mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

SCOPING REPORT

FOR LISTED ACTIVITIES ASSOCIATED WITH MINING RIGHT.

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATION 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).

NAME OF APPLICANT: BCR Coal (Pty) Ltd

TEL NO: +27 (0)11 467 5793

FAX NO: +27 (0)86 671 0418

POSTAL ADDRESS: Postnet Suite 911, Private Bag x153, Bryanston, 2021

PHYSICAL ADDRESS: Unit 5, Lancaster Park, Electron Lane, Lanseria Corporate Estate, Lanseria, 1739

FILE REFERENCE NUMBER SAMRAD: MP 30/5/1/2/2/10293 MR

REVISION AND APPROVAL

REVISION NUMBER:	02		
ENVIRONMENTAL MANAGEMENT ASSISTANCE (PTY) LTD (EMA) REF:	BCR Coal (Pty) Ltd Vlakfontein Mine Project		
TITLE:	SCOPING REPORT FOR THE LISTED ACTIVITIES IN TERMS OF NEMA ACTIVITIES ASSOCIATED WITH THE PROPOSED VLAKFONTEIN MINE		
REVIEWERS			
	NAME	**DIGITAL SIGNATURE**	**DATE**
AUTHOR	**Anandi Alers** *MSc Geography and Environmental Management* ***EAP*** *Natural Scientist (400016/17) and registered EAP (2019/1514)*		16 August 2022
DOCUMENT REVIEWER	**Taryn Bigwood** *Masters* ***EMA Director*** *Member of LaRSSA, SAAG and IAIAsa*		16 August 2022

DISTRIBUTION:

TO	DESCRIPTION	DATE	COMMENTS/CHANGES
Walter Murray	Applicant	12 August 2022	General comments and request for clarity.

DISCLAIMER

The findings, results, observations, conclusions, and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. Environmental Management Assistance (Pty) Ltd, hereinafter referred to as EMA, as independent party, reserve the right to modify aspects of the report including the recommendations if new information may become available from on-going research, monitoring, further work in this field pertaining to the investigation.

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EXECUTIVE SUMMARY

BCR Coal (Pty) Ltd (the applicant) is proposing an open pit coal mining operation, hereafter referred to as the BCR Coal Vlakfontein Mine, situated on Portion (Ptn.) 2, Ptn 11 and Ptn 21 of farm Vlakfontein 108 IT, Ptn 1, 7, 14, and 12 of farm Welgelegen 107 IT, Msukaligwa Municipality, Mpumalanga.

Environmental Management Assistance (Pty) Ltd has been appointed as the independent Environmental Assessment Practitioner (EAP) in terms of Regulation 12 of the Environmental Impact Assessment Regulations (GNR 982 GG 38282 of 4 December 2014, as amended), published in terms of Sections 24 (5) and 44 of the National Environmental Management Act (NEMA Act No. 107 of 1998), to manage the required legislated Scoping and Environmental Impact Assessment (S&EIA) Process. To commence with the S&EIA process, it is important to first understand the key listed activities in terms of NEMA(***Table 1***), associated with such a coal mine.

LEGISLATIVE CONTEXT

The following listed activities are relevant to this application:

Table 1: Listed activities being triggered by the proposed coal mine

ACTIVITY DESCRIPTION	RELEVANT LEGISLATION	LISTED ACTIVITIES	KEY PROCESS COMPONENTS
All activities and related infrastructure associated with the proposed Vlakfontein Mine	**GNR. 984 GG 38282 dated 8 December 2014** (as amended by GN. 325 GG 40772 dated 7 April 2017 and GN.517 GG 44701 dated 11 June 2021) – Environmental Impact Assessment Regulations, Listing Notice 2	**Activity 17** – Any activity including the operation of that activity which requires a mining right in terms of section 22 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contemplated in Listing Notice 2, in Listing Notice 1 or Listing Notice 3 of 2014, required to exercise the mining right.	• Environmental Authorisation (EA) application in terms of NEMA; • Site Sensitivity Verification Report (SSVR); • Scoping Report; • Environmental Assessment Report (EIR), Environmental Management Programme (EMPr); • Financial Liability and Closure Liability Plan in terms of GNR. 1147 GG 39425 dated 20 November 2015, as amended; • Specialist Reporting as required by the Screening Report generated by the National Web-based screening tool; and • Engagement with the registered I&AP.

Based on the defined listed activities, the EAP has determined that a S&EIA process is applicable to the required application for Environmental Authorisation (EA).

This Scoping would sufficiently achieve the objective as contemplated in Appendix 2 of the NEMA 2014 EIA regulations and provide the competent authority (CA), Mpumalanga's Department of Mineral Resources and Energy (DMRE), with the required information and identified key issues that will be addressed in the assessment phase. The first step to determining the environmental impacts from the proposed coal mining operations, is to establish the site sensitivity through performing a site verification and screening to identify potential environmental and social impacts.

SITE SENSITIVITY VERIFICATION AS PER THE SCREENING REPORT

As a result of the Screening Report generated by the National Screening Tool, as required by the NEMA 2014 EIA regulations, various environmental sensitivities have been identified. Based on the environmental sensitivities, the following list of specialist baseline assessments has been identified for inclusion in the Scoping phase:

- Agricultural Assessment (including soils and hydro-pedological assessment);
- Landscape and Visual Assessment;
- Archaeological, Cultural, and Palaeontology Assessment;
- Terrestrial Biodiversity (Fauna and Flora included) Assessment;
- Aquatic Biodiversity Assessment;
- Hydrology Assessment;
- Noise Assessment;
- Traffic Assessment;
- Climate Impact Assessment;
- Health Assessment;
- Socio-economic Assessment; and
- Air Quality Assessment.

In addition to the above, the EAP recommended that the following additional assessment be conducted:

- Geohydrological Assessment;
- Avi-faunal Assessment; and
- Herpetological Assessment.

Various protocols (GN 320 (GG 43110 dated 20 March 2020) requires that prior to commencing with the said specialist assessment, the current use of land and the environmental sensitivity of the site must be confirmed by undertaking a site sensitivity verification) have been published for the specialist assessments. Where no specific assessment protocol has been prescribed a site sensitivity was performed using accepted verification techniques and by following the general protocols in line with Appendix 6 of the NEMA 2014 EIA Regulations.

