	5	3	10	5	**90**	
		Post-Mitigation	3	2	6	4	**44**	
• Stores, workshops &wash bays • Fuel operating power generators • Fuel storage	**Spread of chemical fires** **Direct Impact:** • The improper storage of hazardous substances poses a risk of chemical fires. In the event of a chemical fire the impact to the surrounding environment is significant. Fires may lead to the loss of ecosystems, damage to properties and fatalities. • Altered ecological regimes (fire), ecological processes, contamination of nearby sensitive (wetland) habitat. **Indirect Impact:** • Site clearing caused by the devastation of fires exposes un-vegetated area to the influx of alien invasive vegetation causing Irreversible damage to the native fauna and flora species and loss of habitats.		**D**	**E**	**M**	**P**	**S**	Chemical fires can be ***avoided*** n the following ways: (1) Develop and implement a Hazardous substances management plan. (2) Develop an emergency procedure addressing, in particular, the management of chemical fires and spill response. (3) Report and record all incidents related to chemical fires. (4) Employees must be trained on emergency response procedures required to counter the nature and hazards of an accidental release. (5) Employees must be familiar with and have received the appropriate training regarding the handling and storage practices, for all containers with which they will come into contact.
		Pre-Mitigation	5	3	10	2	**36**	
		Post-Mitigation	1	1	0	1	**2**	

	Cumulative Impact: • Loss of vegetation and habitat leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding protected areas are affected and may lead to the degradation of the protected area's ecology.							(6) Document the types and amounts of hazardous materials present on the project site (including for example the name and description, classification, regulatory reporting threshold, quantities, characteristics, analysis of potential consequence, identification of location, details of responsible persons, detail of availability of spill response equipment etc.). (7) The emergency response procedure should describe response activities in the event of a spill, release, or other chemical emergency and include the internal and external notification procedure, specific responsibilities of individuals or groups, decision process for assessing severity of the release, and determining appropriate actions, facility evacuation routes, and post event activities such as clean-up and disposal, incident investigation, employee re-entry, and restoration of spill response equipment. (8) Procedures should be prepared for informing the public and emergency response agencies, documenting first aid and emergency medical treatment, taking emergency response actions, reviewing and updating the emergency response plan to reflect changes, and using, inspecting, testing, and maintaining the emergency response equipment.

Aspect	**Aquatic Biodiversity**							
Activities	**Impact**	**Significance rating**	**D**	**E**	**M**	**P**	**S**	**Mitigation Measures**
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Transport of construction material, mobile plant, and equipment to the site • Storm water runoff management features	**Sedimentation and siltation of watercourses** **Direct Impact:** • Constructing access roads through drainage lines may cause sedimentation and siltation of watercourses if not managed properly. • Improper or ineffective storm water runoff management features poses a risk of contributing to the sedimentation and siltation of watercourses. • The use of heavy machinery within the construction footprint will lead to soil compaction, which increases the runoff of water over the topsoil and the reduction in stormwater infiltration into the soil profile, therefore increasing the likelihood of erosion gully formation and the deposition of sediment within associated watercourses. **Indirect Impact:** • While the placement of various infrastructure associated with the propose mine may not result in the direct loss of wetland habitat, activities associated with the establishment of the mine is likely to impact the adjacent and downstream watercourses through the clearing of natural vegetation, altered overland flow and sediment transport. • Further, the use of heavy machinery within the construction footprint will lead to soil compaction, which increases the runoff of water over the topsoil and the reduction in stormwater infiltration into the soil profile, therefore increasing the likelihood of erosion gully formation and the deposition of sediment within associated watercourses. • In addition, the presence of bare soil associated with stockpiles during mining activities will result in a change in the stormwater runoff volume and velocity entering adjacent wetland systems. • Various impacts have been attributed to sedimentation of aquatic ecosystems, including reduction of light penetration (resulting in reduction in photosynthesis and subsequently, productivity), alteration of foraging dynamics of both carnivores and herbivores, impacting on predator and prey relationships, clogging of gills, rendering the watercourse unfit for various aquatic organisms, truncating and shifting the trophic pyramid, absorption of nutrients onto	**Pre-Mitigation**	2	3	8	5	**65**	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents. (3) Implementing storm water management plan as conceptualised by the Hydrological Assessment (see **Appendix L**). Several recommendations resulted from the Aquatic Biodiversity Assessment (**Appendix J**). These recommendations are included in Part B of this report.
		Post-Mitigation	2	1	4	3	**21**	

	suspended particles, rendering them unavailable and thereby reducing the productivity of the watercourse, and filling of interstitial spaces, thereby destroying habitat for macro invertebrates and vertebrates owing to sedimentation, etc. • Sediment deposition within the western tributary is further expected to smother available stones biotopes, leading to a reduction in abundance and diversity of flow-sensitive hydraulic habitat, ultimately resulting in a loss of sensitive aquatic biota noted to be present. **Cumulative Impact:** • Alteration of aquatic ecology of direct affected watercourses as well as downstream watercourses. • Loss of unique biodiversity features. • The proposed activity is expected to impact on national protected areas targets as well as provincial freshwater conservation targets, both of which are expected to be cumulative if the impact is to be considered with other regional impacts that have or are expected to have on such areas.							
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Storm water runoff management features	**Alteration of drainage patterns** **Direct Impact:** • The construction of access roads or other storm water management infrastructures through drainage lines may lead to the alteration of streams that consequently changes the drainage pattern. • The encroaching of proposed infrastructure into flood-line and 100m stream buffers. This includes pit excavation through the headwaters of a non-perennial stream. • The establishment of the proposed operation will result in a loss of runoff reaching the natural environment by naturally flowing into watercourses. **Indirect Impact:** • Alteration of the drainage patterns may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. • Changes to catchment characteristics such as the removal of vegetation and associated increase in hardstanding at the site will increase runoff and erosion potential during rainfall events. • The construction of crossings across various watercourses within the study area, most notably the access/haul road crossing of the western tributary, has the potential to disrupt movement patterns of aquatic and terrestrial fauna within the associated catchment, limiting both upstream as well as downstream movement. **Cumulative Impact:** • The change in the drainage patterns may negatively impact the surrounding aquatic biodiversity and poses a risk of affecting the catchment ecology. • Loss of unique biodiversity features. • The proposed activity is expected to impact on national protected areas targets as well as provincial freshwater conservation targets, both of which are expected to be cumulative if the impact is to be considered with other regional impacts that have or are expected to have on such areas.		**D**	**E**	**M**	**P**	**S**	
		Pre-Mitigation	5	3	8	5	**65**	
		Post-Mitigation	3	1	4	4	**32**	The effects on surface water quality and aquatic ecology resulting from the alteration in drainage patterns can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Implement the Liability Estimation and Final Rehabilitation, Decommissioning and Mine Closure Plan (LRDCP) specifically addressing the rehabilitation measures related to reinstatement of drainage lines (see **Appendix U**). Several recommendations resulted from the Aquatic Biodiversity Assessment (**Appendix J**). These recommendations are included in Part B of this report.
	Destruction of wetlands		**D**	**E**	**M**	**P**	**S**	

• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Storm water runoff management features	**Direct Impact:** • Site clearing and topsoil stripping in Wetlands will cause the loss of micro and macro aquatic species. The potential presence of wetland features with the proposed mining area is likely to result in the direct loss of potential wetland features present. **Indirect Impact:** • Generally, the seepage of mine-impacted water from spoil deposits and stockpiles is a distinct risk in mining environments, with the implication that 1) new wetlands can occur in mining environments as water drains out of toe seep areas or 2) wetlands that are established can experience ingress of poorer quality water in terms of acidity, metals and sulphates (van der Waals, 2016). The change in water quality has an adverse effect on the ecological characteristics of the wetland systems and riverine environments into which the water ultimately flows, the extent of which is determined by the difference in pH and salt load of the polluted water compared to the natural wetland water (van der Waals, 2016). **Cumulative Impact:** • The proposed mine may result in impacts to drivers of wetland features adjacent to and/or downstream of the proposed mining areas, resulting in the degradation and loss of ecosystem services provided by wetlands. • The proposed activity may impact on national protected areas targets as well as provincial freshwater conservation targets, both of which are expected to be cumulative in the impact is to be considered with other regional impacts that have or are expected to have on such areas. • Loss of unique biodiversity features. • The proposed activity is expected to impact on national protected areas targets as well as provincial freshwater conservation targets, both of which are expected to be cumulative if the impact is to be considered with other regional impacts that have or are expected to have on such areas.	**Pre-Mitigation**	5	3	8	5	**80**	The potential effects may be ***avoided*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Implement the LRDCP, specifically addressing the rehabilitation measures related to reinstatement of wetlands (**Appendix U**). Several recommendations resulted from the Aquatic Biodiversity Assessment (**Appendix J**). These recommendations are included in Part B of this report.
		Post-Mitigation	3	1	4	4	**32**	
	Contamination of water resources		**D**	**E**	**M**	**P**	**S**	
• Pollution Control Dams (PCD's) i.e. Construction and operation • Stores, workshops &wash bays • Ablutions & change house with sewage treatment plant • Fuel operating power generators • Fuel storage	**Direct Impact:** • If PCD's are not constructed in a way to avoid seepage to the surrounding environment or if not maintained, it poses a risk of contaminating water resources within proximity to the facility. • Improper management of effluent from store, workshops, wash bays, ablution facilities, change houses, and chemical toilets/septic tank systems poses a high risk to contaminating water resources. • The construction of improper generator facilities and hazardous substance storage facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating both surface and sub-surface water sources as well as the soils surrounding the facility. • Where run-off from these stockpiles or poor containment of dirty water from the mining footprint enters the adjacent aquatic ecosystem, water quality deterioration is likely to result, including increases in turbidity, sulphates and metal concentrations (e.g. aluminium and iron), and potentially a drop in pH. Accordingly, aquatic assemblages are likely to be negatively affected, with a decrease in diversity expected. **Indirect Impact:** • Over an extended period, the exposure to contamination will cause the degradation of fauna and flora habitats as well as affect the surface and sub-surface water quality.	**Pre-Mitigation**	4	3	6	5	**65**	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3) Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan. Several recommendations resulted from the Aquatic Biodiversity Assessment (**Appendix J**). These recommendations are included in Part B of this report.
		Post-Mitigation	2	2	4	4	**32**	

	Cumulative Impact: • Mismanagement of mine-generated waste and pollutants (including hydrocarbons, construction waste, hazardous chemicals, etc.) is likely to result in these substances or their derivatives entering and polluting the sensitive aquatic environments either directly through surface runoff during rainfall events, or subsurface water movement. • An increase in pollutants will lead to changes in the water quality of the wetlands and watercourses, affecting their ability to act as ecological corridors within the development landscape. • The linked nature of the wetland systems to downstream water resources will result in pollutants being carried downstream from the mine construction site having consequences on further downstream users. • Common explosives used at mine sites often contain large percentages of nitrogen compounds which have been shown to appear in surface water drainages (Morin & Hutt, 2009). Previous studies conducted within the Dwars River catchment has indicated that the catchment is under significant pressure due to blasting which increases the nitrate concentrations in groundwater which then daylight within surface water resources. This has resulted in algal proliferation on rocky substrate within the river channels, resulting in a loss of substrate and a steadily increasing electrical conductivity over time which has been shown to impact the more sensitive species present within the system. • The proposed activity is expected to impact on national protected areas targets as well as provincial freshwater conservation targets, both of which are expected to be cumulative if the impact is to be considered with other regional impacts that have or are expected to have on such areas.							
	Hydrocarbon contamination		**D**	**E**	**M**	**P**	**S**	
• Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Storm water runoff management features	**Direct Impact:** • Throughout the construction phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality. • Mismanagement of mine-generated waste and pollutants (including hydrocarbons, construction waste, hazardous chemicals, etc.) is likely to result in these substances or their derivatives entering and polluting the sensitive aquatic environments either directly through surface runoff during rainfall events, or subsurface water movement. • Storm water from dirty areas such as the mining area, lay down areas, workshops, stores, wash bays etc. poses a risk to hydrocarbon containing effluent to contaminate water resources. Depending on the level of contamination the risk may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality. • The construction of improper storage facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating both surface and sub-surface water sources as well as the soils surrounding the facility. • The lack of inspections or regular maintenance of facilities such as water pumps poses a risk to contaminating the surface and sub-surface water resource. **Indirect Impact:**	**Pre-Mitigation**	4	2	6	4	**48**	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure. Several recommendations resulted from the Aquatic Biodiversity Assessment (**Appendix J**). These recommendations are included in Part B of this report.
		Post-Mitigation	1	1	0	3	**6**	

	• An increase in pollutants will lead to changes in the water quality of the wetlands and watercourses, affecting their ability to act as ecological corridors within the development landscape. **Cumulative Impact:** • The linked nature of the wetland systems to downstream water resources will result in pollutants being carried downstream from the mine construction site having consequences on further downstream users.							
• Access and hauling along roads i.e. during the construction of roads	**Destruction of upstream tributaries and reduction in water in the catchment** **Direct Impact:** • The destruction of tributaries may lead to a limited volume of water available to the downstream users. The reduction in water in the catchment may cause the degradation of surface water quality. **Indirect Impact:** • Alteration of the upstream drainage lines may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Cumulative Impact:** • The change in the drainage patterns may negatively impact the surrounding aquatic biodiversity and poses a risk of affecting the catchment ecology. • Loss of unique biodiversity features. • The proposed activity is expected to impact on national protected areas targets as well as provincial freshwater conservation targets, both of which are expected to be cumulative if the impact is to be considered with other regional impacts that have or are expected to have on such areas.		**D**	**E**	**M**	**P**	**S**	
		Pre-Mitigation	5	3	8	5	**80**	The effects on the aquatic biodiversity resulting from the destruction of upstream tributaries and reduction in water in the catchment can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Implement the LRDCP specifically addressing the rehabilitation measures related to reinstatement of drainage lines (see **Appendix U**). Several recommendations resulted from the Aquatic Biodiversity Assessment (**Appendix J**). These recommendations are included in Part B of this report.
		Post-Mitigation	3	1	4	4	**32**	

Aspect	**Soil**							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Stores, workshops &wash bays • Ablutions & change house with septic tank • Fuel operating power generators • Fuel storage	**Degradation of soil resources** **Direct Impact:** • As part of the construction activity related to roads, valuable topsoil's will be removed. Improper management of topsoil or fertile soil may cause the loss of flora micro-ecosystems and cause the degradation of soil quality. • The continuous spills of hydrocarbons and hazardous substances poses a environmental risk to the surrounding soil quality. The degradation of the soil quality will cause the loss of habitat or healthy environment for micro ecosystems. • Continuous leaking or lack of maintenance poses a risk to contaminating the surrounding soils and degrading the soil quality. This will affect the micro-ecosystems in a negative manner. **Indirect Impact:** • Degradation of soil quality risk difficulty in the re-establishment of vegetation during rehabilitation. • Loss of fertile soil will require costly import of fertile soils for rehabilitation, increasing the risk of importing non-indigenous seeds and establishing invasive vegetation competing with native vegetation.		**D**	**E**	**M**	**P**	**S**	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Implement the LRDCP (**Appendix U**).
		Pre-Mitigation	5	1	10	5	**80**	
		Post-Mitigation	2	1	6	4	**36**	

	• Continuous exposure to hydrocarbon leaks poses a risk to the degradation of the surrounding soil resources. • Unvegetated areas are prone to erosion formation. **Cumulative Impact:** • Loss of vegetation and habitat, due to the degradation in soil quality, leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding protected areas are affected and may lead to the degradation of the protected area's ecology. • The formation of erosion gullies may lead to the change in the drainage patterns, negatively impacting the surrounding aquatic biodiversity and poses a risk of affecting the catchment ecology.							
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Storm water runoff management features • Transport of construction material, mobile plant, and equipment to the site	**Erosion** **Direct Impact:** • Un-vegetated areas exposed to weathering for an extended period will lead to erosion. Erosion prone areas has a high risk of losing fertile soil caused by flash floods. The loss of fertile soil will result in the loss of important micro ecosystems. **Indirect Impact:** • Improper management of storm water may lead to erosion along the access routes. This may lead to the loss of fertile soil and in its turn effect the micro-ecosystems of the surrounding environment. **Cumulative Impact:** • Loss of vegetation and habitat, due to the degradation in soil quality, leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding protected areas are affected and may lead to the degradation of the protected area's ecology. • The formation of erosion gullies may lead to the change in the drainage patterns, negatively impacting the surrounding aquatic biodiversity and poses a risk of affecting the catchment ecology.		**D**	**E**	**M**	**P**	**S**	Erosion can be ***controlled*** in the following ways: (1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study).
		Pre-Mitigation	5	2	10	5	85	
		Post-Mitigation	2	1	4	3	21	
• Mining offices i.e. operation of training centres, offices, and kitchen facilities	**General waste generation & Littering** **Direct Impact:** • Littering throughout the construction and operational phase poses the risk of the visual environment to be affected negatively. The storing of waste onsite for an extended time may cause the formation of leachate that will affect the soil and water quality of the surrounding environment in a negative way. **Indirect Impact:** • Exposure of leachate to the natural environment poses a health risk to the surrounding fauna and flora habitats as well as human health. **Cumulative Impact:** • Loss of vegetation and habitat, due to the degradation in soil quality, leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding protected areas are affected and may lead to the degradation of the protected area's ecology.		**D**	**E**	**M**	**P**	**S**	Soil and surface water quality due to leachates can be ***controlled*** in the following ways: (1) Develop and implement as waste management plan with the focus on reuse, reduce, recycle, or avoid. (2) Development and maintenance of a waste disposal record keeping system.
		Pre-Mitigation	3	1	2	4	24	
		Post-Mitigation	1	1	0	3	6	

Aspect	Water Resources							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
• Access and hauling along roads i.e. during the construction of roads	**Water usage for dust suppression** **Direct Impact:** • Improper management of the water used during dust suppression may lead to the wastage of the available water resource. **Indirect Impact:** • Reduction in surface and groundwater availability. **Cumulative Impact:** • Loss of aquatic and terrestrial biodiversity. • Loss of water resource to surrounding water users. • Loss of livelihood.		**D**	**E**	**M**	**P**	**S**	The following mitigation measures can be implemented to ***control*** the usage of water resources: (1) Water usage monitoring plan to be developed and implemented. (2) Create awareness of water conservation.
		Pre-Mitigation	3	1	6	4	**40**	
		Post-Mitigation	1	1	0	3	**6**	
• Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Use of existing drilled / new boreholes	**Water level reduction and contamination** **Direct Impact:** • The reduction in water levels as well as contamination of the water resource that may be caused by alternating the topography during site clearing and topsoil stripping poses a risk to affecting the surface and sub-surface water quality as well as the downstream users. • Improper management of boreholes i.e. Pumping rates exceeding yield thresholds poses a risk to boreholes being pumped dry. **Indirect Impact:** • Exposed boreholes may result in both sub-surface and surface water quality to be affected. **Cumulative Impact:** • Overexposing for an extended time may lead to water shortages and poses a negative effect to the downstream users.		**D**	**E**	**M**	**P**	**S**	Water level reduction and contamination affecting the water resource quality can be ***controlled*** in following ways: (1) Development and implementation of water quality monitoring plan. (2) Development of a storm water management plan. (3) Reporting and recording incidents. (4) Create awareness of water conservation.
		Pre-Mitigation	3	2	6	4	**44**	
		Post-Mitigation	1	1	2	3	**12**	
• Onsite Clinic • Mining offices i.e. operation of training centres, offices, and kitchen facilities	**Domestic water usage** **Direct Impact:** • The lack of water management and maintenance of taps, toilets, basins etc. poses a risk to wastage of water. **Indirect Impact:** • Wastage of water leads to the overexposure or decrease in water resource. **Cumulative Impact:** • Overexposing for an extended time may lead to water shortages and poses a negative effect to the downstream users.		**D**	**E**	**M**	**P**	**S**	The following mitigation measures can be implemented to ***avoid*** the usage of water resources: (1) Water usage monitoring plan to be developed and implemented. (2) Create awareness of water conservation.
		Pre-Mitigation	3	1	4	3	**24**	
		Post-Mitigation	1	1	0	2	**4**	
• Water storage facilities	**Improper water storage management** **Direct Impact:** • Improper management of water storage facilities i.e. Not inspecting or regularly maintaining the storage tanks poses a risk of leaks and contamination. **Indirect Impact:** • Wastage of water leads to the overexposure or decrease in water resource. **Cumulative Impact:** • Overexposing for an extended time may lead to water shortages and poses a negative effect to the downstream users.		**D**	**E**	**M**	**P**	**S**	The following mitigation measures can be implemented to ***avoid*** the usage of water resources: (1) Water usage monitoring plan to be developed and implemented. (2) Create awareness of water conservation.
		Pre-Mitigation	3	1	4	3	**24**	
		Post-Mitigation	1	1	0	2	**4**	

Aspect	Topography and Visual							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
			D	**E**	**M**	**P**	**S**	
• Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Mining offices i.e. operation of training centres, offices, and kitchen facilities • Pollution Control Dams (PCD's) i.e. Construction and operation	**Topography and visual alteration** **Direct Impact:** • Vegetation stripping during site clearing and topsoil removal activities will alter the visual environment and topography. • Construction of infrastructures and facilities will alter the topography and visual environment. • Visual impact of construction activities on sensitive visual receptors near the proposed mine. • Visual impact on observers and residents at homesteads within a 2 - 3km radius of the mine. • Visual impact on observers travelling along the roads and residents at homesteads within a 3 – 6km radius of the mine. • Potential visual impact of operational, safety and security lighting of the facility at night on observers near the proposed mine. • Visual impact of the ancillary infrastructure during the operational phase on observers near the structures. **Indirect Impact:** • An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light. **Cumulative Impact:** • Potential permanent scarring of the landscape if no rehabilitation is undertaken. • The potential cumulative visual impact of the mining activities on the visual quality of the landscape.	**Pre-Mitigation**	3	2	6	5	**55**	
		Post-Mitigation	2	1	2	3	**15**	The effects of altering the topography caused by vegetation clearance and topsoil stripping can be ***remedied*** in the following ways: (1) Record keeping of the topography and environmental state before the commencement of any activities. (2) Implementation of the LRDCP (**Appendix U**).

Aspect	Noise							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
			D	**E**	**M**	**P**	**S**	
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Mining offices i.e. operation of training centres, offices, and kitchen facilities	**Noise generation** **Direct Impact:** • Increased noise levels at potentially sensitive receptors exceeding criteria of the Noise Control Regulations legislation (NCR) and SANS guidelines. • Disturbing character of sound. • The use of construction equipment during site clearing and topsoil stripping may cause noise during the construction phase. If equipment is not maintained and serviced consistently high levels of noise may result throughout the construction and operational phase. **Indirect Impact:** • Changing ambient sound levels could increase annoyance and potential complaints. **Cumulative Impact:** • Changing ambient sound levels could change the acceptable land use capability.	**Pre-Mitigation**	2	2	6	5	**50**	Noise generation can be ***controlled*** in the following ways: (1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix H**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.
		Post-Mitigation	2	1	2	3	**15**	

Aspect	Heritage and Palaeontology							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
	Destruction of graves		**D**	**E**	**M**	**P**	**S**	The impacts on heritage and palaeontology can be ***avoided*** in the following ways:

• Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas	**Direct Impact:** • Proposed activities near identified graves poses the risk of destructing graves of great cultural and heritage importance. **Indirect Impact:** • Loss of heritage and history for the future generation of the affected community. **Cumulative Impact:** • The greater study area has been impacted on by various mining developments and the development as per the current lay out will impact on significant heritage resources and therefore the cumulative impact is high. • Although surface sites can be avoided or mitigated, there is a chance that completely buried sites would still be impacted on, but this cannot be quantified.	**Pre-Mitigation**	5	1	10	4	64	(1) Develop and implement an awareness campaign on the protection of social heritage impacts. (2) Clear marking of graves discovered by the Heritage Impact Assessment Report (**Appendix P**).
		Post-Mitigation	5	1	2	4	32	
	Degradation of cultural significance heritage sites **Direct Impact:** • Proposed mining activities near cultural significant heritage sites poses the risk of degrading or loss of these sites. **Indirect Impact:** • Loss of heritage and history for the future generation of the affected community. **Cumulative Impact:** • The greater study area has been impacted on by various mining developments and the development as per the current lay out will impact on significant heritage resources and therefore the cumulative impact is high. • Although surface sites can be avoided or mitigated, there is a chance that completely buried sites would still be impacted on, but this cannot be quantified.		**D**	**E**	**M**	**P**	**S**	
		Pre-Mitigation	5	1	10	4	64	
		Post-Mitigation	5	1	2	4	32	

Aspect	**Health and Safety**							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
			D	**E**	**M**	**P**	**S**	
• Employment of workers and procurement of construction materials.	**Health and Safety of employees and surrounding communities** **Direct Impact:** • Increased demand for labour and employees from different cultures may pose the risk to the lack of knowledge and skills on health and safety in the workplace. • Different human behaviours deal with different situations and if there is not a simplified system of managing health and safety risk, situations resulting loss or injury of human life may be a result. **Indirect Impact:** • Increase in injury on duty or disabling injuries of employees. • Loss of productivity due to investigations into injuries or fatalities. • Vector-related diseases such as Malaria, Dengue, Schistosomiasis, Onchocerciasis, Lymphatic Filariasis, Yellow Fever. • Respiratory and housing issues: Transmission of communicable diseases such as: Acute Respiratory Infections (bacterial and viral), Pneumonias, Tuberculosis, Meningitis, Plague, Leprosy and Respiratory effects from housing, overcrowding, housing inflation. • Veterinary medicine and zoonotic issues: Diseases affecting animals such as: Bovine Tuberculosis, Swinepox, Avian Influenza; or diseases that can be transmitted from animals to people such as: Brucellosis, Rabies, Bovine TB, Bird Flu.	**Pre-Mitigation**	4	1	6	5	55	The health and safety of employees can be ***controlled*** in the following ways: (1) Develop and implement a Health and Safety plan. (2) All employees to be trained in health and safety in the workplace. (3) Develop and implement an employee training program. (4) Keep and maintain a record of all training of employees.
		Post-Mitigation	4	1	6	3	33	

	• Sexually transmitted infections: Sexually transmitted infections such as: HIV/AIDS, Syphilis, Gonorrhoea, Chlamydia, Hepatitis B. • Soil, water and sanitation related diseases: Diseases that are transmitted directly or indirectly through contaminated water, soil or non-hazardous waste such as: Diarrheal, Schistosomiasis, Hepatitis A and E, Poliomyelitis, Giardiasis, Worms. • Food and nutrition related issues: Adverse health effects such as: Malnutrition, Anaemia (including deficiencies of Folate, Vitamin A, Iron, Iodine), Micronutrient Deficiencies due to changes in agricultural and subsistence practices or food inflation, Gastroenteritis (bacterial and viral), changes in agricultural and subsistence hunting, fishing, and gathering practices. • Accidents and injuries: Road-traffic related, spills and releases, construction (home- and project-related) and drowning. • Exposure to potentially hazardous materials: This considers the environmental health determinants linked to the project and related activities. Noise, water, and air pollution (indoor and outdoor) as well as visual impacts will be considered in this biophysical category. It can also include exposure to heavy metals and hazardous chemical substances and other compounds, solvents or spills and releases from road traffic and exposure to mal odours. Pesticides, fertilizers, road dust, air pollution (indoor and outdoor, related to vehicles, cooking, heating, or other forms of combustion or incineration), landfill refuse or incineration ash, and any other project-related solvents, paints, oils or cleaning agents, by-products, or release events. • Social determinants of health: Including psychosocial stress (due to resettlement, overcrowding, political or economic crisis), social production of disease, political economy of health, and eco-social issues such as resettlement or relocation, violence, gender issues, education, income, occupation, social class, race or ethnicity, security concerns, substance misuse (drug, alcohol, smoking), depression and changes to social cohesion. • Cultural health practices: Role of traditional medical providers, indigenous medicines, and unique cultural health practices. • Health services and infrastructure capacity: Physical health infrastructure, staffing levels and competencies, technical capabilities of health care facilities at district levels; program management delivery systems; coordination and alignment of the project to existing national- and provincial-level health programs (for example, TB, HIV/AIDS), and future development plans. • Noncommunicable diseases: Hypertension, diabetes, stroke, cardiovascular disorders, cancer, and mental health. **Cumulative Impact:** • Loss of human life.							
			D	**E**	**M**	**P**	**S**	
• Onsite Clinic	**Generation of medical waste** **Direct Impact:** • Improper management of medical waste generated from first aid incidents during the construction and operational phase poses a high risk to human health. **Indirect Impact:** • Contamination of general waste during mixing. • Illegal disposal. **Cumulative Impact:** • Loss of human life. • Transmitting of infectious diseases to surrounding communities.	**Pre-Mitigation**	3	2	6	4	**44**	The risk to human health from generated medical waste can be ***controlled*** in following ways: (1) Develop and implement a Waste Management plan. (2) Develop and implement a waste recoding procedure. (3) Develop and implement a Health and Safety management plan, including the handling of medical waste.
		Post-Mitigation	4	1	4	3	**27**	

Aspect	Socio-economic							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
• Employment of workers and procurement of construction materials	**Loss of farm labour** **Direct Impact:** • Increased demand of labour force poses a risk of the local farmers losing farm labour due to competing financial income. **Indirect Impact:** • Deterioration of farming practices due to the loss of knowledgeable labour. **Cumulative Impact:** • Deterioration of surrounding agricultural farms.		**D**	**E**	**M**	**P**	**S**	The social-economic impacts can be ***controlled*** in the following ways: (1) Develop and implement a social labour plan. (2) Develop and implement a social development plan. (3) Develop and implement a skills development program.
		Pre-Mitigation	2	2	4	5	**40**	
		Post-Mitigation	2	2	2	4	**24**	
	Population Influx **Direct Impact:** • Increased demand for labour force poses a risk of a population influx in the local district municipality leading to pressure on resources. • The increased population influx may lead to conflicting social pathologies in the surrounding local community. • The increased population influx may lead to community conflicts in the surrounding local community. **Indirect Impact:** • The increasing population will put pressure on the local municipality to provide services such as sewage, drinking water, waste management, electricity etc. • Conflicting cultural and spiritual believes and standards. • Increased competition for job opportunities. • As with any large-scale development in a rural area, there is likely to be an influx of people (both employees and jobseekers) that could change the local social dynamic and structure. This could result in increased social ills, such as drug and alcohol abuse, gender-based violence, and increased social conflict. • The influx of employees and jobseekers, the increase in traffic and reduced natural resources (air, water), could impact negatively on existing communities through reduced environmental health (respiratory), spread of communicable diseases, and increased crime and violence (outside people and competition for resources). **Cumulative Impact:** • Poor service delivery of municipal infrastructures. • Community unrest.		**D**	**E**	**M**	**P**	**S**	
		Pre-Mitigation	2	3	6	5	**55**	
		Post-Mitigation	2	2	2	4	**24**	
			D	**E**	**M**	**P**	**S**	

	Job creation and local economic development **Direct Impact:** • It is anticipated that the operational phase will see the employment of approximately 44 people for the ten-year duration for the operational phase, creating direct employment for the region. In addition, the sourcing of materials and services could develop indirect employment opportunities. • The local procurement of materials and services could benefit local businesses and indirectly provide employment and improved local spending in the short-term. **Indirect Impact:** • Social projects forming part of the proposed mining project will create additional job opportunities for the local communities. • A number (unknown) of temporary employment opportunities may be generated during the construction phase, which would benefit local unemployed individuals. • The benefits may impact beyond the local area – i.e. to the regional or national level – as many of these opportunities may be skilled or professional and so are unlikely to be sourced locally. • As the types of services required during construction is unlikely to exist locally, these benefits may be realised on a regional or national level, however the procurement of materials and services such as security and cleaning could be sourced locally. • Local businesses could also see growth and diversification through the provision of services and materials to the operation, thus encouraging diversification within the local economy. **Cumulative Impact:** • Job creation for local and district communities. • Local economic development.	**Pre-Mitigation**	2	2	0	4	**16**
		Post-Mitigation	2	2	0	4	**16**
	Reduced access to livelihood resources **Direct Impact:** • Development within proximity to communities. **Indirect Impact:** • Construction activities my require the securing of certain portions of the site, which may be used by local communities to support their subsistence livelihoods, including collection of firewood and herbal medicines, and grazing. **Cumulative Impact:** • Reduced access to livelihood resources.		**D**	**E**	**M**	**P**	**S**
		Pre-Mitigation	2	3	6	4	**44**
		Post-Mitigation	2	2	4	3	**24**
	Change in sense of place **Direct Impact:** • Development within proximity to communities. • Mining activities could negatively impact the physical environment, including reduced air quality, noise emissions, and increased traffic. These aspects could cause a nuisance to residents, and potentially change the sense of place. **Indirect Impact:** • Construction activities could change the nature of the local area with increased traffic, influx of people, and presence of machinery and activities in the area. **Cumulative Impact:** • Change in sense of place.		**D**	**E**	**M**	**P**	**S**
		Pre-Mitigation	2	3	6	4	**44**
		Post-Mitigation	2	2	4	3	**24**

Aspect	Traffic							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
			D	**E**	**M**	**P**	**S**	
• Bulk transporting of Ore to market on Public roads	**Pressure on public transport infrastructure** **Direct Impact:** • Influx of bulk transporting vehicles puts pressure on the public transport infrastructures. During the life cycle of the proposed activity an increase in vehicle movement in the area will be expected. This poses a potential increase in vehicle, pedestrian, and livestock accidents. **Indirect Impact:** • Increased pressure on existing road infrastructures and municipalities to maintain infrastructures. **Cumulative Impact:** • Degradation of public transport infrastructure.	**Pre-Mitigation**	2	4	3	4	**36**	The traffic impacts can be ***controlled*** in the following ways: (1) Develop and implement a traffic management plan.
		Post-Mitigation	2	4	3	4	**36**	

Operational Phase

Aspect	Air Quality & Climate							
Activities	**Impact**	**Significance rating**	**D**	**E**	**M**	**P**	**S**	**Mitigation Measures**
• Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Residue stockpiles • Screening Operations • Discard disposal (backfilling of mining area) • Vehicular activity on haul roads; and operation of mining equipment • Bulk transporting of Ore to market on Public roads	**Fugitive and ambient dust generation** **Direct Impact:** • Topsoil and subsoil stripping expose the mining operation area to dust generation. • High levels of dust fallout, caused by exposed unvegetated areas or blasting and drilling, will affect the overall air quality. • The generation of dust during these activities will affect the visual environment negatively. • Continuous use of haul road often leads to the generation of fugitive dust comprising TSP, PM_{10} and $PM_{2.5}$ from the dirt roads. • Stockpiled RoM and product are continuously exposed to weathering leading the generation of fine dust particles. **Indirect Impact:** • Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities. **Cumulative Impacts:** • Continuous generation of fugitive and ambient dust generation during operational activities poses a high risk in the overall degradation of local air quality conditions posing a health risk to both the human and ecological surroundings.	**Pre-Mitigation**	3	2	8	4	**52**	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. Several recommendations resulted from the Air Quality Assessment (**Appendix F**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix F**) prior to the commencement of operations. There are also several legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.
		Post-Mitigation	3	1	4	3	**24**	
• Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Drilling & Blasting • Waste generation, storage, and disposal • RoM & product stockpiling • Residue stockpiles • Screening Operations • Discard disposal (backfilling of mining area) • Vehicular activity on haul roads; and operation of mining equipment • Bulk transporting of Ore to market on Public roads	**GHG & CO_2 emissions (direct and indirect)** **Direct Impact:** • The use of diesel operated hauling equipment and power generators will cause a contributing factor the Nomamix (Pty) Ltd carbon footprint. • Increase in fuel consumption due to declining ore grade concentrations. **Indirect Impact:** • It is expected that some clearing of land may be required in terms of removing vegetation. This will result in the loss of carbon sink capacity due to vegetation not being available to convert the CO_2 emitted to oxygen. • Fossil fuel combustion is a major source of CO_2 emissions. CH_4 and N_2O are related to vehicle km travelled rather than fuel consumption and account for 5% of diesel engine emissions in terms of CO_2 equivalent (Amoako, et al. 2018). • According to Goswami & Brent (n.d.), GHG emissions from the detonation of explosives are of the order of 1 tonne of CO_2 for every 5 tonnes of explosives consumed. However, upstream emissions from the manufacture of ammonium nitrate can range from the equivalent of 1 to 4 tonnes of CO_2 for every tonne of explosives. In terms of the direct detonation of the explosives at the proposed mine, it can be estimated, based on a maximum usage of 1.2 kg of explosives used per m^3 of hard overburden, and the calculation of '1 tonne of CO_2 for every 5 tonnes of explosives consumed' that CO_2 emissions would be around 1 319.434 tonnes of CO_2 from the 6 597.17 tonnes of explosives used. • Increase of electricity consumption due to declining ore grade concentrations.	**Pre-Mitigation**	3	4	6	3	**39**	GHG & CO_2 emissions can be ***controlled*** in the following ways: (1) Develop and maintain GHG & CO_2 emissions reporting policy; (2) Investigate alternative energy efficient measures; and (3) Monitor the GHG & CO_2 emissions throughout the entire life cycle of the Vygenhoek Platinum Mine; Several recommendations resulted from the Air Quality Assessment (**Appendix G**). These recommendations are included in Part B of this report. GN R. 1651 published in terms of section 39 of the Atmospheric Pollution Prevention Act of 1965 stipulated a list of requirements in terms of regulating emissions form diesel operated vehicles/plant/equipment.