In the finalisation of the Scoping report, due to access constraints, no ground truthing was conducted to verify the identified sensitivities from the desktop analysis. On-site verification of the site sensitivities will be confirmed during the EIA phase and is summarised in ***Table 2***.

Table 2: Preliminary desktop verification outcome

SCREENING TOOL SENSITIVITY	VERIFIED SENSITIVITY	OUTCOME STATEMENT/PLAN OF STUDY	RELEVANT APPENDIX OF REQUIRED ASSESSMENT
AGRICULTURAL IMPACT ASSESSMENT			
High	**High**	Agricultural Agro-Ecosystem Specialist Assessment	***Appendix F.1 – Agricultural Assessment***
LANDSCAPE AND VISUAL IMPACT ASSESSMENT			
ND	**Moderate**	Visual Impact Assessment (VIA)	*Error! Reference source not found.*
ARCHAEOLOGICAL AND PALAEONTOLOGY IMPACT ASSESSMENT			
Paleontology - **High**	**Low**	Paleontological Impact Assessment	*Error! Reference source not found.*
Archaeological - **Low**	**Low** -with the exception of Grave sites that can occur anywhere on the landscape.	Heritage Impact Assessment	
TERRESTRIAL BIODIVERSITY, PLANT AND ANIMAL SPECIES IMPACT ASSESSMENT			
Terrestrial vegetation - **High**	**Low:** modified land **Medium** to **low:** secondary grassland **High:** remaining natural grasslands and moist grasslands especially as these correspond with a CBA: Irreplaceable	Conduct a Terrestrial Vegetation assessment during the growing season (October earliest)	**Error! Reference source not found.**
Plant species – **Medium** to **low**	**Medium** areas as indicated by the screening tool correspond with desktop delineated moist grasslands and remaining good condition grassland on the site. These areas are suitable habitat for plant species of conservation concern and therefore the desktop verifies this sensitivity. It is highly likely that the site supports plant species of conservation concern, and should these be recorded, the rating will change to **high.** **Low** sensitivity areas correspond largely to the desktop delineated modified land (cultivated)	Undertake a habitat assessment during the growing season (October earliest)	

SCREENING TOOL SENSITIVITY	VERIFIED SENSITIVITY	OUTCOME STATEMENT/PLAN OF STUDY	RELEVANT APPENDIX OF REQUIRED ASSESSMENT
	and are unlikely to support plant species of conservation concern.		
Animal species, mammals – Medium rank for two trigger Species of Conservation Concern (SCC)	Expected that any natural habitats will become High rank for the SCCs / potential TOP species.	Full Animal Species Specialist Assessment	
Animal species, invertebrates - Low	Low		
Animal species, avifauna - High	Medium	Site Survey and Avifaunal Impact Assessment	
Animal species, herpetofauna - High	Low - High	Site verification and Herpetofauna Impact Assessment	
AQUATIC BIODIVERSITY IMPACT ASSESSMENT			
Very High	Very High	Aquatic Biodiversity Specialist Assessment; & Wetland Specialist Assessment	*Error! Reference source not found.*
HYDROLOGICAL ASSESSMENT			
ND	High	Compliance and mitigation plan	*Error! Reference source not found.*
NOISE IMPACT ASSESSMENT			
Very High	Very High	Environmental Noise Assessment	*Error! Reference source not found.*
TRAFFIC IMPACT ASSESSMENT			
ND	Low	Traffic Impact Assessment	*Error! Reference source not found.*
CLIMATE IMPACT ASSESSMENT			
ND	TBA	GHG Calculations and predictions for the EIA phase of the project to determine potential climate change impacts associated with proposed project	***Appendix F.9 – Climate Assessment***
HEALTH IMPACT ASSESSMENT			
ND	TBA	Rapid Appraisal Health Impact Assessment	***Appendix F.10 - Health Assessment***
SOCIO-ECONOMIC IMPACT ASSESSMENT			
ND	Moderate to high (land-use and impact on sense of place and impact on resource use)	Social Impact Assessment	***Appendix F. 11 - Socio-economic Assessment***
AIR QUALITY IMPACT ASSESSMENT			
ND	TBA	Level 2 Air Quality Impact Assessment	***Appendix F.12 - Air Quality Assessment***
GEOHYDROLOGICAL ASSESSMENT			
ND	TBA	Hydrogeological Assessment	***Appendix F.13 – Geohydrological Assessment***

* ND – Not Defined in the Screening Report; TBA – to be assessed during the EIA process

By understanding the sensitivities highlighted in ***Table 2,*** one can assess the "Need and Desirability" of the proposed coal mine.

NEED AND DESIRABILITY

Various factors were taken into consideration to assess the "Need and Desirability" of the proposed mine. These include, but are not limited to resources demand, economic desirability and demand and environmental sustainability and competing land uses.

Although a "Need and Desirability Statement" cannot be made as part of the Scoping Phase, the following findings based on the desktop assessment are key to the progress of this application process and as such is to be considered:

- The proposed site layout plan is restricted by the Mpumalanga Biodiversity Sector Plan (MBSP,2013), the municipal Integrated Development Plans (IDP's), Spatial Development Plan (SDP's) and Environmental Management Framework (EMF) biodiversity objectives. The Draft National Biodiversity Offset Guideline (October 2021) defines a "fatal flaw" as a major defect or deficient in a project proposal that should result in an Environmental Authorisation being refused, and from a biodiversity perspective, a residual negative impact that would have a Very High significance rating. Various specialist highlighted that based on the desktop verification outcome, there is a high possibility that the proposed site layout plan may be considered as being fatally flawed and recommended that alternatives are to be considered.
- The socio-economic impacts from the proposed coal mine can be seen as positive and negative. The existing landowners will potentially experience a negative effect due to the loss of land resources. The employment and income that will be generated from the operation itself, due to supply links with local suppliers, possible job creation for low-income groups throughout the life of mine, and availability of social funds for socio-economic development, which will lead to poverty alleviation are positive impacts.