	Cumulative Impact: • Although the ore will be processed by a concentrator not owned and managed by the applicant, the proposed mine is in part responsible for the GHG emissions generated by the concentrator, due to the role they play in feeding the concentrator with the raw materials needed to undertake their own processes. • CH_4 emissions from waste stored temporarily onsite are not expected to generate any significant GHG emissions. CH_4 is generated as a result of degradation of organic material under anaerobic conditions, therefore it is only the total mass of decomposing material currently in the solid waste disposal site (SWDS) that matters, and not what (and how much) waste was deposited in that year. CH_4 emissions can however be calculated once the projected amount of waste (waste composition) to be deposited annually at the SWDS is known. • The impacts of climate change pose serious risks for the mining sector. "The mining sector is extremely energy-intensive and one of the major emitters of greenhouse gases. Total CO_2 emissions vary across the industry, largely depending upon the type of resource proposed mined as well as the design and nature of the mining process. It is widely recognised that available mining deposits are increasingly deeper and of declining ore grade. This will lead to growing demands for water as well as greater proposed mine waste, thereby raising energy consumption, and increasing the industry's climate footprint" (Ruttinger, 2016).	**Post-Mitigation**	2	4	6	3	**36**	

Aspect	**Terrestrial Biodiversity**							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
			D	**E**	**M**	**P**	**S**	
• Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • RoM & product stockpiling • Residue stockpiles	**Vegetation and habitat loss** **Direct Impact:** • Clearing the mining area for operational purposes leads to the loss of vegetation and habitats of macro and micro-organisms. • The loss of vegetation also affects the surrounding Fauna and Flora. • Increased human-animal conflict and accidental killings. • Direct impacts on species of conservation consideration and habitat associated with these species. • Impacts on species of conservation consideration, local diversity patterns and ecological patterns. • Impacts on habitat types that exhibit unperturbed status, local and regional conservation efforts, anthropogenic encroachment, and human-nature conflict. **Indirect Impact:** • If areas surrounding the storm water features are not rehabilitated properly or features installed are not constructed according to the storm water management model, these areas are prone to erosion. **Cumulative Impact:** • Loss of vegetation and habitat leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding protected areas are affected and may lead to the degradation of the protected area's ecology.	**Pre-Mitigation**	5	2	10	5	**85**	The loss of vegetation can be ***remedied*** in the following ways: (1) Development and implementation of the LRDCP (see **Appendix U**). (2) Develop and implement a plant species search and rescue management plan. Several recommendations resulted from the Terrestrial Biodiversity Assessment (**Appendix I**). These recommendations are included in Part B of this report.
		Post-Mitigation	3	1	6	5	**50**	

	• Deterioration of habitat adjacent to mining site, indirect impacts on habitat status of conservation important taxa, loss of general biodiversity, changed ecological patterns and migratory routes of animals, and an altered fire regime. • Cumulative losses of remaining natural habitat on a regional scale due to exacerbated mining activities in the region, exacerbated human encroachment and associated impacts caused by human-animal conflict and exacerbated use of natural resources.							
• Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • RoM & product stockpiling • Residue stockpiles	**Influx of alien invasive vegetation** **Direct Impact:** • Site clearing of the operational mining area exposes the un-vegetated area to the influx of alien invasive vegetation causing irreversible damage to the native fauna and flora species and loss of habitats. • Impacts on species of conservation consideration, local diversity patterns and ecological patterns. • Impacts on habitat types that exhibit unperturbed status, local and regional conservation efforts, anthropogenic encroachment, and human-nature conflict. **Indirect Impact:** • Disturbed areas are likely to act as seed areas that will ultimately facilitate the invasion of associated watercourses and riparian areas. • Alien species generally out-compete indigenous species for water, light, space and nutrients as they are adaptable to changing conditions and are able to easily invade a wide range of ecological niches, posing an ecological threat as they alter habitat structure, lower biodiversity (both number and "quality" of species), change nutrient cycling and productivity, and modify food webs. **Cumulative Impact:** • Loss of vegetation and habitat leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding protected areas are affected and may lead to the degradation of the protected area's ecology. • Deterioration of habitat adjacent to mining site, indirect impacts on habitat status of conservation important taxa, loss of general biodiversity, changed ecological patterns and migratory routes of animals, and an altered fire regime. • Cumulative losses of remaining natural habitat on a regional scale due to exacerbated mining activities in the region, exacerbated human encroachment and associated impacts caused by human-animal conflict and exacerbated use of natural resources.		**D**	**E**	**M**	**P**	**S**	
		Pre-Mitigation	5	3	10	5	**90**	
		Post-Mitigation	3	2	6	4	**44**	The influx of alien invasive vegetation can be ***controlled*** in the following ways: (1) Development and implementation of an alien and invasive control plan. (2) Awareness training on the identification of weeds and alien species to employees responsible for the management of these species. Several recommendations resulted from the Terrestrial Biodiversity Assessment (**Appendix I**). These recommendations are included in Part B of this report.

Aspect	Aquatic Biodiversity							
Activities	**Impact**	**Significance rating**	**D**	**E**	**M**	**P**	**S**	**Mitigation Measures**
• Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • RoM & product stockpiling • Residue stockpiles • Screening Operations • Discard disposal (backfilling of mining area) • River crossings • Vehicular activity on haul roads; and operation of mining equipment • Water Management	**Sedimentation and siltation of watercourses** **Direct Impact:** • Stripping topsoil and subsoil, stockpiling material (excavated, RoM, screened or waste), and or backfilling of material through or near drainage lines may cause sedimentation and siltation of watercourses if not managed properly. • Constructing access roads through drainage lines may cause sedimentation and siltation of watercourses if not managed properly. • Various stockpiles will be likely be located within the area, including overburden, topsoil, throw out and emergency stockpiles, and will be characterised by bare soil and steep side slopes that generate significant surface run-off. Run-off from these stockpiles is likely to be sediment rich, while carbonaceous stockpiles (if any) might also generate acid rock drainage as pyrites in the overburden are exposed to oxygen. • Where run-off from these stockpiles enters adjacent wetlands, water quality deterioration is likely to result, including increases in turbidity, sulphates, and metal concentrations (e.g. aluminium and Iron), and a drop in pH. • Runoff from lay down areas, construction areas, mining areas, stockpile areas, roads etc. potentially contains sediment and silt that poses a risk of affecting surrounding water courses and drainage lines. • Various impacts have been attributed to sedimentation of aquatic ecosystems, including reduction of light penetration (resulting in reduction in photosynthesis and subsequently, productivity), alteration of foraging dynamics of both carnivores and herbivores, impacting on predator and prey relationships, clogging of gills, rendering the watercourse unfit for various aquatic organisms, truncating and shifting the trophic pyramid, absorption of nutrients onto suspended particles, rendering them unavailable and thereby reducing the productivity of the watercourse, and filling of interstitial spaces, thereby destroying habitat for macro invertebrates and vertebrates owing to sedimentation, etc. • Sediment deposition within the western tributary is further expected to smother available stones biotopes, leading to a reduction in abundance and diversity of flow-sensitive hydraulic habitat, ultimately resulting in a loss of sensitive aquatic biota noted to be present. **Indirect Impact:** • Storm water runoff of dirt roads and un-vegetated areas may cause sedimentation and siltation of nearby watercourses. • Storm water runoff of dirt roads may cause sedimentation and siltation of nearby watercourses. • The presence of bare soil associated with stockpiles during mining activities will result in a change in the stormwater runoff volume and velocity entering adjacent wetland systems. **Cumulative Impact:** • Alteration of aquatic ecology of direct affected watercourses as well as downstream watercourses. • Loss of unique biodiversity features. • The proposed activity is expected to impact on national protected areas targets as well as provincial freshwater conservation targets, both of which are expected to be cumulative if the	**Pre-Mitigation**	4	3	8	5	75	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents. (3) Implementing storm water management plan as conceptualised by the Hydrological Assessment (see **Appendix L**). Several recommendations resulted from the Aquatic Biodiversity Assessment (**Appendix J**). These recommendations are included in Part B of this report.
		Post-Mitigation	3	1	4	4	32	

	impact is to be considered with other regional impacts that have or are expected to have on such areas.							
• Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • RoM & product stockpiling • Residue stockpiles • Screening Operations • Discard disposal (backfilling of mining area) • River crossings • Vehicular activity on haul roads; and operation of mining equipment • Water Management	**Alteration of drainage patterns** **Direct Impact:** • Site clearing and topsoil stripping through drainage lines may lead to the siltation of streams as well as lead to erosion along the riverbanks that will affect the surface water quality negatively. • Various stockpiles will be likely be located within the area, including overburden, topsoil, throw out and emergency stockpiles, and will be characterised by bare soil and steep side slopes that generate significant surface run-off. • Run-off from these stockpiles is likely to be sediment rich, while carbonaceous stockpiles (if any) might also generate acid rock drainage as pyrites in the overburden are exposed to oxygen. • Where run-off from these stockpiles enters adjacent wetlands, water quality deterioration is likely to result, including increases in turbidity, sulphates, and metal concentrations (e.g. aluminium and Iron), and a drop in pH. • The encroaching of proposed infrastructure into flood-line and 100m stream buffers. This includes pit excavation through the headwaters of a non-perennial stream. • The establishment of the proposed operation will result in a loss of runoff reaching the natural environment by naturally flowing into watercourses. **Indirect Impact:** • Alteration of the drainage patterns may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. • Changes to catchment characteristics such as the removal of vegetation and associated increase in hardstanding at the site will increase runoff and erosion potential during rainfall events. • The construction of crossings across various watercourses within the study area, most notably the access/haul road crossing of the western tributary, has the potential to disrupt movement patterns of aquatic and terrestrial fauna within the associated catchment, limiting both upstream as well as downstream movement. **Cumulative Impact:** • Alteration of aquatic ecology of direct affected watercourses as well as downstream watercourses. • Loss of unique biodiversity features. • The proposed activity is expected to impact on national protected areas targets as well as provincial freshwater conservation targets, both of which are expected to be cumulative if the impact is to be considered with other regional impacts that have or are expected to have on such areas.		**D**	**E**	**M**	**P**	**S**	
		Pre-Mitigation	5	3	10	5	**90**	
		Post-Mitigation	3	2	6	5	**55**	The effects on surface water quality and aquatic ecology resulting from the alteration in drainage patterns can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Implement the LRDCP specifically addressing the rehabilitation measures related to reinstatement of drainage lines (see **Appendix U**). Several recommendations resulted from the Aquatic Biodiversity Assessment (**Appendix J**). These recommendations are included in Part B of this report.

			D	E	M	P	S	
• Topsoil and subsoil stripping & stockpiling for mining operation area	**Destruction of wetlands** **Direct Impact:** • Site clearing and topsoil stripping in Wetlands will cause the loss of micro and macro aquatic species. • Various stockpiles will be likely be located within the area, including overburden, topsoil, throw out and emergency stockpiles, and will be characterised by bare soil and steep side slopes that generate significant surface run-off. • Run-off from these stockpiles is likely to be sediment rich, while carbonaceous stockpiles (if any) might also generate acid rock drainage as pyrites in the overburden are exposed to oxygen. • Where run-off from these stockpiles enters adjacent wetlands, water quality deterioration is likely to result, including increases in turbidity, sulphates, and metal concentrations (e.g. aluminium and Iron), and a drop in pH. **Indirect Impact:** • Alien invasive trees and shrubs are expected to increase within the area as the tend to invade areas that have been disturbed (e.g. on stockpiles and excavated or eroded areas). • Such disturbed areas are likely to act as seed areas that will ultimately facilitate the invasion of associated watercourses and riparian areas. • Alien species generally out-compete indigenous species for water, light, space and nutrients as they are adaptable to changing conditions and are able to easily invade a wide range of ecological niches, posing an ecological threat as they alter habitat structure, lower biodiversity (both number and "quality" of species), change nutrient cycling and productivity, and modify food webs. • Generally, the seepage of mine-impacted water from spoil deposits and stockpiles is a distinct risk in mining environments, with the implication that 1) new wetlands can occur in mining environments as water drains out of toe seep areas or 2) wetlands that are established can experience ingress of poorer quality water in terms of acidity, metals and sulphates (van der Waals, 2016). The change in water quality has an adverse effect on the ecological characteristics of the wetland systems and riverine environments into which the water ultimately flows, the extent of which is determined by the difference in pH and salt load of the polluted water compared to the natural wetland water (van der Waals, 2016). **Cumulative Impact:** • Alteration of aquatic ecology of direct affected watercourses as well as downstream watercourses. • Loss of unique biodiversity features. • The proposed activity is expected to impact on national protected areas targets as well as provincial freshwater conservation targets, both of which are expected to be cumulative if the impact is to be considered with other regional impacts that have or are expected to have on such areas.	**Pre-Mitigation**	5	3	10	5	**90**	The potential effects may be ***avoided*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Implement the LRDCP specifically addressing the rehabilitation measures related to reinstatement of wetlands (**Appendix U**). Several recommendations resulted from the Aquatic Biodiversity Assessment (**Appendix J**). These recommendations are included in Part B of this report.
		Post-Mitigation	3	1	6	5	**50**	

• Opencast mining excavations • RoM & product stockpiling • Residue stockpiles • Discard disposal (backfilling of mining area) • Screening Operations • Drilling & Blasting • Waste generation, storage and disposal • Chemical Toilets • River crossings • Water supply (potable & process) • Storage of fuel and lubricants in temporary facilities • Water Management	**Contamination of water resources** **Direct Impact:** • Throughout the operational phase of the mining operations, potential pollutants are used such as high levels of nitrates. • Improper management of potential pollutants may lead to the degradation of water quality (both surface and sub-surface). • Polluted water resources may affect the aquatic environment in a detrimental manner. • Various stockpiles will be likely be located within the area, including overburden, topsoil, throw out and emergency stockpiles, and will be characterised by bare soil and steep side slopes that generate significant surface run-off. • Run-off from these stockpiles is likely to be sediment rich, while carbonaceous stockpiles (if any) might also generate acid rock drainage as pyrites in the overburden are exposed to oxygen. • Where run-off from these stockpiles enters adjacent wetlands, water quality deterioration is likely to result, including increases in turbidity, sulphates, and metal concentrations (e.g. aluminium and Iron), and a drop in pH. • Water seeping from stockpiles poses a risk of leading to elevated concentrations of heavy metals and other elements in the groundwater environment and can potentially be acidic. When this water reaches surface water bodies or the groundwater it can negatively affect the water quality. • Improper management of blasting activities poses the risk of contaminating water resources with pollutants such as high content of Nitrates. The presence of pollutants in the water resources poses a risk of degrading the conditions for the aquatic ecology to thrive. • These storage of large amounts of waste over an extended time in a area not lined or bunded poses a risk of forming potentially hazardous leachates. • Improper management of effluent from chemical toilets poses a high risk to contaminating water resources. • Storm water run-off from river crossing structures containing pollutants poses a risk in contaminating the surrounding water resources. • Leaks and breaks of water supply infrastructure poses a risk of contaminating water resources. • The use of improper storage facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating both surface and sub-surface water sources as well as the soils surrounding the facility. • The poor management of onsite water i.e. Storm water, process water, effluent, potable water etc. may lead to the contamination of water resources. **Indirect Impact:** • Alteration to the conditions of the water resources may negatively affect the aquatic ecology. • The hazardous leachate from the waste storage facilities poses a risk of contaminating both surface and sub-surface water resources. This may lead to the degradation of conditions for the aquatic ecology to thrive. • Over an extended period, the exposure to contamination will cause the degradation of fauna and flora habitats as well as affect the surface and sub-surface water quality. • Pollutants poses a risk in altering the conditions of the aquatic ecology to thrive. **Cumulative Impact:**		**D**	**E**	**M**	**P**	**S**	
		Pre-Mitigation	4	3	6	5	**65**	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3) Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan. Several recommendations resulted from the Aquatic Biodiversity Assessment (**Appendix J**). These recommendations are included in Part B of this report.
		Post-Mitigation	3	1	4	4	**32**	

	• Mismanagement of mine-generated waste and pollutants (including hydrocarbons, construction waste, hazardous chemicals, etc.) is likely to result in these substances or their derivatives entering and polluting the sensitive aquatic environments either directly through surface runoff during rainfall events, or subsurface water movement. • An increase in pollutants will lead to changes in the water quality of the wetlands and watercourses, affecting their ability to act as ecological corridors within the development landscape. • The linked nature of the wetland systems to downstream water resources will result in pollutants being carried downstream from the mine construction site having consequences on further downstream users.							
• Topsoil and subsoil stripping & stockpiling for mining operation area • Vehicular activity on haul roads; and operation of mining equipment • Storage of fuel and lubricants in temporary facilities	**Hydrocarbon contamination** **Direct Impact:** • Throughout the operational phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment is not maintained. • The use of drill Riggs poses a high risk of hydrocarbon spills. • Hydrocarbon spills can occur where heavy machinery such as the screening plant and hauling vehicles are parked because they contain large volumes of lubricating oils, hydraulic oils, and diesel to run. This poses a risk of hydrocarbon spills if equipment is not maintained. • The use of vehicles on haul roads throughout the operational phase poses a risk of hydrocarbon spills if equipment is not maintained. • Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality. **Indirect Impact:** • An increase in pollutants will lead to changes in the water quality of the wetlands and watercourses, affecting their ability to act as ecological corridors within the development landscape. **Cumulative Impact:** • The linked nature of the wetland systems to downstream water resources will result in pollutants being carried downstream from the mine construction site having consequences on further downstream users.		**D**	**E**	**M**	**P**	**S**	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure. Several recommendations resulted from the Aquatic Biodiversity Assessment (**Appendix J**). These recommendations are included in Part B of this report.
		Pre-Mitigation	3	1	4	4	**32**	
		Post-Mitigation	1	1	0	3	**6**	
• Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Water Management	**Destruction of upstream tributaries and reduction in water in the catchment** **Direct Impact:** • The destruction of tributaries may lead to a limited volume of water available to the downstream users. • The reduction in water in the catchment may cause the degradation of surface water quality. **Indirect Impact:** • Alteration of the upstream drainage lines may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. • Drawdown of the regional water table as the opencast workings flood. • Flooding of the opencast workings while operational. Potentially from contact zones or 1:100Y flooding events. **Cumulative Impact:**		**D**	**E**	**M**	**P**	**S**	The effects on the aquatic biodiversity resulting from the destruction of upstream tributaries and reduction in water in the catchment can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Implement the LRDCP specifically addressing the rehabilitation measures related to reinstatement of drainage lines (see **Appendix U**). Several recommendations resulted from the Aquatic Biodiversity Assessment (**Appendix J**). These recommendations are included in Part B of this report.
		Pre-Mitigation	5	3	10	5	**90**	
		Post-Mitigation	3	2	6	5	**55**	

	• The change in the drainage patterns may negatively impact the surrounding aquatic biodiversity and poses a risk of affecting the catchment ecology. • Loss of unique biodiversity features. • The proposed activity is expected to impact on national protected areas targets as well as provincial freshwater conservation targets, both of which are expected to be cumulative if the impact is to be considered with other regional impacts that have or are expected to have on such areas.							
• Residue stockpiles • Waste generation, storage, and disposal	**Hazardous Leachate** **Direct Impact:** • Potential pollutant in the residue material resulting from mining operation may lead to the formation of leachate. The leachate may contain toxins that is hazardous to the aquatic ecology and water resources. • The poor-quality seepage from the waste storage facilities poses a risk of contaminating both surface and sub-surface water as well as soil resources. This may lead to the degradation of conditions for the aquatic ecology to thrive. **Indirect Impact:** • Mismanagement of mine-generated waste and pollutants (including hydrocarbons, construction waste, hazardous chemicals, etc.) is likely to result in these substances or their derivatives entering and polluting the sensitive aquatic environments either directly through surface runoff during rainfall events, or subsurface water movement. • Run-off from these stockpiles is likely to be sediment rich, while carbonaceous stockpiles (if any) might also generate acid rock drainage as pyrites in the overburden are exposed to oxygen. Where run-off from these stockpiles enters adjacent wetlands, water quality deterioration is likely to result, including increases in turbidity, sulphates, and metal concentrations (e.g. aluminium and Iron), and a drop in pH. **Cumulative Impact:** • An increase in pollutants will lead to changes in the water quality of the wetlands and watercourses, affecting their ability to act as ecological corridors within the development landscape. • The linked nature of the wetland systems to downstream water resources will result in pollutants being carried downstream from the mine construction site having consequences on further downstream users.		**D**	**E**	**M**	**P**	**S**	
		Pre-Mitigation	5	3	8	4	**64**	Formed hazardous leachate can be ***controlled*** in the following ways: (1) Design and implement an Integrated Water and Waste Management Plan (IWWMP). (2) Develop and implement a water quality management plan. (3) Report and record any incidents related to hazardous leachates. (4) All residue material to be classified and disposed as per classification (**see Appendix T**). (5) Waste Management Facilities to be designed by a certified civil engineer.
		Post-Mitigation	3	2	6	3	**33**	
• Drilling & Blasting	**Noise generation** **Direct Impact:** • Mining activities, including blasting, is expected to result in the loss of biodiversity features within the immediate area, as result in a depauperate aquatic biodiversity assemblage downstream of the proposed mining activities. **Indirect Impact:** • This impact is of particular relevance given that currently-undescribed fish species of conservation concern are known to be present within the watercourses downstream of the study area, and may utilise the watercourses associated with the proposed mine for spawning or breeding purposes. The blasting associated with mining therefore has the potential to disrupt spawning or breeding behaviour through generation of vibrations and movement of aquatic habitat.		**D**	**E**	**M**	**P**	**S**	
		Pre-Mitigation	3	2	8	5	**65**	Noise generation can be controlled in the following ways: (1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix H**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.
		Post-Mitigation	3	1	6	4	**40**	

	• Noise generated through mining activities is further expected to result in a localised decrease in amphibian species because of decreased mate attraction during breeding periods. **Cumulative Impact:** • Loss of aquatic species.							

Aspect	Soil							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
• Topsoil and subsoil stripping & stockpiling for mining operation area • RoM & product stockpiling • Residue stockpiles • Opencast mining excavations • Drilling & Blasting • Screening Operations • Discard disposal (backfilling of mining area) • Waste generation, storage and disposal • Chemical Toilets • Storage of fuel and lubricants in temporary facilities • Vehicular activity on haul roads; and operation of mining equipment	**Degradation of soil resources** **Direct Impact:** • If not managed properly, fertile soil will be lost during site clearance, topsoil striping and stockpiling. Loss of fertile soil will cause the degradation of habitat for flora micro- and macro organisms. • Improper management of blasting activities poses the risk of contaminating soil resources with pollutants such as a high content of Nitrates. The presence of pollutant in the soils results in the degradation of the quality. • Improper management of stockpile area i.e. mixing of topsoil and fertile soils with subsoil or RoM product poses a risk of degrading of soil quality. • Backfilling of soil layers will impact on the land capability by restoring the land capability to some extent because vegetation will be supported and therefore returned to the planned post mining land capability such as arable and or grazing. However, if not done incorrectly, the conditions for fauna and flora to reinstate the area will be negatively affected. • These storage of large amounts of waste over an extended time in an area not lined or bunded poses a risk of forming potentially hazardous leachates. • Continuous leaking, spills or lack of maintenance poses a risk to contaminating the surrounding soils and degrading the soil quality. This will affect the micro-ecosystems in a negative manner. • As part of the maintenance related to roads, valuable topsoil's may be removed. Improper management of topsoil or fertile soil may cause the loss of flora micro-ecosystems and cause the degradation of soil quality. **Indirect Impact:** • The degradation of soil quality poses the risk of degrading the conditions for flora and fauna micro ecosystems. • The hazardous leachate potentially poses a risk in contaminating the soil causing the degradation of conditions for flora microorganisms to thrive. **Cumulative Impact:** • Loss of vegetation and habitat, due to the degradation in soil quality, leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding protected areas are affected and may lead to the degradation of the protected area's ecology. • The formation of erosion gullies may lead to the change in the drainage patterns, negatively impacting the surrounding aquatic biodiversity and poses a risk of affecting the catchment ecology.		**D**	**E**	**M**	**P**	**S**	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Implement the LRDCP (**Appendix U**).
		Pre-Mitigation	5	1	10	5	**80**	
		Post-Mitigation	3	1	6	4	**40**	
	Erosion		**D**	**E**	**M**	**P**	**S**	Erosion can be ***controlled*** in the following ways:

• Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • RoM & product stockpiling • Discard disposal (backfilling of mining area) • River crossings • Vehicular activity on haul roads; and operation of mining equipment • Water Management	**Direct Impact:** • Un-vegetated areas exposed to weathering for an extended period will lead to erosion. Erosion prone areas has a high risk of losing fertile soil caused by flash floods. The loss of fertile soil will result in the loss of important micro ecosystems. • Improper installation of river crossing infrastructure poses the risk of contributing to the conditions causing erosion i.e. Un-vegetated and exposed river/watercourse banks. **Indirect Impact:** • Erosion poses a risk of contributing to sedimentation and siltation of rivers/watercourses. Pollutants may affect the conditions for the aquatic ecology to thrive. • Improper management of storm water may lead to erosion along the access routes. This may lead to the loss of fertile soil and in its turn effect the micro-ecosystems of the surrounding environment. **Cumulative Impact:** • Loss of vegetation and habitat, due to the degradation in soil quality, leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding protected areas are affected and may lead to the degradation of the protected area's ecology. • The formation of erosion gullies may lead to the change in the drainage patterns, negatively impacting the surrounding aquatic biodiversity and poses a risk of affecting the catchment ecology.	**Pre-Mitigation**	5	2	10	5	**85**	(1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study).
		Post-Mitigation	3	1	4	3	**24**	
	Illegal dumping		**D**	**E**	**M**	**P**	**S**	
• Waste generation, storage, and disposal	**Direct Impact:** • Dumping of generated water in areas other than is approved by the authorisation or EMP poses a high risk of polluting numerous sources i.e. Water and soil. The dumping of general waste poses a choking risk to grazing animals. **Indirect Impact:** • Hazardous Leachates from illegal dumps also poses a risk to the health of surrounding communities. • The hazardous leachate from the waste storage facilities poses a risk of contaminating both surface and sub-surface water as well as soil resources. This may lead to the degradation of conditions for the aquatic ecology to thrive. **Cumulative Impact:** • Loss of vegetation and habitat, due to the degradation in soil quality, leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding protected areas are affected and may lead to the degradation of the protected area's ecology.	**Pre-Mitigation**	3	1	4	4	**32**	Soil and surface water quality due to leachates can be ***controlled*** in the following ways: (1) Develop and implement as waste management plan with the focus on reuse, reduce, recycle, or avoid. (2) Development and maintenance of a waste disposal record keeping system.
		Post-Mitigation	1	1	2	3	**12**	

Aspect	**Water Resources**							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
• Water Management	**Improper water storage management**		**D**	**E**	**M**	**P**	**S**	The following mitigation measures can be implemented to ***avoid*** the usage of water resources:

	Direct Impact: • Improper management of water storage facilities i.e. Not inspecting or regularly maintaining the storage tanks poses a risk of leaks and contamination. **Indirect Impact:** • Wastage of water leads to the overexposure or decrease in water resource. **Cumulative Impact:** • Overexposing for an extended time may lead to water shortages and poses a negative effect to the downstream users.	**Pre-Mitigation**	3	1	4	3	**24**	(1) Water usage monitoring plan to be developed and implemented. (2) Create awareness of water conservation.
		Post-Mitigation	1	1	0	2	**4**	

Aspect	**Topography and Visual**							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
	Topography and visual alteration		**D**	**E**	**M**	**P**	**S**	
• Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Residue stockpiles	**Direct Impact:** • Vegetation stripping during site clearing and topsoil removal activities will alter the visual environment and topography. • Visual impact of construction activities on sensitive visual receptors near the proposed mine. • Visual impact on observers and residents at homesteads within a 2 - 3km radius of the mine. • Visual impact on observers travelling along the roads and residents at homesteads within a 3 – 6km radius of the mine. • Potential visual impact of operational, safety and security lighting of the facility at night on observers near the proposed mine. • Visual impact of the ancillary infrastructure during the operational phase on observers near the structures. **Indirect Impact:** • An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light. **Cumulative Impact:** • Potential permanent scarring of the landscape if no rehabilitation is undertaken. • The potential cumulative visual impact of the mining activities on the visual quality of the landscape.	**Pre-Mitigation**	5	2	8	5	**75**	The effects of altering the topography caused by vegetation clearance and topsoil stripping can be ***remedied*** in the following ways: (1) Record keeping of the topography and environmental state before the commencement of any activities. (2) Implementation of the LRDCP (**Appendix U**).
		Post-Mitigation	3	1	4	4	**32**	

Aspect	**Noise & Vibration**							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
	Noise generation		**D**	**E**	**M**	**P**	**S**	
• Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Screening Operations	**Direct Impact:** • Increased noise levels at potentially sensitive receptors exceeding criteria of the Noise Control Regulations legislation (NCR) and SANS guidelines. • Disturbing character of sound. • The use of construction equipment during site clearing and topsoil stripping may cause noise during the construction phase. If equipment is not maintained and serviced consistently high levels of noise may result throughout the construction and operational phase.	**Pre-Mitigation**	3	2	6	5	**55**	Noise generation can be ***controlled*** in the following ways: (1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix H**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.
		Post-Mitigation	3	1	4	3	**24**	

• Discard disposal (backfilling of mining area) • Vehicular activity on haul roads; and operation of mining equipment	**Indirect Impact:** • Changing ambient sound levels could increase annoyance and potential complaints. **Cumulative Impact:** • Changing ambient sound levels could change the acceptable land use capability.							
• Drilling & Blasting	**Damaging vibrations** **Direct Impact:** • Air blasts can cause discomfort to persons and, at high levels, damage to structures. At very high levels, it may even cause injury to people. Air blasts could also interact with structures and create secondary noises which people detect, raising their concern about the blasting activity. While rare, window breakage may be the result an air blast. • Damage to infrastructures and loss of life caused by fly rock. **Indirect Impact:** • Loss of infrastructures. • Loss of human life. **Cumulative Impact:** • Loss of community homestead and farming infrastructures. • Reputational damage.		**D**	**E**	**M**	**P**	**S**	Damaging vibrations can be ***avoided*** in the following ways: (1) Safe blasting radius as identified in the Blasting Survey (**Appendix H**) is maintained.
		Pre-Mitigation	3	1	4	3	**24**	
		Post-Mitigation	1	1	2	3	**12**	

Aspect	**Heritage and Palaeontology**							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
• Topsoil and subsoil stripping & stockpiling for mining operation area • Blasting and drilling	**Destruction of graves** **Direct Impact:** • Proposed activities near identified graves poses the risk of destructing graves of great cultural and heritage importance. **Indirect Impact:** • Loss of heritage and history for the future generation of the affected community. **Cumulative Impact:** • The greater study area has been impacted on by various mining developments and the development as per the current lay out will impact on significant heritage resources and therefore the cumulative impact is high. • Although surface sites can be avoided or mitigated, there is a chance that completely buried sites would still be impacted on, but this cannot be quantified.		**D**	**E**	**M**	**P**	**S**	The impacts on heritage and palaeontology can be ***avoided*** in the following ways: (1) Develop and implement an awareness campaign on the protection of social heritage impacts. (2) Clear marking of graves discovered by the Heritage Impact Assessment Report (**Appendix P**).
		Pre-Mitigation	5	1	10	4	**64**	
		Post-Mitigation	5	1	2	4	**32**	
	Degradation of cultural significance heritage sites **Direct Impact:** • Proposed mining activities near cultural significant heritage sites poses the risk of degrading or loss of these sites. **Indirect Impact:** • Loss of heritage and history for the future generation of the affected community. **Cumulative Impact:** • The greater study area has been impacted on by various mining developments and the development as per the current lay out will impact on significant heritage resources and therefore the cumulative impact is high.		**D**	**E**	**M**	**P**	**S**	
		Pre-Mitigation	5	1	10	4	**64**	
		Post-Mitigation	5	1	2	4	**32**	

	• Although surface sites can be avoided or mitigated, there is a chance that completely buried sites would still be impacted on, but this cannot be quantified.							

Aspect	Health and Safety							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
			D	**E**	**M**	**P**	**S**	
• Employment of workers	**Health and Safety of employees** **Direct Impact:** • Increased demand for labour and employees from different cultures may pose the risk to the lack of knowledge and skills on health and safety in the workplace. • Different human behaviours deal with different situations and if there is not a simplified system of managing health and safety risk, situations resulting loss or injury of human life may be a result. **Indirect Impact:** • Increase in injury on duty or disabling injuries of employees. • Loss of productivity due to investigations into injuries or fatalities. **Cumulative Impact:** • Loss of human life.	**Pre-Mitigation**	4	1	6	5	**55**	The health and safety of employees can be ***controlled*** in the following ways: (1) Develop and implement a Health and Safety plan. (2) All employees to be trained in health and safety in the workplace. (3) Develop and implement an employee training program. (4) Keep and maintain a record of all training of employees.
		Post-Mitigation	4	1	6	3	**33**	

Aspect	Socio-economic							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
			D	**E**	**M**	**P**	**S**	
• Employment of workers and procurement of construction materials	**Loss of farm labour** **Direct Impact:** • Increased demand of labour force poses a risk of the local farmers losing farm labour due to competing financial income. **Indirect Impact:** • Deterioration of farming practices due to the loss of knowledgeable labour. **Cumulative Impact:** • Deterioration of surrounding agricultural farms.	**Pre-Mitigation**	3	3	4	5	**50**	The social-economic impacts can be ***controlled*** in the following ways: (1) Develop and implement a social labour plan. (2) Develop and implement a social development plan. (3) Develop and implement a skills development program.
		Post-Mitigation	3	2	2	3	**21**	
	Population Influx **Direct Impact:** • Increased demand for labour force poses a risk of a population influx in the local district municipality leading to pressure on resources. • The increased population influx may lead to conflicting social pathologies in the surrounding local community. • The increased population influx may lead to community conflicts in the surrounding local community. **Indirect Impact:** • The increasing population will put pressure on the local municipality to provide services such as sewage, drinking water, waste management, electricity etc. • Conflicting cultural and spiritual believes and standards. • Increased competition for job opportunities. • As with any large-scale development in a rural area, there is likely to be an influx of people (both employees and jobseekers) that could change the local social dynamic and structure. This could result in increased social ills, such as drug and alcohol abuse, gender-based violence, and increased social conflict.	**Pre-Mitigation**	2	3	6	5	**55**	
		Post-Mitigation	2	2	2	4	**24**	

• The influx of employees and jobseekers, the increase in traffic and reduced natural resources (air, water), could impact negatively on existing communities through reduced environmental health (respiratory), spread of communicable diseases, and increased crime and violence (outside people and competition for resources). **Cumulative Impact:** • Poor service delivery of municipal infrastructures. • Community unrest.							
Job creation and local economic development		**D**	**E**	**M**	**P**	**S**	
Direct Impact: • It is anticipated that the operational phase will see the employment of approximately 44 people for the ten-year duration for the operational phase, creating direct employment for the region. In addition, the sourcing of materials and services could develop indirect employment opportunities. • The local procurement of materials and services could benefit local businesses and indirectly provide employment and improved local spending in the short-term. **Indirect Impact:** • Social projects forming part of the proposed mining project will create additional job opportunities for the local communities. • A number (unknown) of temporary employment opportunities may be generated during the construction phase, which would benefit local unemployed individuals. • The benefits may impact beyond the local area – i.e. to the regional or national level – as many of these opportunities may be skilled or professional and so are unlikely to be sourced locally. • As the types of services required during construction is unlikely to exist locally, these benefits may be realised on a regional or national level, however the procurement of materials and services such as security and cleaning could be sourced locally. • Local businesses could also see growth and diversification through the provision of services and materials to the operation, thus encouraging diversification within the local economy. **Cumulative Impact:** • Job creation for local and district communities. • Local economic development.	**Pre-Mitigation**	2	2	0	4	**16**	
	Post-Mitigation	2	2	0	4	**16**	
Reduced access to livelihood resources		**D**	**E**	**M**	**P**	**S**	
Direct Impact: • Development within proximity to communities. **Indirect Impact:** • Construction activities my require the securing of certain portions of the site, which may be used by local communities to support their subsistence livelihoods, including collection of firewood and herbal medicines, and grazing. **Cumulative Impact:** • Reduced access to livelihood resources.	**Pre-Mitigation**	2	3	6	4	**44**	
	Post-Mitigation	2	2	4	3	**24**	
Change in sense of place		**D**	**E**	**M**	**P**	**S**	
Direct Impact: • Development within proximity to communities. • Mining activities could negatively impact the physical environment, including reduced air quality, noise emissions, and increased traffic. These aspects could cause a nuisance to residents, and potentially change the sense of place.	**Pre-Mitigation**	2	3	6	4	**44**	

	Indirect Impact: • Construction activities could change the nature of the local area with increased traffic, influx of people, and presence of machinery and activities in the area. **Cumulative Impact:** • Change in sense of place.	**Post-Mitigation**	2	2	4	3	**24**	

Aspect	**Traffic**							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
	Pressure on public transport infrastructure		**D**	**E**	**M**	**P**	**S**	
• Bulk transporting of Ore to market on Public roads	**Direct Impact:** • Influx of bulk transporting vehicles puts pressure on the public transport infrastructures. During the life cycle of the proposed activity an increase in vehicle movement in the area will be expected. This poses a potential increase in vehicle, pedestrian, and livestock accidents. **Indirect Impact:** • Increased pressure on existing road infrastructures and municipalities to maintain infrastructures. **Cumulative Impact:** • Degradation of public transport infrastructure.	**Pre-Mitigation**	2	4	3	4	**36**	The traffic impacts can be ***controlled*** in the following ways: (1) Develop and implement a traffic management plan.
		Post-Mitigation	2	4	3	4	**36**	
Decommissioning Phase								

Aspect	**Air Quality & Climate**							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
	Fugitive and ambient dust generation		**D**	**E**	**M**	**P**	**S**	
• Demolition / removal of portable and related infrastructure • Vehicular activity: removal of mobile plant / equipment and vehicles • Rehabilitation of the lay down areas • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.	**Direct Impact:** • Dismantling and demolition of existing infrastructure, transporting, and handling of topsoil on unpaved roads to bring the site to state suitable for alternative land uses poses potential impacts on the atmospheric environment. • Demolition and removal of all infrastructures will cause fugitive dust emissions. Any implication this activity will have on ambient air quality will be short-term and localised. • Transportation of mobile plants / equipment and other materials from site can lead to the generation of fugitive dust comprising TSP, PM_{10} and $PM_{2.5}$. This activity will be short-term, localised, and will have low impacts on the atmospheric environment once the demolition ceases. • Re-vegetation of the remaining footprint of the mine must be done after the reclamation. The impacts on the atmospheric environment during rehabilitation will be limited to the vehicular activity, spreading of soil and profiling/contouring. The impact will be medium-term, limited on spatial scale, with limited implication on ambient air quality. **Indirect Impact:** • Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities. **Cumulative Impacts:** • Continuous generation of fugitive and ambient dust generation during decommissioning activities poses a high risk in the overall degradation of local air quality conditions posing a health risk to both the human and ecological surroundings.	**Pre-Mitigation**	2	2	4	5	**40**	
		Post-Mitigation	2	1	2	3	**15**	

Aspect	Terrestrial Biodiversity							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
• Rehabilitation of mining areas • Rehabilitation of mining areas	**Vegetation and habitat loss** **Direct Impact:** • Improper rehabilitation measures implemented poses a risk of vegetation and habitat loss. • Areas not being rehabilitated adequately exposes the un-vegetated area to the influx of alien invasive vegetation causing irreversible damage to the native fauna and flora species and loss of habitats. **Indirect Impact:** • If areas surrounding the storm water features are not rehabilitated properly or features installed are not constructed according to the storm water management model, these areas are prone to erosion. **Cumulative Impact:** • Loss of vegetation and habitat leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding protected areas are affected and may lead to the degradation of the protected area's ecology. • Deterioration of habitat adjacent to mining site, indirect impacts on habitat status of conservation important taxa, loss of general biodiversity, changed ecological patterns and migratory routes of animals, and an altered fire regime. • Cumulative losses of remaining natural habitat on a regional scale due to exacerbated mining activities in the region, exacerbated human encroachment and associated impacts caused by human-animal conflict and exacerbated use of natural resources.		D	E	M	P	S	
		Pre-Mitigation	3	1	6	5	**50**	
		Post-Mitigation	1	1	2	3	**12**	
• Rehabilitation of mining areas • Rehabilitation of mining areas	**Influx of alien invasive vegetation** **Direct Impact:** • The un-vegetated areas leads to the influx of alien invasive vegetation causing irreversible damage to the native fauna and flora species and loss of habitats. • Impacts on species of conservation consideration, local diversity patterns and ecological patterns. • Impacts on habitat types that exhibit unperturbed status, local and regional conservation efforts, anthropogenic encroachment, and human-nature conflict. **Indirect Impact:** • Influx of alien invasive species leads to a degradation of the natural fauna species to thrive and limits the resettlement of protected or indigenous species. **Cumulative Impact:** • Loss of vegetation and habitat leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding protected areas are affected and may lead to the degradation of the protected area's ecology. • Deterioration of habitat adjacent to mining site, indirect impacts on habitat status of conservation important taxa, loss of general biodiversity, changed ecological patterns and migratory routes of animals, and an altered fire regime. • Cumulative losses of remaining natural habitat on a regional scale due to exacerbated mining activities in the region, exacerbated human encroachment and associated impacts caused by human-animal conflict and exacerbated use of natural resources.		D	E	M	P	S	
		Pre-Mitigation	5	2	8	5	**75**	
		Post-Mitigation	3	1	6	5	**50**	

Aspect	Aquatic Biodiversity							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
			D	**E**	**M**	**P**	**S**	
• Rehabilitation of mining areas • Vehicular activity: removal of mobile plant / equipment and vehicles • Rehabilitation of the lay down areas	**Sedimentation and siltation of watercourses** **Direct Impact:** • Runoff from exposed un-vegetated areas poses a risk in contaminating nearby streams, rivers, and drainage lines. **Indirect Impact:** • Storm water runoff of dirt roads and un-vegetated areas may cause sedimentation and siltation of nearby watercourses. • Storm water runoff of dirt roads may cause sedimentation and siltation of nearby watercourses. • The presence of bare soil associated with stockpiles during mining activities will result in a change in the stormwater runoff volume and velocity entering adjacent wetland systems. **Cumulative Impact:** • Alteration of aquatic ecology of direct affected watercourses as well as downstream watercourses.	**Pre-Mitigation**	2	3	6	4	44	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents. (3) Implementing storm water management plan as conceptualised by the Hydrological Assessment (see **Appendix L**). (4) Implementing the LRDCP (**Appendix U**). Several recommendations resulted from the Aquatic Biodiversity Assessment (**Appendix J**). These recommendations are included in Part B of this report.
		Post-Mitigation	1	1	2	3	12	
• Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.	**Contamination of water resources** **Direct Impact:** • Discharge, spills, and leakage of effluent containing pollutants poses a risk of contaminating water resources within close proximity. **Indirect Impact:** • Alteration to the conditions of the water resources may negatively affect the aquatic ecology. • The hazardous leachate from the waste storage facilities poses a risk of contaminating both surface and sub-surface water resources. This may lead to the degradation of conditions for the aquatic ecology to thrive. • Over an extended period, the exposure to contamination will cause the degradation of fauna and flora habitats as well as affect the surface and sub-surface water quality. • Pollutants poses a risk in altering the conditions of the aquatic ecology to thrive. **Cumulative Impact:** • Mismanagement of mine-generated waste and pollutants (including hydrocarbons, construction waste, hazardous chemicals, etc.) is likely to result in these substances or their derivatives entering and polluting the sensitive aquatic environments either directly through surface runoff during rainfall events, or subsurface water movement. • An increase in pollutants will lead to changes in the water quality of the wetlands and watercourses, affecting their ability to act as ecological corridors within the development landscape. • The linked nature of the wetland systems to downstream water resources will result in pollutants being carried downstream from the mine construction site having consequences on further downstream users.		**D**	**E**	**M**	**P**	**S**	
		Pre-Mitigation	2	3	6	4	44	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3) Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan. (6) Implementing the LRDCP (**Appendix U**). Several recommendations resulted from the Aquatic Biodiversity Assessment (**Appendix J**). These recommendations are included in Part B of this report.
		Post-Mitigation	1	1	4	3	18	

Aspect	Soil							
Activities	**Impact**	**Significance rating**						**Mitigation Measures**
• Rehabilitation of mining areas • Demolition / removal of portable and related infrastructure • Rehabilitation of the lay down areas • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.	**Degradation of soil resources** **Direct Impact:** • If not managed properly, fertile soil will be lost during incorrect replacement of soil during shaping and rehabilitation activities. Loss of fertile soil will cause the degradation of habitat for flora micro- and macro organisms. • Spills or leaks of effluent may contain possible pollutants that poses a risk of further degradation of soil resources. Workshop floors, waste storage facilities and fuel storage facilities are exposed to hydrocarbons throughout construction, operation, and decommissioning. Improper disposal method or remediation poses a risk of polluting the surrounding water and soil resources. **Indirect Impact:** • The degradation of soil quality poses the risk of degrading the conditions for flora and fauna micro ecosystems. **Cumulative Impact:** • Loss of vegetation and habitat, due to the degradation in soil quality, leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding protected areas are affected and may lead to the degradation of the protected area's ecology. • The formation of erosion gullies may lead to the change in the drainage patterns, negatively impacting the surrounding aquatic biodiversity and poses a risk of affecting the catchment ecology.		**D**	**E**	**M**	**P**	**S**	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Implement the LRDCP (**Appendix U**).
		Pre-Mitigation	5	1	8	5	**72**	
		Post-Mitigation	2	1	2	3	**15**	
• Rehabilitation of mining areas • Demolition / removal of portable and related infrastructure • Rehabilitation of the lay down areas • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc. • Vehicular activity: removal of mobile plant / equipment and vehicles	**Erosion** **Direct Impact:** • Un-vegetated areas exposed to weathering for an extended period will lead to erosion. Erosion prone areas has a high risk of losing fertile soil caused by flash floods. The loss of fertile soil will result in the loss of important micro ecosystems. • Improper installation of river crossing infrastructure poses the risk of contributing to the conditions causing erosion i.e. Un-vegetated and exposed river/watercourse banks. **Indirect Impact:** • Erosion poses a risk of contributing to sedimentation and siltation of rivers/watercourses. Pollutants may affect the conditions for the aquatic ecology to thrive. • Improper management of storm water may lead to erosion along the access routes. This may lead to the loss of fertile soil and in its turn effect the micro-ecosystems of the surrounding environment. **Cumulative Impact:** • Loss of vegetation and habitat, due to the degradation in soil quality, leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding protected areas are affected and may lead to the degradation of the protected area's ecology. • The formation of erosion gullies may lead to the change in the drainage patterns, negatively impacting the surrounding aquatic biodiversity and poses a risk of affecting the catchment ecology.		**D**	**E**	**M**	**P**	**S**	Erosion can be ***controlled*** in the following ways: (1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study). (5) Implement the LRDCP (**Appendix U**).
		Pre-Mitigation	5	2	10	5	**85**	
		Post-Mitigation	3	1	4	3	**24**	

• Demolition / removal of portable and related infrastructure • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.	**General waste generation & Littering** **Direct Impact:** • Throughout the decommissioning phase of the project large amounts of waste (general and hazardous waste) will be generated putting strain on local landfill sites. The storage of large amounts of waste over an extended time in an area not lined or bunded poses a risk of forming potentially hazardous leachates. **Indirect Impact:** • Exposure of leachate to the natural environment poses a health risk to the surrounding fauna and flora habitats as well as human health. **Cumulative Impact:** • Loss of vegetation and habitat, due to the degradation in soil quality, leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding protected areas are affected and may lead to the degradation of the protected area's ecology.		**D**	**E**	**M**	**P**	**S**	
		Pre-Mitigation	1	1	8	5	**50**	Soil and surface water quality due to leachates can be ***controlled*** in the following ways: (1) Develop and implement as waste management plan with the focus on reuse, reduce, recycle, or avoid. (2) Development and maintenance of a waste disposal record keeping system. (3) Implement the LRDCP (**Appendix U**).
		Post-Mitigation	1	1	5	3	**18**	
• Rehabilitation of mining areas • Demolition / removal of portable and related infrastructure • Rehabilitation of the lay down areas • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc. • Vehicular activity: removal of mobile plant / equipment and vehicles	**Hydrocarbon contamination** **Direct Impact:** • Throughout the decommissioning phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment is not maintained. • The use of vehicles on haul roads throughout the operational phase poses a risk of hydrocarbon spills if equipment is not maintained. • Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality. **Indirect Impact:** • An increase in pollutants will lead to changes in the water quality of the wetlands and watercourses, affecting their ability to act as ecological corridors within the development landscape. **Cumulative Impact:** • The linked nature of the wetland systems to downstream water resources will result in pollutants being carried downstream from the mine construction site having consequences on further downstream users.		**D**	**E**	**M**	**P**	**S**	
		Pre-Mitigation	3	1	6	3	**30**	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure. (4) Implement the LRDCP (**Appendix U**). Several recommendations resulted from the Aquatic Biodiversity Assessment (**Appendix J**). These recommendations are included in Part B of this report.
		Post-Mitigation	1	1	0	3	**6**	

Aspect	Topography and Visual							
Activities	**Impact**	**Significance rating**	**D**	**E**	**M**	**P**	**S**	**Mitigation Measures**
• Rehabilitation of mining areas • Demolition / removal of portable and related infrastructure • Rehabilitation of the lay down areas • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc. • Vehicular activity: removal of mobile plant / equipment and vehicles	**Topography and visual alteration** **Direct Impact:** • Permanent scarring of the landscape if no rehabilitation is undertaken. • Visual impact of construction activities on sensitive visual receptors near the proposed mine. • Visual impact on observers and residents at homesteads within a 2 - 3km radius of the mine. • Visual impact on observers travelling along the roads and residents at homesteads within a 3 – 6km radius of the mine. • Potential visual impact of operational, safety and security lighting of the facility at night on observers near the proposed mine. • Visual impact of the ancillary infrastructure during the operational phase on observers near the structures. **Indirect Impact:** • An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light. **Cumulative Impact:** • Potential permanent scarring of the landscape if no rehabilitation is undertaken. • The potential cumulative visual impact of the mining activities on the visual quality of the landscape.	**Pre-Mitigation**	5	2	8	5	**75**	The effects of altering the topography caused by vegetation clearance and topsoil stripping can be ***remedied*** in the following ways: (1) Record keeping of the topography and environmental state before the commencement of any activities. (2) Implementation of the LRDCP (**Appendix U**).
		Post-Mitigation	3	1	4	4	**32**	

Aspect	Noise							
Activities	**Impact**	**Significance rating**	**D**	**E**	**M**	**P**	**S**	**Mitigation Measures**
• Rehabilitation of mining areas • Demolition / removal of portable and related infrastructure • Vehicular activity: removal of mobile plant / equipment and vehicles • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.	**Noise generation** **Direct Impact:** • Increased noise levels at potentially sensitive receptors exceeding criteria of the Noise Control Regulations legislation (NCR) and SANS guidelines. • Disturbing character of sound. • The use of construction equipment during site clearing and topsoil stripping may cause noise during the construction phase. If equipment is not maintained and serviced consistently high levels of noise may result throughout the construction and operational phase. **Indirect Impact:** • Changing ambient sound levels could increase annoyance and potential complaints. **Cumulative Impact:** • Changing ambient sound levels could change the acceptable land use capability.	**Pre-Mitigation**	1	1	4	5	**30**	Noise generation can be ***controlled*** in the following ways: (1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix H**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.
		Post-Mitigation	1	1	0	3	**6**	

Aspect	Socio-economic							
Activities	**Impact**	**Significance rating**	**D**	**E**	**M**	**P**	**S**	**Mitigation Measures**
• Employment of workers	**Loss of permanent jobs** **Direct Impact:** • The employment during operational phase is likely to be phased out during decommissioning, resulting in a loss employment locally and regionally. **Indirect Impact:** • **Cumulative Impact:** •	**Pre-Mitigation**	3	3	4	5	**50**	The social-economic impacts can be ***controlled*** in the following ways: (1) Develop and implement a social labour plan. (2) Develop and implement a social development plan. (3) Develop and implement a skills development program.
		Post-Mitigation	3	2	2	3	**21**	

A detailed impact assessment can be found in **Appendix V**.

vi) Methodology used in determining and ranking the impacts and risks

(Rank the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks. Describe how the significance, probability, and duration of the aforesaid identified impacts that were identified through the consultation process was determined in order to decide the extent to which the initial site layout needs revision)

The significance (quantification) of potential environmental impacts identified during the Basic Assessment have been determined using a ranking scale, based on the following (terminology has been taken from the Guideline Documentation on EIA Regulations, of the Department of Environmental Affairs and Tourism, April 1998):

Occurrence

- Probability of occurrence (how likely is it that the impact may occur?)
- Duration of occurrence (how long may it last?)

Severity

- Magnitude (severity) of impact (will the impact be of high, moderate or low severity?)
- Scale/extent of impact (will the impact affect the national, regional or local environment, or only that of the site?)

Each of these factors has been assessed for each potential impact using the ranking scales represented by Table 10.

Table 17: Ranking scale of the four factors considered to determine significance rating

Probability	Duration
1 - very improbable (probably will not happen 2 - improbable (some possibility, but low likelihood) 3 - probable (distinct possibility) 4 - highly probable (most likely) 5 - definite (impact will occur regardless of any prevention measures)	1 - of a very short duration (0–1 years) 2 - of a short duration (2-5 years) 3 - medium-term (5–15 years) 4 - long term (> 15 years) 5 - permanent
Extent	**Magnitude**
1 - limited to the site 2 - limited to the local area 3 - limited to the region 4 - will be national 5 - will be international	0 - small and will have no effect on the environment 2 - minor and will not result in an impact on processes 4 - low and will cause a slight impact on processes 6 - moderate and will result in processes continuing but in a modified way 8 - high (processes are altered to the extent that they temporarily cease) 10 - very high and results in complete destruction of patterns and permanent cessation of processes

The environmental significance of each potential impact is assessed using the following formula:

Significance Points (SP) = (Magnitude + Duration + Extent) x Probability

The maximum value is 100 Significance Points (SP). Potential environmental impacts were rated as high, moderate or low significance on the following basis:

- < 30 significance points = **LOW** environmental significance.
- 31- 60 significance points = **MODERATE** environmental significance
- 60 significance points = **HIGH** environmental significance

vii) Positive and negative impacts of the proposed activity and alternatives on environment and affected communities

(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)

The possible positive and negative impacts that the proposed Vygenhoek Platinum Mine may pose was discussed in detail in ***section v)***.

The advantages and disadvantages of the preferred alternative site layout have been discussed in the various specialist reports as well as in ***section g)***.

viii) Possible mitigation measures

(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)

Part B of this document provides the detailed management plan of each impact and risks. The management plan addresses mitigation measures in detail.

All concerns raised by the I&AP as part of the PPP listed in the previous section will be incorporated and addressed and will form part of the consideration of mitigation measures.

ix) Motivation where no alternative sites were considered

As discussed in section (***h)*** of this report, no property alternatives have been considered as the proposed activities will occur on properties forming part of where previous prospecting rights was issued. However, several alternatives regarding the placement of infrastructure within the property boundaries have been considered (see ***section g)***).

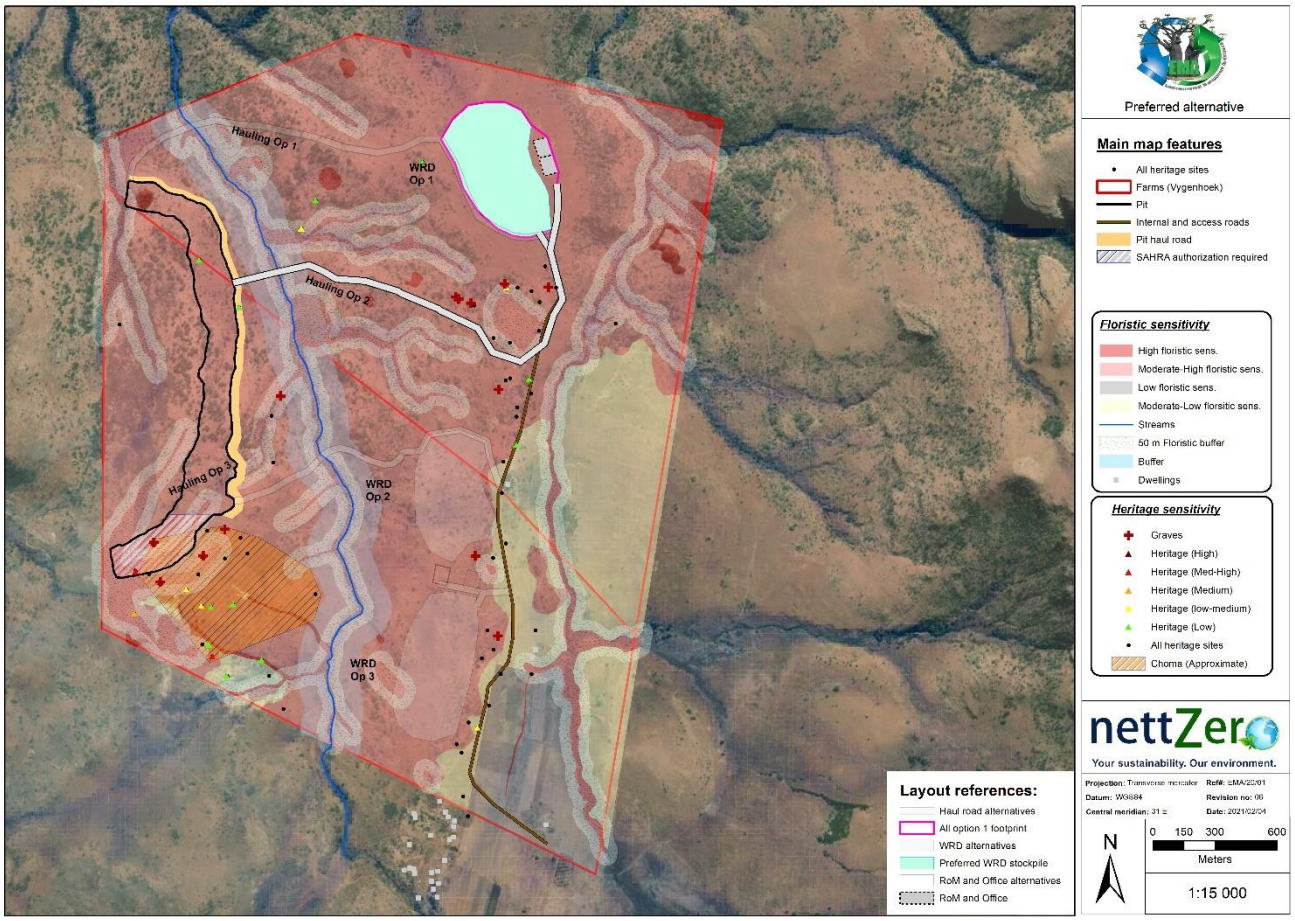

Figure 24: Preferred site layout

The preferred site layout (**Appendix C**) has been determined by considering both environmental and social sensitive receptors as well as considering operational feasibility.

At the time of submitting this report to the competent authority the following conceptual infrastructures formed part of the site layout:

- Storm water infrastructure; and
- Location of PCD's.

It is therefore recommended that before the activity commences a detailed site layout plan, detailing the storm water infrastructures and PCD's, is submitted for approval.

x) Statement motivating the alternative development location within the overall site

(Provide a statement motivating the final site layout that is proposed)

As discussed in the previous sections, both environmental and social sensitive receptors where considered in the site layout attached as **Appendix C**.

In terms of the actual mining areas, there are no alternative sections to be mined as the prospecting results indicated that these areas would be most feasible. However, due to the sensitivities identified during the site assessment, the preferred site layout plan reduced the original development footprint of the associated infrastructures with approximately 29 ha.

Section g) of this report motivated the selection of the alternative preferred site layout. The heritage impact assessment identified the southern portion of the pit (8.2 ha) is falling within the historical Choma village. Mining in a site of such historical importance will require authorisation from the South African Heritage Resources Agency (SAHRA).

h) Full description of the process undertaken to identify, assess and rank the impacts and risks through the life of the activity

(Including (i) a description of all environmental issues and risks that were 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.)

Environmental Management Assistance (Pty) Ltd as the appointed EAP took an [2]Integrated Environmental Management (IEM) approach. However, the adoption of an IEM approach should not be interpreted as an Environmental Impact Assessment (EIA) in itself. It should rather be seen as an underlying philosophy and set of principles, supported by an EIA and management tools that are aimed at promoting sustainability (DEAT, 2004).

Together with the requirements stipulated in GN R. 982 (2014 EIA regulations) the principles set out in the IEM Guideline series published by the Department of Environmental Affairs (DEA, 1992) were considered throughout the assessment process.

Table 12 firstly provides a full description of all environmental issues and risks identified during the EIA process. Secondly it provides the assessment of the significance of each issue and risk according to the methodology discussed in section **vi)** of this report. Lastly, it provides with an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.

The supporting Impact Assessment conducted is attached as **Appendix V** to this report.

[2] Definition of IEM according to DEAT (2004): *IEM provides a holistic framework that can be embraced by all sectors of society for the assessment and management of environmental impacts and aspects associated with an activity for each stage of the activity life cycle, taking into consideration a broad definition of environment and with the overall aim of promoting sustainable development.*

i) 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)

This section identifies all potential impacts associated to the proposed activities associated with the construction, operation, and decommissioning phase of the proposed mining project. Each possible impact have been rated according to the methodology described in section ***vi)***. Pre- and Post- significance ratings were established and are represented in **Table 21**. Each score rating indicates the significance of the potential impacts and risks and is colour coded according to **Table 20**.

Table 18: Explanation of colour indicator

Colour	Significance Points	Explanation
	≤ 30	**LOW** environmental significance
	31 - 60	**MODERATE** environmental significance
	> 60	**HIGH** environmental significance

To avoid replication of information, only the mitigation type will be summarised. The detailed mitigation measures are found in section B to this report.

Table 19: Potential environmental impacts and the assessment thereof

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
Air Quality Management & Climate Change						
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for lay down area of approximately 47 ha and all related mining infrastructure • Construction of training centres, offices, ablution facilities and kitchen facilities • Construction of Pollution Control Dams (PCD's) • Transport of construction material, mobile	Fugitive and ambient dust generation	Air Quality	Entire Lifecycle	**70**	**Control**	**24**
	GHG emissions (direct and indirect)	Air Quality & Climate	Entire Lifecycle	**40**	**Control**	**21**
	Electricity usage	GHG emissions	Operational	**44**	**Control**	**18**

plant, and equipment to the site • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Residue stockpiles • Screening Operations • Discard disposal (backfilling of mining area) • Vehicular activity on haul roads; and operation of mining equipment • Bulk transporting of Ore to market on Public roads						
Terrestrial Biodiversity						

• Access and hauling along roads i.e. during the construction of roads	Vegetation and habitat loss	Macro and Micro organisms Fauna and Flora	Entire Lifecycle	90	Remedy	50
	Influx of alien invasive vegetation	Fauna and Flora micro and macro ecosystems	Entire Lifecycle	90	Control	44
• Site clearing and topsoil stripping for lay down area and all related mining infrastructure • Storm water runoff management features • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • RoM & product stockpiling • Residue stockpiles • Rehabilitation of mining areas • Rehabilitation of the lay down areas	Spread of chemical fires	Fauna and flora micro and macro ecosystems	Construction & Operational	36	Avoid	2
Aquatic Biodiversity						

• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for lay down area and all related mining infrastructure • Storm water runoff management features • Pollution Control Dams (PCD's) i.e. Construction and operation	Sedimentation and siltation of watercourses	• Wetland and aquatic ecology • Surface water quality • Groundwater quality • Soil quality	Entire Lifecycle	65	Avoid	21
	Alteration of drainage patterns			80	Remedy	32

• Stores, workshops &wash bays • Ablutions & change house with sewage treatment plant • Fuel operating power generators • Fuel storage • Transport of construction material, mobile plant, and equipment to the site • Topsoil and subsoil stripping & stockpiling for mining operation area	Contamination of water resources			65	Control	32
	Hydrocarbon contamination			48	Control	6

• Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Residue stockpiles • Screening Operations • Discard disposal (backfilling of mining area) • Waste generation, storage, and disposal • Chemical Toilets • River crossings • Water supply (potable & process) • Storage of fuel and lubricants in temporary facilities • Water Management • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.	Destruction of upstream tributaries and reduction in water in the catchment			**80**	**Avoid**	**32**
	Hazardous Leachate			**64**	**Remedy**	**33**

• Rehabilitation of mining areas • Vehicular activity: removal of mobile plant / equipment and vehicles • Rehabilitation of the lay down areas						
Soil						
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for lay down area and all related mining infrastructure • Stores, workshops &wash bays	Degradation of soil resources	• Soil quality • Loss of fertile soil • Soil contamination	Entire Lifecycle	**80**	**Remedy**	**36**

• Ablutions & change house with sewage treatment plant • Fuel operating power generators • Fuel storage • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Residue stockpiles • Screening Operations • Discard disposal (backfilling of mining area) • Waste generation, storage, and disposal • Chemical Toilets	Hydrocarbon Contamination			**48**	**Control**	**6**
	Erosion			**85**	**Remedy**	**21**
	Illegal dumping			**32**	**Avoid**	**12**
	General waste generation & Littering			**24**	**Control**	**6**

• Storage of fuel and lubricants in temporary facilities • Rehabilitation of mining areas • Demolition / removal of portable and related infrastructure • Rehabilitation of the lay down areas • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.						
Water Resources						
• Onsite clinic • Mining offices i.e. operation of training centres, offices, and kitchen facilities • Water storage facilities • Access and hauling along roads i.e. during the	Water level reduction and contamination	• Wetland and aquatic ecology • Surface water quality • Groundwater quality • Downstream water users	Construction & Operational	**44**	**Control**	**12**
	Domestic water usage			**24**	**Control**	**4**

construction of roads • Site clearing and topsoil stripping for lay down area and all related mining infrastructure • Use of existing drilled / new boreholes • Water supply (potable & process) • Water Management	Improper water storage management			24	Control	4
	Water usage for dust suppression			40	Control	6
Topography and visual alteration						
• Site clearing and topsoil stripping for lay down area and all related mining infrastructure • Mining offices (construction and operation) i.e. operation of training centres, offices, and kitchen facilities • Topsoil and subsoil stripping & stockpiling for	Topography and visual alteration	• Topography and Visual Environment	Entire Lifecycle	55	Remedy	15

mining operation area • Opencast mining excavations • RoM & product stockpiling • Residue stockpiles • Rehabilitation of mining areas						
Noise						
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for lay down area and all related mining infrastructure • Mining offices (construction and operation) i.e. operation of training centres, offices, and kitchen facilities • Stores, workshops &wash bays	Noise generation	• Surrounding noise quality	Entire Lifecycle	**50**	**Control**	**15**

• Fuel operating power generators • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Screening Operations • Discard disposal (backfilling of mining area) • Vehicular activity on haul roads; and operation of mining equipment • Rehabilitation of mining areas • Demolition / removal of portable and related infrastructure						

• Vehicular activity: removal of mobile plant / equipment and vehicles • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.						
Heritage and Palaeontology						
• Site clearing and topsoil stripping for lay down area and all related mining infrastructure • Topsoil and subsoil stripping & stockpiling for mining operation area	Destruction of graves	• Loss of heritage resources	Construction & Operational	**64**	**Avoid**	**32**
	Degradation of cultural significance heritage sites			**64**		**32**
Health and Safety						
• Employment of workers during all phases	Health and Safety of employees and surrounding communities	• Human health and safety environment	Entire Lifecycle	**55**	**Control**	**33**
	Generation of medical waste			**44**	**Control**	**27**
Socio-economic						

• Employment of workers and procurement of construction materials. • Employment of workers	Loss of farm labour	• Socio-economic	Entire Lifecycle	50	Control	21
	Population influx			55	Control	24
	Job creation and local economic development			16	Control	16
	Reduced access to livelihood resources			44	Control	24
	Change in sense of place			44	Control	24

The supporting impact assessment conducted by the EAP must be attached as **Appendix V.**

j) 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 20: Summary of inclusion of specialist recommendations

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMEN-DATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
Air Quality (**Appendix F**: Rayten Environmental, December 2020)	The implementation of dust mitigation measures at the proposed mine is advised to reduce dust emissions as far as possible. Further, the proposed mine must compile and implement a dust management plan throughout the life cycle of the mine (during construction, operation, and decommissioning/closure).	X	All recommendations are included in the EMPr (see **Table 15 & 19** of Part B of this report).
Climate Change (**Appendix G**: Rayten Environmental, October 2020)	The total carbon footprint (Scope 1 only) for Vygenhoek Platinum Mine, for years 1-10, is expected to be 53 671.82 tonnes CO_2e. This should however be recalculated on an annual basis as more accurate usage and activity data becomes available. Vygenhoek Platinum Mine's GHG emissions, in terms of a percentage of South Africa's carbon budget, are considered to be Medium impact (albeit on the lower end of Medium) in terms of the magnitude/severity of the proposed mine's GHG emissions and climate change impacts. It should be noted however that this excluded any Scope 3 GHG emissions, which would result in higher overall CO_2e figures, as well as potentially moving the mine to a High (negative) band in terms of an impact rating.	X	

	The majority of the calculated emissions for Vygenhoek Platinum Mine stem from the use of diesel for mining vehicles and plant/machinery. Grid-based electricity will not be utilised, and all electricity requirements will be generated from diesel-powered generators. There are options to mitigate/lower the GHG emissions from the platinum mine, and while these may reduce the amount of diesel used, and subsequent GHG emissions generated, the overall impact of the mining operations are expected to remain a Medium to High negative impact. This is due to the fact that: • GHG emissions remain in the atmosphere indefinitely, • Their extent will continue to be at an international / global scale, • Climate change is irreversible, • The duration of climate change impacts is permanent, • The probability of contributing to climate change is definite, • The impact of the proposed mine on climate change is cumulative in nature, • The mining activity will contribute to a loss of resource. The impacts of climate change on the project can vary. Mpumalanga Province is expected to experience higher minimum, average and maximum temperatures over the next few decades. These temperature changes would be accompanied by increasing incidence and intensity of drought, possibly even in regions where total rainfall increases (such as along the Mpumalanga escarpment). Total annual rainfall is expected to increase by between 85 and 303 mm per year, with distinct increases along the escarpment (MSDF, 2018). Water demand in Mpumalanga has increased due to rapid industrialisation, mining, urbanization and population growth, and it is stated that the province is unlikely to meet the water availability due to the climate change impact on the province.		

	However, a decision on whether the mining operation should be approved should not rely solely on the climate change impacts. The GHG emissions should be viewed against locally and internationally accepted emission intensity benchmarks for platinum mining. Annexure A of Government Gazette No. 43452 of 19 June 2020, as part of the Carbon Tax Act (Act No. 15 of 2019) provides an SA Industry benchmark value of 0.004 tonnes CO2e/tonne of ore mined, for a shallow depth mine (0-300m) in the Platinum mining sector. In year 1, and intensity ratio of 0.16 tonnes CO2e/tonne of ore is expected. An intensity ratio of 0.03 is calculated for subsequent years 2-10. This is higher that the industry benchmark provided as part of the Carbon Tax Act. The purpose of the emission intensity benchmark is that companies that perform better as compared to a carbon emissions intensity sector benchmark qualify for a higher than default tax-free threshold.		
Noise (**Appendix H**: Enviro Acoustic Research, December 2020)	Mitigation measures are required, and it is recommended that the access road be planned (and constructed) further than 50 m from any structure used for residential purposes. The significance of the noise impact will be reduced to low if all access roads are further than 50 m for any structure used for residential purposes. If the recommended mitigation measures are implemented noise monitoring would not be required.	**X**	
Terrestrial Biodiversity (**Appendix I**: Bathusi Environmental Consulting, December 2020)	***Botanical Biodiversity*** • Vegetatal attributes that characterises the study site, although deemed sensitive, are abundantly represented in the wider region. • The assessment revealed a high and moderately high floristic sensitivity of the largest extent of the site, which is reflects the regional importance of the ecological types, the presence of undisturbed and pristine habitat types, the presence of sensitive habitat types, the extensive presence of numerous species of conservation consideration, and exceptionally high floristic diversity.	**X**	

	• A high number of protected and conservation important plant species were recorded on the site and requires conservation; those that are situated within development footprints require permitting authorisation prior to removal. • It is regarded moderately possible that other plant species of conservation concern may also persist on the site; the implementation of a dedicated monitoring programme is crucial. • The presence of habitat types that are considered unique and sensitive on a local and wider scale is noted; these areas should be excluded from any impacts. • An evaluation of the placement of the mining infrastructure indicated that extensive parts of the high and moderately high sensitivity areas will be affected by direct and indirect impacts. • The loss of natural habitat within the site, although comparatively severe on a local scale, is not expected to result in unacceptable, effects of biodiversity conservation patterns or obligations on a provincial or national scale. • While modifications to the ecological functionality of the site and immediate surrounds are reasonably anticipated, the implementation of the recommended mitigation approach is expected to result in some amelioration of the impacts. • Unavoidable impacts are anticipated within certain, localised areas of high sensitivity; the remainder of these habitat types should be conserved at all costs. • A review of the impacts indicated that, despite the significant and severe nature of the impacts (locally), none of these are deemed entirely unacceptable, with the obvious understanding that the recommended mitigation approach is timeously and comprehensively implemented during the entire life of mine. • Cumulative impacts are anticipated to result in severe, but unavoidable impacts on the surrounding areas (regional). These impacts are considered long-term with a moderate to low potential for successful mitigation. • The need for a Biodiversity Offset, from a botanical perspective, is not clear. It is assumed that the governing authorities will guide/ indicate the need for a Biodiversity Offset assessment, subsequent to which a suitable assessment should be commissioned.		

	It is therefore concluded that the proposed site comprises a vegetatal continuum with wooded grassland and mixed woodland on rocky slopes along a series of perennial drainage lines at a mature state (similar to late-successional habitat), exhibiting floristically sensitive aspects such as conservation important plant species, sensitive habitat types and localised areas of floristic importance. It was also found that these aspects are encountered and represented in the surrounding region. While the proposed activity is expected to result in localised losses of floristic important aspects, no unacceptable impacts of a regional or national concern were identified. It is therefore the considered opinion that, apart from afore-mentioned reservations that stem from the unavoidable and permanent nature of anticipated impacts within a sensitive environment, no explicit objections to the project are raised. This statement is strongly biased with the understanding that best practice guidelines are followed, and the recommended mitigation approach is comprehensively and timeously implemented and stringently adhered for during all stages of the mine. ***Faunal and Avian Biodiversity*** The faunal assemblages along the mature mixed woodland continuum are spatially autocorrected with a high overlap of similar taxa and similar functional groups occurring in these different habitat types, thereby emphasising an intact "functionality". Therefore, the study site represents an exceedingly healthy and natural habitat, expressing intact ecological processes and functionalities. It is predicted that the unmitigated mining activity will have severe and unacceptable negative impacts on the animal and bird constituents and communities (notably species of conservation concern) on a scale larger than the site, with the potential to disrupt the natural movement/dispersal of fauna from upland habitat along the escarpment down into the Dwars River Valley. The comprehensive implementation of the suggested mitigation approach is expected to result in amelioration of the anticipated impacts to an acceptable level, although still considered (unavoidably) devastating on a local scale. No specific objections to the project is raised, but with the understanding that the suggested mitigation protocol is timeously and comprehensively implemented.		

Aquatic Biodiversity (**Appendix J**: Ecology International, January 2021)	The following potential impacts have been identified and assessed throughout the life cycle of the proposed mine: • Sedimentation of aquatic habitats: The potential impact to the aquatic habitats due to sedimentation resulting from various activities related to the proposed mine was determined to be a ***high significance***. However if mitigation measure proposed by the specialist (as per **Appendix J**) as well as the measures defined in the EMPr (**Part B**) are implemented, this impact can be mitigated to a ***low to moderate significance***. • Water quality deterioration: Water quality deterioration due to various activities associated with the proposed mine are likely to have a ***high significance*** impact if not mitigated. However, if the mitigation measures proposed are implemented, the impact can be mitigated to a ***low to moderate significance***. • Loss of unique biodiversity features: The loss of aquatic biodiversity within the western tributary as a result of proposed mining activities poses several concerns and has particular relevance to the confirmed presence of what appears to be an undescribed fish species with a very narrow distribution range. Therefore, if activities are not managed, the proposed mine poses a ***high significance impact*** on various aquatic biodiversity features. By implementing mitigation measures identified specific to the identified aquatic biodiversity features, the potential impacts are expected to be of a ***low to moderated significance***. • Aquatic ecosystem fragmentation: The construction of crossings across various watercourses within the study area, most notably the access/haul road crossing of the western tributary, has the potential to disrupt movement patterns of aquatic and terrestrial fauna within the associated catchment, limiting both upstream as well as downstream movement (***moderate significance impact***). While it is acknowledged that natural barriers to fish movement do exist within the western tributary that will limit the upstream migration of many species, the placement and design of the structures may still have an impact on those species with reach-scale or habitat-scale movement patterns (***low to moderate significance impact***).	**X**	

	• Invasive alien plant species encroachment: Unvegetated and disturbed areas due to the proposed mine, poses a ***moderate to high significant*** risk to the encroachment of invasive alien plant species. However, if mitigation measures defined in the EMPr (Part B) are implemented this risk, from an aquatic point of view, can be mitigated to a ***low to moderate significant*** impact. • Impact on provincial freshwater conservation targets: The proposed activity is expected to impact on national protected areas targets as well as provincial freshwater conservation targets, both of which are expected to be cumulative if the impact is to be considered with other regional impacts that have or are expected to have on such areas (***moderate to high significance*** if not mitigated, ***low to moderate*** if mitigated). A functional buffer of 108m from the edge of the macro-channel of the watercourse is proposed for protection of the riverine ecosystem. The following mitigation measures are seen as conditional should the proposed mining activities within the present study area be considered for approval: • Redesign the mine layout to place all mining-related activities and infrastructure including (but not limited to) water management infrastructure, waste-rock stockpiles, stock yards, laydown areas, etc. upslope of the proposed pit area so that the active pit can act as a final protection measure for runoff from such areas. No mining activities or construction, including access or haul roads other that a single watercourse crossing, are to be allowed within the final designated buffer zone (a functional buffer of 108m from the edge of the macro-channel of the watercourse was proposed for the present study, but final buffer width will be dependent on inputs from terrestrial faunal specialist and wetland specialist); • Design of the final water management system (including Pollution Control Dam, clean/dirty water separation facilities, surface runoff and stormwater management facilities, containment of any carbonaceous or contaminant-bearing material, etc.) is to done in consultation with a suitably qualified aquatic ecologist approved by the Mpumalanga Tourism and Conservation Agency to		

	ensure due consideration of the sensitivities associated with the western tributary. The final design is to take further cognisance of any interflow soils that are present and the implication of these soils on contamination transport, and as such should include consultation with the appointed hydropedologist and wetland specialist; • Given the uncertainty pertaining to the barb species identified within the western tributary associated with the proposed Vygenhoek Platinum Mine, a formal fish sanctuary area within the catchment of the western tributary upstream of the proposed Vygenhoek Platinum Mine area is to be established that will serve to ensure the persistence of the population of Enteromius sp. 'Lowveld-Incomati' until such time as the uncertainties pertaining to the specie are addressed; • In support of the establishment of the fish sanctuary, an adaptive Aquatic Ecosystem Management Plan is to be developed for the western tributary that takes specific cognisance of the presence of Enteromius sp. 'Lowveld-Incomati' and the fish sanctuary. Such a management plan is to follow the SMART approach in order to ensure that the objectives and targets set within the management plan are Specific, Measurable, Achievable, Relevant and Time-bound, and must include the monitoring of the Enteromius sp. 'Lowveld-Incomati' population within the western tributary. Implementation of the management plan is to be audited by a suitably-qualified aquatic specialist on an annual basis, and reviewed every five years based on audit findings.		
Soils (**Appendix K**: Viljoen & Associates, February 2021)	The results of the Impact Assessment for the proposed mine will have a ***medium to low*** impact on the immediate and surrounding soil systems. Implementation and management of proposed mitigation measures will minimize loss of topsoil, prevent contamination of topsoil and stockpiled soil and prevent overall soil erosion. It is recommended that the proposed project be approved subjected to the mitigation measures stipulated in the Impact Assessment and Environmental Management Programme.	**X**	

Hydrology (**Appendix L**: Highlands Hydrology, February 2021)	Hydrological impacts associated with the proposed operation which have been identified in this assessment include the sedimentation and siltation of water courses, alteration of drainage patterns and associated stream flow volumes, as well as the contamination of water resources (including hydrocarbons). The site visits confirmed green-field conditions with an associated pristine hydrological environment. As such, the proposed operation (with the development of infrastructure and associated mining practices) will have a negative impact on receiving water resources. In terms of the Environmental Assessment (EA) and Environmental Management Program (EMPr), the following should be noted: • Where possible, relocate infrastructure outside of the 1:100 year flood-line and 100m stream buffers to reduce flood risk and preserve natural vegetation associated with riparian areas as far as possible. The revised layout (this draft) showed a significant improvement compared to the previous layout and iterations thereof. Where this is not possible ensure appropriate flood protection and correct design of infrastructure such as bridges and culvert. • Ensure the SWMP progresses to detailed design phase ensuring compliance with GN704 and Best Practice Guideline G1 for Storm Water Management (BPG1). The proposed infrastructure footprint and associated area of disturbance (dirty areas) should be minimised as far as practically possible. • Ensure the water quality monitoring program is appropriate and implemented as soon as practically possible to ensure an adequate baseline can be established prior to disturbance through development and mining. It is recommended that monitoring takes place quarterly (at minimum), ensuring a comprehensive analysis is undertaken at an appropriately accredited laboratory. It is further recommended that water from within the dirty water process circuit such as the PCD and pit be included in the monitoring program. • Ensure dirty water generated on site is contained and reused in the process water circuit as far as possible. To this end, there is a need for further investigation into the re-use, or treatment and discharge of dirty water at the operation as highlighted by the static water balance, particularly in the summer months. Dust suppression can be considered, water quality dependant.	**X**	