Upon the approval of this Scoping Report, a detailed impact assessment with an alternatives assessment will be conducted as part of the EIA Phase. Once completed, a final "Need and Desirability Statement" will be made.

KEY ISSUES TO BE ADDRESSED

In light of the desktop sensitivity verification conducted by the specialists and the preliminary "Need and Desirability" of the proposed coal mine, the following key issues are required to be addressed during the EIA Phase:

- ***Agriculture and Soil*** - Impacts of the proposed open cast coal mine on the agricultural productivity within the study area will be both direct and indirect loss of agriculturally productive land. Given that the proposed site is at least 70% agricultural productive and is located within an area dominated by agricultural activities, one must consider the aims of the Preservation and Development of Agricultural Land Bill (2021) and minimise the loss of agriculturally viable land.
- ***Landscape and Visual Environment*** - Notwithstanding the fact that the proposed coal mine may have a fairly limited area of potential visual exposure, the mine and mining activities, where visible from shorter distances (e.g. within a 2-5km radius), may constitute a high visual prominence, potentially resulting in a high visual impact.
- ***Archaeological, Cultural and Palaeontological Environment*** - Based on the current information obtained for the area at a desktop level it is anticipated that any heritage resources that occur within the proposed development

area will have a Local Significance (LS), Grade 3B (high heritage significance where the site should be retained *in-situe*) or lower field rating and all sites should be mitigatable. Graves are of high social significance (Field rating "Generally Protected" A) and can be expected anywhere on the landscape.

- ***Terrestrial Vegetation and Plant Specie Biodiversity*** – The desktop assessment indicated that about half of the vegetation that could be impacted on by the proposed coal mine were cultivated, modified or could compromise secondary grasslands. A large portion of seemingly intact natural Eastern Highveldt Grasslands are exected. It is therefore imperative that the site vegetation be assessed for the presence of intact (undisturbed or untransformed) Eastern Highveld Grassland, as remaining portions should be conserved to preserve this vegetation type and protect it from extinction. Importantly, the remaining grassland on the site corresponds greatly with the Critical Biodiversity Area (CBA): Irreplaceable category of the MBSP, in which mining is not an acceptable land use.
- ***Terrestrial Mammal and Invertebrate Specie Biodiversity*** **-** Highly sensitive areas and areas likely to support higher faunal richness or biodiversity in the project area are directly linked to the irreplaceable CBAs on site, with the eastern CBA the potential primary biodiversity hotspot in terms of mammals and invertebrates. In the surrounds, highly sensitive areas incorporate the riverine and associated grassland areas north and towards the Vaal and the Vaal Tributary southeast of the project area.
- ***Terrestrial Herpetofaunal Specie Biodiversity*** **-** An initial desktop assessment suggests that the site is a mix of herpetofaunal sensitivities, with parts of it being of low value and some areas of higher value for herpetofauna. These higher value areas may include natural communities within CBA Irreplaceable areas, and among these may be habitat specialists and possibly two Near Threatened reptiles. Given the CBA Irreplaceable classification of some areas, the possibility for diverse grassland herpetofaunal communities to be present, and the lack of onsite investigation to date, it is recommended that the sensitivity of the site from a herpetofaunal perspective be considered as medium-high, pending further investigation.
- ***Terrestrial Avifauna Specie Biodiversity*** **-** Parts of the proposed study area are considered to have a "High and Medium Animal Species Theme Sensitivity", as a result of the presence of Southern Bald Ibis Geronticus calvus, African Grass Owl Tyto capensis, Denham's Bustard Neotis denhamii, White-bellied Korhaan Eupodotis senegalensis, and Caspian Tern Hydroprogne caspia. Based on the low number (n=2) of Southern Bald Ibis recorded in the Project Area Of Influence (PAOI), this preliminary assessment assigns a "Medium" rating to the PAOI. In addition, it is unlikely that African Grass Owl will occur within the PAOI, based on previous surveys conducted in the area (pers comms. Christelle Trutter, African Grass Owl Study Group Manager) and White-bellied Korhaan and Caspian Tern have not been recorded in the PAOI to date. Notable SCC that have been recorded, albeit in low numbers, include Secretarybird Sagittarius serpentarius, Deham's Bustard, Grey Crowned Crane Balearica regulorum, Black Harrier Circus maurus, African Marsh Harrier Circus ranivorus, Lanner Falcon Falco biarmicus, Greater Flamingo Phoenicopterus roseus and Lesser Flamingo Phoeniconaias minor in addition to the availability of suitable habitat, thereby confirming the "Medium sensitivity" rating. This rating will be verified further during the EIA phase of the project, following a site verification survey to the proposed development area and broader PAOI.
- ***Aquatic Biodiversity*** – The proposed coal mine is likely to result in a direct loss of wetlands determined to be in a largely natural state and identified as being Freshwater Ecological Protected Areas (FEPAs) within a designated Strategic Water Source Areas (SWSA) and Fish Sanctuary. In addition, the proposed mine footprint is classified as Ecological Support Areas (ESA') on the basis of wetlands and wetland clusters. While it is acknowledged that some mining activities are already located within the catchment of hydrogeomorphic area unit 1 (HGM 1), such activities

were determined to fall outside the boundaries of the designated SWSA and not directly located within wetlands identified as being FEPAs. The Recommended Ecological Category (REC) determined for the catchment within which the proposed mine is to be located is set as an Ecological Category B, and is reflected as such within the numerical limits set for instream habitat, aquatic macroinvertebrates, fish, riparian vegetation, hydrology and water quality. In addition, the Resource Quality Objective set for the catchment state that 'salt concentrations must be maintained to meet quality requirements for agriculture and to maintain the ecosystem wellbeing', an objective that will be unlikely to be achieved should additional mining activities impact the water quality and quantity within the catchment through mining of wetlands and inadvertent or unintentional release of mine-affected water into the catchment.

- ***Hydrology*** - The proposed site will result in the removal of soil surface cover and the presence of hard surfaces and drainage systems, which will accelerate flows and could result in the occurrence of erosion if storm water runoff is not properly controlled and disposed of. This could result in a deterioration in the water quality of downstream areas. Alternative placements of the waste rock stockpiles outside the 100 m buffer of the defined watercourse is recommended.
- ***Geohydrology*** - Based on the vulnerability assessment the underlying aquifer is regarded as a low to medium vulnerability aquifer system requiring reasonable groundwater protection measures to ensure that no cumulative pollution affects the aquifer. Site specific groundwater levels range from 0.4 m bgl to 55.2 m bgl with an average of 9.9 m bgl within the project area. Typical groundwater levels expected on catchment level is 13.3 m bgl. Such shallow groundwater levels potentially indicate a shallow driven aquifer system that could be acceptable to groundwater contamination from surface related impacts. Exposure of sulphide bearing minerals (i.e., coal) during mining may negatively affect the ambient groundwater quality in the immediate vicinity of the Mine. Sources of pollution such may include stockpiles, discharges from mine workings and backfilled open pit (post-closure) (decant). As for most coal mines (in the Mpumalanga Highveld) there's a risk for acid rock drainage and should be managed as such.
- ***Noise*** - Considering the project infrastructure layout, there is a potential of a low to high significance of a noise impact during the construction phase, and of a low to high significance during the operational phase. Further study is required, and it is recommended that a full Environmental Noise Impact Assessment study be conducted
- ***Traffic*** - Anticipated vehicle traffic to be generated by the proposed coal mine, with specific reference to heavy vehicles transporting coal, would have an impact on the existing gravel road, Road D1426. This could contribute to the deteriorating condition of the roadway and could lead to the Proposed Mining Development not being accessible via Road D1426 should the road not be maintained.
- ***Climate Change*** - An impact verification statement cannot be determined from the baseline study, as this requires the quantification of GHG emissions and the activity's contribution to the carbon budget of South Africa. Climate change is spatially homogeneous, therefore, emissions that result from the mining activity will affect the climate regardless of where the mine is sited. Climate change impacts associated with the proposed project can only be determined through an emissions inventory and GHG calculations.
- ***Air Quality*** - The anticipated impact of activities at the proposed Vlakfontein Coal Mine will be quantitatively assessed through dispersion modelling and presented in the final Level 2 Air Quality Impact Assessment (AQIA). It is expected that emissions from activities at the proposed mine will most likely result in air quality impacts in terms of dustfall, PM_{10} and $PM_{2.5}$. However, as the impact assessment has not yet been conducted (this will be done after

the dispersion modelling exercise), no fatal flaws and red flags that could impact on the feasibility of the Mine could be determined in this baseline assessment report.

- ***Social -*** The socio-economic impacts from the proposed coal mine can be seen as positive and negative. The existing landowners will potentially experience a negative effect (high) due to the loss of land resources. The employment and income that will be generated from the operation itself, due to supply links with local suppliers, possible job creation for low-income groups throughout the life of mine, and availability of social funds for socio-economic development, which will lead to poverty alleviation are positive impacts.

Based on the above-mentioned desktop findings, it is imperative that ground truthing of the proposed site layout and recommended alternatives verify the sensitivities. Once the sensitivities are verified on site a detailed impact assessment taking into consideration all levels of mitigation measures are required to be assessed during the EIA phase.

PREFERRED ACTIVITY AND TECHNOLOGY ALTERNATIVE

Following the desktop sensitivity verification, 72% of the evaluated site, defined on the layout, proposed for the mining pit, is situated in an area restricting open cast or surface mining and 28% is considered as no-go areas, as per the MBSP. In terms of underground mining, 72% of the proposed mining pits are located in areas permitted and 28% in a restricted area, resulting in underground mining being a more favourable option than opencast or surface mining.

It is therefore recommended that underground mining be investigated by the applicant as opposed to surface or opencast coal mining. In the event of underground mining being assessed as an unfavourable option, it is recommended that the applicant revise its surface mining layout (including supporting infrastructures), in order to restrict activities to areas of least concern (as per the outcome of the EIA Phase site assessment and recommended alternatives) and aligns with the biodiversity objectives as defined in the MBSP.

The above mentioned and the desktop sensitivities highlighted by the specialist prompted possible recommended alternatives and are attached in ***Appendix C – Site Layout Plan, Sensitivities, and Land Use***. These alternatives are to be considered and assessed in addition to the proposed site layout during the EIA Phase.

EAP'S REASONED OPINION TO THE ACCEPTABILITY OF THE PROPOSED DEVELOPMENT AND RECOMMENDATIONS

It is highlighted throughout this Scoping Report, that a desktop level sensitivity verification by the specialists were conducted. At the time of finalising this report, no alternatives were defined as a verification of the sensitivities are required to inform potential alternative selections in terms of the site layout.

From the desktop sensitivity verification, it is clear that the proposed coal mine is situated in areas considered as CBA: Irreplaceable, ESA's and FEPA's. In addition, the Chrissiesmeer declared Protected Environment is situated within 5 km northeast of the proposed development. The MBSP identifies Quarrying and Mining zones for surface and underground mining (see previous section defining the options for underground and surface mining in terms of the MBSP). These defined zones are not compatible with the defined biodiversity objectives and should not be in Protected Areas (PA)'s, CBA's or ESA's and should only be located in Heavily Modified areas or in some other natural areas (ONA's) subjected to the relevant authorisations and impact assessments (MPTA, 2014).

The Draft National Biodiversity Offset Guideline (October 2021) defines a "fatal flaw" as a major defect or deficient in a project proposal that should result in an Environmental Authorisation being refused, and from a biodiversity perspective, a residual negative impact that would have a "Very High" significance rating. It further defines thresholds stating the importance of biodiversity and/or ecological infrastructures. CBA: Irreplaceable are listed under the "[1]Exclusionary Threshold" and implies that any activity that falls within this CBA category and has a "Very High" impact significance rating should not be authorised except in exceptional circumstance.

Considering the above, there is a high probability that some of the areas as per the proposed site layout may be confirmed as a "fatal flaw" or "No Go" alternative and there is a high risk that the application for environmental authorisation may be rejected. Therefore, in addition to the proposed site layout a number of alternatives are recommended and should be further assessed during the EIA phase. The assessment process should consider all potential impact/risks associated with the recommended alternatives and be assessed to such an extend where all hierarchy of mitigation measures are considered, including assessment of the potential of [2]biodiversity offsetting as a mitigation option.