	• A dynamic water balance simulation model should be developed to more accurately represent water reticulation on site, which can also be used as a decision support tool at both planning and operational levels. • The mitigation measures associated with this project will reduce the impact of the proposed operation on receiving water resources considerably, and as such are considered imperative.		
Geo-hydrology (**Appendix M**: GCS, January 2021)	The following recommendations are made: • Dedicated groundwater monitoring boreholes should be drilled before pit expansion to obtain baseline water quality and quantity data. Drilling log data should be recorded and can supplement any future geohydrological work for the site (i.e. will help to better understand the local geohydrology). • Additional rock samples should be collected during mining, to maintain a clear understanding of the AMD potential of the rock being mined. It is important to use ABA and NAG as pre-emptive tools to determine if any AMD may occur. The following can be done to improve the assumptions and understanding of the groundwater aquifer and hence improve the numerical groundwater model confidence: • All new exploration boreholes drilled in the area should note groundwater occurrences as well as strike depths. The data can be used to update the conceptual hydrogeological model which is incorporated into the numerical flow model. • Water levels of dedicated monitoring boreholes that will be drilled, as well as any new boreholes which are discovered in the area during routine hydrocensus updates, should be monitored bi-annually. • Dewatering volumes (during mining) should be recorded daily and reported bi-monthly. It is recommended that the numerical groundwater model and transport model be updated annually, to: • Recalibrate the flow system based on the dedicated monitoring boreholes drilled and routine water level monitoring data gathered for the site.	**X**	

	• Confirm preferential flow paths and groundwater migration velocities as new geological data is attained via mining. • Evaluate the spatial impact (i.e. TDS plume) calibrated with the proposed monitoring borehole data. • Confirm long term liabilities associated with the workings (i.e. predict likely changes in flow fields etc.); and • Ensure no monitoring network gaps exist (i.e. check if the monitoring network is representative of the site).		
Human Health (**Appendix N**: Adaptera Strategic Support Services, December 2020)	Key HIA Findings and Recommendations: • The surrounding environment already has numerous small, medium, and large-scale mining operations across the region. • The current state (condition) of the local and regional healthcare facilities are poor to mediocre. This may also present an opportunity for the Project to support the improvement/refurbishment of key healthcare infrastructure. • An influx of people into the proposed Project area can be expected in relation to people seeking employment. This could impact the already strained localised health care facilities, housing situation, water and sanitation, and food availability and inflation. • The potential for an increase in accidents and injuries due to increased and/or changes in road traffic, may significantly and adversely affect levels of accidents in the area. • The coronavirus pandemic (Covid-19) remains a significant risk to both the people engaged with the Project, as well as the Project achieving its objectives within anticipated timeframes. • The risk of work stoppages as a result of frequent and often violent protest action in the area remains a high risk. • A positive impact of the Project is the opportunity for job creation at a time when it is desperately needed. As such an investment into local socio-economic environment will be a positive impact to the area.	**X**	

	It is proposed that the following requirements be included into the EMPr and/or EA respectively: • Develop and implement a Health Action Plan (HAP) for construction and operational phases. This can either be a separate document or be included into the EMPr; • Prepare and implement a specific covid-19 management plan for construction and operational phases. This should be aligned to the World Health Organisation (WHO) and South African Covid-19 Regulations; • Appoint a suitably qualified and experienced EHS practitioner whose responsibility should include managing, implementing, and reporting on the Health Action Plan. The EHS practitioner should be registered with SACPCMP at an appropriate level (as per 8(6) of the Construction Regulations) which will outline qualification and experience requirements; • Develop and implement an integrated waste management plan (incl. hazardous and non-hazardous waste); • Develop and implement an integrated water management plan (incl. surface and groundwater); • Investigate (and where feasible implement) the opportunity to support the local healthcare facilities that will be integral to the Projects direct and indirect stakeholders; • Develop and implement an appropriate occupational health and safety management plan (incl. community safety initiatives, OHSE awareness campaigns at schools, churches, and social events); • Ensure that a suitable/recognised food safety management system (e.g. HACCP/ISO22000) is implemented and monitored during construction and operations; and • Ensure that an HIV/AIDS policy, awareness campaign is developed and implemented throughout the construction and operational phases of the Project. The following statements reflect the professional opinion of the appointed specialist: • In relation to the receiving landscape, which already includes numerous mining activities, most of which are substantially larger than this project – it can be deemed that this project is very-small to small in comparison and thus the comparable impacts are minor, however the Project in question will		

	naturally add to the accumulated impacts and effects of mining in the surrounding landscape and communities which reside in this area. • That said, the positive socio-economic impacts of a project such as this, at a time in South Africa's economy which has been hard hit by covid-19 and other economic challenges and which is in dire need of job creation and social upliftment - should not be overlooked when analysing the various health related impacts, many of which can be mitigated. • As such, the proposed project, and related activities (from a health-related perspective) does not indicate any reason for not being authorised in conjunction with the various environmental, social and health related mitigation measures as specified during the Scoping-EIA process.		
Socio-economic (**Appendix O**: Envital, January 2021)	It is the opinion of the specialist that the proposed Vygenhoek Platinum Mine should be authorised within the context of the socio-economic assessment, as the mine is anticipated to be of economic benefit for the local area, as well as contributing to regional mining and economic development opportunities. Although the mine is not considered a major mining development (medium scale and extraction only), employment opportunities and the multiplier effect could improve the opportunities for currently unemployed individuals and low-income households within the local area. However, the manner in which the operations are carried out, must be done in line with best practice, including the Social and Labour Plan and the Social Management Plan. It is possible that not every eventuality of the potential socio-economic impacts have been detailed by this study, due to the complexity of socio-economic environment. It is, therefore, crucial that ongoing and transparent engagement and management of issues as they arise through the recommendations of the Social Management Plan is carried out. This is likely to ensure that the host community and other stakeholders remain in support of the mine, and that negative impacts on the host community are minimised and benefits are maximised. The key mitigation measures required include the following: • Implementation of the Social Management Plan (provided in this study); • Development of Community Plans (communications, complaints, health and safety); • Maximising benefits, including the prioritisation of local employment and appointment of local service providers, and community development initiatives;	**X**	

	• Ensuring transparent, equitable and comprehensive engagement with local communities and other stakeholders throughout the Proposed Project life cycle. It is important to note that social impacts can be felt on an actual or perceptual level, and therefore it is not always possible, or at least straightforward, to measure the impacts in a quantitative manner. It should therefore not be assumed that indirect opportunities for business and employment are sufficient to acquire social license to operate in the host community. The structure and history of the local communities is such that unrest is likely to be an ongoing issue for the operations if stakeholders and communities are not properly engaged.		
Heritage and Palaeontology (**Appendix P**: HCAC, February 2021)	The following recommendations for Environmental Authorisation apply and the project may only proceed based on approval from SAHRA: • Social consultation with the Choma representatives is required to adequately record intangible and tangible resources that could be impacted on by the proposed project; • The Choma Village will be preserved based on the preferred alternative layout, however it is recommended that consultations with the Choma representatives should determine conservation thresholds and to ensure that indirect and secondary impacts are acceptable; • With the preferred alternative, the Mine Plan was amended as far as feasible to avoid damage to the recorded heritage resources. Where this is not possible phase 2 mitigation is recommended based on approval from SAHRA; • The aerial extent of recorded heritage resources must be mapped in relation to the mine layout to finalise mitigation measures (sites that will require monitoring or phase 2 mitigation); • A heritage specialist should assess any material change to the conceptual layout plan and a heritage walkdown of the final layout must be conducted prior to construction. Note that time should be allowed for mitigation if additional sites are identified during the walk down; • A possible grave site was identified during the mapping process and it should be confirmed whether the site is a grave, if so possible micro adjustment of the haul road to retain site in-situ with an adequate buffer zone and safe access for family members is recommended;	**X**	

	• Implementation of a chance find procedure for the project. The overall impact of the preferred alternative layout on heritage resources is medium and can be mitigated to an acceptable level based on the recommendations in this report and approval from SAHRA prior to development. The socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures are implemented for the project.		
Traffic Assessment (**Appendix Q**: Siyazi Limpopo Consulting Services (Pty) Ltd, January 2021)	It is recommended that the following mitigation measures should be implemented for the current situation in terms of road safety, regardless of the proposed mining development: a) Provide a dedicated right-turn lane on the northern approach of the intersection of Roads D212 and D874 (Point A); b) Provide reflective road studs at the intersection of Roads D212 and D874 (Point A) in order to improve the intersection geometry visibility at night time. The following recommendations are made from a traffic engineering perspective as part of the proposed mining development: a) The existing Local Road that provides access to the proposed mining development from Road D874 is deemed to not be suitable in the current state for mine related vehicle traffic with specific reference to heavy vehicles. With no viable identified alternatives for access to the proposed mining development for workers and delivery vehicles, and the fact that workers are expected to also reside east and south of the proposed mining development and will make use of the Local Road to gain access, it is recommended that the Local Road be upgraded to a two lane gravel road with at least a 7 meter wide compacted roadway. The last mentioned should be determined as part of the detail design phase and the standards would also be dependent on potential alternative mined product transport routes;	**X**	

	b) From a road safety perspective, dust suppression on the Local Road (gravel road) should be conducted if and when required in order to avoid road visibility issues caused by dust from vehicles making use of the road, especially mine related heavy vehicles, which could lead to vehicle and pedestrian accidents; c) A road safety training program should be developed by the proposed mining development safety officer to form part of an initiative of community upliftment with the aim of educating the local community and making them aware of road safety risks which is associated with roads and includes but is not limited to pedestrian safety and children playing within road reserves. Staff of the proposed mining development should also form part of the training program; d) A dedicated loading and off-loading area should be provided on-site of the proposed mining development as close as possible to the operation area of the proposed mining development where workers can be loaded and off-loaded in a safe environment; e) Rehabilitation of some sections of Road D874 could from time to time be required to ensure that workers, consumable deliveries and mined product could be transported at all times to and from the proposed mining development. It is recommended that the proposed mining development should monitor the conditions of the relevant section of Road D874 that is proposed to be used to transport workers, consumables and mined product and collaborate with the roads authority when repairs are required; f) Further investigation with regards to a single lane water stream crossing on Road D874 near Point A (**Figure 14**) should be conducted in order to determine whether this crossing would be suitable for an increase in heavy vehicle traffic in the long-term. The following recommendations are made in terms of the detailed design phase of roads for the proposed mining development:		

	a) Detailed investigations should be conducted in conjunction with the relevant road authority and other mining developments in terms of the existing quality and potential life span of the existing road surface layers where consumables, mined ore and workers will be transported. b) A road maintenance plan should be prepared in conjunction with the relevant road authority and other mining developments on public roads where trucks will operate as soon as the proposed mining development has been approved to ensure that the consumables, mined ore and workers can be transported at all times.		
Visual Assessment (**Appendix R**: Logis, November 2020)	The development and operation of the proposed Vygenhoek Platinum Mine and its associated infrastructure, may have a visual impact on the study area, especially within (but not restricted to) a 3km radius of the proposed mine. The post mitigation significance of these visual impacts is expected to range from ***moderate to low***. The anticipated visual impacts on sensitive visual receptors (if and where present) in close proximity to the proposed mining facility are not considered to be fatal flaws for the proposed mine. It is however recommended that the project proponent engage with the residents of the settlements south of the Vygenhoek farm, in order to discuss potential visual impact concerns, to investigate potential visual screening solutions, or to offer reasonable compensation for potential inconvenience experienced.	**X**	
Waste Classification (**Appendix T**: Nettzero (Pty) Ltd,)		**X**	

(Attach copies of Specialist Reports as appendices.)

k) Environmental Impact Statement

In accordance with the Appendix 3 section 3 (q) of the EIA Regulations GN R982, the EAP must provide an opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation must be stated (see **section 1)p)**).

An impact assessment has been undertaken, which has incorporated extensive consultation with appointed independent specialist, and resulted in this report.

Alternatives was assessed based on findings made by the various appointed specialists. The final site layout as presented in **section g) and m)** presented manageable impacts.

It is the EAP's opinion that due process has been followed in terms of identifying impacts found to be potentially significant. Various mitigation measures to manage and monitor the impacts of the proposed Vygenhoek Platinum Mine have been proposed. **Appendix U** provides for addressing the requirements stipulated in GNR 1147 dealing with the financial provisions for the proposed mining operation as well as commitment to rehabilitation measures that must be implemented once authorisation has been granted.

The Vygenhoek Platinum Mine's conceptual Liability Estimation and Final Rehabilitation, Decommissioning and Mine Closure Plan (LRDCP) (**Appendix U**) has been completed during the time of finalising this document. However, this document is considered to be a living document and is subject to an annual review.

Therefore, in consideration of all facts presented by this final EIR, the proposed activities may only commence with the following conditions:

- The identified reduced footprint associated to the preferred alternative site layout plan as presented in **Appendix C** is adhered with;
- All existing informal access roads as presented in **Appendix C** (with specific reference to the coordinates provided) are maintained. For the purpose of this application, any upgrades to the existing roads must not exceed the maximum width of 8m. Should the upgrade require a road reserve larger than 8m, authorisation subject to the relevant listed activities must be obtained;
- The southern portion of the mining pit only be mined once SAHRA grants authorisation for the disturbance of the identified historical Choma village;
- The findings and recommendations stipulated in the Vygenhoek Platinum Mine's LRDCP (**Appendix U**) be implemented;
- A annual rehabilitation be developed and reviewed as per the requirements stipulated by GNR 1147;
- The identified aspects for inclusion of conditions in the EA (as per **section 1) n)**) are adhered with;
- The comments received by the registered I&AP be incorporated into the final EMPr; and

- That the recommended mitigation measures must be strictly implemented and compliance be monitored and reported in order to minimise the impacts and ensuring compliance with current legislative requirements.

It is recommended that the proposed Vygenhoek Platinum Mine is allowed to proceed on the assumption that the environmental and social management commitments are adhered to, the scope of the mining operation remains as per the description provided in the final EIR & EMPr and considering the positive social impacts associated with the mine.

i) Summary of the key findings of the EIA

A number of significant impacts associated to the proposed activities have been identified in previous section in this report as part of the EIA process. In the review of the specialist assessment reports highlighted in section ***j)*** specific environmental and social sensitive receptors were identified. **Table 23** summarises the high significant potential impacts associated to the proposed activities (detailed assessment attached as **Appendix V**).

Table 21: Summary of high significant potential impacts

Activity	Possible Impacts	Significance Pre-mitigation	Significance Post-mitigation	Phase
Terrestrial Biodiversity				
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Storm water runoff management features • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • RoM & product stockpiling • Residue stockpiles • Rehabilitation of mining areas • Rehabilitation of the lay down areas	Vegetation and habitat loss	90	50	Construction, Operational, and Decommissioning
	Influx of alien invasive vegetation	90	44	
Aquatic Biodiversity				
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Storm water runoff management features	Sedimentation and siltation of watercourses	80	21	Construction, Operational, and Decommissioning

• Pollution Control Dams (PCD's) i.e. Construction and operation • Stores, workshops &wash bays • Ablutions & change house with sewage treatment plant • Fuel operating power generators • Fuel storage • Transport of construction material, mobile plant, and equipment to the site • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Residue stockpiles • Screening Operations • Discard disposal (backfilling of mining area) • Waste generation, storage, and disposal • Chemical Toilets • River crossings • Water supply (potable & process) • Storage of fuel and lubricants in temporary facilities • Water Management • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc. • Rehabilitation of mining areas • Vehicular activity: removal of mobile plant / equipment and vehicles • Rehabilitation of the lay down areas	Alteration of drainage patterns	80	32	
	Destruction of wetlands	80	32	
	Contamination of water resources	65	32	
	Destruction of upstream tributaries and reduction in water in the catchment	80	32	
Soil				

• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Stores, workshops &wash bays • Ablutions & change house with sewage treatment plant • Fuel operating power generators • Fuel storage • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Residue stockpiles • Screening Operations • Discard disposal (backfilling of mining area) • Waste generation, storage, and disposal • Chemical Toilets • Storage of fuel and lubricants in temporary facilities • Rehabilitation of mining areas • Demolition / removal of portable and related infrastructure • Rehabilitation of the lay down areas • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.	Degradation of soil resources	80	36	Construction, Operational, and Decommissioning
	Erosion	85	21	
Heritage and Palaeontology				
• Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Topsoil and subsoil stripping & stockpiling for mining operation area	Destruction of graves	64	32	Construction & Operational
	Degradation of cultural significance heritage sites	64	32	

It is clear from the assessment listed above that there will be a number of impacts that poses a ***high negative significant*** impact. However if the mitigation measures proposed in Part B (EMPr) of this report are implemented, monitored and audited throughout the life cycle of the proposed Vygenhoek Platinum Project, the impacts can be mitigated to a ***medium/low negative significant*** impact or avoided all together.

Resulting from the specialist studies as well as the assessment of possible impacts, the following areas of concern would require attention throughout the life cycle of the proposed Vygenhoek Platinum Project:

Terrestrial Biodiversity

Botanical assessment

- A total of 23 plant species of conservation consideration has been recorded during the field survey period. The presence of numerous plant species of conservation concern, notably some of which occur abundantly across the study site (specifically within the proposed development footprints), attest to the natural, pristine, and sensitive nature of the floristic receiving environment.
- No species of a threatened category (VU, EN, CR, CR PE), was recorded within the study site, although, the likelihood that other species of conservation concern would occur within the study site cannot be excluded confidently.

Faunal and Avifaunal assessment

- The site provides habitat for five threatened and four near threatened mammal species. Seven of these species exhibit a high probability of occurrence, of which three species were positively confirmed during the surveys.
- The Sekhukhune Flat Lizard (*Platysaurus orientalis*) was confirmed from the study site where it was widespread to nearly every habitat unit where large boulders and outcrops occur. This species is regarded as a near threatened species in Mpumalanga where it is restricted to the Sekhukhuneland region although its conservation status on national level is regarded as least concern (sensu Bates et al., 2014).
- A total of eight (8) bird species of conservation importance has been recorded in the wider study area (sensu SABAP2 and personal observations) which include five (5) globally threatened species, two (2) regionally threatened species and one (1) regionally near threatened species.
- Two threatened and one near threatened species were observed on the study site, while one globally threatened (currently regionally near threatened) species was observed adjacent to the study site. These include the globally vulnerable Southern Bald Ibis (*Geronticus calvus*), the globally endangered Cape Vulture (*Gyps coprotheres*) and the regionally near threatened Half-collared Kingfisher (*Alcedo semitorquata*).
- The globally vulnerable (regionally near threatened) Blue Crane (*Grus paradisea*) was observed at a small impoundment on the Farm Schaapkraal 42, approximately 3.7 km south of the study boundary.

Heritage and Palaeontology

- The Mine Plan must be amended as far as feasible to avoid damage to the recorded heritage resources (**Appendix P**). Where this is not possible phase 2 mitigation is recommended based on approval of SAHRA permits.

- Du Piesanie and Higgitt (2012) identified Choma Village as a fatal flaw and recommended that the site should be declared a Regional Heritage Site by the SAHRA. It is recommended that the settlement and associated features is preserved in situ with an adequate buffer zone.

ii) 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)

The final preferred site layout is presented in **Appendix C**.

iii) Summary of the positive and negative implications and risks of the proposed activity and identified alternatives

Throughout this report a number of positive and negative implications and risk associated to the proposed Vygenhoek Platinum Mine (**Table 24**) have been identified.

Table 22: Summary of positive and negative implications and risks associated to the Vygenhoek Platinum Mine

Positive Implications	Negative Implication and risk
• Job creation • Positive contribution to social economic development • Contribute to the national GDP • Open communication with the I&AP of environmental findings and performance will contribute the learning opportunity of the surrounding communities. Implementing recommendations made in **Appendix O** will result in the following positive implications: • Possibly stimulate the increase in household income • Increase the ability to afford healthier food and associated improved nutritional and health status • Raise awareness within the community on all associated human health risks. Implementing the recommendations made in **Appendix I** regarding the management of alien invasive species may result in the following positive outcomes: • Promote the knowledge and need for the eradication of alien species within the surrounding communities	• Loss of vegetation and habitat • Degradation of soil resources • Degradation of ambient air quality due to dust generation • Noise generation • Hydrocarbon contamination and pollution • Erosion • Contamination of water resources • Sedimentation and siltation of watercourses • Alteration of drainage patterns • Influx of alien invasive vegetation • Alteration of the visual environment and topography • Destruction or degradation of significant heritage sites and graves • Waste generation (hazardous and general waste) • Health and safety of employees • Community conflict caused by population influx

I) 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 authorisation.)

Part B of this report provides the proposed EMPr. The purpose of the EMPr is to achieve a required end state and describes how activities that have, or could have, an adverse impact on the environment will be mitigated, controlled and monitored. It also addresses the environmental impacts during the Construction, Operational, Decommissioning and Post-Closure Phases of the proposed activities.

The main focus of the EMPr is environmental protection throughout the life cycle of the proposed mining project. A number of environmental recommendations are therefore made to achieve environmental protection.

The environmental and social objectives are set to allow the mining of the chromite and all associated mineral resources in an environmental and socially responsible fashion while ensuring that sustainable closure can be achieved. To achieve closure the correct decisions need to be taken during the planning phase.

The following Environmental Objectives and goals formed the baseline for the development of the EMPr in Part B of this report:

- Protect the biophysical environment from any impacts that cannot be mitigated and that will negatively impact on biodiversity on a regional scale;
- Reserve the water resources in line with the objectives of the integrated catchment management and thereby ensure that the limited available resources are utilised to the maximum benefit of the country and its inhabitants;
- Ensure that activities are carried out so as to aid rehabilitation;
- Ensure a safe and healthy environment for people to live in as is stipulated in the constitution; and
- Ensuring compliance to legislation, regulations, and national standards throughout the life cycle of the project.

The following socio–economic objectives should be attained during the entire life cycle of the proposed activities:

- Adhere to an open and transparent communication procedure with stakeholders at all times.
- Ensure that accurate and regular information is communicated to I&APs in a manner which is understandable and accessible.
- Mitigate negative impacts.
- Enhance Project benefits and minimise negative impacts through intensive consultation with stakeholders.
- Assemble adequate, accurate, appropriate, and relevant socio-economic information relating to the context of the operation.
- Ensure that recruitment strategies for the mine, prioritise the sourcing of local labour, and share in gender equality.
- Ensure an atmosphere of equality and non-discrimination among the workforce.

- Contribute to the development of functional literacy and numeracy among employees.
- Empower the workforce to develop skills that will equip them to obtain employment in other sectors of the economy.
- Contribute to the development of a self-reliant (not dependent on the mine) community surrounding the area of operation.
- Ensure that decommissioning and retrenchments take place in a legally compliant and humane manner.

The overall rehabilitation objectives for this project are as follows:

- Maintain and minimise impacts to the ecosystem within the project area.
- Re-establishment of the pre-development land capability to allow for a desirable post mining land use.
- Prevent excessive losses of soil resources, including soil seed banks, by adequately managing stormwater and accelerated erosion.
- Prevent soil, surface water and groundwater contamination.
- Comply with the relevant local and national regulatory requirements.
- Maintain and monitor the rehabilitated areas until they have reached a stable state in which a gradual natural succession to an optimal natural species composition can progress.

The closure objectives which will drive the closure criteria, **Appendix S**, and which have been developed to support the closure vision are:

- **Physical stability:** to remove and/or stabilise surface infrastructure, unavoidable mining residue and highwalls that are present on the mine to facilitate the implementation of the planned next land use, by ensuring that:
    - Mining-related remnants/features are stable and as such will not pose a safety risk;
    - The stability of remaining mining-related remnants/features will display longevity with slow landform evolution when exposed to expected natural forces;
    - The stability of remaining mining-related remnants/features will be such that these do not detract from the surrounding next land use;
    - If long term stability cannot be ensured, the measures adopted will take account of this and any instability mitigated as far as possible;
    - All rehabilitated disturbed areas that have the potential for wind and/or water erosion will be provided with a suitable vegetation cover to combat these aspects/forces;
    - Final voids will be backfilled to be free draining;
    - Highwalls will remain and stabilised where possible (i.t.o. falling rocks);
    - Where localised material deficits occur, voids will be backfilled and shaped as pan like or naturally undulating structures so that beneficial land uses can be implemented; and

- Monitoring is undertaken to demonstrate the success of the closure and rehabilitation measures implemented.

- **Environmental quality:** to ensure that local environmental quality is not adversely affected by possible physical impacts and chemical contamination which may be arising from the rehabilitated areas. The catchment yield must be sustained post closure as far as possible by ensuring that:
  - Rehabilitated mining areas do not present any unacceptable environmental risks;
  - Environmental impacts will be investigated and addressed at source. If not addressed at the source, the required intervention/mitigation measures will be implemented, preferably during operations, to limit the intervention required at closure; and
  - Ongoing monitoring will be undertaken to ensure the quality of the surface and groundwater, specifically in terms of acidity and salinity, remains within pre-mining quality ranges.
- **Health and safety:** to limit the possible health and safety threats to humans and animals' life by using the rehabilitated mine site as it becomes available, by ensuring that:
  - Health and safety threats are prevented as far as possible. If not, to limit these to acceptable risks that can be reasonably/realistically achieved.
- **Land capability/land-use:** to re-instate suitable land capabilities over the rehabilitated portions of the mine site, by ensuring that:
  - Where possible, land capability will be reinstated to match the pre-mining land capabilities;
  - A functional post-mining landscape is achieved that enables self-sustaining agricultural practices where possible;
  - Invasive vegetation species will be eradicated to further enable achievement of the desired land capability on rehabilitated areas, and functioning of riparian zones; and
  - Landforms are mostly free draining to maximise the surface water return into the catchment to reduce recharge and ensure connectivity of wetlands and functioning of riparian zones.
- **Aesthetic quality:** to leave behind a rehabilitated mine site that, in general, is not only neat and tidy with an acceptable overall aesthetic appearance, but which is also aligned to the respective land uses, by ensuring that:
  - Recognition is given to the local/natural analogues and these be repeated as far as practically possible; and
  - Rehabilitation measures that appear unnatural/visually intrusive will be avoided as far as possible.
- **Biodiversity:** to encourage, where appropriate (for example in corridors), the re-establishment of native vegetation on the rehabilitated mine site such that the terrestrial biodiversity is largely re-instated over time, by ensuring that:
  - Viable self-sustaining vegetation communities are established; and
  - Invasive species that could threaten the reinstatement of the desired vegetation communities are actively eradicated.

- **Social:** to ensure that the infrastructure transfers (if any), and measures and/or contributions made by the mine towards the long-term socio-economic benefit of the local communities are sustainable, the mine will be ensuring that:
    - The local communities are adequately informed about mine closure (next land use planning, scheduled closure and reskilling initiatives linked to the next land use, where possible);
    - Obsolete/dormant mine infrastructure that could be beneficially reused is identified and re-used; and
    - Communities scheduled to benefit are empowered to take over and maintain ceded infrastructure for their ongoing benefit (e.g. boreholes to remain at closure for local communities).

m) 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)

Various alternatives in terms of the infrastructure layouts were considered during the assessment (see **section g)**) of the report detailing the assessment motivation). ***Figure 28*** presents the preferred alternative compared with the layout as presented during the scoping phase.

Table 23: Footprint comparison of the layout presented during the scoping phase with the preferred alternative

Layout presented in Scoping report		**Preferred layout (reduced footprint)**	
Infrastructure	**Footprint**	**Infrastructure**	**Footprint**
Mining pit	38 ha	Mining pit falling outside Choma village	29.4 ha
WRD 1 (north)	4.3 ha	Mining pit requiring authorisation from SAHRA	8.2 ha
WRD 2 (south)	21 ha	WRD 4 & 5	22 ha
WRD 3 (downslope of mining pit)	10 ha	ROM stockpile option 3	0.3 ha
ROM stockpile 1 (north)	2 ha	Offices and workshops	1 ha
ROM stockpile 2 (south)	6 ha	Access and hauling roads	Existing roads: 2.59 km (<8m wide) New road: 1.71km (12m wide) Mining pit road: 2.44 km (15m wide) Total of ±8 ha.
Offices and workshops	3.3 ha	Subsoil stockpiles	1.33 ha
Access and hauling roads	± 15 ha (20 m wide)	Topsoil stockpiles	0.4 ha
Total footprint	100 ha	Total footprint	71 ha

Overall, the alternative motivated in ***section g)*** reduces the total footprint of the mine with approximately 29 ha.

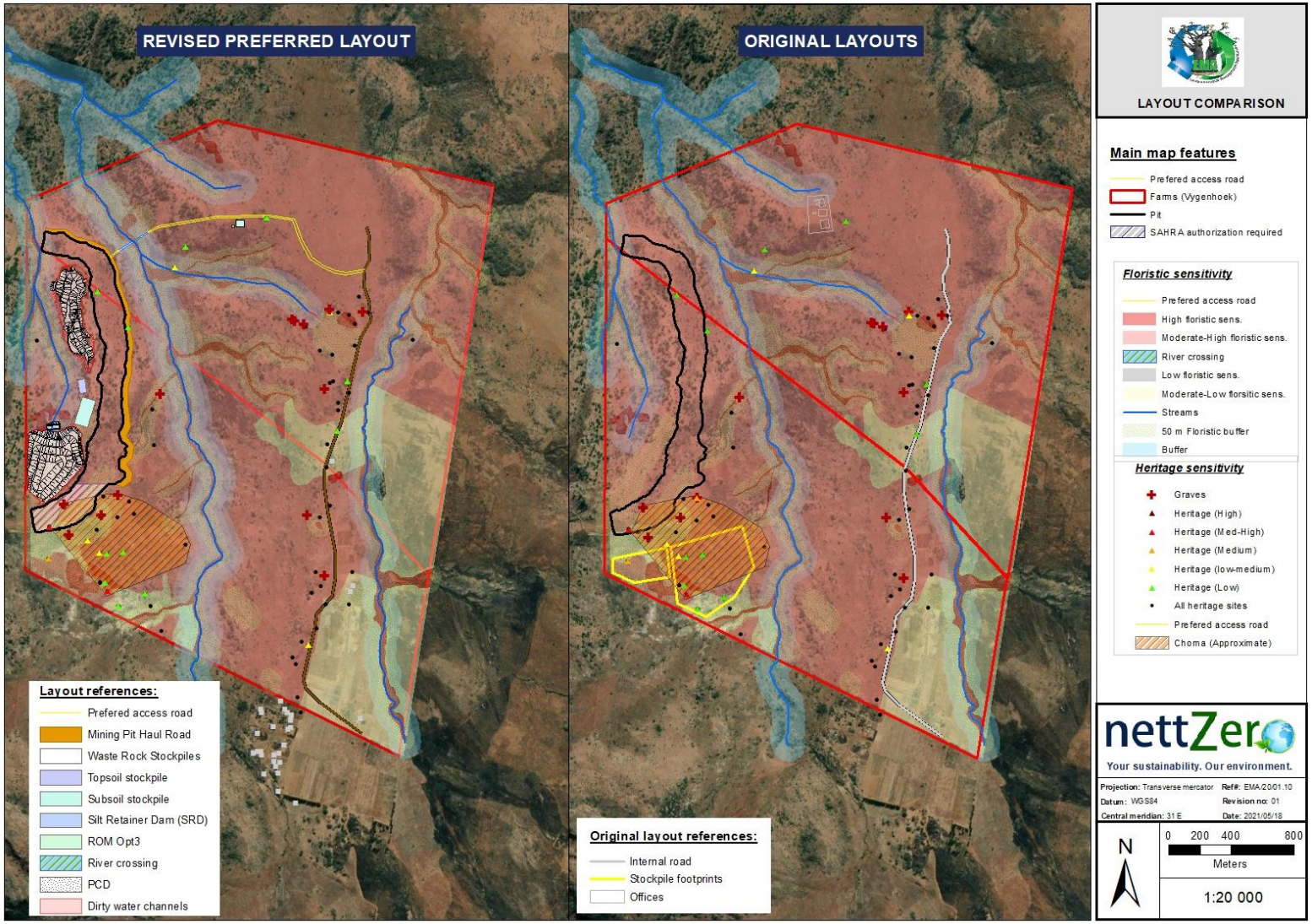

Figure 25: Representation of the layout submitted during the scoping phase and the revised preferred alternative layout

n) Aspects for inclusion as conditions of Authorisation

(Any aspects which have not formed part of the EMPr that must be made conditions of the Environmental Authorisation)

This EIR and EMPr is an integrated application for both an EA as well as a Waste Management Licence (WML). Although a waste classification of the Residue Stockpiles was conducted and general mitigation measures associated to the Waste Management Facilities was considered in the EMPr, only conceptual engineering designs associated with the facilities formed part of the assessment (only the assessment of the location of the facilities) at the time of completing this report.

Therefore, the submission of detailed facility designs for approval from relevant authorities as well as other conditions associated to a mine residue waste management facility deemed necessary by the competent authority, must be specified.

o) Description of any assumptions, uncertainties, and gaps in knowledge

(Which relate to the assessment and mitigation measures proposed)

During conducting the specialist studies, where there was a gap in knowledge or uncertainties, various assumptions has been made (see relevant Appendices for the specific specialist studies.)

The following assumptions, uncertainties, and gaps in the EAP's knowledge has been identified during the assessment process:

- Only a conceptual storm water management plan with identified infrastructures has been developed. Detailed engineering designs are in process of being developed.
- As part of the WML application process, waste classification was conducted using core samples obtained during prospecting drilling. The waste classification identified the type of lining system required for the classified waste stream.
- Micro-siting of the infrastructures associated with the offices and workshops will be required before commencing of the mining activity.

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

i) Reasons why activity should be authorised or not

Environmental Management Assistance (Pty) Ltd as the appointed EAP and associated Specialist recommends that on the conditions that all the requirements, conditions, and measures listed in this document and associated appendices be adhered to, that there is no reason why this activity should not be authorised.

Authorisation should be subjected to the completion of all requirements stipulated by GN R. 982 and GN R. 1142.

ii) Conditions that must be included in the authorisation

A number of conditions have been highlighted in previous sections of this report.

To summarise, the following conditions are recommended to be included in the environmental authorisation:

Terrestrial biodiversity protection conditions

- The recommended 50m buffers around the high sensitivity areas as identified in the Terrestrial Biodiversity Assessment (**Appendix I** also see **Appendix S**) to be protected and mining activities within these areas, unless authorised by the relevant competent authorities, must be avoided at all times. In the event that these areas are unavoidable, a suitable management plan as an addendum to the EMPr must be developed by an appointed specialist to specify mitigation measures.
- The removal and damage of any protected and conservation important plant species on the site requires compliance in terms of national and provincial legislation. In particular, the National Forest Act and Mpumalanga Nature Conservation Act (No.10 of 1998) requires that permits be obtained prior to the removal, damage or destruction of certain plant species.
- Timelines involving permit applications need to be considered, taking cognisance of the seasonal requirements to execute surveys as well as required time of the completion, submission, and approval of permit applications by relevant authorities. It is emphasised that no activity may commence that will adversely affect protected plant species, prior to the approval of all permitting requirements.
- A suitable survey that geolocates and identify all protected and conservation important plants with the approved development footprints need to be commissioned during a suitable time of the year that allows for accurate identification of all affected species, typically during the austral summer period. This will form the basis of the permit applications.
- A search and rescue (relocation) programme to be implemented for certain species that would withstand rigours of transplanting. These species typically include geophytes, succulents, and herb species.
- Not all protected trees can be transplanted, only individuals that will allow for successful excavation and relocation. In these instances, seeds must be harvested, and seedlings be grown to be used for rehabilitation purposes. This is subjected to permitting requirements as it involves activities that make use or exploit protected plant species.
- Rehabilitation design should take note of existing habitat conditions, notably of aspects such as vegetatal characteristics, functionality, landscape form, topography, and slopes. These attributes should be simulated in the rehabilitation design to simulate blend in with the existing environment and not revert to an artificial and altered landscape and appearance.
- The implementation of the annual monitoring protocol by a suitably qualified specialist as identified in the EMPr is emphasised.

Ground water resource management conditions

- Dedicated groundwater monitoring boreholes should be drilled before pit expansion to obtain baseline water quality and quantity data.
- Additional rock samples should be collected during mining, to maintain a clear understanding of the Acid Mine Drainage (AMD) potential of the rock being mined. It is important to use ABA and NAG as pre-emptive tools to determine if any AMD may occur.
- All new exploration boreholes drilled in the area should note groundwater occurrences as well as strike depths. The data can be used to update the conceptual hydrogeological model which is incorporated into the numerical flow model.
- The numerical groundwater model and transport model be updated annually, to:
    - Confirm preferential flow paths and groundwater migration velocities as new geological data is attained via mining.
    - Evaluate the spatial impact (i.e. TDS plume) calibrated with the proposed monitoring borehole data.
    - Confirm long term liabilities associated with the workings (i.e. predict likely changes in flow fields etc.); and
    - Ensure no monitoring network gaps exist (i.e. check if the monitoring network is representative of the site).

Surface water resource management conditions

- Where possible, relocate infrastructure outside of the 1:100 year flood-line and 100m stream buffers to reduce flood risk and preserve natural vegetation associated with riparian areas as far as possible. Where this is not possible ensure appropriate flood protection and correct design of infrastructure such as bridges and culvert.
- Ensure the Storm Water Management Plan progresses to detailed design phase ensuring compliance with GN704 and Best Practice Guideline G1 for Storm Water Management (BPG1). The proposed infrastructure footprint and associated area of disturbance (dirty areas) should be minimised as far as practically possible. All water uses associated to the infrastructures must be authorised by the Department of Human Settlement, Water and Sanitation before commencement of any mining activities.
- Ensure the water quality monitoring program is appropriate and implemented as soon as practically possible to ensure an adequate baseline can be established prior to disturbance through development and mining. Monitoring to take place quarterly (at minimum), ensuring a comprehensive analysis is undertaken at an appropriately accredited laboratory. Water from within the dirty water process circuit such as the PCD and pit must be included in the monitoring program.
- Ensure dirty water generated on site is contained and reused in the process water circuit as far as possible. To this end, there is a need for further investigation into the re-use, or treatment and discharge of dirty water at the operation

as highlighted by the static water balance, particularly in the summer months. Dust suppression can be considered, water quality dependant.

- A dynamic water balance simulation model should be developed to more accurately represent water reticulation on site, which can also be used as a decision support tool at both planning and operational levels.
- The mitigation measures associated with this project will reduce the impact of the proposed operation on receiving water resources considerably, and as such are considered imperative.

Heritage resource protection conditions

- The identified portion of the mining pit falling within the historical Choma village, can only be mined once authorisation from SAHRA has been received and a specific mitigation management plan has been developed by an appointed heritage specialist.

General conditions

- All comments and concerns raised by the registered I&AP be considered and incorporated into the final EIR and EMPr where applicable & practicable.
- The Vygenhoek Platinum Mine's LRDCP attached as **Appendix U** should be considered as the ***conceptual draft*** and a living document. A number of assumptions, gaps and uncertainties were identified during the preparation of this report. It is recommended that it be reviewed. As highlighted in **Part A section q)ii)(2),** on granting of the authorisation for the proposed mining activities to proceed a final Annual Rehabilitation plan and a Risk Assessment plan as specified by GNR 1147 must be submitted to the competent authority for approval.
- A final site layout detailing all infrastructure (with specific reference to the storm water management infrastructure, the PCD's designs, the river crossings, and WRD) associated to the mining activities, clearly indicating the total footprint, must be provided to the competent authorities for approval before any activities commence.
- All existing informal access roads as presented in **Appendix C** (with specific reference to the coordinates provided) are maintained. Any upgrades to the existing roads must not exceed the maximum width of 8m. Should the upgrade require a road reserve larger than 8m, authorisation subject to the relevant listed activities must be obtained.
- A Vygenhoek Mine Community and Stakeholders forum must be established that is open to all interested and affected parties. The purpose of the forum is to communicate social and environmental performance (reporting of incidents, performance of implementing the EMPr and EA conditions), raise concerns, communicate proposed blasting schedules, and initiate collaborations.
- Conditions stipulated in the final EMPr and closure plan be adhered with.
- Conditions stipulated in all other permits or authorisations should be implemented.

- All recommendations made in the EIR and specialist studies be implemented and considered in the finalisation of the site layout plan and operational design of the proposed mining development.

(1) **Specific conditions to be included into the compilation and approval of EMPr**

All requirements stipulated by the final EIR, as well as the developed Vygenhoek Platinum Mine's LRDCP and comments received by the I&AP have been incorporated into the final EMPr (Part B).

(2) **Rehabilitation requirements**

The Vygenhoek Platinum Mine's LRDCP has been developed according to GNR 1147 published under the National Environmental Management Act (Act No. 107 of 1998) (NEMA).

The purpose of these regulations is to regulate the determination and making of financial provision as contemplated in NEMA for the cost associated with the undertaking of management, rehabilitation and remediation of environmental impacts from prospecting and mining operations through the lifespan of such operations and latent or residual environmental impacts that may become known in the future.

This regulation requires the following documents:

- Annual rehabilitation, as reflected in an annual rehabilitation plan;
- Final rehabilitation, decommissioning and closure of the prospecting or mining operations at the end of the life of operations, as reflected in a final rehabilitation, decommissioning and mine closure plan; and
- Remediation of latent or residual environmental impacts which may become known in the future, including the pumping and treatment of polluted or extraneous water, as reflected in an environmental risk assessment report.

The required documents listed above has been combined and incorporated into the first Vygenhoek Platinum Mine's LRDCP attached as **Appendix U**.

Annual rehabilitation

GNR 1147 stipulates the requirements of the annual rehabilitation plan. The annual rehabilitation plan will be relevant for a period of 1 year, after which the plan will be updated by Nomamix (Pty) Ltd to reflect progress relating to rehabilitation and remediation activities in the preceding 12 months and to establish a plan, schedule and budget for the forth coming 12 months. The purpose of this document is to explain the following:

- Definition of concurrent rehabilitation and remediation activities for the forthcoming 12 months;
- how these relate to the operations' closure vision, as detailed in the final rehabilitation, decommissioning, and mine closure plan;
- indicate what closure objectives and criteria are being achieved through the implementation of the plan; and

- Must be measurable and auditable.

As explained in **Appendix U**, a detailed annual rehabilitation plan for mining related activities cannot be devised at this stage of the process. However, conceptual expectations on annual rehabilitation have been defined in the report and will be required to be reviewed and updated on an annual basis. Therefore, as soon as the proposed mining activity has been granted and authorised, the LRDCP will need to be reviewed.

Liability Estimation and Final Rehabilitation, Decommissioning and Mine Closure Plan (LRDCP)

GNR 1147 lists a number of requirements for the final rehabilitation, decommissioning and closure plan. This plan must include or describe the following:

- Must be measurable and auditable;
- Must take into consideration the proposed post-mining end use of the affected area;
- Must contain information that is necessary for the definition of the closure vision, objectives, design, and relinquishment criteria;
- Indicate what infrastructure and activities will ultimately be decommissioned, closed, removed and remediated;
- The risk drivers determining actions, indicating how the closure actions will be implemented to achieve closure relinquishment criteria; and
- Indicate monitoring, auditing and reporting requirements.

The Vygenhoek Platinum Mine's LRDCP addresses the requirements stipulated above. However, as soon as the final site layout detailing all infrastructures associated to the mining activities have been defined and finalised (**Appendix U**), it is recommended that this report be reviewed.

Risk assessment Report

The environmental risk assessment report must contain information that is necessary to determine the potential financial liability associated with the management of latent environmental liabilities post closure, keeping in mind the proposed post-mining end use, once the initial relinquishment criteria have been achieved.

Although the potential impacts associated with the proposed mining activities have been identified throughout the EIA process, the identification of latent risks, without the initiation of full mining activity and monitoring of the implementation of the relevant mitigation strategies, remains hypothetical at this stage and thus is not possible to assess.

In an effort to prevent any possible latent impacts/risks from the proposed mining activities during operation and post closure, the following knowledge gaps have been identified in **Appendix U** to be addressed annually during operation and/or upon closure where applicable.

q) Period for which the Environmental Authorisation is required

The expected life of mine has been determined to be 10 years. However, should the proposed mine development exceed this period, it is recommended that the environmental authorisation be revised.

r) 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 Basic assessment report and the Environmental Management Programme report.)

See Part B of this report and **Appendix W**.

s) Financial Provision

(State the amount that is required to both manage and rehabilitate the environment in respect of rehabilitation.)

As stated in **section p)ii)(2)**, the Vygenhoek Platinum Mine's LRDCP has been developed according to GNR 1147 published under the National Environmental Management Act (Act No. 107 of 1998) (NEMA).

The following section will provide details on how the financial provisions associated with the proposed Vygenhoek Platinum Mine was derived.

i) Explanation of deriving provisions

Financial provision methodology

A detailed site assessment was conducted to identify all the relevant infrastructure and actions that would need to be included in the calculation of the financial provision. A site layout plan was used to identify and mark related infrastructure. Once this was complete, a list of the entire infrastructure was compiled. The infrastructure was classified in accordance with the tariffs list and the surface areas of the infrastructure were calculated to determine the volume or surface requiring rehabilitation or demolition. The following information serves as input into explaining the process followed to calculate the financial provision required, see **Table 22**.

Table 24: DMRE Input information based on guideline

Aspect	DMR Guideline reference	Input
Minerals related to quarrying	Table B12	Chromite and associated minerals
Environmental sensitivity	Table B12	Class C, Low risk
Specialist studies required	Table B9	Screening level risk assessment
Preliminary and General	N/A	6% as total is above R 100 000 000.00
Contingencies	N/A	10%
Weighing factor 1 – Nature of terrain	Table B7	Undulating – 1.20
Weighing factor 2 – Proximity to urban area	Table B8	Urban – 1.05

Demolition and rehabilitation rates

The guideline for the calculation of closure costs issued by DMRE in 2005 was used to support the calculation of the closure cost quanta.

The tariffs used in the guideline document have been adjusted to support inflation increases since 2005 (as per CPIX obtained from Statistics South Africa, statistical release P0141). **Table 23** contains the rates used for the 2020 closure liability calculation.

Table 25: DMRE Tariffs used for quantum determination

Category	Description	Unit	2020 Rates (CPI @ 2.9%)
1	Dismantling of processing plant and related structures	M3	R 15.83
2a	Demolition of steel buildings and structures	M2	R 218.63
2b	Demolition of reinforced concrete buildings and structures	M2	R 322.23
3	Rehabilitation of access roads	M2	R 39.1
4a	Demolition and rehabilitation of electrified railway lines	M	R 379.75
4b	Demolition and rehabilitation of non-electrified railway lines	M	R 207.14
5	Demolition of housing and/or administrative facilities	M2	R 438.66
6	Opencast rehabilitation including final voids and ramps (enviroberm)	Ha	R 229 237.82
7	Sealing of shaft audits and inclines	M3	R 117.37
8a	Rehabilitation of overburden and spoils	Ha	R 152 825.2
8b	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	Ha	R 190 341.03
8c	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	Ha	R 552 840.59
9	Rehabilitation of subsided areas	Ha	R 127 968.09
10	General surface rehabilitation	Ha	R 121 063.33
11	River diversions	Ha	R 121 063.33
12	Fencing	M	R 138.08
13	Water management	-	R 46 031.68
14	2 to 3 years maintenance and aftercare	ha	R 16 111.09

ii) Confirmation that amount can be provided for from the 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)

Once the EA has been received, the applicant will review the Vygenhoek Platinum Mine's LRDCP as per GNR 1147, a financial provision as per regulation 7 and 8 must be provided.

t) Deviations from the approved scoping report and plan of study

No deviations in terms of listed activities as identified in the approved scoping report and plan of study.

Due to various identified sensitivities, the site layout has been significantly changed. See ***section m)*** of the report.

i) Deviation 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)

No deviation from the methodology described in the scoping report.

ii) Motivation for deviation

No deviation from the methodology described in the scoping report.

u) Other information required by the competent Authority

The submitted Scoping Report and Plan of Study for Environmental Impact Assessment, received by the DMRE on 13 November 2020, was accepted on 25 February 2021. The DMRE required that the following be undertaken as part of the final EIR and EMPr:

- All the activities to be undertaken on site must be described and the impacts that the proposed mining activity will have on the physical, biological, social, economic and cultural aspects of the environment must be assessed (***section g) v) and Appendix V***).
- A description of the impact management objectives, including management statements identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all of the phases of the development and the method of monitoring of the implementation of the impact management actions (***Part B***).
- Feasible and reasonable alternatives based on the different types/categories of alternatives must be identified and assessed, so that the Department can be able to make an informed decision (***section d) ii) and g) i), ix), and x***).
- Public Participation Process must be transparent, and all comments received during the process must be incorporated into the comments and response report of the final Environmental Impact Report (***section g) iii)*** and ***Appendix E***).
- State Departments must be consulted, and comments must be incorporated in the final Environmental Impact report (***section g) iii)*** and ***Appendix E***).
- Proof of correspondence with the various stakeholders must be included in the EIAR. Should you be unable to obtain comments, proof of the attempts that were made to obtain comments should be submitted to the Department (***Appendix E***).
- All comments from interested and affected parties must be adequately addressed in the final Environmental Impact Report (***section g) iii)*** and ***Appendix E***).

- For linear activities such as roads and pipelines, a description of the co-ordinates of the corridor in which the proposed activities are to be undertaken. The impacts of these linear activities must be thoroughly assessed (***Appendix C and section g) v)***).
- A motivation for the need and desirability of the project must be included (***section f)***).

All of the above requirements have been addressed within this report (see relevant sections in brackets).

i) Compliance with the provisions of sections 24 (4)(a) and (b) read with section 24 (3)(a) and (7) of NEMA

Section 24 (4)(a) and (b) of NEMA states the following:

"Procedures for the investigation, assessment and communication of the potential consequences or impacts of the activities on the environment – (a) must ensure, with respect to every application for an environmental authorisation –

(i) Coordination and cooperation between organs of state in the consideration of assessments where an activity falls under the jurisdiction of more than one organ of state;

(ii) that the findings and recommendations flowing from an investigation, the general objectives of integrated environmental management laid down in this Act and the principles of environmental management set out in section 2 are taken into account in any decision made by an organ of state in relation to any proposed policy, programme, process, plan or project;

(iii) that a description of the environment likely to be significantly affected by the proposed activity is contained in such application;

(iv) investigation of the potential consequences for or impacts on the environment of the activity and assessment of the significance of those potential consequences or impacts; and

(v) public information and participation procedures which provide all interested and affected parties, including all organs of state in all spheres of government that may have jurisdiction over any aspect of the activity, with a reasonable opportunity to participate in those information and participation procedures; and

(b) must include, with respect to every application for an environmental authorisation and where applicable –

(i) investigation of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity;

(ii) investigation of mitigation measures to keep adverse consequences or impacts to a minimum;

(iii) investigation, assessment and evaluation of the impact of any proposed listed or specified activity on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999

(Act No. 25 of 1999), excluding the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act;

(iv) reporting on gaps in knowledge, the adequacy of predictive methods and underlying assumptions, and uncertainties encountered in compiling the required information;

(v) investigation and formulation of arrangements for the monitoring and management of consequences for or impacts on the environment, and the assessment of the effectiveness of such arrangements after their implementation;

(vi) consideration of environmental attributes identified in the compilation of information and maps contemplated in subsection (3); and

(vii) provision for the adherence to requirements that are prescribed in a specific environmental management Act relevant to the listed or specified activity in question."

Section 24 (3)(a) and (7) of NEMA states the following:

"24 (3) The Minister, or an MEC with the concurrence of the Minister, may compile information and maps that specify the attributes of the environment in particular geographical areas, including the sensitivity, extent, interrelationship and significance of such attributes which must be taken into account by every competent authority."

"24 (7) Compliance with the procedures laid down by the Minister or an MEC in terms of subsection (4) does not absolve a person from complying with any other statutory requirement to obtain authorization from any organ of state charged by law with authorising, permitting or otherwise allowing the implementation of the activity in question."

The purpose of Part A and Part B of this report fulfils the requirements stipulated in section 24 of NEMA. This report resulted with the outcomes of the detailed impact assessment carried out and provides recommendations from a broad spectrum of expertise.

(1) **Impact on the socio-economic conditions of any affected persons**

(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 2.19.1 and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6.and 2.12.herein)

The Vygenhoek Platinum social and labour plan (**Appendix D**) the Human health impact assessment (**Appendix N**), and the Social Impact Assessment (**Appendix O**) addresses the associated impacts on the socio-economic conditions.

See section **1) (a) XIII** of this report summarising the findings of the Social Impact Assessment (**Appendix O**).

(2) **Impact on any national estate referred to in section (3)2 of the National Heritage Resource 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)

A detailed Heritage Impact Assessment is attached as **Appendix P** Section **1)(a)XIV** summarises the findings and recommendations made by the specialist investigation.

v) 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. The EAP must attach such motivation as Appendix 4).

As discussed in previous sections of this reports, alternatives were considered with regards to the infrastructure layout plan.

PART B: ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

The purpose of this section is to provide a baseline Environmental Management Programme (EMPr) to essentially form part of the Vygenhoek Platinum Mine's Environmental Management System (EMS). The information provided in this section describes guidelines, operating procedures and rehabilitation/pollution control requirements which will be a legal binding document which the holder of the authorisation, upon granting the Mining Right, will be held accountable for implementation.

The recommendations and procedures stipulated in the EMPr are based on the findings discussed in Part A of this report. It is therefore essential that this portion be carefully studied, understood, implemented, and adhered to at all times.

Part B of this report should be considered as a "living" document, to be reviewed and amended as deemed necessary.

The reasons for review and/or amendments may be the following:

- Failure to identify certain risk or impacts during the initial EIA process; and
- The ability of the EMPr to sufficiently provide for the avoidance, management, and mitigation of environmental impacts associated with the undertaking of authorised activities.

In the event that additional activities not specified in the EIR and EMPr is to take place, the impacts associated to these activities should be assessed according to the requirements stipulated by GN R. 982. Therefore this EMPr is only applicable to the listed authorising activities as stipulated ***Part A section d)i)***.

1) Draft environmental management programme.

Part B of this report is considered to be the first draft EMPr and is subject to the approval of the Department of Minerals, Resources and Energy (DMRE). Once approved this report will be considered as finalised as the legal binding EMPr read together with the Environmental Authorisation.

a) 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)

As stipulated in Part A section 1 (a).

b) 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)

As stipulated in Part A, section (1) (h).

c) 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)

Find **Appendix C**

d) Description of Impact management objectives including management statements

Throughout Part A and Part B of this report, a number of possible environmental and social impacts/risks have been identified. The sections to follow will provide the management approach related to each potential impact/risk by defining management and outcome-based objectives.

i) Determination of closure objectives

(Ensure that the closure objectives are informed by the type of environment described in 2.4 herein)

As stated in **Part A section p)ii)(2)**, the Vygenhoek Platinum Mine's conceptual LRDCP (**Appendix S**) has been developed according to GNR 1147 published under the National Environmental Management Act (Act No. 107 of 1998) (NEMA).

The closure objectives which will drive the LRDCP are:

- **Physical stability:** to remove and/or stabilise surface infrastructure, unavoidable mining residue and highwalls that are present on the mine to facilitate the implementation of the planned next land use, by ensuring that:
    - Mining-related remnants/features are stable and as such will not pose a safety risk;
    - The stability of remaining mining-related remnants/features will display longevity with slow landform evolution when exposed to expected natural forces;
    - The stability of remaining mining-related remnants/features will be such that these do not detract from the surrounding next land use;
    - If long term stability cannot be ensured, the measures adopted will take account of this and any instability mitigated as far as possible;
    - All rehabilitated disturbed areas that have the potential for wind and/or water erosion will be provided with a suitable vegetation cover to combat these aspects/forces;
    - Final voids will be backfilled to be free draining;
    - Highwalls will remain and stabilised where possible (i.t.o. falling rocks);
    - Where localised material deficits occur, voids will be backfilled and shaped as pan like or naturally undulating structures so that beneficial land uses can be implemented; and
    - Monitoring is undertaken to demonstrate the success of the closure and rehabilitation measures implemented.

- **Environmental quality:** to ensure that local environmental quality is not adversely affected by possible physical impacts and chemical contamination which may be arising from the rehabilitated areas. The catchment yield must be sustained post closure as far as possible by ensuring that:
    - Rehabilitated mining areas do not present any unacceptable environmental risks;
    - Environmental impacts will be investigated and addressed at source. If not addressed at the source, the required intervention/mitigation measures will be implemented, preferably during operations, to limit the intervention required at closure; and
    - Ongoing monitoring will be undertaken to ensure the quality of the surface and groundwater, specifically in terms of acidity and salinity, remains within pre-mining quality ranges.
- **Health and safety:** to limit the possible health and safety threats to humans and animals' life by using the rehabilitated mine site as it becomes available, by ensuring that:
    - Health and safety threats are prevented as far as possible. If not, to limit these to acceptable risks that can be reasonably/realistically achieved.
- **Land capability/land-use:** to re-instate suitable land capabilities over the rehabilitated portions of the mine site, by ensuring that:
    - Where possible, land capability will be reinstated to match the pre-mining land capabilities;
    - A functional post-mining landscape is achieved that enables self-sustaining agricultural practices where possible;
    - Invasive vegetation species will be eradicated to further enable achievement of the desired land capability on rehabilitated areas, and functioning of riparian zones; and
    - Landforms are mostly free draining to maximise the surface water return into the catchment to reduce recharge and ensure connectivity of wetlands and functioning of riparian zones.
- **Aesthetic quality:** to leave behind a rehabilitated mine site that, in general, is not only neat and tidy with an acceptable overall aesthetic appearance, but which is also aligned to the respective land uses, by ensuring that:
    - Recognition is given to the local/natural analogues and these be repeated as far as practically possible; and
    - Rehabilitation measures that appear unnatural/visually intrusive will be avoided as far as possible.
- **Biodiversity:** to encourage, where appropriate (for example in corridors), the re-establishment of native vegetation on the rehabilitated mine site such that the terrestrial biodiversity is largely re-instated over time, by ensuring that:
    - Viable self-sustaining vegetation communities are established; and
    - Invasive species that could threaten the reinstatement of the desired vegetation communities are actively eradicated.
- **Social:** to ensure that the infrastructure transfers (if any), and measures and/or contributions made by the mine towards the long-term socio-economic benefit of the local communities are sustainable, the mine will be ensuring that:

- The local communities are adequately informed about mine closure (next land use planning, scheduled closure and reskilling initiatives linked to the next land use, where possible);
- Obsolete/dormant mine infrastructure that could be beneficially reused is identified and re-used; and
- Communities scheduled to benefit are empowered to take over and maintain ceded infrastructure for their ongoing benefit (e.g. boreholes to remain at closure for local communities).

ii) 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

This section describes the approach taken by the EAP in preparation of Part B of this report.

Environmental Management Approach

Globally, there are a number of tools or guideline documents available to assist or describe environmental management. The purpose of an EMPr (Part B of this report) is to describe the process of managing the identified potential environmental impacts or risks described in Part A of this report (EIR) throughout the entire life cycle (from design, to implementation, operation, and decommissioning) of the proposed Vygenhoek Platinum Mine. The IEM (Integrated Environmental Management) tool used for managing the identified environmental impacts by the EAP in this document is the Environmental Management System (EMS). This approach will assist the Vygenhoek Platinum Mine to achieve continual improvement in environmental performance.

The EMPr in essence will be adopting the approach of the internationally recognised ISO 14001 Environmental Management System (EMS) standard that is essentially based on the Deming Cycle rationale which is a simplified continuous improvement model consisting of four main iterative steps.

These steps are described as follows:

- Plan – Establish objectives and processes necessary to deliver results in accordance with the developed organisational environmental policy.
- Do – Implement the process.
- Check – Monitor and measure processes against environmental policy, objectives, legal and other requirements and report the results.
- Act – Take action to continually improve environmental performance.

Continual improvement is achieved by periodically monitoring and reviewing the EMPr and the subsequent implementation of corrective actions when required. Therefore this document should be considered as a living document which should be continuously updated and possibly improved.

This approach taken in the development of the EMPr is in line with the requirements stipulated in GN R. 982 (2014 EIA regulations).

Legislative compliance

Throughout the development of management measures all legislative and other requirements associated to the proposed Vygenhoek Platinum Mine activities were considered and highlighted.

Specialist recommendations

A number of specialist investigations formed part of the EIA process and resulted in a number of findings and recommendations (Part A section **1)j)** summarises the findings). These reports provided specific mitigation and management measures as a recommendation. These findings have been considered throughout the development of the EMPr.

iii) Potential risk of Acid Mine Drainage

(Indicate whether or not the mining can result in acid mine drainage)

Two (2) types of static testing were used to assess the acid (short & long term) and neutralisation potential of the rock at the Vygenhoek mine, namely Acid-Base Accounting (ABA) and Net Acid Generation (NAG). These two testing methods was implemented and assessed as part of the Geohydrological Assessment (**Appendix M**).

Based on the screening results, the following is noted:

- The % Sulphur, Neutralisation Potential and Net Neutralisation Potential of the rock samples, none of the samples are prone to cause acid generation (classified as Rock Type IV).
- All samples are not potentially acid generating (Non-PAG) and no long-term acid drainage is associated with the samples analysed.
- NAG results suggest that samples are Non-PAG.

iv) Steps taken to investigate, assess, and evaluate the impact of acid mine drainage.

Acid-Base Accounting (ABA)

ABA is a static test where the net potential of the rock to produce acidic drainage is determined. The percentage sulfur (%S), the AP (acid potential), the NP (neutralisation potential) and the Net Neutralization Potential (NNP) of the rock material are determined in this test, as an important first-order assessment of the potential leachate that could be expected from the rock material. The ABA screening criteria as described by (Price, 1997) are listed in **Error! Reference source not found.**. The components of an ABA analysis are further explained below:

- If pyrite is the only sulphide in the rock the AP is determined by multiplying the %S with a factor of 31.25. The unit of AP is kg CaCO3/t rock and indicates the theoretical amount of calcite neutralized by the acid produced.

- The NP is determined by treating a sample with a known excess of standardized hydrochloric or sulfuric acid (the sample and acid are heated to ensure a completed reaction). The paste is then back titrated with standardized sodium hydroxide to determine the amount of unconsumed acid. NP is also expressed as kg CaCO3/t rock as to represent the amount of calcite theoretically available to neutralize the acidic drainage; and
- NNP is determined by subtracting AP from NP (EPA, 1994).

For the material to be classified in terms of their AD potential, the ABA results could be screened in terms of its NNP, %S and NP: AP ratio as follows:

- A rock with NNP < 0 kg CaCO3/t will theoretically have a net potential for acidic drainage. A rock with NNP > 0 kg CaCO3/t rock will have a net potential for the neutralization of acidic drainage. Because of the uncertainty related to the exposure of the carbonate minerals or the pyrite for reaction, the interpretation of whether a rock will be net acid generating or neutralizing is more complex. Research has shown that a range from -20 kg CaCO3/t to 20 kg CaCO3/t exists that is defined as a "grey" area in determining the net acid generation or neutralization potential of a rock. Material with an NNP above this range is classified as Rock Type IV - No Potential for Acid Generation, and material with an NNP below this range as Rock Type I - Likely Acid Generating; and
- (Soregaroli & Lawrence, 1998) further states that samples with less than 0.3% sulphide sulphur are regarded as having insufficient oxidisable sulphides to sustain long term acid generation. Material with a %S below 0.3% is therefore classified as Rock Type IV - No Potential for Acid Generation, and material with a %S of above 0.3%, as Rock Type I - Likely Acid Generating.

Table 26: ABA and NAG screening criteria (adapted from (Price, 1997) and (Fourie, 2014)

ABA: NPR Screening Criteria			**ABA: %S Screening Criteria**			**ABA: NNP Screening Criteria**		
Potential Acid Generation	**NP: AP (NPR)**	**Comments**	**Potential Acid Generation**	**% S**	**Comments**	**Potential Acid Generation**	**NP: AP (NPR)**	**Comments**
Rock Type I: Likely Acid Generating.	< 1	Likely AMD generating.	Rock Type IV: No Potential for Long Term Acid Generation	< 0.3%	Sample may produce AMD bit will be short term.	Rock Type IV: No potential Acid Generation.	> 20	No AMD potential
Rock Type II: Possibly Acid Generating.	1-2	Possibly AMD generating if NP is insufficiently reactive or is depleted at a faster rate than sulphides.				Rock Type I: Likely Acid Generation.	< -20	Likely AMD potential

ABA: NPR Screening Criteria			ABA: %S Screening Criteria			ABA: NNP Screening Criteria		
Potential Acid Generation	**NP: AP (NPR)**	**Comments**	**Potential Acid Generation**	**% S**	**Comments**	**Potential Acid Generation**	**NP: AP (NPR)**	**Comments**
Rock Type III: Low Potential for Acid Generation.	2-4	Not potentially AMD generating unless significant preferential exposure of sulphides along fracture planes, or extremely reactive sulphides in combination with insufficient reactive NP.	Rock Type I: Likely Long-Term Acid Generation	> 0.3%	Potential for long term AMD.	Uncertain	20 to -20	Sample may become acidic or remain neutral. Use with conjunction of the other criteria to resolve this uncertainty.
Rock Type IV: No Potential for Acid Generation.	> 4	No further AMD testing required unless materials are to be used as a source of alkalinity.						

Net-Acid Generating (NAG)

In the NAG test hydrogen peroxide (H_2O_2) is used to oxidize sulphide minerals to predict the acid generation potential of the sample.

The NAG test provides a direct assessment of the potential for a material to produce acid after a period of exposure (to a strong oxidant) and weathering. The test can be used to refine the results of the ABA predictions (refer to **Table 29**).

In general, the static NAG test involves the addition of 25 ml of 30% H_2O_2 to 0.25 g of sample in a 250 ml wide mouth conical flask, or equivalent. The sample is covered with a watch glass and placed in a fume hood or well-ventilated area. Once "boiling" or effervescing ceases, the solution can cool to room temperature and the final pH (NAG pH) is determined. A quantitative estimation of the amount of net acidity remaining (the NAG capacity) in the sample is determined by titrating it with NaOH to pH 4.5 (and/or pH 7.0) to obtain the NAG Value (Lapakko & Lawrence, 1993).

Table 27: NAG screening methods used (Edited from (Miller, Robertson, & Donahue, 1997)

Rock Type	NAG pH	NAG Value (H_2SO_4 kg/t)	NNP ($CaCO_3$ kg/t)
Rock Type Ia. High Capacity Acid Forming.	< 4	> 10	Negative

Rock Type Ib. Lower Capacity Acid Forming.	< 4	≤ 10	-
Uncertain, possibly Ib.	< 4	> 10	Positive
Uncertain.	≥ 4	0	Negative
Rock Type IV. Non-acid Forming.	≥ 4	0	Positive

v) Engineering or mine design solutions to be implemented to avoid or remedy acid mine drainage.

Not a potential risk.

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

Not a potential risk.

vii) Volumes and rate of water use required for the mining, trenching or bulk sampling operation.

The permitted volume and rate of water use required for the mining, trenching or bulk sampling operations will be confirmed in the Water Use Licence. However an annual volume of 2.28 mega litre has been estimated at the time of this report.

The main uses for the abstracted water, at the time of this study, will be as follows:

- Dust suppression on the access roads, stockpile areas, and pit areas; and
- Domestic purposes such as the ablution facilities.

viii) Has a water use licence been applied for?

An integrated application approach has been taken by Nomamix (Pty) Ltd. Therefore an application for a water use licence will be required to be submitted to the Department of Water Affairs and sanitation. No application for a water use licence has been submitted at the time of completing this report.

The following water uses has been predetermined and will be required to form part of the application:

- Section 21 (a) - taking water from a water resource (water will be sourced via a borehole);
- Section 21 (c) - Impeding or diverting the flow of water in a watercourse
- Section 21 (g) - disposing of waste in a manner which may detrimentally impact on a water resource
- Section 21 (j) - altering the bed, banks, course or characteristics of a watercourse
- Section 21 (i) - removing, discharging, or disposing of water found underground if it is necessary for efficient continuation of an activity or for the safety of people

As part of the application for a water use licence an Integrated Waste Water Management Plan (IWWMP) will be required to be developed and should form part of the final construction and operational EMPr for implementation.

ix) Impacts to be mitigated in their respective phases

(Measures to rehabilitate the environment affected by the undertaking of any listed activity)

In Part A of this report a number of potential environmental and social risks and or impacts was assessed. **Table 30** identifies and describes the measures to be taken to ensure a sustainable outcome.

Table 28: Recommended measures to control, avoid, mitigate, and remediate potential environmental and social risks identified in Part A of this report

ACTIVITIES *(as listed in 2.11.1)*	**POTENTIAL IMPACT**	**PHASE**	**SIZE AND SCALE of disturbance** *(volumes, tonnages and hectares or m²)*	**MITIGATION MEASURES** ***(describe how each of the recommendations in herein will remedy the cause of pollution or degradation and migration of pollutants)***	**COMPLIANCE WITH STANDARDS** *(A description of how each of the recommendations herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)*	**TIME PERIOD FOR IMPLEMENTATION**
Air Quality Management & Climate						
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Construction of training centres, offices, ablution facilities and kitchen facilities • Construction of Pollution Control Dams (PCD's) • Transport of construction material, mobile plant and equipment to the site • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Drilling & Blasting	**Fugitive and ambient dust generation**	Construction, Operational, and Decommissioning	78 ha	(1) Construction activity to take place under the supervision of an environmental representative. (2) Set the on-site speed limit to 40km/h for gravel roads and 50km/h for tar roads. (3) Develop and implement a dust suppression schedule. (4) Biodegradable and environmentally friendly flocculent (approved by the environmental control officer/environmental officer/ SHEQ officer) may be used as dust suppressant. (5) Dust formation and wind erosion must be visibly managed on all stockpile areas. This can be done by using water sprays, wind breaks, vegetation, and enclosures. (6) Measures to be implemented to prevent dust generation during when transporting ROM, product, or any material. (7) Conduct regular cleaning/sweeping of paved road surfaces to prevent the accumulation of dust. (8) Conduct regular maintenance and checks for haul road surfaces. (9) Immediate clean-up of any material spillage. (10) Disturbed areas no longer used for mining related activities shall be re-vegetated immediately. (11) Areas having to be stripped of topsoil for construction purposes must be kept to a minimum and only stripped when work is about to take place (retaining as much vegetation as possible, including patches and strips). (12) Avoid clearing the entire site at once, instead clear areas as required in stages of the operation. (13) Activities with high dust-causing potential, such as topsoil stripping, should not be carried out in sensitive areas during adverse wind conditions. When necessary, topsoil should be stripped in discrete sections, allowing buffer strips (windbreaks) between clearings. (14) Wind barriers should be placed on site before commencement of works and when it is apparent that one is required during the phase of the operation. Wind barriers are most effective when placed perpendicular to the direction of the prevailing wind but will have little or no effect when the wind direction is parallel to the fence. When choosing wind barriers, it has been observed that solid barriers provide significant reductions in wind velocity for relatively short leeward distances, whereas porous barriers provide smaller reductions in velocity for more extended distances. Wind barriers should be at least 2 metres high. The screening material should have a porosity of 50% or less.	(1) Development and implementation of a Dust management plan as part of an Air quality management plan to including the monitoring and prevention programme. (2) Ensuring compliance with the National Environmental Management: Air Quality Act (NEMAQA), No. 39 of 2004 as amended by Act no 20 of 2014. (3) Ensure activities remain under the thresholds stipulated in GNR 893 (in terms of section 21 of NEMAQA. (4) Register online to the National Atmospheric Emissions Inventory System (NAEIS) in terms of the National Reporting Regulations (GNR 283) as Group C emitters. (5) Ensuring compliance with the National Ambient Air Quality Standards (GNR 1210 of 24 December 2009). (6) Ensuring compliance with the National Dust Control regulations (GNR 897 of November 2013).	Entire Life cycle of project

• RoM & product stockpiling • Residue stockpiles • Screening Operations • Discard disposal (backfilling of mining area) • Vehicular activity on haul roads; and operation of mining equipment • Bulk transporting of Ore to market on Public roads				(15) The loading, transfer and discharge of materials should take place with a minimum height of fall and be shielded against the wind. (16) During earth-moving works, pre-water areas to be disturbed. Plan earth moving works so that they are completed just prior to the time they are needed. (17) Switch off engines whilst not in use. (18) Establish a maintenance schedule to ensure proper maintenance of the trucks & mobile equipment. (19) Conduct regular maintenance and quality checks (engines/tyres) for all heavy mobile equipment/trucks. (20) All decommissioning activities to take place under the supervision of an environmental representative. (21) Measures to be implemented to manage dust formation of revegetated areas where vegetation cover has not been established during decommissioning. (22) Implementation of monitoring programme as per **Table 34**.		
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Stores, workshops &wash bays • Fuel operating power generators • Transport of construction material, mobile plant, and equipment to the site • Onsite Clinic • Construction of training centres, offices, ablution facilities and kitchen facilities	**GHG emissions (direct and indirect)** **Electricity usage**	Construction, Operational, and Decommissioning	78 ha	(1) Plant and equipment to function at an optimal level. (2) Where possible lead replacement petrol to be used. (3) Where possible low sulphur containing diesel to be used. (4) All vehicles and equipment must be maintained and serviced according to the manufacturer's specification. (5) Any vehicle, plant or equipment emitting visible emissions from their exhaust systems must be serviced or repaired immediately. (6) Ensure that all unnecessary office equipment, air cons, and lights are switched off at the end of each shift. (7) If feasible, the use of solar powered geysers will allow for the reduction in contributing to the carbon footprint of the project. (8) An annual GHG emissions calculation, comparing emissions of CO2, CH4 and N2O over time, to be conducted. (9) Initiate investigation into energy efficient measures to reduce the current GHG emissions. An implementation plan of measures identified by the investigation must be developed and progress audited. (10) Develop and implement an adaption strategy to adequately protect all assets, operation, and supply chains from the material risks of extreme weather, floods, and drought (refer to section 7.7 of the Climate Change Impact Assessment Report, **Appendix G).** (11) Implementation of monitoring programme as per **Table 34**.	(1) Develop and maintain a Carbon footprint reporting policy. (2) Annual GHG emissions calculations. (3) Develop and implement an electricity usage monitoring programme.	Entire Life cycle of project
Terrestrial Biodiversity						

• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Storm water runoff management features • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • RoM & product stockpiling • Residue stockpiles • Rehabilitation of mining areas • Rehabilitation of the lay down areas	**Vegetation and habitat loss**	Construction, Operational, and Decommissioning	78 ha	(1) Avoid clearing areas outside the development footprint. (2) Cleared vegetation and debris that has not been utilized must be collected and disposed of at a suitable waste disposal site. Under no circumstances may it be burned on site. (3) Collection of branches, wood (dead or alive), shrubs or any vegetation for fire making purposes is strictly prohibited. (4) Avoid development in sensitive environments such as areas within pristine or valuable ecological significance. (5) Before the commencement of any vegetation clearance, a search and rescue operation should take place identifying possible protected species as well as indigenous species. (6) An area should be identified to re-instate protected and indigenous areas. (7) If feasible an onsite nursery should be established and maintained relocating identified species that could withstand rigorous transplant. These species typically include geophytes, succulents, and herb species. (8) The removal and damage of any protected and conservation important plant species on the site requires compliance in terms of national and provincial legislation. In particular, the National Forest Act and Mpumalanga Nature Conservation Act (No.10 of 1998) requires that permits be obtained prior to the removal, damage, or destruction of certain plant species. (9) Timelines involving permit applications need to be considered, taking cognisance of the seasonal requirements to execute surveys as well as required time of the completion, submission, and approval of permit applications by relevant authorities. It is emphasised that no activity may commence that will adversely affect protected plant species, prior to the approval of all permitting requirements. (10) Suitable surveys that geolocates and identify all protected and conservation important plants with the approved development footprints need to be commissioned during an appropriate time of the year that allows for accurate identification of all affected species, typically during the austral summer period. This will form the basis of the permit applications. (11) It is not recommended that all protected trees be transplanted, only individuals that will allow for successful excavation and relocation. Rather, seeds can be harvested, and seedlings be grown to be used for rehabilitation purposes. (12) No mining activities to take place inside the identified 50 m terrestrial protection buffer as identified by the Terrestrial Biodiversity Assessment (**Appendix I**). If it is unavoidable, a suitably qualified specialist must be appointed to assess the impact and develop a specific mitigation management plan. This management plan must be submitted to the relevant authority for approval and attached as an Addendum to this EMPr. (13) Concurrent rehabilitation of disturbed areas to take place as per the Vygenhoek Platinum Mine's LRDCP (**Appendix U**). (14) Under no circumstances should exotic and invasive plants be used for landscaping or rehabilitation purposes. (15) The rehabilitation grass mix should consist of locally indigenous grasses adapted to the local environmental conditions, with a suitable compliment of forbs, geophytes, succulents, shrubs, and trees. (16) No painting or marking of rocks or vegetation (in remaining or adjacent natural habitat) to identify locality or other information will be allowed, as it will disfigure the natural setting. Marking should be done by steel stakes with tags, if required. All temporary markings will be removed upon completion.	(1) Develop a plant species search and rescue management plan. (2) Develop and implement a phased rehabilitation management plan. (3) Develop and implement a soil conservation management plan. (4) Apply for permits to remove protected species (provincial and national).	Entire Life cycle of project
• Access and hauling along roads i.e. during the construction of roads	**Influx of alien invasive vegetation**	Construction, Operational, and Decommissioning	78 ha	(1) Awareness training on the identification of weeds and alien species to employees responsible for the management of these species. (1) Alien vegetation growing on topsoil stockpiles must be removed immediately in a manner as to prevent regrowth.	(1) Develop and implement an alien eradication and control management plan.	Entire Life cycle of project

• Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • RoM & product stockpiling • Rehabilitation of mining areas • Rehabilitation of the lay down areas				(2) All disturbed areas to be monitored on a regular basis for exotic or invasive plant species and weeds. (3) Chemical removal shall be used in accordance with the manufacturer's specification for weeds where mechanical eradication/control are no longer effective. (4) The type of chemical to be utilised must be determined in consultation with an herbicide consultant and the Environmental Control Officer/Environmental Officer/SHEQ Officer. (5) Those exotic/invasive plant or weed which cannot be eradicated by means of herbicides, needs to be manually removed from site. (6) The herbicide consultant must have a Pest Control Operators licence. (7) Control the type of material imported to site to ensure that soil contamination, in terms of weed and alien invasive plants does not occur.		
• Stores, workshops &wash bays • Fuel operating power generators • Fuel storage • Storage of fuel and lubricants in temporary facilities	**Chemical Fires**	Construction and Operational	1 ha	(1) Employees must be trained on emergency response procedures required to counter the nature and hazards of an accidental chemical fire. (2) Employees must be familiar with and have received the appropriate training regarding the handling and storage practices, for all containers with which they will come into contact. (3) Document the types and amounts of hazardous materials present on the project site (including for example the name and description, classification, regulatory reporting threshold, quantities, characteristics, analysis of potential consequence, identification of location, details of responsible persons, detail of availability of spill response equipment etc.). (4) The emergency response procedure should describe response activities in the event of a spill, release, or other chemical emergency and include the internal and external notification procedure, specific responsibilities of individuals or groups, decision process for assessing severity of the release, and determining appropriate actions, facility evacuation routes, and post event activities such as clean-up and disposal, incident investigation, employee re-entry, and restoration of spill response equipment. (5) Procedures should be prepared for informing the public and emergency response agencies, documenting first aid and emergency medical treatment, taking emergency response actions, reviewing, and updating the emergency response plan to reflect changes, and using, inspecting, testing, and maintaining the emergency response equipment. (6) Reactive, flammable, and explosive materials must be managed to avoid uncontrolled reactions or conditions resulting in fire or explosion. (7) Ensure storage of incompatible materials (acids, basis, flammables, oxidisers, reactive chemical) in separate areas, and with containment facilities separating material storage areas.	(1) Develop and implement a fire prevention plan that includes measures of prevention and response to chemical fires. (2) Develop an emergency preparedness procedure and include the process to be followed in case of a chemical fire. (3) Develop a Hazardous substances management plan. (4) Develop a frequent inspection programme to include inspections of hazardous substances storage facilities.	Entire Life cycle of project

				(8) Ensure the provision of material-specific storage for extremely hazardous or reactive materials. (9) Ensure the use of flame arresting devices on vents from flammable storage containers. (10) Ensure the provision of grounding and lightning protection. (11) Ensure the storage of hazardous materials in an area of the facility separated from the main authorised activities. (12) Ensure that all personnel that use or handle hazardous materials are trained in the use and potential dangers of the materials. (13) Implement all measures detailed in the spill prevention procedure in the event of a spill. (14) Prevent uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion using engineering controls (containment, automatic alarms, and shut-off systems) commensurate with the nature of hazard. (15) Implement management controls (procedures, inspections, communications, training, and drills) to address residual risks that have not been prevented or controlled through engineering measures. (16) Store all hazardous (reactive, flammable, corrosive and toxic) materials in clearly identified, fit-for-purpose containers or vessels. (17) Chemical products must be secured when not needed to prevent tampering and vandalism. (18) Provide warning notices, firefighting facilities, and protection from weather damage. (19) Each shift supervisor or safety officer is to report on the integrity of the hazardous material storage. (20) Keep products in their original container (unless they are not re-sealable) with all stored products and containers being labelled, and original labels and MSDS retained. (21) Label containers so that the hazard nature of the material is clear. (22) Obtain Material Safety Data Sheets (MSDS) for all chemicals before use and all materials must be handled according to the instructions. (23) Transporters of hazardous materials must ensure that the vehicle is suitable and registered for the purpose it is being used (24) Transport vehicles must display clear markings in English indicating the nature of the materials being carried, what to do in the event of an emergency, and an emergency telephone number (24 hour) of a responsible person who can provide advice in the event of an emergency. (25) No combustible material (e.g. wood, rags, carton boxes, etc.) are to be kept in the presence of flammable liquids. (26) "No Open Flames" and "No smoking" symbolic signs are to be displayed in the vicinity of the flammable liquid storage areas. (27) Flammable liquids are to be issued only on a need-to-use-basis and strict control is to be exercised to ensure that persons do not draw more than what is needed for the specific job. (28) All cables are to be grounded as appropriate. (29) An adequate number (according to safety regulations) and type of firefighting equipment is to be available in the close vicinity of the flammable liquid store. (30) Flammable liquid stores are to be well ventilated and free of explosive vapours. (31) Flammable liquid containers in stores are to be clearly marked or labelled as to their contents. (32) Locations are to support MSDS information and handling/storage instructions. (33) Flammable liquid tanks are to be properly earthed to prevent static electricity accumulating. (34) Drainage points on flammable liquid tanks are to be provided with threaded caps or blanking plates.		