It is the EAP's opinion that the proposed site layout, excluding the recommended alternatives, from a desktop perspective is not supported in terms of the MBSP. At this stage, no site verification of sensitivities, alternative assessments, or consideration of possible mitigation options informed this opinion, Therefore a final opinion and recommendation for authorisation is only possible once the before mentioned EIA phase has been completed.

PUBLIC PARTICIPATION

This document is considered to be the "draft" Scoping Report, providing the registered Interested and Affected Parties (I&AP) an opportunity to comment as per the required commenting period of at least 30 days.

It is therefore requested that all comments on the Scoping Report and associated appendices be submitted in form of a formal correspondence (email, sms, fax, and/or during arranged public meeting) using the following contact information:

Company: EnviroRoots (Pty) Ltd
Contact Person: Chantel Bowyer
Tel: +27 84 444 2414
Email: info@enviroroots.co.za
Email reference: BCR Coal (Pty) Ltd Vlakfontein Mine, Scoping comments

[1] Residual impacts in this category cannot be fully compensated by offsets because of the high threat status or irreplaceability of the affected biodiversity or ecosystem services.

[2] ***"Biodiversity offset"*** means the measurable outcome of compliance with a formal requirement contained in an environmental authorisation to implement an intervention that has the purpose of counterbalancing the residual negative impact of an activity, or activities, on biodiversity, through increased protection and appropriate management, after every effort has been made to avoid and minimise impacts and rehabilitate affected areas.

IMPORTANT NOTICE

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

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

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

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

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

OBJECTIVE OF THE SCOPING PROCESS

The objective of the scoping process is to, through a consultative process—

(a) identify the relevant policies and legislation relevant to the activity;

(b) motivate 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 and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process;

(d) identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;

(e) identify the key issues to be addressed in the assessment phase;

(f) agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and

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

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SCOPING REPORT

2. CONTACT PERSON AND CORRESPONDENCE ADDRESS

Environmental Management Assistance (Pty) Ltd (hereafter referred to as EMA) 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) to the Mpumalanga Department of Mineral and Resources and Energy (DMRE) on behalf of BCR Coal (Pty) Ltd (applicant) for the proposed Vlakfontein Coal Mine situated in the Msukaligwa Municipality, Mpumalanga.

A) DETAILS OF

I) DETAILS OF THE EAP

Name of the Practitioner:	Environmental Management Assistance (Pty) Ltd
Contact person:	Anandi Alers
EAPASA registration no.:	2019/1514
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

EMA has appointed Mrs. Anandi Alers (EAPASA reg. no. 2019/1514) as the EAP to manage the application process on behalf of BCR Coal (Pty) Ltd.

A detailed portfolio of the team members associated with the management of this project can be found in ***Appendix A – EAP Qualifications and Team Members***.

(1) The qualifications of the EAP

*(With evidence attached as **Appendix A**)*

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.

*(Attach the EAP's curriculum vitae as **Appendix A**)*

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 – EAP Qualifications and Team Members.***

B) DESCRIPTION OF THE PROPERTY

Farm Name:	Ptn 2, Ptn 11 and Ptn 21 of farm Vlakfontein 108 IT; Ptn 1, 7, 14, and 12 of farm Welgelegen 107 107 IT
Application area (Ha) :	1301,44 ha (397 ha mining)
Magisterial district:	Gert Sibande District Municipality, Msukaligwa Local Municipality
Distance and direction from nearest town:	5 km south-east of Breyten, 7,5 km south-west of Chrissiesmeer and 14,5 km north-east of Ermelo
21 digit Surveyor General Code for each farm portion:	T0IT00000000010800002 T0IT00000000010800009 T0IT00000000010800011 T0IT00000000010700001 T0IT00000000010700007 T0IT00000000010700012 T0IT00000000010700014

C) LOCALITY MAP

*(show nearest town, scale not smaller than 1:250000 attached as **Appendix B**)*

See ***Appendix B – Locality Map*** 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 and attach as **Appendix C**)*

The conceptual 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 – Site Layout Plan, Sensitivities, and Land Use***.

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

I) LISTED AND SPECIFIED ACTIVITIES

Table 3 provides the confirmed listed activities as part of the S&EIA application.

Table 3: 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*
Clearing of areas associated with required development footprints of the mine, including required supporting infrastructures: • Clearing and grubbing; • Topsoil & subsoil stripping; and • Excavation associated with construction activities.	521 ha	X	GNR 984 GG 38282 dated 4 December 2014 (as amended) – [3]***Listed Activity 17***
Blasting and opencast excavations with associated required surface water management infrastructures.	456 ha	X	
Mine offices, including a medical station, and contractor's yard with septic/chemical ablution facilities (including surface water management infrastructures).	11 ha	X	
Residue stockpiles (waste rock), Run of Mine (RoM) and product stockpiles, and topsoil stockpiles (including ***conceptual*** surface and wastewater management facilities).	13 ha	X	
Fuel storage facility (diesel) and generator.	< 1 ha	X	
Upgrade of existing access roads for hauling and development of new roads required for access to mining pits and associated infrastructures (including storm water management infrastructures and any associated river crossings).	6 ha	X	
Crushing and screening facility and associated laydown area with storm water management infrastructure.	< 1 ha	X	
Stores, workshop and wash bays.	< 1 ha	X	
Weighbridge and associated laydown area associated with traffic control.	< 1 ha	X	
Water (potable & process) and power supply.	< 1 ha	X	
Water storage (reservoirs / tanks).	< 1 ha	X	
Construction and operational waste generation and management associated with the mining offices and laydown areas.	<1 ha	X	
Backfilling of opencast mining pits and concurrent pit rehabilitation.	456 ha	X	

[3] As per Listed Activity 17 of Listing Notice 2, the following activities, inter alia, may (to be confirmed during the EIA phase upon the finalisation of the preferred site layout plan) be triggered as part of this application process:

- Listing Notice 1 – Activity 9, 10, 12, 13, 14, 19, 24, 25, 27 and 28;
- Listing Notice 2 – Activity 15; and
- Listing Notice 1 – Activity 4, 10, 12, and 14.