				(35) Bund walls are to surround storage tanks containing flammable liquids and these must be able to contain the entire volume of the contents plus 10% in case of spillage. (36) Earthing is to be tested regularly (according to safety regulations). (37) Bulk storage facilities of flammable liquids to be approved by the provincial fire inspector.		
Aquatic Biodiversity						
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Transport of construction material, mobile plant and equipment to the site • Storm water runoff management features • Pollution Control Dams (PCD's) i.e. Construction and operation • Stores, workshops &wash bays • Ablutions & change house with septic tank • Fuel operating power generators • Fuel storage • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • RoM & product stockpiling • Residue stockpiles • Screening Operations	**Sedimentation and siltation of watercourses**	Construction, Operational, and Decommissioning	78 ha	(1) Avoid stockpiling material within drainage lines or in the 1:10 year flood line. A 100 m stream buffer to be maintained to reduce flood risk and preserve natural vegetation as far as possible. (2) Ensure erosion control measures or sediment control measures on stockpiles or in stockpile areas. (3) Prevent the discharge of water containing polluting matter or visible suspended materials directly into drainage lines or streams. (4) Clean and dirty water should be managed separately as guided by GN704. Deflect any unpolluted water/runoff away from any dirty areas i.e. stockpile areas, mining areas, workshops, lay down areas etc. (5) Water from excavations or mining areas either through seepage or collection to be pumped and discharge into a pollution control dam via appropriately lined and sized channels, from where it can be re-used or treated.. (6) Before any water is permitted to enter natural drainage lines, the quality of water must comply with the standards contained in the Water Use Licence conditions. (7) Measures must be put in place to attenuate water from infrastructure areas and reduce runoff. (8) River crossings shall be designed by a registered civil engineer. (9) Measures to avoid or prevent erosion formation must be incorporated into the designs of the infrastructure associated with the river crossings. (10) During construction through drainage lines, most of the flow must be allowed to pass down the stream. In stream diversions should be used rather than the construction of new channels. (11) All development footprint areas to remain as small as possible and vegetation clearing to be limited to what is essential. (12) Contain poor quality runoff from dirty areas and divert this water to PCD for re-use. (13) Indigenous vegetation cover within the designated buffer zone (as per **Appendix J**) is to be maintained at a minimum of 80% to ensure that the buffer remains functional and must be assessed annually. (14) Alien vegetation establishment within these buffer zone areas is to be strictly controlled through the development and implementation of a detailed alien management plan developed in accordance with the legislative requirements that considers management actions to be taken during all phases of the lifecycle of the mine, including post-closure management requirements.	(1) Implement monitoring programme as per **Table 34**. (2) Develop and implementation of the conceptual storm water management plan as per **Appendix L** addressing the separation of "dirty" and clean "areas". (3) Development of emergency response plan with specific reference to spill prevention and remediation. (4) Development and implementation of vehicle/plant/equipment maintenance plan with specific reference to daily inspections of plant/vehicles/equipment for leaks or breakages. (5) Develop and implement an Integrated Waste and Water Management Plan (IWWMP). (6) Ensure compliance with the WUL conditions. (7) Update predictive groundwater flow and geochemical numerical models yearly.	Entire Life cycle of project
	Alteration of drainage patterns			(1) Plan the final site layout in a manner as to reduce alteration of drainage patterns. (2) If drainage patterns will be altered, the natural flow to be diverted. (3) Any diversions should be designed in such a manner as to avoid erosion formation or pollution through siltation and sedimentation. (4) Ensure water quality complies with the requirements stipulated by the Water Use Licence conditions. (5) Channels and drainage systems required to divert the flow of drainage lines to be designed by a civil engineer, taking into consideration the peak volumes and flow. (6) Measures to avoid or prevent erosion must be incorporated into the designs of the infrastructure associated with the river crossings. (7) During construction through drainage lines, most of the flow must be allowed to pass down the stream. In stream diversions should be used rather than the construction of new channels.		

• Discard disposal (backfilling of mining area) • Drilling & Blasting • Waste generation, storage and disposal • Storage of fuel and lubricants in temporary facilities • Vehicular activity on haul roads; and operation of mining equipment • Rehabilitation of mining areas • Rehabilitation of the lay down areas • Demolition of workshops, waste storage facilities, fuel storage facilities etc.				(8) Ensure rehabilitation measures are according to rehabilitation plan and that measures are taken to prevent the formation of erosion dongas or rills (see **Appendix U**). (9) Given the uncertainty pertaining to the barb species identified within the western tributary associated with the proposed Vygenhoek Platinum Mine, a formal fish sanctuary area within the catchment of the western tributary upstream of the proposed Vygenhoek Platinum Mine area is to be established that will serve to ensure the persistence of the population of Enteromius sp. 'Lowveld-Incomati' until such time as the uncertainties pertaining to the specie are addressed (10) Ensure peak particle velocities of less than 13mm/sec within the reach of the western tributary designated as a fish sanctuary. (11) Pipe culverts are to be avoided at all watercourse crossings to limit opportunities of flow confinement and channel incision of the wetland units and drainage lines.		
	Destruction of wetlands			(1) Plan the final site layout in a manner as to reduce the destruction of wetlands, if possible, avoid working within a wetland. (2) A wetland delineation will be required before the commencement of any activities within a wetland. (3) If a wetland will be altered, mitigation measures to reduce the impact on the wetland must be strictly monitored. (4) Ensure water quality complies with the requirements stipulated by the Water Use Licence conditions. (5) Channels and drainage systems required to divert the flow of drainage lines to be designed by a civil engineer, taking into consideration the peak volumes and flow. (6) Ensure rehabilitation measures are according to rehabilitation plan and that measures are taken to prevent the formation of erosion dongas or rills. (7) Species of ecological importance to be searched and rescued and reinstated during rehabilitation.		
	Contamination of water resources			(1) All sources of process water must be identified and quantified for the life cycle of the authorised activities. (2) A wastewater management system must be installed complying with regal requirements. (3) A water use licence for wastewater storage facilities to be obtained. (4) All wastewater management facilities to be designed by a qualified engineer. (5) Wash bays, service areas, and fuel storage areas may not be located within the 1:100-year flood line or horizontal distance of 100 m (whichever is greater) of a watercourse or drainage line. (6) No environmentally harmful detergents may be used. (7) Workshops, refuelling depots and washing areas shall be bunded. (8) All bunded areas to be constructed in a way as to avoid seepage to the surrounding environment as well as be able to contain its content to a capacity of 110%. (9) Water from wash bays, service areas and fuel storage areas must be discharged into oil separators and sumps. (10) Oils collected in this manner should be retained in a safe holding tank and removed from site by a specialist oil recycling company or disposal at approved waste disposal sites. (11) No drainage from fuel storage areas to be permitted. (12) Never hose oil or fuel spills into storm water drain or sewer, or into the surrounding natural environment. (13) Any contaminated storm water and other run-off from dirty areas to be disposed of in the suitably designed PCD's. (14) Any spill which may contaminate water must be treated according to the approved spill management procedure. (15) Contain oil or fuel spills in water using an approved oil absorbent fibre.		

				(16) Should contaminated water due to spillages or other unforeseen circumstances enter identified wetland or watercourse, a wetland/aquatic specialist must be consulted regarding implementation of suitable mitigation and/or rehabilitation measures. (17) Grey water not deemed suitable for dust suppression must be disposed of with other wastewater in the designated and suitably designed PCD. (18) Wastewater as well as spilled fuel collected within bunded areas and refuelling areas shall be disposed of or treated as hazardous waste. (19) Avoid unnecessary alteration of drainage lines. (20) Avoid locating lay down areas, wash bays, workshops etc. within the 1:50 year flood line or within horizontal distance of 100 m (whichever is greater) of a water course. (21) Contain contaminated runoff from dirty areas (i.e. lay down areas, RoM and product stockpile areas, workshops, fuelling bays etc..) in suitable designed PCD's. (22) Contaminated runoff to be treated and re-used for processing water or dust suppression in dirty areas only when complying with legal requirements or water quality standards specified in the Water Use Licence. (23) Do not locate any ablution facilities, chemical toilets, sanitary convenience, septic tanks, or French drains within the 1:100-year flood line, or within a horizontal distance of 100 m (whichever is greater) of any watercourses. (24) Do not allow the use of any drainage line or wetland for swimming, bathing, or cleaning of clothing, tools or equipment. (25) Prevent the discharge of water containing polluting matter or visible suspended materials directly into drainage lines or streams. (26) Deflect any unpolluted water/runoff away from any dirty area. (27) Ensure that no storm water can enter any drainage installation for the reception, conveyance, storage, and or treatment of sewage. (28) Before any water is permitted to enter natural drainage lines, the quality of the water must comply with the standards contained within the Water Use Licensing conditions authorised by the DWAS. (29) Ensure water passing through vehicle wash bays and workshops pass through oil separators before passing into conservancy tank. (30) Avoid unnecessary cutting roads through river, stream banks as this may lead to erosion causing siltation of streams and downstream dams. (31) Ensure any groundwater ingress into the opencast workings is sampled and that the inflow quantity is recorded. (32) Ensure that dewatering pumps are on standby to dewater should there be any seepage or accumulated rainwater in the pits.		
	Hydrocarbon contamination			(1) Fuel to be stored in above ground storage tanks or sealed containers. (2) Hazardous substances to be stored within a bund area with a sump drainage. (3) Bunded areas to be designed to contain at least 110% of the storing capacity. (4) All spills (minor and major) must be cleaned and remediated to the satisfaction of the appointed environmental representative or the competent authority within 24 hours. (5) Any spillages on site to be excavated to the visible depth of impact and disposed of for removal to a registered hazardous waste disposal site. Alternative in-situ remediation techniques may be used. (6) On site spill kits or absorbent materials must be readily available. These kits must include materials to absorb, breakdown, and where possible encapsulate minor material spillages.		

				(7) Where possible and practical all maintenance of vehicles and equipment shall take place in the workshop areas. Should emergency repairs be necessary, drip trays or tarpaulins must be utilised to ensure the collection of any hydrocarbons. (8) All vehicles, plant, and equipment must be inspected daily. Records to be made available for these inspections. (9) Drip trays or any form of oil absorbent material must be placed underneath vehicles and equipment (where possible leaks may occur) when not in use. (10) All vehicles, plant, and equipment must be well maintained to minimise the risk of fuel and oil leakages. (11) Leaking equipment shall be removed and repaired immediately from site to facility designated for repairs.		
	Destruction of upstream tributaries and reduction in water in the catchment			(1) Plan the final site layout in a manner as to reduce the destruction of upstream tributaries. (2) If drainage patterns will be altered, the natural flow to be diverted as to prevent reduction of water in the catchment. (3) Any diversions to be in such a manner as to avoid erosion formation or pollution through siltation and sedimentation. (4) Ensure water quality complies with the requirements stipulated by the Water Use Licence conditions. (5) Channels and drainage systems required to divert the flow of drainage lines to be designed by a civil engineer, taking into consideration the peak volumes and flow. (6) Ensure rehabilitation measures are according to rehabilitation plan and that measures are taken to prevent the formation of erosion dongas or rills.		
	Hazardous Leachate			(1) Ensure that ore stockpiles are not kept on-site to long (i.e. before weathering takes place which could cause poor quality seepage). (2) Manage and contain seepage from residue stockpiles trough implementing storm water management actions such as clean water diversion and dirty water containment (**Appendix L**). (3) Limit long-term exposure of residue stockpiles during operational phase by implementing concurrent rehabilitation.		
Soil						
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Stores, workshops &wash bays • Ablutions & change house with sewage treatment plant • Fuel operating power generators • Fuel storage	**Degradation of soil resources**	Construction, Operational, and Decommissioning	78 ha	(1) All areas to be stripped firstly of topsoil and fertile soils and stockpiled in a designated area. (2) Do not mix sub-soil with topsoil and fertile soils. (3) Topsoil and fertile soil to be protected from contamination (i.e. hydrocarbons or infertile material). (4) Topsoil and fertile soil stockpiles to be protected from weathering conditions such as covering the stockpiles with indigenous, non-invasive vegetation. (5) Avoid stockpiling topsoil and fertile soil stockpiles within drainage lines or within the 1:10 year flood lines. (6) Implement storm water control measures on topsoil and fertile soil stockpiles. (7) Exposed areas to be re-vegetated with indigenous or non-invasive species or protected from erosion. (8) Rehabilitation of areas after the completion of works to take place as soon as possible. (9) Avoid overexposing un-vegetated areas as far as possible.	(1) Development of a soil conservation management plan. (2) Development of a storm water management plan. (3) Development and implementation of vehicle/plant/equipment maintenance plan with specific reference to daily inspections of plant/vehicles/equipment for leaks or breakages.	Entire Life cycle of project
	Erosion			(1) Soil conservation measures to be implemented on stockpiles to prevent erosion. This could include the use of erosion control fabric or non-invasive grass seeding. (2) All areas susceptible to erosion must be identified and protection measures be implemented. (3) Retain natural trees, shrubbery, and grass species where possible. (4) In areas within proximity to wetlands, rivers and streams, sedimentation control measures to be implemented, specifically when excavations or disturbances takes place within riverbanks, or the riverbed. (5) Formation of erosion channels ("dongas") to be prevented by applying soil erosion control and bank stabilisation procedures as specified by a qualified environmental specialist.	(1) Development and implementation of a storm water management plan. (2) Development of a soil conservation management plan. (3) Development and implementation of mine rehabilitation plan.	Entire Life cycle of project

• Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Residue stockpiles • Screening Operations				(6) Erosion formation beyond rills must be avoided. (7) Erosion damages to be repaired as soon as possible and no later than the target set by the Management team. (8) Slopes steeper than 1(V):3(H) or slopes where soils are by nature dispersive or erodible must be stabilised. (9) Where berms are installed on severe slopes the outflow shall be suitably stone pitched to prevent erosion from starting on berms. (10) Access routes should not traverse slopes with gradients more than 8%. (11) Wherever possible, access routes should avoid crossing drainage lines and riparian zones. (12) Drainage lines should not be altered and should be level with the surrounding land once subsistence has occurred. (13) Run-off from roads must be managed in a way to avoid erosion and prevent pollution.		
• Discard disposal (backfilling of mining area) • Waste generation, storage, and disposal • Chemical Toilets • Storage of fuel and lubricants in temporary facilities • Rehabilitation of mining areas • Demolition / removal of portable and related infrastructure • Rehabilitation of the lay down areas • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.	**General waste generation & Littering**			(1) Characterise and quantify all waste streams associated to the authorised activities in terms of quantity, hazard, generation frequency and recyclability and define and implement disposal options as specified in the waste management plan. (2) As part of the characterisation define opportunities for source reduction, as well as reuse and recycling as opposed to simply disposing waste. (3) Ensure segregation of hazardous wastes from non-hazardous. (4) Sealable bins and containers must be made available for the storage of all streams of waste. (5) During the construction phase, temporary storage of construction waste to be stored in a bunded designated area. (6) Waste will not be stored longer than specified by the waste regulations. If storage exceeds the threshold stipulated by the regulations a waste management licence must be obtained. (7) All waste materials must be removed off site by a suitable and registered waste service provider. (8) All waste to be disposed of at a suitably registered waste disposal facility. (9) Proof of disposal to be obtained and kept on record. (10) Maintain a waste register for materials removed from site, indicating type, quantity, date, haulage contractor, delivery point, and safe disposal certificates. (11) All waste receptacles to be clearly labelled according to type. (12) Where possible, recyclable waste including glass, paper, and plastic must be separated, stored and recycled where possible. (13) Waste oil and scrap metal should also be recycled if possible. (14) All employees or contractors must be informed about the necessity of using waste drums. (15) No littering will be allowed, and a daily site clean-up will be initiated. (16) All domestic refuge generated by staff and sub-contractors must be disposed at a registered waste disposal facility by a suitably registered service provider on a regular basis (i.e. weekly). (17) Measures to ensure that solid waste is transported as to avoid waste spills en-route must be implemented. (18) Waste bins must be emptied on a regular basis as to ensure bins do not overflow. (19) Site should be kept clean and free of rubbish that could potentially attract animal pests and that bins are scavenger proof. (20) DO not dump waste of any nature, or any foreign material into any drainage line or stream. A strict no dumping policy must be communicated to all staff and sub-contractors. (21) During transportation of waste, all waste service providers must comply with the codes of practice and guidelines for licensing of waste transport vehicles and the regulation and monitoring of transport operations.	(1) Compliance with the National Environmental Management: Waste Act, act no 59 of 2008 and associated regulations.	Entire Life cycle of project

Water resources						
• Onsite clinic • Mining offices i.e. operation of training centres, offices, and kitchen facilities • Water storage facilities • Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Use of existing drilled / new boreholes • Water supply (potable & process) • Water Management	**Water usage for dust suppression** **Water level reduction and contamination** **Domestic water usage** **Improper water storage management**	Construction and Operational	78 ha	(1) Filtered or treated water from PCD's may be used for dust suppression should they conform to the sediment load requirements or other quality requirements as specified by the Water Use Licence issued by the Department of Water Affairs and sanitation. (2) Monitor water usage and ensure that areas of waste are identified and minimised. (3) Where possible, reuse water from the PCD's for dust suppression on the roads. (4) In the event that RoM product materials requires the usage of water during processing, the holder of the environmental authorisation must ensure that these activities comply with the current authorisation and ensure that a WUL are obtained. (5) A water balance associated with the mining operation must be developed and updated annually. (6) Ensure that all taps and pipes are maintained to avoid spills or leaks. (7) Monitor water use and ensure that areas of waste are identified and minimised. (8) Repair identified leaks and address issues of water wastage as soon as these are identified. (9) Where possible reuse water on site for dust suppression. (10) The monitoring programme as specified in **Table 34** must be implemented.	(1) Implement monitoring programme as per **Table 34**. (2) Develop and implement an Integrated Waste and Water Management Plan (IWWMP). (3) Ensure compliance with the WUL conditions. (4) Development and implementation of a Dust management plan including the monitoring and prevention programme. (5) Develop and implement a water usage record keeping procedure. (6) Develop and implement a infrastructure maintenance programme to include frequent inspections of water pipes and taps.	Entire Life cycle of project
Topography and Visual						
• Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Mining offices i.e. operation of training centres, offices, and kitchen facilities • Pollution Control Dams (PCD's) i.e. Construction and operation • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Residue stockpiles	**Topography and visual alteration**	Construction, Operational, and Decommissioning	78 ha	(1) Limit site clearance to approved areas. (2) Reduce the construction period through careful logistical planning and productive implementation of resources. (3) Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. (4) Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities. (5) Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent). (6) Restrict construction activities to daylight hours to negate or reduce the visual impacts associated with lighting. (7) During rehabilitation ensure that the topography is reinstated as close as possible to the state before commencement of any activities. (8) Vegetation cover (i.e. either natural or cultivated) immediately adjacent to the development footprint to be maintained, both during construction and operation. This will minimise visual impact because of cleared areas and areas denuded of vegetation. (9) Existing roads should be utilised wherever possible. New roads should be planned to take due cognisance of the topography to limit cut and fill requirements. The construction/upgrade of roads should be undertaken properly, with adequate drainage structures in place to forego potential erosion problems. (10) Re-vegetate, with indigenous and non-invasive species, all cleared or rehabilitated areas immediately. (11) During rehabilitation ensure that the topography is reinstated as close as possible to the state before commencement of any activities.	(1) Mine plan in accordance with the MPRDA Regulation 56 section (1) to (8). (2) Adherence to the finalised approved lay out plan. (3) Review and implementation of the LRDCP.	Entire Life cycle of project

				(12) Onsite ancillary buildings and structures must be planned so that clearing of vegetation is minimised. This implies consolidating this infrastructure as much as possible and making use of already disturbed areas rather than undisturbed sites wherever possible. (13) Lighting impacts to be mitigated by: Shielding the sources of light by physical barriers (walls, vegetation, or the structure itself); Limiting mounting heights of lighting fixtures, or alternatively using foot-lights or bollard level lights; Making use of minimum lumen or wattage in fixtures; Making use of down-lighters, or shielded fixtures; Making use of Low Pressure Sodium lighting or other types of low impact lighting; and Making use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes. (14) During operation, the maintenance of the mining site, and ancillary structures and infrastructure will ensure that the mining facility does not degrade, therefore avoiding aggravating the visual impact. (15) Roads must be maintained to forego erosion and to suppress dust, and rehabilitated areas must be monitored for rehabilitation failure. Remedial actions must be implemented as and when required. (16) Once the mine has exhausted its life span, all infrastructure not required for the post rehabilitation use of the site should be removed and all disturbed areas appropriately rehabilitated. An ecologist should be consulted to give input into rehabilitation specifications. (17) All rehabilitated areas should be monitored for at least a year following decommissioning, and remedial actions implemented as and when required. (18) Implementation of monitoring programme as per **Table 34**.		
• Mining offices i.e. operation of training centres, offices, and kitchen facilities • Demolition / removal of portable and related infrastructure • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.	**General waste generation & Littering**	Construction, Operational, and Decommissioning	78 ha	(1) Characterise and quantify all waste streams associated to the authorised activities in terms of quantity, hazard, generation frequency and recyclability and define and implement disposal options as specified in the waste management plan. (2) As part of the characterisation define opportunities for source reduction, as well as reuse and recycling as opposed to simply disposing waste. (3) Ensure segregation of hazardous wastes from non-hazardous. (4) Sealable bins and containers must be made available for the storage of all streams of waste. (5) During the construction phase, temporary storage of construction waste to be stored in a bunded designated area. (6) Waste will not be stored longer than specified by the waste regulations. If storage exceeds the threshold stipulated by the regulations a waste management licence must be obtained. (7) All waste materials must be removed off site by a suitable and registered waste service provider. (8) All waste to be disposed of at a suitably registered waste disposal facility. (9) Proof of disposal to be obtained and kept on record. (10) Maintain a waste register for materials removed from site, indicating type, quantity, date, haulage contractor, delivery point, and safe disposal certificates. (11) All waste receptacles to be clearly labelled according to type. (12) Where possible, recyclable waste including glass, paper, and plastic must be separated, stored and recycled where possible. (13) Waste oil and scrap metal should also be recycled if possible. (14) All employees or contractors must be informed about the necessity of using waste drums. (15) No littering will be allowed, and a daily site clean-up will be initiated. (16) All domestic refuge generated by staff and sub-contractors must be disposed at a registered waste disposal facility by a suitably registered service provider on a regular basis (i.e. weekly).	(1) Compliance with the National Environmental Management: Waste Act, act no 59 of 2008 and associated regulations.	Entire Life cycle of project

				(17) Measures to ensure that solid waste is transported as to avoid waste spills en-route must be implemented. (18) Waste bins must be emptied on a regular basis as to ensure bins do not overflow. (19) Site should be kept clean and free of rubbish that could potentially attract animal pests and that bins are scavenger proof. (20) Do not dump waste of any nature, or any foreign material into any drainage line or stream. A strict no dumping policy must be communicated to all staff and sub-contractors. (21) During transportation of waste, all waste service providers must comply with the codes of practice and guidelines for licensing of waste transport vehicles and the regulation and monitoring of transport operations. (22) Implementation of monitoring programme as per **Table 34**.		
Noise & Vibration						
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Mining offices i.e. operation of training centres, offices and kitchen facilities • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Screening Operations • Discard disposal (backfilling of mining area) • Vehicular activity on haul roads; and operation of mining equipment • Rehabilitation of mining areas	**Noise generation**	Construction, Operational, and Decommissioning	78 ha	(1) Limit the maximum speed on the haul roads to 50 km/h on tar roads or 40 km/h or less on gravel roads. (2) Road speeds should be kept as consistent as is feasibly possible (i.e. no speed bumps to reduce noise or stop junctions). This will help minimise the use of air brakes as well as reduce required maximum capacity of heavy vehicles during pull off. (3) Roads should be planned to reduce heavy vehicles reversing when collecting or dumping at stockpiles/tips etc. (E.g. use of a loop instead of a dead-end road). This will minimise the use of reverse alarms on vehicles. (4) Ensuring that equipment is well maintained and fitted with the correct and appropriate noise abatement measures. (5) Acoustical mufflers (or silencers) should be considered on equipment exhausts on open cast pits and stockpile areas. (6) A noise absorption braid could be mounted on the front of heavy equipment radiators (ADT's, FEL's etc.) to prevent excess mechanical fan noise into the surrounding environment. Engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised. (7) Access roads to be constructed further than 50 m from all houses used for residential purposes. (8) Investigate the use of white-noise alarms instead of tonal reverse alarms on heavy vehicles operating on roads, within the mining area and at stockpile areas.	(1) Keep a register of all noise and blasting complaints. (2) Investigate all noise complaints as per **Table 34**. (3) Develop and implement a vehicle/plant/equipment management plan to specifically include routine inspections and testing of sound frequencies.	Entire Life cycle of project

• Demolition / removal of portable and related infrastructure • Vehicular activity: removal of mobile plant / equipment and vehicles • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.						
• Drilling & Blasting	**Damaging vibrations**	Operational	38 ha	(1) Blasts vibration levels to be calculated for each blast to take place within 1,660 m from any occupied structure (used for residential purposes). The blast should be controlled (charge per delay) to ensure a vibration level less than 2.54 mm/s at structures closer than 1,660 m from the blasting area. (2) Erect blasting notice boards in the community to the South-east of the opencast pit, with blasting dates and times highlighted. The BSR to the north north-west should be provided with a blasting schedule in advance to the blasts. (3) Prevent blasting in adverse meteorological conditions where possible (overcast conditions, strong wind blowing in direction of local community, early in the mornings or late in the afternoon). (4) People and livestock to be moved further than 500 m from active blast before a blast is detonated. (5) Conduct blast monitoring, if, and when complaints are registered. The results from blasting should be analysed to calculate the site constants and the blasting vibration study updated.		
Heritage and Palaeontology						

• Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Topsoil and subsoil stripping & stockpiling for mining operation area	**Destruction of graves** **Degradation of cultural significance heritage sites**	Construction and Operational	78 ha	(1) If human remains are uncovered during authorised activities or archaeological work, the excavations affecting the burial must be stopped. (2) SAHRA should then be consulted and depending on the situation, the remains are either covered and left in situ, exposed (but not removed) and studies in situ, or fully excavated and studied with the consent and participation of the interested parties. (3) It is, therefore, advisable that if it is foreseen that any archaeological research will uncover human remains an agreement with the interested and affected parties and a permit for burials be obtained beforehand. (4) A suitable accredited archaeologist must be appointed on a watching brief to monitor the excavation of any grave sites. (5) At the onset of construction or mining operations, all graves that might be affected should be clearly demarcated and if possible, fenced off to protect them from any accidental damage, whether they are earmarked for relocation, or not. (6) Should the decision be taken to propose the relocation of the affected graves, a suitably accredited and experienced service provider must be appointed to undertake relocation. (7) Relocation of grave relocation is dependent on permission for the action by the close relatives and interested and affected parties from the community, and the requirement is that the developer must assist this community to fulfil their cultural and religious requirements during the process. (8) Mitigation measures for the identified features (**Appendix P**) must be implemented. (9) All sites rated as significant importance (**Appendix P**) to be avoided and preserved in-situ with an adequate buffer zone (as determined through consultation with SAHRA), in particular, the sites identified associated to the Choma Village. This area as divined in the Heritage Impact Assessment must be clearly fenced off and demarcated. (10) No archaeological artifacts or infrastructures may be destructed or removed from site without the required permissions. (11) If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager. (12) It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area. (13) The senior on-site Manager will inform the appointed Environmental Representative (ER) of the chance find and its immediate impact on operations. The ER must then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA. (14) A register with GPS locations of each feature as identified in the Heritage Impact Assessment (**Appendix P**) to be kept on site. All employees, including contractors, to be made aware of these sites. The register to include pictures and must be inspected quarterly.	(1) Ensure compliance with the National Heritage Resources Act (NHRA), No. 25 of 1999. (2) Ensure compliance with the Human Tissue Act, 1983 (Act no. 65 of 1983.	Entire Life cycle of project
Health and Safety						

• Employment of workers and procurement of construction materials. • Onsite Clinic	**Health and safety of employees and surrounding communities**	Construction, Operational, and Decommissioning	78 ha	(1) Ensure compliance to the relevant Occupational Health and safety act and regulations. (2) All employees or sub-contractors entering site must be inducted to ensure the awareness of the developed health and safety plan. (3) A health and safety representatives to be appointed. (4) Regular inspections and observations of on-site activities shall take place. (5) All incidents to be reported, recorded, investigated, and mitigated. (6) Where required, adequate safety requirements for all areas to be clearly indicated. (7) Employees or sub-contractors must be informed as to what required PPE is applicable in working sections. (8) All site personnel and cub-contractors to be fully always equipped with appropriate PPE. (9) Safety signs to be provided in areas considered as high-risk zones. (10) Adequate first aid services must be provided. (11) Ongoing health and safety awareness campaigns must be promoted. (12) Support community-based information campaigns related to TB symptoms and the need to seek care. The campaign should address the risk of co-infection between HIV and TB. (13) Develop partnerships to support the community-based TB control programs in conjunction with the authorities and any agencies/NGO. (14) Develop a HIV/AIDS policy that incorporates both the workplace and community considerations. (15) Providing employees with basic HIV/AIDS education. (16) Support the local health authorities in extending care and treatment programs in the area. (17) Support community-based condom distribution centres. (18) Support NGO groups active in area on gender-based sexual violence. (19) Issue TOR for HIV prevention program targeting high-risk groups, particularly Sex Workers. (20) Include requirements for case-finding & treatment of curable STIs. (21) Social marketing of condoms, peer educators' program, condom distribution, and Voluntary Counselling & Testing (VCT) targeting PACs. (22) Provide adequate numbers of toilets and urinals for workers at each work site (establish number per local or applicable international guidance/requirements). (23) Conduct health education programs for project workers regarding faecal/oral transmission of diseases, transmission of helminthic diseases (ascaris, pinworm, etc.), and safe drinking water and food safety. (24) Collaborate with local waste-management services to implement non-hazardous-waste-management plans in resettlement communities, such that: number of garbage cans and dumpsters provided is sufficient to hold accumulated garbage; garbage is stored in rodent-proof containers, and with tightly fitting lids; sanitary and solid waste is collected daily and covered daily with a solid layer of soil (15–30 cm) or incinerated, to prevent insect and rodent access; prohibit the movement of large quantities of foodstuffs to local animal farmers, so that rodent and reptile habitats are not created; appropriate container program, to avoid breading waterborne vectors (i.e., dengue control). (25) Provide pictorial take-home handouts. (26) The quality of groundwater and surface water should be monitored to ensure that the mine does not have any detrimental effects on community water sources. (27) Monitor the degree of influx (job seekers) resulting in informal settlement. (28) Restrict access to the mine created water bodies.	(1) Develop and implement a Health Action Plan (HAP) for construction and operational phases. (2) Prepare and implement a specific covid-19 management plan for construction and operational phases. This should be aligned to the World Health Organisation (WHO) and South African Covid-19 Regulations. (3) Appoint a suitably qualified and experienced EHS practitioner whose responsibility should include managing, implementing, and reporting on the Health Action Plan. The EHS practitioner should be registered with SACPCMP at an appropriate level (as per 8(6) of the Construction Regulations) which will outline qualification and experience requirements. (4) Develop and implement an integrated waste management plan (see **Table 34**). (5) Develop and implement an integrated water management plan (see **Table 34**). (6) Develop and implement an appropriate occupational health and safety management plan (incl. community safety initiatives, OHSE awareness campaigns at schools, churches, and social events). (7) Ensure that a suitable/recognised food safety management system (e.g. HACCP/ISO22000) is implemented and monitored during construction and operations.	Entire Life cycle of project

				(29) Perform end user analysis of water quality. This serves as an indicator for monitoring water quality where it is consumed and determines the level of general sanitation and hygiene even if water is collected from clean sources. (30) Ensure proper disposal of human waste that is generated from the mine. (31) Support sustainable livelihood programs through increased use of agriculture. The financial benefit of farming over other practices will be essential to support. (32) Support maternal and child health programs. (33) Favour local procurement of food items in combination with incentives to increase local production. (34) Assist with food sanitation awareness materials to local district environmental sanitation officers for educational sessions with food handlers and slaughterhouses, particularly vendors who sell food to project workers. (35) Improving road safety by collaborating with the district road-safety unit to establish and maintain road-safety signage near the site in local languages. (36) Clearly demarcated pedestrian crossings in appropriate places etc. This could be achieved by establishing and implementing a Traffic Management Plan. Conduct a traffic impact assessment to assess the impact of increased traffic within the proposed mine area. (37) Develop community security and safety management structures (such as the Security Community Liaison Forum – a liaison body between the affected farmers and security personnel, through which security arrangements are discussed with affected farmers) for the mine related to the different activities. This should include emergency response plans for both community related accidents and also for the workplace. This must include a fire, rescue, and chemical spill response capability, as well as medical emergency response strategies. (38) Develop a clear policy for the management of emergencies or accidents in the community as a direct result of the projects activities. (39) Gender empowerment should be considered. Supporting education programs with a gender equity focus. (40) Support vulnerable groups and graduate training programs for the youth in the community. (41) Collaborate with the authorities to establish a system to monitor violence and community cohesion related to project activities. (42) Conduct violence-prevention education programs, particularly focusing on gender violence. (43) Conduct alcoholism-prevention education programs. (44) Throughout all project-cycle materials published for the community, include information about the closure and decommissioning phase and its effects on both workers and communities. (45) Support the maintenance (refurbishment) of key localised health infrastructure that could serve the projects needs. (46) Support the recruitment, training, and development of project healthcare practitioners. (47) Collect indicator data on noncommunicable diseases (NCD) in area. Focus on hypertension and diabetes as most common conditions. (48) Support the local health care personnel with training on disease management programs and the recognition of NCD symptoms and associated management. (49) Support health education programs as part of a community-based peer health educator program. These should focus on lifestyle risk factors such as diet, exercise, smoking and alcohol consumption.		

Socio-economic						
• Employment of workers and procurement of construction materials. • Employment of workers • Drilling & Blasting	**Loss of farm labour** **Population Influx** **Reduced access to livelihood resources** **Job Creation & local economic development** **Change in sense of place** **Indirect damage to/loss of assets**	Construction, Operational, and Decommissioning	78 ha	(1) Maximise and monitor local recruitment by ensuring that, where possible, construction contractors appoint portions of their workforce from neighbouring communities as a condition of contracting, but where this does to not conflict with labour law, specifically from the Vygenhoek and Skaapkraal (subject to engagement). (2) Consultation with local communities through the appropriate channels (understood to be the Bantau ba ga Choma Royal Family) must be conducted to make use of local businesses and skills where possible. (3) Ensure local employment and local services providers are appointed where possible from the Thaba Chweu Local Municipality, and Ward 5 specifically. (4) Prevent nepotism / corruption in local recruitment structures through transparent and fair recruitment practices. (5) Establish a liaison point with the adjacent farming community to monitor the impact on their local labour. (6) Ensure that goods and services are procured from within Thaba Chweu Local Municipality and from within Ward 5 specifically, as far as possible by: Developing a register of local Small, Medium and Micro Enterprises (SMMEs) that could provide goods and services; and Identify and develop links with skills development/ SMME development institutions. (7) Engaged and work with the representatives and elders of local communities, through the appropriate channels (understood to be the Bantau ba ga Choma Royal Family) prior to commencement of construction to: Ensure communities are aware of the timeframes and activities occurring on site, so as to ensure transparency and prevent conflict; and Identify medicinal plants within the mining site and to relocate these to the communities where possible, within the framework of applicable legislation. (8) Fence off and secure the construction areas to ensure that livestock and people are not unintentionally exposed to construction activities. (9) Develop a control plan in collaboration with local community representatives to control influx and informal settling. (10) Establish relationships with local police and community policing forums to assist with monitoring and controlling informal settlement. (11) Provide access to information for the affected communities (specifically Vygenhoek and Skaapkraal) in advance of project impacts occurring (awareness). (12) Partner with local policing units to monitor criminal activity and work with local health services (monitoring and awareness, particularly HIV/AIDS). (13) Ensure the mitigation provide din the Blasting Impact Assessment (**Appendix H**) is implemented. (14) Establish and secure a safe blasting buffer through as per relevant regulations and best practice. (15) Access within the blasting area shall be controlled to prevent presence of livestock or unauthorized persons during blasting. (16) Schedule blasting activities at reasonable times (through consultation with communities), e.g. lunch time when the community is least likely to be disturbed. (17) Develop a blasting schedule and provide this information to the Vygenhoek Community.	(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure. (3) Develop and implement community plans, including communications plan, and community health and safety plan (see ***Table 34***)	Entire Life cycle of project
Traffic Management						
• Bulk transporting of Ore to market on public roads	**Pressure on public transport infrastructure**	Construction and Operational	78 ha	(18) Access roads should be planned so that only minimum linear distances are developed. (19) All storm water control mechanisms to be maintained. (20) Clean and repair any damages caused by the haul vehicles to public or private roads. (21) All incidents related to traffic resulting from the authorised activities should be documented and kept in the safety records. (22) Haulage of ROM product should preferably be scheduled off-peak hour traffic times.	(1) Develop and implement a traffic management plan (see **Table 34**). (2) Develop and implement a road maintenance plan (see **Table 34**). (3) Develop and implement a Public Complaints procedure.	Entire Life cycle of project

				(23) Allow for safe pedestrian crossings where necessary. (24) Traffic calming measures must be implemented in consultation with the provincial traffic department. (25) Warning signs must be placed on and around the site as per the Occupational, Health and Safety Act requirements. (26) Clearly indicate which activities are to be taken place within which areas of the site using demarcation and/or signage. (27) All incidents should be reported to the appointed Health and Safety officer/Manager, investigated, documented, and kept in a safety file (digital or hardcopy). (28) Traffic warning signage must be erected where applicable, along transport routes and access roads. (29) All access roads shall be properly marked. (30) Markers shall show the direction of travel. (31) Roads not being used shall be marked with a "No Entry" sign. (32) Position security lighting so that it does not pose a nuisance to residential properties or tourist facilities or a danger to road users. (33) Warning barricading should be placed around open excavations and should be suitable for varying weather conditions. (34) Construct a dedicated right-turn lane on the northern approach of Road D212 as part of the proposed mining development. (35) Reflective road studs must be installed at the intersection of Road D212 and Road D874 in order to ensure visibility of the intersection geometry to road users at night-time. (36) Road safety training to be provided to residents of the local community and all employees (including contractors). (37) Transport of workers should be by means of arranged or contracted transport. (38) The existing Local Road that provides access to the proposed mining development from Road D874 is deemed to not be suitable in the current state for mine related vehicle traffic with specific reference to heavy vehicles. With limited alternatives for access to the proposed mining development, the Local Road must be upgraded to a two-lane gravel road. Upgrades of the existing road cannot be done without the required approvals (if applicable). (39) Dust suppression on the Local Road should be conducted on a regular basis in order to avoid road visibility issues caused by dust from vehicles making use of the road, especially heavy vehicles. (40) A dedicated loading and off-loading area should be provided on-site of the proposed mining development as close as possible to the operation area of the proposed mining development where workers can be loaded and off-loaded in a safe environment. (41) Rehabilitation of some sections of Road D874 are required to ensure that workers, consumable deliveries, and mined product could be transported at all times to and from the proposed mining development. (42) Further investigation with regards to a single lane water stream crossing on Road D874 near the intersection of Road D212 and Road874 should be conducted in order to determine whether this crossing would be suitable for an increase in heavy vehicle traffic in the long-term. (43) Detailed investigations should be conducted in conjunction with the relevant road authority and other mining developments in terms of the existing quality and potential life span of the existing road surface layers where consumables, mined ore and workers will be transported.		

				(44) A road maintenance plan should be prepared in conjunction with the relevant road authority and other mining developments on public roads where trucks will operate as soon as the proposed mining development has been approved to ensure that the consumables, mined ore and workers can be transported at all times.		

e) Impact Management Outcomes

(A description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph ()

This section defines the objectives and targets (**Table 31**) associated to the mitigation programme.

Table 29: Impact management outcomes associated to the identified aspects

ACTIVITY whether listed or not listed.	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE (modify, remedy, control, or stop)	STANDARD TO BE ACHIEVED (Impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives) etc.	
					Objective	Target
Air Quality Management & Climate						
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Construction of training centres, offices, ablution facilities and kitchen facilities • Construction of Pollution Control Dams (PCD's) • Transport of construction material, mobile plant, and equipment to the site • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Residue stockpiles • Screening Operations • Discard disposal (backfilling of mining area) • Vehicular activity on haul roads; and operation of mining equipment • Bulk transporting of Ore to market on Public roads	**Fugitive and ambient dust generation**	Air Quality	Construction, Operational, and Decommissioning	**Control**	Control dust fallout throughout the life cycle of the mining activity.	(1) Dust fallout levels at active operational sites do not exceed the pre-determined baseline levels by more than 10%. (2) Zero number of complaints from site staff, surrounding landowners and communities. (3) Adherence with legal required dust fallout levels. (4) Adherence with 600 mg/m² /day averaged over 30 days in residential areas and 1200 mg/m² /day averaged over 30 days in non-residential areas. (5) Exceedances no more than two within a year, no two sequential months per dust fallout monitoring site. (6) If exceeding dust fallout standard, within 3 months after submission of a dust fallout monitoring report, develop and submit a dust management plan to the competent authority (air quality officer) for approval.
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Stores, workshops &wash bays	**GHG emissions (direct and indirect)** **Electricity usage**	Air Quality Climate Change GHG emissions	Construction, Operational, and Decommissioning	**Control**	The levels of GHG and CO_2 emissions emanating from the use of plant and vehicles as well as the use of generators for power on site, is kept to a minimum by implementing an energy efficiency strategy.	(1) All vehicles, plant, and equipment to be serviced as per manufacturer's maintenance schedules. (2) Record keeping of service records of all vehicles, plant, and equipment. (3) No evidence of plant, equipment, or vehicles in bad condition. (4) Reduction in CO_2, CH_4, and N_2O emissions over time. (5) Annual reduction of the Carbon footprint.

• Fuel operating power generators • Transport of construction material, mobile plant, and equipment to the site • Onsite Clinic • Construction of training centres, offices, ablution facilities and kitchen facilities					Control and monitor the carbon footprint of the Vygenhoek Platinum Mine.	
Terrestrial Biodiversity						
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Storm water runoff management features • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • RoM & product stockpiling • Residue stockpiles • Rehabilitation of mining areas • Rehabilitation of the lay down areas	**Vegetation and habitat loss**	Fauna and Flora micro and macro ecosystems	Construction, Operational, and Decommissioning	**Remedy**	Avoid unnecessary loss of vegetation and habitats. Rehabilitation of all affected habitats and mining related areas.	(1) Limiting site clearance to areas as per the approved site layout plan. (2) All sensitive or protected flora identified to be rescued and relocated.
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • RoM & product stockpiling • Rehabilitation of mining areas • Rehabilitation of the lay down areas	**Influx of alien invasive vegetation**			**Control**	Prevent the spreading of alien plants/seeds on site and to the surrounding areas. Eradication and removal of alien and invasive plants.	(1) No visible presence of alien vegetation on site.
• Stores, workshops &wash bays • Fuel operating power generators • Fuel storage • Storage of fuel and lubricants in temporary facilities	**Chemical Fires**			**Avoid**	Avoid and prevent chemical fires. Hazardous spills are prevented and no incidents to human health occurs.	(1) Water quality of streams and rivers are maintained within the predetermined seasonally baseline levels. (2) Immediate removal and remediation of all spills. (3) All staff trained on emergency procedure related to chemical fires. (4) All hazardous substances are documented. (5) No incidents recorded involving chemical fires.
Aquatic Biodiversity						
• Access and hauling along roads i.e. during the construction of roads	**Sedimentation and siltation of watercourses**	Wetlands and aquatic biodiversity Surface water quality	Construction, Operational, and Decommissioning	**Avoid**	Avoid or minimise the degradation of water quality of watercourses due to sedimentation and siltation.	(1) Ensure water quality results do not exceed the pre-determined baseline results with more than 10%. (2) Water quality of streams and rivers are maintained within the pre-determined seasonality baseline levels. (3) No incidents related to the pollution of rivers and streams. (4) No visible signs of erosion damages.

• Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Transport of construction material, mobile plant and equipment to the site • Storm water runoff management features • Pollution Control Dams (PCD's) i.e. Construction and operation • Stores, workshops &wash bays • Ablutions & change house with septic tank • Fuel operating power generators • Fuel storage • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • RoM & product stockpiling • Residue stockpiles • Screening Operations • Discard disposal (backfilling of mining area) • Drilling & Blasting • Waste generation, storage and disposal • Storage of fuel and lubricants in temporary facilities • Vehicular activity on haul roads; and operation of mining equipment • Rehabilitation of mining areas • Rehabilitation of the lay down areas • Demolition of workshops, waste storage facilities, fuel storage facilities etc.	**Alteration of drainage patterns**	Groundwater quality		**Remedy**	Remedy the possible effects of alteration to natural drainage lines. Adherence with water quality requirements as set by the Water Use Licence Conditions.	(1) No visible signs of erosion formations such as dongas or rills. (2) Sedimentation loads of streams and rivers not to exceed the baseline levels by more than 10%. (3) Erosion control measures implemented in high-risk areas. (4) No signs of degradation of diversion channels or drainage systems.
	Destruction of wetlands			**Avoid**	Avoid the destruction of wetlands.	(1) Ensure water quality results do not exceed the pre-determined baseline results with more than 10%. (2) Water quality of streams and rivers are maintained within the pre-determined seasonality baseline levels. (3) No incidents related to the pollution of rivers and streams. (4) No visible signs of erosion damages.
	Contamination of water resources			**Avoid**	Avoid the release of pollutants into the aquatic environment. Wastewater is appropriately managed. Erosion is prevented. Suitable water management facilities and treatment works are developed and maintained.	(1) Water quality of streams and rivers are maintained within the predetermined seasonally baseline levels. (2) No evidence of pollutants released into streams and rivers. (3) No formation of erosion gullies or rills. (4) No leaks or spills caused by inadequate wastewater management facilities.
	Hydrocarbon contamination			**Control**	Adequate protection of soil and water resources. Active remediation in case of spill is ensured.	(1) No evidence of hydrocarbon and hazardous spills. (2) No release of contaminated water into the natural environment. (3) Immediate removal and remediation of all spills.
	Destruction of upstream tributaries and reduction in water in the catchment			**Remedy**	Remedy the possible effects of destruction of upstream tributaries and reduction in the water catchment. Adherence with water quality requirements set by the Water Use Licence Conditions.	(1) No visible signs of erosion formations such as dongas or rills. (2) Sedimentation loads of streams and rivers not to exceed the baseline levels by more than 10%. (3) Erosion control measures implemented in high-risk areas. (4) No signs of degradation of diversion channels or drainage systems.
	Hazardous Leachate			**Avoid**	Stormwater management on residue stockpiles. Implement design as per the Waste Classification (**Appendix T**).	(1) No signs of leachate formation. (2) No degradation of water quality downstream of residue stockpiles.
Soil						
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Stores, workshops &wash bays • Ablutions & change house with sewage treatment plant • Fuel operating power generators • Fuel storage • Topsoil and subsoil stripping & stockpiling for mining operation area	**Degradation of soil resources**	Soil quality Loss of fertile soil Soil contamination	Construction, Operational, and Decommissioning	**Remedy**	Adequate protection of soil resources and remediation if degradation cannot be avoided.	(1) No evidence of erosion. (2) No mixing of topsoil or fertile soils with infertile soils.
	Erosion			**Avoid**	To prevent any erosion and to provide adequate erosion control measures where required.	(1) No visible signs of erosion formations such as dongas or rills. (2) Sedimentation loads of streams and rivers not to exceed the baseline levels by more than 10%. (3) Erosion control measures implemented in high-risk areas.
	General waste generation & Littering			**Control**	Promoting the reduction, re-use, or recycle of waste where prevention is not possible. Disposal of waste to local waste disposal sites is limited.	(1) No littering (2) No unpleasant odours (3) Marked and sealable bins observed (4) Evidence of waste disposal certificates

• Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Residue stockpiles • Screening Operations • Discard disposal (backfilling of mining area) • Waste generation, storage, and disposal • Chemical Toilets • Storage of fuel and lubricants in temporary facilities • Rehabilitation of mining areas • Demolition / removal of portable and related infrastructure • Rehabilitation of the lay down areas • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.						
Water resources						
• Onsite clinic • Mining offices i.e. operation of training centres, offices, and kitchen facilities • Water storage facilities • Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Use of existing drilled / new boreholes • Water supply (potable & process) • Water Management	**Water usage for dust suppression**	Wastage of water resource Downstream water users Surface and groundwater quality	Construction and Operational	**Control**	Storm water run-off from dirty areas is as far as possible recycled for reuse.	(1) Abstraction from natural watercourses is kept to a minimum and does not exceed the DWAS Water Use Licence provisions.
	Water level reduction and contamination				Control the potential water level reduction and contamination related to authorised activities.	(1) Ensure water quality results do not exceed the pre-determined baseline results with more than 10%. (2) Water quality of streams and rivers are maintained within the pre-determined seasonality baseline levels. (3) No incidents related to the pollution of rivers and streams. (4) No visible signs of erosion damages. (5) No signs of blockages to the natural flow of the associated river catchment.
	Domestic water usage **Improper water storage management**				Maintain all infrastructure associated to the management of domestic water. Avoid the wastage of water resources. Full compliance to the water abstraction limits provided by DWAS. Ensure maintenance of infrastructure related to water usage and storage.	(1) Abstraction from natural watercourses is kept to a minimum and does not exceed the DWAS Water Use Licence provisions. (2) No visible signs of leaks or damage to water storage infrastructures.
Topography and Visual						
• Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Mining offices i.e. operation of training centres, offices, and kitchen facilities • Pollution Control Dams (PCD's) i.e. Construction and operation	**Topography and visual alteration**	Topography and Visual Environment	Construction, Operational, and Decommissioning	**Remedy**	Remedy alteration of the visual environment and topography as close as possible to the predetermined state.	(1) No areas left un-vegetated. (2) No signs of alien or invasive species on site. (3) Control of visual effects.

• Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Residue stockpiles						
• Mining offices i.e. operation of training centres, offices, and kitchen facilities • Demolition / removal of portable and related infrastructure • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.	**General waste generation & Littering**	Visual Environment	Construction, Operational, and Decommissioning	**Control**	Promoting the reduction, re-use, or recycle of waste where prevention is not possible. Disposal of waste to local waste disposal sites is limited.	(1) No littering. (2) No unpleasant odours. (3) Marked and sealable bins observed. (4) Evidence of waste disposal certificates.
Noise & Vibration						
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Mining offices i.e. operation of training centres, offices and kitchen facilities • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Screening Operations • Discard disposal (backfilling of mining area) • Vehicular activity on haul roads; and operation of mining equipment • Rehabilitation of mining areas • Demolition / removal of portable and related infrastructure • Vehicular activity: removal of mobile plant / equipment and vehicles • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.	**Noise generation**	Surrounding noise quality	Construction, Operational, and Decommissioning	**Control**	Control potential noise pollution stemming from the construction of the project	(1) No noise complaints. (2) Investigation of all complaints as per **Table 34**.
• Drilling and blasting	**Damaging vibrations**	Damages to surrounding infrastructures	Operational	**Avoid**	Limit exposure of surrounding infrastructures to vibrations due to drilling and blasting activities	(1) No damage to surrounding infrastructures caused by fly rock or vibrations.
Heritage and Palaeontology						
• Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas	**Destruction of graves**	Loss of heritage resources	Construction and Operational	**Avoid**	Identification of all possible sites of archaeological value and graves have been	(1) All sites clearly demarcated as no-go areas. (2) Evidence of records should further discoveries be identified during construction. (3) Full compliance to all mitigation measures as identified in **Table 30**.

• Topsoil and subsoil stripping & stockpiling for mining operation area	**Degradation of cultural significance heritage sites**				identified prior to the commencement of authorised work.	
Health and Safety						
• Employment of workers and procurement of construction materials. • Onsite Clinic	**Health and safety of employees and surrounding communities**	Human health and safety environment	Construction, Operational, and Decommissioning	**Control**	Ensuring the health and safety of all personnel on site and the surrounding affected communities.	(4) Low incidents of injured on duty (IOD's) on site. (5) Low incidents of reported pedestrian accidents. (6) Increased awareness on health and safety issues amongst employees and surrounding affected communities. (7) Visible evidence and use of PPE. (8) Support local healthcare facilities. (9) Monitor the exposure of employees to communicable diseases (Malaria, Tuberculosis, Covid-19, HIV, Hepatitis B etc.). (10) Reduce the exposure of employees and affected communities to noncommunicable diseases. (11) Reduce the exposure of employees and affected communities to potential hazardous materials. (12) Reduce the exposure of employees and affected communities to soil, water and sanitation related diseases. (13) Prevent the spread of sexually transmitted infections under employees and surrounding communities. (14) Improve water quality, wastewater treatment and safe reuse. (15) Universal access or awareness training to the importance of safe and nutritious food (if food is provided to employees). (16) Prevent and treat substance abuse by continuous awareness training and providing support to employees requiring treatment. (17) Reduce mortality from non-communicable diseases and promote mental health.
Socio-economic						
• Employment of workers and procurement of construction materials. • Employment of workers	**Loss of farm labour** **Population Influx** **Job Creation and economic development** **Reduced access to livelihood** **Change in sense of place**	Socio-economic	Construction, Operational, and Decommissioning	**Control**	Promoting open public communication in terms of required labour. Promoting the management of population influx associated to the mining operations in a sustainable manner. Control convicting social pathologies. Promoting peaceful negotiations with the surrounding communities and local business owner	(1) No complaints from local landowners regarding loss of farm labour. (2) Peaceful negotiations regarding employment opportunities. (3) Provision of existing housing infrastructures. (4) Continuous awareness training on HIV/AIDS/STD in collaboration with local health service providers. (5) Peaceful negotiations regarding employment, skills development, and financial provisions for social development projects.
Traffic Management						
• Bulk transporting of Ore to market on public roads	**Pressure on public transport infrastructure**	Socio-economic	Construction and Operational	**Control**	Accidents are kept to a minimum.	(1) No incidents reported of vehicle, pedestrian, and livestock accidents. (2) Condition of road surface maintained. (3) No complaints from surrounding landowners or road users. (4) Clearly visibility of warning signage.

					The surface quality of the road is not negatively impacted resulting from haulage of ROM product. The presence of heavy vehicles turning are clearly indicated thereby minimising potential accidents. Sections of existing road surfaces which have been impacted on by the haulage of ROM product are remediated.	(5) Existing road surfaces are utilised and maintained within baseline levels.

f) Impact Management Actions

(A description of impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (c) and (d) will be achieved).

In the previous section management objectives and targets have been established. **Table 31** identifies management actions to be implemented to reach the defined objectives identified in **Table 31**.

As part of the Vygenhoek Platinum Mine's Environmental Management System (based on the International ISO 14001:2015 standard) the following additional requirements must be implemented in order to promote continual improvement.

Development of an Environmental Policy

The management team of the Vygenhoek Platinum Mine shall define an organisational environmental Policy and ensure that, within the defined scope of this EMS, it:

- Is appropriate to the nature, scale and environmental impacts of its activities, products and services;
- Includes a commitment to continual improvement and prevention of pollution;
- Includes a commitment to comply with applicable legal requirements and with other requirements to which the Vygenhoek Platinum Mine subscribes which relate to its environmental aspects;
- Provides the framework for setting and reviewing environmental objectives and targets;
- Is documented, implemented, and maintained;
- Is communicated to all persons working for or on behalf of the Vygenhoek Platinum Mine; and
- Is available to the public.

Legal and other requirements

The management team of the Vygenhoek Platinum Mine shall establish, implement, and maintain a procedure (s) to:

- Identify and have access to the applicable legal requirements and other requirements to which the organisation subscribes related to its environmental aspects; and
- Determine how these requirements apply to its environmental aspects.

The managerial team of the Vygenhoek Platinum Mine shall ensure that all the applicable legal requirements identified in Part A section ***e)*** or any other legislative requirements published after the approval of this report, to which the project subscribes are taken into account in establishing, implementing, and maintaining the Vygenhoek Platinum Mine's EMS.

Resources, roles, responsibility, and authority

Management shall ensure the availability of resources essential to establish, implement, maintain, and improve the Vygenhoek Platinum Mine's EMS. Resources include human resources and specialised skills, organisational infrastructure, technology, and financial resources.

Roles, responsibilities, and authorities must be defined, documented and communicated in order to facilitate effective environmental management.

Vygenhoek Platinum's top management shall appoint a specific management representative(s) who, irrespective of other responsibilities, shall have defined roles, responsibilities, and authority for:

- Ensuring that an EMS is established, implemented, and maintained in accordance with the requirements stipulated by the Environmental Authorisation and approved EMPr; and
- Reporting to top management on the performance of the EMS for review including recommendations for improvement.

Competence, training, and awareness

The management team of the Vygenhoek Platinum Mine shall ensure that any person(s) performing tasks for it or on its behalf have the potential to cause a significant environmental impact(s) identified by the project is (are) competent on the basis of appropriate education, training, or experience, and shall retain associated records.

Training needs associated with its environmental aspects and its EMS shall be identified. Actions shall be taken to provide the required training to meet the identified needs and records of this shall be kept.

The management of the Vygenhoek Platinum Mine shall establish, implement, and maintain a procedure(s) to make persons working for it or on its behalf aware of the following:

- The importance of conformity with the established environmental policy, procedures, the EMPr, and Environmental Authorisation (EA);
- The significant environmental aspects and related actual or potential impacts associated with their work, and the environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving conformity with the requirements of the environmental management system; and
- The potential consequences of non-conformities from the specified procedures.

Communication

With regard to its environmental aspects and the EMS, the management team of the Vygenhoek Platinum Mineshall establish, implement, and maintain a procedure(s) for:

- Internal communication among various levels and functions; and
- Receiving, documenting, and responding to relevant communication from external I&AP.

GN R. 982 (2014 EIA regulations) requires that the compliance of the environmental authorisation, EMPr, and closure plan (in compliance with GN R. 1147) be audited throughout the time these documentation remains valid.

Section 34 (6) of the 2014 EIA regulation stipulated the following:

"Within 7 days of the date of submission of an environmental audit report to the competent authority, the holder of an environmental authorisation must notify all potential and registered interested and affected parties of the submission of that report, and make such report immediately available- (a) to anyone on request; and (b) on a publicly accessible website, where the holder has such a website."

Therefore in order to comply with the requirement stipulated above, a method of communicating the auditing report shall be established and implemented.

Documentation

The Vygenhoek Platinum Mine EMS documentation shall include the following:

- The Vygenhoek Platinum Mine environmental policy and the objectives and targets specified in the EMPr (**Table 31**);
- Description of the scope of the EMS;
- Description of the main elements of the EMS and their interaction, and reference to related documents;
- Documents, including records required by the EMPr and EA; and
- Documents, including records, determined by the Vygenhoek Platinum Mine's EMS, EMPr and EA to be necessary to ensure effective planning, operation and control of processes that relate to its significant environmental aspects.

Operational Control

The identified significant environmental impacts and/or risk as specified in Part A of this report must be managed by identifying and planning those operations associated to each impact and/or risk that are consistent with the developed environmental policy, objectives and targets, in order to ensure that they are carried out under specified conditions, by:

- Establishing, implementing and maintaining a documented procedure(s) to control situations where their absence could lead to deviation from the environmental policy, objectives and targets;
- Stipulating the operating criteria in the procedure(s); and
- Establishing, implementing, and maintaining procedures related to the identified significant environmental aspects of goods and services used by the Vygenhoek Platinum Mine and communicating applicable procedures and requirements to suppliers, including contractors or sub-contractors.

Emergency preparedness and response

Procedure(s) to identify potential emergency situations and potential accidents that can have an impact(s) on the environment and methods of respond to them shall be established, implemented, and maintained.

All actual emergency situations and accidents shall be responded to immediately and preventative or mitigation measures associated to the adverse environmental impacts shall be implemented.

This document shall be reviewed periodically and, where necessary, revise its emergency preparedness and response procedure after the occurrence of accidents or emergency situations.

The Emergency preparedness and response plan shall also periodically test such procedures where practicable.

Monitoring and measurement

As part of the Vygenhoek Platinum Mines's EMS, a procedure(s) to monitor and measure, on a regular basis, the key characteristics of the activities that can have a significant environmental impact must be established, implemented and maintained. This procedure shall include the documenting of information to monitor performance, applicable operational controls and conformity with the established objectives and goals. It must be inline and refer to the monitoring programme (**Table 34**).

Evaluation of compliance

In addition to the auditing requirements set by GN R. 982, the Vygenhoek Platinum Mine shall establish, implement and maintain a procedure for periodically evaluating compliance with all requirements set out in the developed Vygenhoek Platinum Mine's EMS, the approved EMPr, EA, and closure plan (complying with the requirements set by GN R. 1147). Records of these results must be kept and communicated to all responsible persons.

Nonconformity, corrective action, and preventative action

A procedure for dealing with actual and potential nonconformities and for taking corrective and preventative actions shall be established, implemented, and maintained. This procedure should include and define the following requirements:

- Identifying and correcting nonconformity (ies) and taking action(s) to mitigate their environmental impacts;
- Investigating nonconformity(ies), determining their cause(s) and taking actions in order to avoid their recurrence;
- Evaluating the need for action(s) to prevent nonconformity(ies) and implementing appropriate actions designed to avoid their occurrence;
- Recording the results of corrective action(s) and preventative action(s) taken; and
- Reviewing the effectiveness of corrective action(s) and preventative action(s).

The actions to be implemented shall be appropriate to the magnitude of the problems and the environmental impacts encountered.

Internal Audit

As discussed in previous sections, GN R. 982 (2014 EIA regulations) requires that compliance with the environmental authorisation, environmental management programme and the closure plan be submitted to the competent authority. However, this shall not be the only audit report generated throughout the life cycle of the Vygenhoek Platinum Mine.

A internal audit of the Vygenhoek Platinum Mine's EMS is recommended to be conducted on a annual (at least once before submitting independent audit report to the competent authority) basis, if found to be feasible. The purpose of these audits will be as follows:

- Determine whether the EMS conforms to the planned arrangements for environmental management including the requirements set out by the EMPr, EA, and LRDCP;
- The EMS has been properly implemented and is maintained; and

- Provide information on the results of audits to be managed.

The purpose of the audit report is as follows:

- To describe findings or nonconformity(ies);
- Communicate compliance status to responsible persons;
- To determine compliance status with the EMPr, EA, and closure plan;
- Indicate areas requiring improvement; and
- Determine the accuracy of documented procedures and mitigation measures.

This audit must be conducted by an appointed suitably qualified person with the expertise of environmental management.

Management Review

Top management shall review the Vygenhoek Platinum Mine's EMS at planned intervals (recommended to occur at least biannually), to ensure its continuing suitability, adequacy and effectiveness. Reviews shall include assessing opportunities for improvement and the need for changes to the EMS, EMPr, EA, and closure plan. Records of these review meeting must be documented and kept.

Input to management reviews shall include:

- Results of internal audits and evaluations of compliance with legal and other requirements;
- Communication from external I&AP, including complaints;
- The environmental performance of the Vygenhoek Platinum Project;
- The extent to which objectives and targets have been met;
- Status of corrective and preventative actions;
- Follow-up actions from previous management reviews;
- Changing circumstances, including developments in legal and other requirements related to its environmental aspects; and
- Recommendations for improvement.

The outputs from the management reviews shall include any decisions and actions related to possible changes to environmental policy, objectives and targets and other elements of the EMS, EMRr, EA, and closure plan, consistent with the commitment to continual improvement.

Table 30: Recommended management actions to be implemented to ensure objectives and targets are reached

ACTIVITY whether listed or not listed.	POTENTIAL IMPACT	MITIGATION TYPE (modify, remedy, control, or stop)	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS (A description of how each of the recommendations in 2.11.6 read with 2.12 and 2.15.2 herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)
Air Quality Management & Climate				
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Construction of training centres, offices, ablution facilities and kitchen facilities • Construction of Pollution Control Dams (PCD's) • Transport of construction material, mobile plant and equipment to the site • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Residue stockpiles • Screening Operations • Discard disposal (backfilling of mining area) • Vehicular activity on haul roads; and operation of mining equipment • Bulk transporting of Ore to market on Public roads	**Fugitive and ambient dust generation**	**Control**	Construction, Operational, and Decommissioning	(1) Development and implementation of a Dust management plan as part of an Air quality management plan to including the monitoring and prevention programme. (2) Ensuring compliance with the National Environmental Management: Air Quality Act (NEMAQA), No. 39 of 2004 as amended by Act no 20 of 2014. (3) Ensure activities remain under the thresholds stipulated in GNR 893 (in terms of section 21 of NEMAQA. (4) Register online to the National Atmospheric Emissions Inventory System (NAEIS) in terms of the National Reporting Regulations (GNR 283) as Group C emitters. (5) Ensuring compliance with the National Ambient Air Quality Standards (GNR 1210 of 24 December 2009). (6) Ensuring compliance with the National Dust Control regulations (GNR 897 of November 2013).
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Stores, workshops &wash bays • Fuel operating power generators • Transport of construction material, mobile plant, and equipment to the site • Onsite Clinic • Construction of training centres, offices, ablution facilities and kitchen facilities	**GHG emissions (direct and indirect)** **Electricity usage**	**Control**	Construction, Operational, and Decommissioning	(1) Develop and maintain a Carbon footprint reporting policy. (2) Annual GHG emissions calculations. (3) Develop and implement an electricity usage monitoring programme.
Terrestrial Biodiversity				
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Storm water runoff management features • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • RoM & product stockpiling • Residue stockpiles • Rehabilitation of mining areas • Rehabilitation of the lay down areas	**Vegetation and habitat loss**	**Remedy**	Construction, Operational, and Decommissioning	(1) Develop a plant species search and rescue management plan. (2) Develop and implement a phased rehabilitation management plan. (3) Develop and implement a soil conservation management plan. (4) Apply for permits to remove protected species (provincial and national).
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for lay down area and all related mining infrastructure • Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities	**Influx of alien invasive vegetation**	**Control**	Construction, Operational, and Decommissioning	(1) Develop and implement an alien eradication and control management plan.

• Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • RoM & product stockpiling • Rehabilitation of mining areas • Rehabilitation of the lay down areas				
• Stores, workshops &wash bays • Fuel operating power generators • Fuel storage • Storage of fuel and lubricants in temporary facilities	**Chemical Fires**	**Avoid**	Construction and Operational	(1) Develop and implement a fire prevention plan that includes measures of prevention and response to chemical fires. (2) Develop an emergency preparedness procedure and include the process to be followed in case of a chemical fire. (3) Develop a Hazardous substances management plan. (4) Develop a frequent inspection programme to include inspections of hazardous substances storage facilities.
Aquatic Biodiversity				
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Transport of construction material, mobile plant and equipment to the site • Storm water runoff management features • Pollution Control Dams (PCD's) i.e. Construction and operation • Stores, workshops &wash bays • Ablutions & change house with septic tank • Fuel operating power generators • Fuel storage • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • RoM & product stockpiling • Residue stockpiles • Screening Operations • Discard disposal (backfilling of mining area) • Drilling & Blasting • Waste generation, storage and disposal • Storage of fuel and lubricants in temporary facilities • Vehicular activity on haul roads; and operation of mining equipment • Rehabilitation of mining areas • Rehabilitation of the lay down areas • Demolition of workshops, waste storage facilities, fuel storage facilities etc.	**Sedimentation and siltation of watercourses**	**Avoid**	Construction, Operational, and Decommissioning	(1) Implement monitoring programme as per **Table 34**. (2) Develop and implementation of the conceptual storm water management plan as per **Appendix L** addressing the separation of "dirty" and clean "areas". (3) Development of emergency response plan with specific reference to spill prevention and remediation. (4) Development and implementation of vehicle/plant/equipment maintenance plan with specific reference to daily inspections of plant/vehicles/equipment for leaks or breakages. (5) Develop and implement an Integrated Waste and Water Management Plan (IWWMP). (6) Ensure compliance with the WUL conditions. (7) Update predictive groundwater flow and geochemical numerical models yearly.
	Alteration of drainage patterns	**Remedy**		
	Destruction of wetlands	**Avoid**		
	Contamination of water resources	**Avoid**		
	Hydrocarbon contamination	**Control**		
	Destruction of upstream tributaries and reduction in water in the catchment	**Remedy**		
	Hazardous Leachate	**Avoid**		
Soil				
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas	**Degradation of soil resources**	**Remedy**		(1) Development of a soil conservation management plan. (2) Development of a storm water management plan.

• Stores, workshops &wash bays • Ablutions & change house with sewage treatment plant			Construction, Operational, and Decommissioning	(3) Development and implementation of vehicle/plant/equipment maintenance plan with specific reference to daily inspections of plant/vehicles/equipment for leaks or breakages.
• Fuel operating power generators • Fuel storage • Topsoil and subsoil stripping & stockpiling for mining operation area	**Erosion**	**Avoid**		(1) Development and implementation of a storm water management plan. (2) Development of a soil conservation management plan. (3) Development and implementation of mine rehabilitation plan.
• Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Residue stockpiles • Screening Operations • Discard disposal (backfilling of mining area) • Waste generation, storage, and disposal • Chemical Toilets • Storage of fuel and lubricants in temporary facilities • Rehabilitation of mining areas • Demolition / removal of portable and related infrastructure • Rehabilitation of the lay down areas • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.	**General waste generation & Littering**	**Control**		(1) Compliance with the National Environmental Management: Waste Act, act no 59 of 2008 and associated regulations.
Water resources				
• Onsite clinic • Mining offices i.e. operation of training centres, offices, and kitchen facilities • Water storage facilities • Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Use of existing drilled / new boreholes • Water supply (potable & process) • Water Management	**Water usage for dust suppression** **Water level reduction and contamination** **Domestic water usage** **Improper water storage management**	**Control**	Construction and Operational	(1) Implement monitoring programme as per **Table 34**. (2) Develop and implement an Integrated Waste and Water Management Plan (IWWMP). (3) Ensure compliance with the WUL conditions. (4) Development and implementation of a Dust management plan including the monitoring and prevention programme. (5) Develop and implement a water usage record keeping procedure. (6) Develop and implement a infrastructure maintenance programme to include frequent inspections of water pipes and taps.
Topography and Visual				

• Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Mining offices i.e. operation of training centres, offices, and kitchen facilities • Pollution Control Dams (PCD's) i.e. Construction and operation • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Residue stockpiles	**Topography and visual alteration**	**Remedy**	Construction, Operational, and Decommissioning	(1) Mine plan in accordance with the MPRDA Regulation 56 section (1) to (8). (2) Adherence to the finalised approved lay out plan. (3) Review and implementation of the LRDCP.
• Mining offices i.e. operation of training centres, offices, and kitchen facilities • Demolition / removal of portable and related infrastructure • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.	**General waste generation & Littering**	**Control**	Construction, Operational, and Decommissioning	(1) Compliance with the National Environmental Management: Waste Act, act no 59 of 2008 and associated regulations.
Noise & Vibration				
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Mining offices i.e. operation of training centres, offices and kitchen facilities • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Screening Operations • Discard disposal (backfilling of mining area) • Vehicular activity on haul roads; and operation of mining equipment • Rehabilitation of mining areas • Demolition / removal of portable and related infrastructure • Vehicular activity: removal of mobile plant / equipment and vehicles • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.	**Noise generation**	**Control**	Construction, Operational, and Decommissioning	(1) Keep a register of all noise and blasting complaints. (2) Investigate all noise complaints as per **Table 34**. (3) Develop and implement a vehicle/plant/equipment management plan to specifically include routine inspections and testing of sound frequencies.
• Drilling and blasting	**Damaging vibrations**	**Avoid**	Operational	
Heritage and Palaeontology				
• Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Topsoil and subsoil stripping & stockpiling for mining operation area	**Destruction of graves** **Degradation of cultural significance heritage sites**	**Avoid**	Construction and Operational	(1) Ensure compliance with the National Heritage Resources Act (NHRA), No. 25 of 1999. (2) Ensure compliance with the Human Tissue Act, 1983 (Act no. 65 of 1983. (3) Implement the mitigation plan as per **Table 30**. (4) Implement the monitoring programme as per **Table 34**.
Health and Safety				

• Employment of workers and procurement of construction materials • Onsite Clinic	**Health and safety of employees and surrounding communities**	**Control**	Construction, Operational, and Decommissioning	(1) Develop and implement a Health Action Plan (HAP) for construction and operational phases. (2) Prepare and implement a specific covid-19 management plan for construction and operational phases. This should be aligned to the World Health Organisation (WHO) and South African Covid-19 Regulations. (3) Appoint a suitably qualified and experienced EHS practitioner whose responsibility should include managing, implementing, and reporting on the Health Action Plan. The EHS practitioner should be registered with SACPCMP at an appropriate level (as per 8(6) of the Construction Regulations) which will outline qualification and experience requirements. (4) Develop and implement an integrated waste management plan (see **Table 34**). (5) Develop and implement an integrated water management plan (see **Table 34**). (6) Develop and implement an appropriate occupational health and safety management plan (incl. community safety initiatives, OHSE awareness campaigns at schools, churches, and social events). (7) Ensure that a suitable/recognised food safety management system (e.g. HACCP/ISO22000) is implemented and monitored during construction and operations.
Socio-economic				
• Employment of workers and procurement of construction materials. • Employment of workers	**Loss of farm labour** **Population Influx** **Reduced access to livelihood resources** **Job Creation & local economic development** **Change in sense of place** **Indirect damage to/loss of assets**	**Control**	Construction, Operational, and Decommissioning	(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.
Traffic Management				
• Bulk transporting of Ore to market on public roads	**Pressure on public transport infrastructure**	**Control**	Construction and Operational	(1) Develop and implement a traffic management plan (see **Table 34**). (2) Develop and implement a road maintenance plan (see **Table 34**). (3) Develop and implement a Public Complaints procedure.

ii) Financial Provision

As part of the Vygenhoek Platinum Mine's Liability Estimation and Final Rehabilitation, Decommissioning and Mine Closure Plan (LRDCP attached as **Appendix U),** the financial provision for the mining operations were determined based on information currently available.

(1) Determined amount for Financial Provision

As part of the calculation of the closure cost certain assumptions needs to be made. The assumptions supporting the costing are the following:

- Costing was done based on the preferred layout presented in Figure 2, which include WRD option 1, Hauling route option 2, Office and RoM option 1 and the existing pit layouts. This is also detailed in the final closure plan report (see section 13 of report no. EMA/20/01/01, dated Dec 2020)
- Costing was updated based on information supplied by the mine, which is assumed to be correct.
- No allowances have been made for money received from sale of equipment, recyclable materials, structures, vehicles or the hiring out of infrastructure.
- Prior to determining which buildings should be demolished the requirements of section 44 of the MPRDA should be considered.
- Current LoM has been communicated as 10 years and closure will commence once the final stages of ore extractions commence.
- Physical structures are expected to be removed.
- Any structures identified in the heritage assessment may not be demolished without the necessary approval from the South African Heritage Resources Agency (SAHRA) due to their historical value.

The financial provision estimate was calculated in line with the Financial Provision Regulations, 2015 (GN R1147). The estimated financial liability for the mine at LoM is R 8,192,421.75 (incl. VAT). The financial provision estimates are included in **Table 31** below.

Table 31: Summary costing

Item	Scheduled (2031)
Biophysical	R 5 126 249.74
Physical	R 374 788.88
Sub-total 1	**R 5 501 038.61**
P & G (6% of sub-total 1)	R 330 062.32
Weighting Factor 1 (1,2)	R 396 074.78
Weighting Factor 2 (1,05)	R 346 565.43
Contingency (10% of sub-total 1)	R 550 103.86
Sub-total 2	R 1 622 806.39

Item	Scheduled (2031)
Sub-total 3 (Sum of sub-total 1 and 2)	R 7 123 845.00
VAT (15% of sub-total 3)	R 1 068 576.75
Grand total	**R 8 192 421.75**

(a) 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

See ***section d) i) of Part B***.