Closure and final rehabilitation activities.	521 ha	X	

II) DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN

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

The surface sub-outcrop of the coal seams 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 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 in a designated position;
- Removal of the overburden;
- Drilling and blasting to break the hard overburden;
- Backfilling of the pit with waste rock with the remainder placed at the designated waste rock stockpile, separate from the topsoil;
- Drilling and blasting of the coal seams;
- Loading and hauling of the ore for stockpiling at the Run-of-Mine (ROM) pad then for transporting to the preferred Washing Plant.

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***.

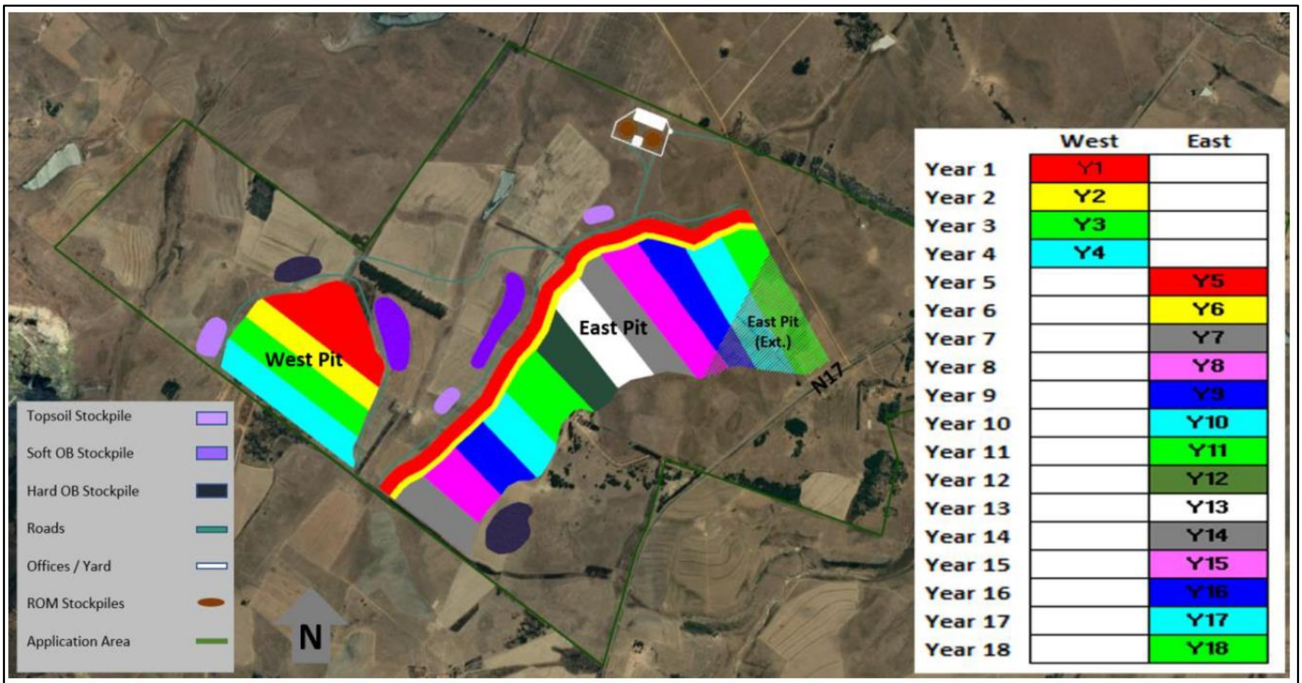

Figure 1: Open pit layout and the Life of Mine schedule

Figure 2 and ***Table 4*** provides details on the slope geometry and geotechnical design parameters.