(b) Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties

The Vygenhoek Platinum Mine's conceptual LRDCP (**Appendix S**) forms part of the EIR and EMPr (Part A and Part B of this report) and has been subjected to the required Public Participation Process as described in ***section g) ii) of Part A***. Comments received has been incorporated in ***section g) iii) of Part A***.

(c) 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

Find **Appendix S**.

(d) Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives

The rehabilitation plan has been developed in line with GNR 1147 and according to the closure objectives. Find **Appendix U**.

(e) Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline

See **Table 31**. Find **Appendix U** for the detailed quantum calculation tables.

(f) Confirm that the financial provision will be provided as determined

Once the EA has been received, the applicant will review the annual rehabilitation plan as per GNR 1147, a financial provision as per regulation 7 and 8 must be provided.

Mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon, including

- Monitoring of Impact Management Actions
- Monitoring and reporting frequency
- Responsible persons
- Time period for implementing impact management actions
- Mechanism for monitoring compliance

As part of the Vygenhoek Platinum Mines's EMS, a procedure(s) to monitor and measure, on a regular basis, the key characteristics of the activities that can have a significant environmental impact must be established, implemented and maintained.

This procedure shall include:

- The documenting of information to monitor performance;
- Applicable operational controls and conformity with the established objectives and goals; and
- Procedure to address the monitoring requirements made in **Table 34**.

It is recommended that a legal compliance and EMS audit be regularly conducted independently by suitably qualified auditors throughout the life of the mine, to monitor the compliance with requirements set out in the EMPr, EA, and closure plan. The outcome of this audit should be as follows:

- Advise on any mitigation measures which need to be added to the existing programmes;
- Communication of findings to Mine management;
- Communicating environmental progress on the set objectives and targets in both the EMPr and closure plan; and
- Status of legal compliance with specific reference to the National Water Act (Act No. 36 of 1998), the MPRDA, NEMA, and the Mine health and safety act (Act no 29 of 1996).

The audit should take into consideration the management principles and strategies stated in the Environmental Management Programme and assess whether this strategy is providing the required results. Any flaws found in the rehabilitation process will be included in the audit report along with the recommended mitigation measures.

In section ***1) e)*** it is recommended that an internal audit of the Vygenhoek Platinum Mine's EMS is be conducted on a annual (at least once before submitting independent audit report to the competent authority) basis, if found to be feasible.

Table 32: Recommended mechanisms for monitoring compliance with and performance assessment against the EMPr

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Air Quality Management & Climate				
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Construction of training centres, offices, ablution facilities and kitchen facilities • Construction of Pollution Control Dams (PCD's) • Transport of construction material, mobile plant and equipment to the site • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Residue stockpiles • Screening Operations • Discard disposal (backfilling of mining area) • Vehicular activity on haul roads; and operation of mining equipment • Bulk transporting of Ore to market on Public roads	**Fugitive and ambient dust generation**	Ensure the development and implementation of an Air Quality Management Plan. The plan must at least address the following: • Methods of complying with legislative requirements (ensuring compliance with the National Ambient Air Quality Standards (GNR 1210 of 24 December 2009) and the National Dust Control regulations (GNR 897 of November 2013); • Methods of controlling dust generation; and • Identifying sensitive receptors and monitoring points (as per **Appendix F**, a minimum of 4 sampling sites and undertaken using the ASTM D1739-98 (reapproved 2017) method). The following requirements regarding dust fallout monitoring must be complied with: • All dust buckets installed should have wind shields attached, in accordance with the specifications provided; • Where possible and practical, dust buckets should not be installed within 20m of structures higher than 1m; • The stand for the container should hold the top of the container at a height of 2m above ground; • Prevailing winds are from the south-eastern and east-south-eastern quadrants, and the dispersion model output plots show dispersion towards the north-western quadrant. Therefore: o At least two buckets be placed north-west of the proposed mining area (see **Appendix F**) to accommodate for this principal wind direction; o At least one bucket be placed close to the proposed haul routes (see **Appendix F**); o At least one bucket be placed downwind of the proposed pit (see **Appendix F**); o At least one bucket be placed close to the proposed ROM and waste stockpiles situated south of the proposed mining area (see **Appendix F**); o At least one bucket be placed south-east of the proposed mining area (see **Appendix F**), depending on site accessibility. It is recommended that baseline monitoring of dust fallout, PM10 and PM2.5 is conducted at the site for a period of at least 12 months from commencement of the construction and operating activities. In the event of exceedance of the thresholds as specified in the National Ambient Air Quality Standards (GNR 1210 of 24 December 2009), continual monitoring of PM10 and PM2.5 will be required for a period agreed upon with the competent authority.	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer. (2) Project Management.	(1) Review of Air quality management plan as or when required. (2) Monthly monitoring of compliance with the NEMAQA regulations. (3) Frequent visual inspections. (4) Reporting and recording emissions related incidents. (5) Once of registration on the online NAEIS systems thereafter reporting as specified.

		The operation must register online to the National Atmospheric Emissions Inventory System (NAEIS) in terms of the National Reporting Regulations (GNR 283) as Group C emitters and report annually.		
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Stores, workshops &wash bays • Fuel operating power generators • Transport of construction material, mobile plant and equipment to the site • Construction of training centres, offices, ablution facilities and kitchen facilities • Topsoil and subsoil stripping & stockpiling for mining operation area • Drilling & Blasting • Opencast mining excavations • Waste generation, storage and disposal • RoM & product stockpiling • Screening Operations • Vehicular activity on haul roads; and operation of mining equipment • Bulk transporting of Ore to market on Public roads	**GHG emissions (direct and indirect) & CO_2 emissions (direct and indirect)**	An annual GHG emissions calculation, comparing emissions of CO_2, CH_4 and N_2O over time, to be conducted. Initiate investigation into energy efficient measures to reduce the current GHG emissions. An implementation plan of measures identified by the investigation must be developed and progress audited. The implementation plan must identify at least the following: • Mine-to-concentrator energy efficient strategy; • Energy efficient mineral separation strategy; • Improvement on ore sorting strategies; • Energy efficient blasting strategy; • Energy efficient material movement, overburden removal, hauling and crushing strategies; and • Overall reduction in energy consumption strategies.	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer. (2) Project Management.	(1) Annual GHG emissions calculations. (2) Annual auditing of energy efficiency implementation plan.
Terrestrial Biodiversity				
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Storm water runoff management features • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • RoM & product stockpiling • Residue stockpiles • Rehabilitation of mining areas • Rehabilitation of the lay down areas	**Vegetation and habitat loss**	A plant search and rescue management plan must be developed and address at least the following: • Recommendations made in the Terrestrial Biodiversity assessment attached as **Appendix I;** • Address requirements issued on the plant species permit obtained; • Method of quantification and record keeping of search and rescued plants; and • Method of reinstating vegetation and ensuring rehabilitation objective is reached. A terrestrial biodiversity monitoring programme must be implemented, and the following aspects must form part of the protocol: • Fixed point monitoring should be applied as the preferred method of monitoring. The selection of monitoring points should consider the spatial layout of mining activities and infrastructure in relation to sensitive environments, also taking note of control points to provide a comparative assessment; • All data gathered should be measurable (qualitative and quantitative) – attention should be provided to species diversity and abundance; • Monitoring report should be repeatable and temporally and spatially comparable, with specific reference to seasonal variation;	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management	(1) Review of soil conservation management plan as or when required. (2) Frequent quantification of available fertile soil for rehabilitation. (3) Review of storm water management plan as or when required. (4) Annual or frequency stipulated by the competent authority compliance auditing with the Mine Rehabilitation and closure plan. (5) Annual rehabilitation plan as per GN R. 1142. (6) Review of the Environmental Rehabilitation risk assessment as stipulated by the competent authority. (7) Frequent quantification review of search and rescued species. (8) Annual review or frequency as stipulated by the permit of plant removal permits. (9) Implementation of the terrestrial biodiversity monitoring protocol at a frequency of at least once annually, taking cognisance of seasonal variations

		• Data, when compared to previous sets, should show spatial and temporal trends; and • General habitat unit overviews should also be undertaken to augment quantitative data. The annual monitoring programme will be executed by a suitable panel of specialists, preferably consisting of the following specialists: • Vegetation/ ecology specialist; • Faunal (invertebrate, mammal, reptile, and amphibian) specialist; and • Avifaunal specialists. Requirements for the appointed specialists should conform to the guidelines of the South African Council for Natural Scientific Professions Act (2019), and specifically adhere to regulations pertaining to the minimum requirements as per the National Environmental Management Act, 1998 (Act No. 107 of 1998). As part of the Annual botanical monitoring protocol, the following aspects will be executed: • Selection of a suitable number of sampling points that is representative of the mining activities within a natural, receiving environment, with particular reference to sensitive habitat types and species of conservation concern; • Annual monitoring of vegetatal aspects during the active mining phase, including aspects of diversity, compositional and structural attributes as well as accumulation of impacts within nearby habitat; • Prevalence and continued persistence of plants of conservation concern; • Prevalence and continued persistence of plants with ethno-botanical properties; • Prevalence and management of alien and invasive plant species; and • Land change/ habitat loss and transformation. The following general monitoring guidelines should be included in the annual faunal monitoring protocol (inter alia): • Fixed point sampling and trapping procedures (annually) of invertebrates and small mammals; • Ad hoc, random sampling of all faunal groups during the same time of year (austral summer, after the first spring rains, preferably from late November onwards); • Monitoring of specific animal groups such as dragonflies and damselflies to be used as bio-indicators of local ecosystem health and ecosystem service status; • Specific sampling aimed at determining the presence/absence and ecology of conservation important species such as Lobatse Hinged Tortoise (Kinixis lobatsiana), Leopard (Panthera pardus), Brown Hyaena (Parahyaena brunnea) and Southern Mountain Reedbuck (Redunca f. fulvorufula) using passive recording devices such as trail cameras; • A baseline (to determine the presence/absence) and annual (if present) acoustic survey of the potentially occurring Cohen's Horseshoe Bat (Rhinolophus cohenae); • Identify any alien and invasive animals that might establish on site or close by;		

		• Include any observational and ad hoc data as gathered by personnel on site during the period between monitoring bouts. Develop a sighting and register log for observations pertaining to the presence/ abundance and occurrence of animals on site; and • Relevant photographic evidence of occurrences of animals wherever possible. The following monitoring guidelines should be included in the annual avian monitoring protocol: • Annual monitoring surveys, consisting of a minimum of 2 full days and should coincide with the peak wet season when most of the drainage lines and wetland features are inundated. This will enable the observed to obtain quantified data on bird richness abundance, which will contribute towards our understanding of impacts related to birds. • Obtaining presence and relative abundance data by means of fixed point counts (see methods used in this report) • Mapping of spatial localities (breeding, foraging and roosting habitat) of collision prone, threatened, near threatened and biome-restricted bird species. • Estimating relative densities of collision prone, threatened, near threatened and biome-restricted bird species by means of direct counts. • Detecting major flight routes of collision-prone and large threatened and near threatened species by means of vantage point counts. • Estimating the relative densities of passerine bird species by means of point counts. • Detecting relative population trends and movements of bird species at and near the development site. • Recommendations regarding the development and the set-up of a post-construction monitoring protocol. A soil conservation management plan must be developed and address at least the following: • Specify mitigation measures that will be implemented to prevent contamination of topsoil's and fertile soils; • Identify measures to be implemented preventing the loss of topsoil and fertile soils; • Record keeping of available topsoil and fertile soil for use during the rehabilitation phase of an activity; and • Monitoring requirements. Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.		
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities	**Influx of alien invasive vegetation**	An alien eradication and control management plan must be developed and address at least the following: • Identification of areas prone to alien species in accordance with the applicable regulations and **Appendix I**; • Reference to recommendations made in **Appendix I**;	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management (3) Herbicide consultant	(1) Review of alien eradication and control management plan as or when required. (2) Weekly inspection of site for the visible signs of alien species establishment.

• Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • RoM & product stockpiling • Rehabilitation of mining areas • Rehabilitation of the lay down areas		• Frequency of monitoring and inspection requirements of areas prone to establishment; • Eradication methods; and • Including requirements stipulated in the legal requirements stipulated in **Table 30**. Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.		
• Stores, workshops &wash bays • Fuel operating power generators • Fuel storage • Storage of fuel and lubricants in temporary facilities	**Chemical Fires**	A hazardous substance management plan must be developed and address at least the following: • Storage, transport, handling, and disposal requirements according to the legislative requirements listed in **Table 30**; • Fire prevention methods including the description of equipment to be available for emergency situations; • Health and safety requirements; and • Monitoring requirements. A fire prevention plan must be developed and address at least the following: • Identification of all fire risks associated to the Vygenhoek Platinum Mine; • Describe preventative measures and include equipment; and • Monitoring of fire prevention equipment and high-risk areas. An Emergency preparedness and response plan to be developed and address at least the following: • Identifying possible emergency situations – include Chemical fires; • Describe preventative measures; • Describe procedure to be followed in the case of a emergency; • Include emergency contact details; • Include monitoring requirements of preventative measures and or equipment; and • Appoint responsible persons. Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Frequent inspection of hazardous substances storage facilities is required. Report and record all incidents related to chemical fires. Records to be kept of monitoring activities.	(1) Health and safety officer (2) Site management	(1) Review of fire prevention plan as or when required. (2) Frequent inspections of fire prevention equipment. (3) Annual review of the Emergency preparedness and response plan or review after occurrence of emergency incident. (4) Frequent inspections of hazardous substances storage facilities. (5) Review of Hazardous substances management plan as or when required. (6) Frequent inspections of spill prevention equipment.
Aquatic Biodiversity				
• Access and hauling along roads i.e. during the construction of roads	**Sedimentation and siltation of watercourses**	Monitoring requirements as stipulated by the conditions of the Water Use Licence (WUL) must be always complied with.	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer	(2) Review of storm water management plan as or when required. (3) Monthly reporting or frequency specified in the WUL on the compliance of water quality results as specified in **Appendix J, L & M**.

• Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Storm water runoff management features • Pollution Control Dams (PCD's) i.e. Construction and operation • Stores, workshops &wash bays • Ablutions & change house with sewage treatment plant • Fuel operating power generators • Fuel storage • Transport of construction material, mobile plant, and equipment to the site • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Residue stockpiles • Screening Operations • Discard disposal (backfilling of mining area) • Waste generation, storage, and disposal • Chemical Toilets • River crossings • Water supply (potable & process) • Storage of fuel and lubricants in temporary facilities • Water Management • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc. • Rehabilitation of mining areas • Vehicular activity: removal of mobile plant / equipment and vehicles • Rehabilitation of the lay down areas	**Alteration of drainage patterns** **Destruction of Wetlands** **Destruction of upstream tributaries and reduction in water in the catchment** **Contamination of water resources**	Compliance with the requirements must be monitored. ***Groundwater monitoring*** • Sampling of the proposed groundwater monitoring boreholes (a total of six (12)) as per **Appendix M**; • Dedicated groundwater monitoring boreholes should be drilled before pit expansion to obtain baseline water quality and quantity data; • Field measurements of the samples taken from groundwater boreholes must include the analysis for pH, EC/TDS, Temp, Disolved Oxygen, and groundwater level. If field measurements indicate a contaminant trend, it is advised that a sample be submitted for analytical testing. The following should typically be analysed: • pH, Conductivity, Total dissolved solids (TDS), total suspended solids (TSS) and turbidity (TUR). • Calcium, Magnesium, Sodium, Potassium, Carbonate, Bicarbonate, Chloride, Sulphate, Nitrate, Iron, Manganese, Fluoride, Aluminium, Total Alkalinity (TALK), Ammonia, Ammonium. Based on the leach testing conducted during the Geohydrological assessment (Appendix M), the following constituents should be focused on: • Dissolved Chromium; • Dissolved Aluminium; and • Dissolved Iron. the numerical groundwater model and transport model be updated annually, to: • Confirm preferential flow paths and groundwater migration velocities as new geological data is attained via mining. • Evaluate the spatial impact (i.e. TDS plume) calibrated with the proposed monitoring borehole data. • Confirm long term liabilities associated with the workings (i.e. predict likely changes in flow fields etc.); and • Ensure no monitoring network gaps exist (i.e. check if the monitoring network is representative of the site). ***Surface water monitoring*** A Storm water management plan must be developed and implemented and address at least the following: • Recommendations made in the conceptual storm water management plan in **Appendix L;**	(2) Project Management	(4) Dewatering volumes during operational phase must be recorded on a bi-monthly basis (5) Quarterly sampling of groundwater monitoring boreholes. (6) Quarterly monitoring of water levels of all known boreholes. (7) Quarterly surface water monitoring, including monitoring of water quality of PCD's and pit containment facilities. (8) Update predictive groundwater flow and geochemical numerical models yearly. (9) Frequent inspections of diversion infrastructure. (10) WUL audits as specified in licensing requirements. (11) Auditing of IWWMP according to the specified time frames stipulated in the WUL. (12) Review of IWWMP according to the specified time frames stipulated in the WUL. (13) Review of the water management plan as or when required. (14) Daily recoding of water usage. (15) Annual review of operational water balances. (16) WUL audits as specified in licensing requirements. (17) Annual review of the Emergency preparedness and response plan or review after occurrence of emergency incident. (18) Weekly inspections of spill prevention equipment.

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Requirements to monitor the functionality of storm water infrastructure;
Frequency of monitoring;
Dirty water containment methods and frequent quantification and control of volumes;
Water quality monitoring requirements; and
Methods addressing requirements set out in the WUL.

A minimum of nine surface water quality monitoring positions have been identified as part of the Hydrological Assessment (Appendix L).
<table>
<tr><th>Point</th><th>X</th><th>Y</th></tr>
<tr><td>1</td><td>30.1582</td><td>-25.0553</td></tr>
<tr><td>2</td><td>30.1561</td><td>-25.0379</td></tr>
<tr><td>3</td><td>30.1559</td><td>-25.0296</td></tr>
<tr><td>4</td><td>30.1518</td><td>-25.0312</td></tr>
<tr><td>5</td><td>30.1486</td><td>-25.0332</td></tr>
<tr><td>6</td><td>30.1487</td><td>-25.0367</td></tr>
<tr><td>7</td><td>30.1554</td><td>-25.0352</td></tr>
<tr><td>8</td><td>30.1687</td><td>-25.0410</td></tr>
<tr><td>9</td><td>30.1704</td><td>-25.0305</td></tr>
</table>
It is recommended that surface water quality monitoring commences prior to the establishment of the proposed mining operation in order to obtain an appropriate seasonal baseline, from which any impact resulting from the proposed operation can be identified.

It is further recommended that water from within the dirty water process circuit such as the PCD and pit be included in the monitoring program.

The compliance of the Integrated Water and Waste Management Plan (IWWMP) approved by the Department of Water Affairs must be monitored as frequently as indicated by the WUL.

Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan.

Records to be kept of monitoring activities.
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Access and hauling along roads i.e. during the construction of roads
Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas
Weigh bridge
Storm water runoff management features
Stores, workshops &wash bays
Fuel operating power generators
Fuel storage
Transport of construction material, mobile plant, and equipment to the site
Use of existing drilled / new boreholes

</td>
<td>Hydrocarbon Contamination</td>
<td>
Regular inspections of areas prone to hydrocarbon spills and contamination must be inspected on a regular basis.

Contamination the affected environment will require remediation actions.

Soil contamination

After completion of remediation actions, it is recommended that samples be taken to ensure the soil quality comply with the rehabilitation objectives.

Water contamination
</td>
<td>(1) All staff
(2) Environmental Control Officer/Environmental Officer/ SHEQ Officer
(3) Project Management</td>
<td>(1) Review of the Water management plan as or when required.
(2) Review of Storm water Management plan as or when required.
(3) Annual review of the Emergency Preparedness and Response Plan or review after occurrence of emergency incident.
(4) Review of vehicle/plan/equipment maintenance plan as or when required.
(5) Daily inspections of vehicles/plant/equipment.
(6) Weekly inspections of hazardous substances storage facilities.
(7) Review of Hazardous substances management plan as or when required.
(8) Weekly inspections of spill prevention equipment.</td>
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• Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Screening Operations • Discard disposal (backfilling of mining area) • River crossings • Storage of fuel and lubricants in temporary facilities • Vehicular activity on haul roads; and operation of mining equipment • Demolition / removal of portable and related infrastructure • Vehicular activity: removal of mobile plant / equipment and vehicles • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.		Water samples should be taken to ensure compliance with legal thresholds and the baseline data as specified in **Appendix J, L & M.** Records to be kept of monitoring activities.		
• Residue stockpiles • Waste generation, storage, and disposal	**Hazardous Leachate**	A Waste management plan must be developed and address at least the following: • Identification of possible waste streams both hazardous and general • Description of method to re-use, reduce, recycle, or avoid waste generation • Monitoring requirements • Quantification of waste streams • Description of mitigation measures • Compliance with regulations stipulated in **Table 30** On-going monitoring, reporting, and recording of all waste streams are required. Monitoring, auditing, and reporting of compliance with the Waste Management Licence will be required as specified in the authorisation.	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management	(1) Frequent inspection of on-site waste disposal facilities and sites. (2) Review of the Vygenhoek Platinum Mine Waste Management plan as or when required. (3) Monthly reporting or frequency specified in the WUL on the compliance of water quality results as specified in **Appendix J, L & M.** (4) Frequent inspection of waste disposal facilities. (5) Compliance audit with the WML as specified by the competent authority.
Soil				
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Stores, workshops &wash bays • Ablutions & change house with sewage treatment plant • Fuel operating power generators	**Degradation of soil resources**	A soil conservation management plan must be developed and address at least the following: • Specify mitigation measures that will be implemented to prevent contamination of topsoil's and fertile soils; • Identify measures to be implemented preventing the loss of topsoil and fertile soils; • Record keeping of available topsoil and fertile soil for use during the rehabilitation phase of an activity; and • Monitoring requirements	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management	(1) Review of soil conservation management plan as or when required. (2) Frequent quantification of available fertile soil for rehabilitation. (3) Review of storm water management plan as or when required. (4) Review of vehicle/plan/equipment maintenance plan as or when required. (5) Daily inspections of vehicles/plant/equipment. (6) Weekly inspections of spill prevention equipment.

• Fuel storage • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Residue stockpiles • Screening Operations • Discard disposal (backfilling of mining area) • Waste generation, storage, and disposal • Chemical Toilets • Storage of fuel and lubricants in temporary facilities • Rehabilitation of mining areas • Demolition / removal of portable and related infrastructure • Rehabilitation of the lay down areas • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.		Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.		
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Storm water runoff management features • Transport of construction material, mobile plant, and equipment to the site • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • RoM & product stockpiling • Discard disposal (backfilling of mining area) • River crossings • Vehicular activity on haul roads; and operation of mining equipment • Water Management • Rehabilitation of mining areas • Demolition / removal of portable and related infrastructure • Vehicular activity: removal of mobile plant / equipment and vehicles • Rehabilitation of the lay down areas • Demolition of PCD's	**Erosion**	A Storm water management plan must be developed and address at least the following: • Recommendations made in the conceptual storm water management plan in **Appendix L;** • Requirements to monitor the functionality of storm water infrastructure; • Frequency of monitoring; • Dirty water containment methods and frequent quantification and control of volumes; • Water quality monitoring requirements; and • Methods addressing requirements set out in the WUL. A soil conservation management plan must be developed and address at least the following: • Specify mitigation measures that will be implemented to prevent contamination of topsoil's and fertile soils; • Identify measures to be implemented preventing the loss of topsoil and fertile soils; • Record keeping of available topsoil and fertile soil for use during the rehabilitation phase of an activity; and • Monitoring requirements. Areas prone to erosion must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management	(1) Review of soil conservation management plan as or when required. (2) Frequent quantification of available fertile soil for rehabilitation. (3) Review of storm water management plan as or when required. (4) Annual compliance auditing or frequency stipulated by the competent authority with the Mine Rehabilitation and closure plan. (5) Annual rehabilitation plan as required by GN R.1142. (6) Annual review of the Environmental Rehabilitation risk assessment as required by GN R.1142.

• Demolition of workshops, waste storage facilities, fuel storage facilities etc.				
• Mining offices (construction and operation) i.e. operation of training centres, offices, and kitchen facilities • Demolition / removal of portable and related infrastructure • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.	**General waste generation & Littering** **Illegal dumping**	A Waste management plan must be developed and address at least the following: • Identification of possible waste streams both hazardous and general; • Description of method to re-use, reduce, recycle, or avoid waste generation; • Monitoring requirements; • Quantification of waste streams; • Description of mitigation measures; and • Compliance with regulations stipulated in **Table 30**. On-going monitoring, reporting, and recording of all waste streams are required. Frequent inspections of waste disposal facilities or areas to take place. Records to be kept of such monitoring activities.	(1) Health and safety officer (2) Project Management	(1) Frequent inspection of on-site waste disposal facilities and sites. (2) Review of the Vygenhoek Platinum Mine Waste Management plan as or when required.
Water Resources				
• Onsite clinic • Mining offices i.e. operation of training centres, offices, and kitchen facilities • Water storage facilities • Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Use of existing drilled / new boreholes • Water supply (potable & process) • Water Management	**Water usage for dust suppression** **Water level reduction and contamination** **Domestic water usage** **Improper water storage management**	Monitor and record water usage for dust suppression. Promoting the re-use of water contained as specified in the Storm water Management plan is recommended. However, the water quality should be tested to ensure legal compliance before re-use. The operational water balances must be monitored and reviewed on a frequent basis as to ensure compliance with the WUL requirements. Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Frequent inspection of water storage facilities is required. Records to be kept of monitoring activities.	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management	(1) Frequent reporting on the compliance of water quality results as specified in **Appendix L & M.** (2) Daily recoding of water usage for dust suppression. (3) Anual review of operational water balances. (4) WUL audits as specified in licensing requirements.
Topography and visual alteration				
• Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Mining offices (construction and operation) i.e. operation of training centres, offices, and kitchen facilities • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • RoM & product stockpiling • Residue stockpiles	**Topography and visual alteration**	Monitoring adherence with the requirements set out by GN R. 1142. Records to be kept of pre-construction topography. Alteration to be monitored and managed in accordance with the rehabilitation objectives. Visual monitoring and supervision of vegetation clearing during construction (by contractor as part of construction contract). Monitoring of rehabilitated areas quarterly for at least a year following the end of construction (by contractor as part of construction contract).	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management (3) Construction contractor	(1) Annual compliance auditing or frequency stipulated by the competent authority with the Mine Rehabilitation and closure plan. (2) Review of the Annual rehabilitation plan as stipulated by GN R. 1142. (3) Annual review of the Environmental Rehabilitation risk assessment. (4) Frequent inspection of mining areas.

		Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.		
Noise & Vibration				
• Access and hauling along roads i.e. during the construction of roads • Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Mining offices (construction and operation) i.e. operation of training centres, offices, and kitchen facilities • Stores, workshops &wash bays • Fuel operating power generators • Topsoil and subsoil stripping & stockpiling for mining operation area • Opencast mining excavations • Drilling & Blasting • RoM & product stockpiling • Screening Operations • Discard disposal (backfilling of mining area) • Vehicular activity on haul roads; and operation of mining equipment • Rehabilitation of mining areas • Demolition / removal of portable and related infrastructure • Vehicular activity: removal of mobile plant / equipment and vehicles • Demolition of PCD's • Demolition of workshops, waste storage facilities, fuel storage facilities etc.	**Noise generation** **Damaging vibrations**	A passive noise monitoring programme (on condition of all access roads constructed further than 50 m away from all houses used for residential purposes) to be developed and address at least the following: • Recording of complaints procedure. • Method of selecting measurement localities; and • Method of measurement procedures. A blast monitoring programme to be developed by a suitably qualified specialist in the event that a complaint was lodged. The results from blasting activities should be analysed to calculate the site constants and the blasting vibration study must be updated. Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities. Vehicles/plant/equipment must be inspected on a regular basis. Records of these inspections must be kept.	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management (3) Acoustical Consultant	(1) Recording of complaints. (2) Investigating complaints as per guidance provided in **Appendix H**. (3) Review of vehicle/plan/equipment maintenance plan as or when required. (4) Frequent inspections of vehicles/plant/equipment.
Heritage and Palaeontology				
• Site clearing and topsoil stripping for offices, workshops, ROM, and WRD areas • Topsoil and subsoil stripping & stockpiling for mining operation area	**Destruction of graves**	Sites identified by **Appendix P** must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan.	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer	(1) Quarterly inspections of identified sites to ensure no disturbance.

	Degradation of cultural significance heritage sites	A register (with GPS coordinates) to be kept of all identified sites. This register to be updated with photographic evidence recording the state of the features on a quarterly basis. Records to be kept of monitoring activities.	(2) Project Management (3) Suitable accredited and qualified archaeologist	
Health and Safety				
• Employment of workers during all phases	**Health and safety of employees**	Develop a Health Action Plan. This action plan must include at least the following: • Monitoring methods for Covid-19 exposure; • Monitoring methods for both communicable and noncommunicable diseases; • Monitoring programme of drinking water quality; • Monitoring programme of onsite sanitation and waste facilities; • Monitoring programme of onsite food sourcing, storage, preparation, delivery, and disposal facilities (if applicable); and • Monitoring and recording methods of alcohol and drug abuse. The Vygenhoek Platinum Mine's Health and Safety Management Plan must at least include the following specific environmental related requirements: • Management of medical waste; and • Management of hazardous substances. On-going monitoring and recording of medical waste generation. On-going monitoring and recording of health-related issues as per the Health Action Plan and recommendations made in **Appendix N**.	(1) Health and safety officer (2) Project Management (3) All trained first aid staff (4) Appointment of a qualified EHS practitioner	(1) Review of the Vygenhoek Platinum Mine Health Action Plan as or when required. (1) Review of the Vygenhoek Platinum Mine Health and Safety management plan as or when required. (2) Review of the on-site Clinic management plan as or when required. (3) Frequent inspection of medical waste facilities. (4) Monthly reporting of medical waste generation. (5) Daily management and monitoring of temperature, handwashing, social distancing, surface sanitising, contact tracing (as per covid-19 per Regulations). (6) Daily, weekly & monthly monitoring of covid-19 positive cases within the mine's direct and indirect employees. (7) Annual monitoring of TB positive cases within the projects direct and indirect employees. (8) Annual monitoring of HIV mitigation and management measures being implemented. (9) Monthly monitoring of toilet to worker ratio being implemented (as per OHS Act & Regulations) as well as the proper management, storage, collection, and disposal of human waste to appropriate registered facilities. (10) Daily, weekly, and monthly monitoring of food sourcing, storage, preparation, delivery and disposal by the project and its contractors as per HACCP/ISO22000 requirements. (11) Monitor the implementation of the projects traffic management plan monthly. (12) Monitor the trends of accidents and injuries through appropriate incident investigations and root cause analysis. (13) Quarterly monitoring of hazardous materials management plan and effectiveness of emergency response procedures. (14) Daily monitoring and recording of alcohol abuse by direct project personnel (breathalyser testing). (15) Weekly monitoring of gender-based violence irt direct project personnel. (16) Monthly monitoring of the mitigation and management measures implemented by the project. (17) Annual monitoring of reported NCD cases (e.g. diabetes, cancer, suicide).
• Onsite Clinic	**Medical Waste generation**			
Socio-economic				

• Employment of workers and procurement of construction materials. • Employment of workers	**Loss of farm labour** **Population Influx** **Job Creation and economic development** **Reduced access to livelihood** **Change in sense of place**	Frequent monitoring of compliance with the Social Labour plan. A communications plan must be developed and should include: • An up-to-date database of all relevant stakeholders, including – public and private individuals, and community, businesses, and organisational representatives; • Described method of communication for various scenarios including the frequency of communications (daily, weekly, ad hoc) and the means to be used (in-person, e-mail, phone call, text message, WhatsApp groups, notice boards, etc); • Consideration must be given to disadvantaged or differently abled stakeholders (e.g. illiterate, visually impaired, etc.) and social restrictions that may apply (e.g. gender roles); and • An indication of who is responsible for communication at each stage and according to each situation, including sender and receiver of each item. A grievance procedure to be developed and address at least the following: • An appropriate mechanism for stakeholder to report issues and complaints - A formal and accessible means of communications, including an electronic and physical (hard copy) procedure, such as a complaints telephone number (e.g. hot line), email address, physical address/site with a box for written complaints, and (if possible) a SMS/WhatsApp line for ease of submission and engagement; and • A formal record of all grievances – including recording, investigation, assessment, management and close out of all grievances. The Vygenhoek Platinum Mine Community Health and Safety management plan must at least include the following specific requirements: • Legal Context – namely South African laws and regulations governing public health and safety; • Organisation – including community resources (e.g. clinics, hospitals, community security measures, etc.), operator and contractor resources (e.g. site clinic, staff, financial provisions, private security, etc.); • Identification of potential impacts – as per the social impact assessment and other relevant reports; • Identification mitigation measures – including regular monitoring and reporting, auditing and review of measures, and communication with communities; • Roles and responsibilities – identification of who is responsible for what aspects of community health and safety and communications; and • Training and awareness – including community and staff awareness campaigns, including HIV, TB, and other communicable diseases. Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan.	(1) Company Directors (2) Human Resource manager (3) Project manager (4) SHEQ/ Health and Safety Manger (5) Community liaison officer	(1) Review of Social Labour plan as required by legislation and the competent authority. (2) Review of grievance procedure as or when required. (3) Ongoing recording of complaints received by I&AP. (4) Review of Vygenhoek Platinum Mine Community Health and Safety management plan as or when required.

		Records to be kept of monitoring activities.		
Traffic Management				
• Bulk transporting of Ore to market on public roads	**Pressure on public transport infrastructure**	A traffic management plan must be developed and address at least the following: • Recommendations made in **Appendix Q;** • Detailed route identification map indicating traffic directions and intersections; • Identification of roads requiring maintenance and maintenance plan; and • Monitoring of road intersections raised as a concern in the Traffic Assessment (**Appendix Q**). Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.	(1) Health and Safety Manager/Officer. (2) Project management.	(1) Review of traffic management plan as or when required. (2) Quarterly visual inspections of intersections of concerns as per **Appendix Q** (intersection at Road D212 and Road874).

(l) Indicate the frequency of the submission of the performance assessment report

Section 34 of GN R. 982 stipulates the requirements for auditing compliance with the Environmental Authorisation (EA), the EMPr, and the closure plan (in compliance with GN R. 1147).

It requires the holder of the authorisation, for the period during which the EA, EMPr, and closure plan are valid, to ensure compliance with all the conditions stipulated in these documents and that is be audited. This audit report must then be submitted to the competent authority.

This audit report must adhere to the following conditions:

- Be prepared by an independent person with the relevant environmental auditing expertise;
- Provide verifiable findings, in a structured and systematic manner, on- (i) the level of performance against and compliance of an organization or project with the provisions of the requisite environmental authorisation or EMPr and, where applicable, the closure plan; and (ii) the ability of the measures contained in the EMPr, and where applicable the closure plan, to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity;
- Contain the information set out in Appendix 7 of GN R. 982; and
- Be conducted and submitted to the competent authority at intervals as indicated in the environmental authorisation.

The purpose of this audit report is also defined in the regulations and is as follows:

- Determine the ability of the EMPr, and where applicable the closure plan, to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity on an ongoing basis and to sufficiently provide for the , avoidance, management and mitigation of environmental impacts associated with the closure of the facility; and
- To determine the level of compliance with the provisions of environmental authorisation, EMPr and where applicable the closure plan.

In the event that findings of the environmental audit report indicate insufficient mitigation of environmental impacts of the activity or insufficient levels of compliance with the requirements, the holder of the EA must submit recommendations to amend the EMPr or closure plan in order to rectify the shortcomings identified in the audit report.

The recommendations must be subjected to a public participation process which process has been agreed to by the competent authority and was appropriate to bring the proposed amendment of the EMPr and, where applicable the closure plan, to the attention of potential and registered interested and affected parties, including organs of state which have jurisdiction in respect of any aspect of the relevant activity and the competent authority, for approval by the competent authority.

Within 7 days of the date of submission of an environmental audit report to the competent authority, the holder of an environmental authorisation must notify all potential and registered interested and affected parties of the submission of that report, and make such report immediately available:

- to anyone on request; and
- on a publicly accessible website, where the holder has such a website.

The environmental audit report must contain all information set out in Appendix 7 of GN R. 982.

It is recommended that this ***independent audit*** takes place on an ***annual basis*** or as specified by the competent authority in the EA, to promote continual improvement on the Vygenhoek Platinum Mine.

In terms of the definition of the regulations (GN R. 982), ***independent*** in relation to the person responsible for the preparation of an environmental audit report, means:

- That such person has no business, financial, personal, or other interest in the activity and is appointed in terms of the regulations; or
- That there are no circumstances that may compromise the objectivity of the person performing such work excluding fair remuneration for work performed in connection with the environmental audit report.

It is also recommended that an internal audit specified in the previous section be carried out on an annual basis, at least before the independent audit.

Compliance monitoring to be carried out as recommended in **Table 34**.

(m) Environmental Awareness Plan

General environmental awareness must be promoted among everyone working on the Vygenhoek Platinum Mine (including consultants and contractors) to encourage the implementation of environmentally sound practices throughout its duration.

This will ensure that environmental incidents are minimised and environmental compliance maximised.

The purpose of an Environmental Awareness Plan is to outline the methodology that will be used to inform the mine's employees of any environmental risks which may result from their work and the manner in which the risks must be dealt with in order to avoid contamination or the degradation of the environment. The awareness plan is primarily a tool to introduce and describe the requirements of the range of environmental and social plans for the Project during the Life of the Project. The environmental awareness plan ensures that training needs are identified and appropriate training is provided.

The environmental awareness plan should at least communicate the following:

- Importance of conformance with the environmental policy, procedures and other requirements of good environmental management;
- The significant environmental impacts and risks of an individual's work activities and the environmental benefits of improved performance;
- Individual's roles and responsibilities in achieving the aims and objectives of the environmental policy; and
- The potential consequences of not complying with environmental procedures.

(1) **Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work**

In order for the environmental awareness policy to be effective, the issues raised through it need to be communicated through training sessions, meetings, consultations and progress reviews. The following are recommended minimum steps that can be taken to ensure communication is effective:

- The agendas of all company board meetings will have an item where issues environmental projects are discussed and feedback is given;
- Provide progress reports on the achievement of policy objectives and level of compliance with the approved EMPr and the closure plan complying with GN R. 1147, to the DMR on request;
- Ensure environmental issues are realised at monthly mine management executive committee meetings and at all relevant, mine wide meetings, at all levels; and
- Ensure environmental issues are discussed at all general liaison meetings with local communities and other I&APs.

All employees are required to undergo environmental awareness induction training upon appointment and records of such training must be obtained and recorded. Refresher induction training must periodically take place.

Regular meetings (recommended to be done daily, at least once a week) communicating the following is recommended:

- Findings of environmental performance reports;
- Awareness raising campaigns discussing environmental topics; and
- Information of any environmental risk which may result from employee's work.

(2) **Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment**

It is recommended that an awareness training schedule be developed. This schedule should at least indicate the following:

- Topic;
- Method of communicating i.e. through a workshop, training session, or meeting;
- Target group i.e. management, skilled or semi skilled labour, admin staff etc;
- Scheduled time; and
- Progress.

The following topics are recommended:

- Potential environmental risks;
- Legal requirements;
- EMS requirements;
- Environmental performance; and
- Environmental incidents addressing corrective and preventative measures to be implemented.

(n) Specific information required by the Competent Authority

(Among others, confirm that the financial provision will be reviewed annually)

See section u) of Part A.

2) UNDERTAKING

The EAP herewith confirms

a. the correctness of the report accompanied by this declaration;

b. the inclusion of comments and inputs from stakeholders and I&AP's;

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.