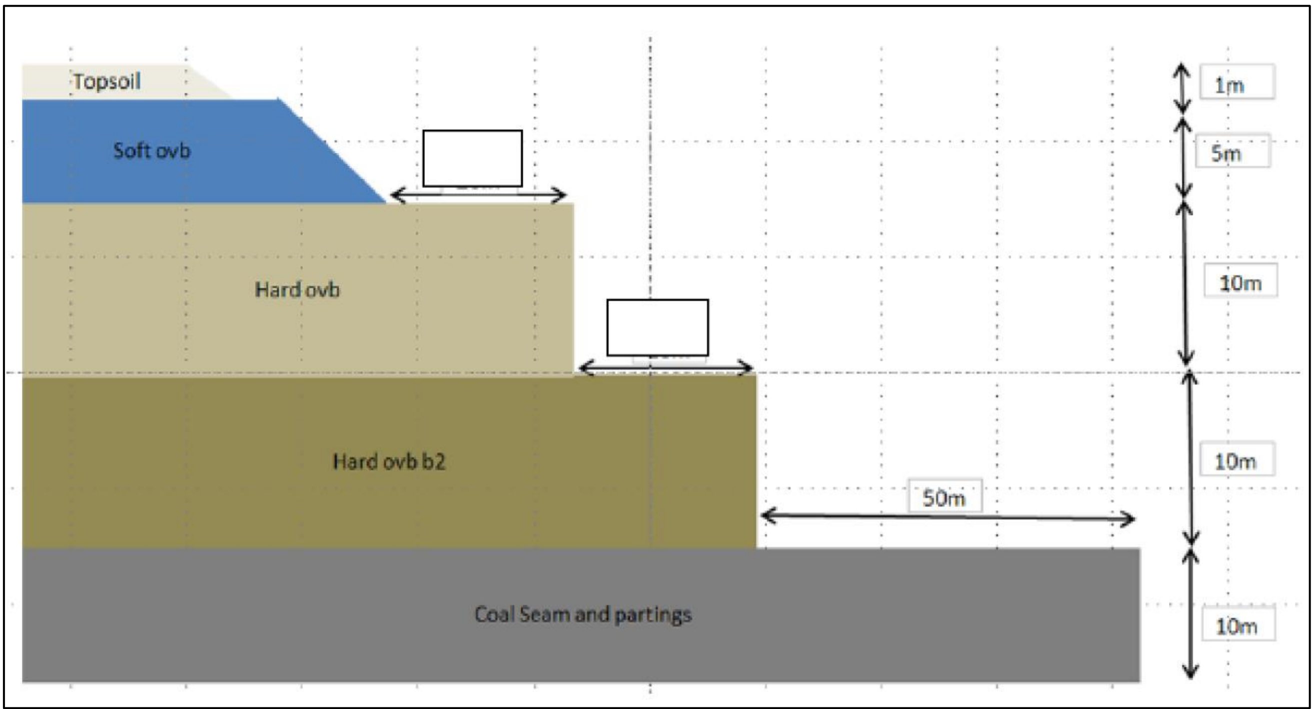

Figure 2: Slope geometry for operational highwalls

Table 4: Geotechnical design parameters

PARAMETER	UNIT	CRITERIA
Topsoil bench angle	Degree (°)	37
Topsoil hight	Meter (M)	1.5
Soft overburden bench angle	Degree (°)	45
Soft overburden bench width	Meter (M)	5
Hard overburden bench width	Meter (M)	50
Hard overburden bench angle	Degree (°)	90
Coal material bench angle	Degree (°)	90
Coal and parting material bench widt	Meter (M)	50

The project footprint will require the support facilities and infrastructure to operate as listed in ***Table 3***.

Resource particulars

The following table summarises the resource particulars:

Table 5: Resource particulars associated with the proposed BCR Coal Vlakfontein Mine

ITEM	DETAIL
Type of Mineral (s)	Coal
Depth of mineral below surface	< 100 m
Geological Formation	The coal seams in the Ermelo Coalfield are generally flat-lying to slightly undulated, separated by fine- to coarse-grained sandstones, siltstones and mudstones. The A, D and E seams are too thin to be of economic viable to mine, historically the C Seam group is the most important in the Carolina-Breyton area, and the B Seam group in the Ermelo area. The C Seam group holds the main economic vialbe coal mining material throughout the Ermelo Coalfield. The C seem is usually split by several partitions which can lead to

	miscorrelation of the seams. In general, the C Seam is subdivided into the C Upper (CU) and C Lower (CL) seams. The CU Seam is well-developed over the entire coalfield and is often split by partitions of different lithologies, such as sandstone, siltstone or mudstone, reaching a composite thickness of 0.7-4 m. The CL Seam is poorly developed throughout the entire coalfield, but where developed runs between 0.5 and 2 m thick. It locally grades into carbonaceous siltstone and mudstone, which often form the roof of the seam, whereas the floor mostly consists of sandstone. The CL seam is the thickest of all the coal seams intersected here, reaching a thickness of more than 1.50 m over large parts of the project area. Locally seam floor rolls may negatively influence the thickness of the CL Seam in the Ermelo Coalfield. The B Seam group varies in thickness from 1-2.7 m and may be split into three units, B Lower (BL), B Upper (BU) and BX seams.

Activities anticipated per phase

Construction Phase

The construction phase will commence upon granting of a mining right and will include the following items and expected timeframes:

- Preparation of Access Roads (3 Weeks)
- Construction of contractor's yard. (1 Week)
- Workshop Construction (3 Weeks)
- Fencing and trenching of Mining Area (4 Weeks)
- Construction of Security (Boom Gates, Security house) (4 Weeks)
- Installation of Weighbridge (3 Weeks)
- Construction of Diesel bunds and Installation of Tanks (2 Weeks)
- Construction of Mine haul roads (4 Weeks)
- Development of trenches and pollution control facilities (8 Weeks)
- Setting up crushing and screening plant (8 weeks)

Operational Phase

The mining method comprised of the following main mining activities for both overburden and coal:

- topsoil and soft overburden removal;
- drilling of hard overburden material;
- charging and blasting;
- loading and hauling; and
- tipping or dumping.

E) POLICY AND LEGISLATIVE CONTEXT

This section will provide the detailed description of the policy and legislative context associated with the proposed Vlakfontein Coal Mine (**Table 6**).

Table 6: Detailed Policy and legislative context of the proposed Vlakfontein Coal 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**
NATIONAL LEGISLATION AND REGULATIONS	
Section 24 of the Constitution of South Africa Act No. 108 of 1996	Adherence with all legislation and regulations that prevents pollution and ecological degradation, promotes conservation, promotes ecological sustainable development and use of natural resources, while promoting justifiable economic and social development.
The Minerals and Petroleum Resources Development Act, 2002 Act No. 28 of 2002 (MPRDA)	• Submission of a mining works programme • Submission of an application to a mining right • Application for Environmental Authorisation A Rehabilitation, closure, and liability plan will be developed as part of the mining right application process.
National Environmental Management Act No. 107 of 1998 (NEMA)	• 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 (GG 38282 dated 4 December 2014, as amended): National Environmental Management Act (107 of 1998): Environmental Impact Assessment Regulations, 2014 (2014 NEMA EIA regulations)	Independent EAP appointed to ensure adherence with the EIA procedure.
GN R. 983 – 985 (GG 38282 dated 4 December 2014, as amended): Listing notices 1 to 3	A Scoping and EIA process will be completed and a final document to be submitted following the approval of this scoping report to the Department of Mineral Resources.
GN. 320 (GG 43110 dated 20 March 2020): Procedure for the assessment and minimum criteria for reporting on identified environmental themes in terms of section 24(5)(a) and (h) and 44 of NEMA when applying for environmental authorisation. **GN. 1150 (GG 43855 dated 30 October 2020)**: Procedure for the assessment and minimum criteria for reporting on identified environmental themes in terms of section 24(5)(a) and (h) and 44 of	A Site Sensitivity Verification Report will be completed by the EAP.

NEMA when applying for environmental authorisation. (Terrestrial animal and plant specie themes)	
GN R. 1147 (GG 39425 dated 20 November 2015, as amended): Regulations pertaining to the financial provision for prospecting, exploration, mining or production	Application for authorisation of listed activities in terms of listing notice 1-3 will be submitted together with the submission of the EIR, EMPr, and Rehabilitation, closure, and liability plan following the approval of this scoping report.
National Environmental Management: Biodiversity Act, 2002 **(NEM:BA)**	Requirements will be incorporated into the EIR and EMPr. However, before the commencement of site clearance an application must be lodged for the removal of protected species that may be identified during the EIA phase of the mining right application process.
The following regulations in terms of NEMA:QA are applicable:	
GN 813 (GG 32474 dated 3 August 2009): National Biodiversity Framework	
GNR 12 (GG 29657 dated 23 February 2007, as amended): Threatened or Protected Species Regulations (TOPS)	Requirements will be incorporated in the EIR and EMPr.
GNR 151 (GG 29657 dated 23 February 2007, as amended): List of Critically Endangered, Endangered, Vulnerable Protected Species	Requirements will be incorporated in the EIR and EMPr.
GN 1002 (GG 34809 dated 9 December 2011): National list of ecosystems that are threatened and in need of protection	Requirements will be incorporated in the EIR and EMPr.
GNR 598 (GG 37885 dated 1 August 2014): Alien and Invasive Specie Regulations, 2014	Requirements will be incorporated in the EIR and EMPr.
GNR 1020 (GG 43735 dated 25 September 2020): Alien and Invasive Specie Regulations, 2020	Requirements will be incorporated in the EIR and EMPr.
GN 1003 (GG 43726 dated 18 September 2020): Alien and Invasive Specie List, 2020	Requirements will be incorporated in the EIR and EMPr.
National Environmental Management: Protected Areas Act No. 57 of 2003 **(NEM:PA)**	The proposed development is situated within a 5 km radius from a declared "Protected Environment" (GN 19 of 2014 GG 2251: Declaration of Chrissiesmeer Protected Environment).
National Environmental Management: Air Quality Act No. 39 of 2004 **(NEMA:QA)**	Requirements as stipulated in the Act will be incorporated with the EIR and EMPr to be submitted for approval.
The following regulations in terms of NEMA:QA are applicable:	
GN 893 (GG 37054 dated 22 November 2013, as amended): List of activities which result in atmospheric emissions	No licence required at this time of the proposed activity.
GN R. 827 GN R. 827 (GG 36974 dated 1 November 2013): National dust control regulations	Requirements will be incorporated in the EIR and EMPr.

GN R. 283 (GG 38633 dated 2 April 2015): National atmospheric emissions reporting regulations	Requirements will be incorporated in the EIR and EMPr.
GN R. 1210 (GG 32816 dated 24 December 2009): National ambient air quality standards	Requirements will be incorporated in the EIR and EMPr.
Atmospheric Pollution Prevention Act of 1965 **GN R. 1651 (GG 4393 dated 20 September 1974):** Regulations concerning the control of noxious or offensive gasses emitted by diesel-driven vehicles	Requirements will be incorporated in the EIR and EMPr.
National Environmental Management: Waste Act No. 59 of 208 **(NEM:WA)**	All waste management activities associated to the proposed mining operation must comply with the requirements set out by the Act. These requirements will be incorporated in the EIR and EMPr associated to the EA and WML application.
The following regulations in terms of NEM:WA are applicable:	
GN R. 634 (GG 36784 dated 23 August 2013): Waste classification and management regulations	A waste classification will be conducted as part of the EIA phase to determine the classification of the residue stockpiles. The findings of the report conducted by an independent consultant will be incorporated in the final EIR and EMPr associated to the EA and WML application. Requirements will be incorporated in the EIR and EMPr.
GN R. 632 (GG 39020 dated 24 July 2015, as amended): Regulations regarding the planning and management of residue stockpiles and residue deposits from prospecting, mining, exploration or production operation	
GN R. 921 (GG 37083 dated 29 November 2013, as amended): Activities listed requiring a waste management licence (WML)	Listed activity number 11, as amended by GNR 633, 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)" This document serves as the required scoping associated with the application for an EA and WML.
GN R. 633 (GG 39020 dated 24 July 2015): Amendments to the list of waste management activities that have, or are likely to have, a detrimental effect on the environment	
GN R. 625 (GG 35583 dated 13 August 2012): National waste information regulations	As listed activity 11 of GN R. 633 will be triggered by the proposed mining activities, GN R. 625 will apply. Therefore, the Vygenhoek Platinum Project must register as a waste generator. These requirements will be included in the EIR and EMPr associated to the EA and WML.
GN R. 635 (GG 36784 dated 23 August 2013): National Norms and Standards for the assessment of waste for landfill disposal	This regulation stipulates the requirements to assess generated waste for disposal to specific designed landfills. As a result, the requirements stipulated in these regulations will be considered in the EIR and EMPr.

GN R. 636 (GG 36784 dated 23 August 2013): National norms and standards for disposal of waste to landfill	This regulation stipulates the general principles associated to the disposal of waste to landfill. As a result the requirements stipulated in these regulations will be considered in the EIR and EMPr.
GN R. 926 (GG 37088 dated 29 November 2013): National norms and standards for storage of waste	This regulation describes the general requirements for the management and storage of waste. As a result the requirements stipulated in these regulations will be considered in the EIR and EMPr.
Environmental Conservation Act of 1989 **(ECA)** **GN R. 425 (GG 31901 dated 13 February 2009):** Waste tyre regulations **GN R. 341 (GG 30904 dated 28 March 2008):** Regulations for the prohibition of the use, manufacturing, import and export of asbestos and asbestos containing materials **GN R. 154 (GG 13717 dated 10 January 1992):** Noise control regulations in terms of section 25 of ECA	Requirements incorporated will be considered in the EIR and EMPr.
National Water Act No. 36 of 1998 (NWA)	Application for a Water Use Licence (WUL) will be launched once the required infrastructures associated to the storm water management plan has been determined during the EIA phase. General conditions stipulated in the NWA will be considered in the EIR and EMPr.
The following regulations in terms of NWA are applicable:	
GNR 267 (GG 40713 dated 24 March 2017): Water Use Licence Application and Appeals Regulation, 2017	An application for a WUL will be launched once the required infrastructures associated to the storm water management plan has been determined during the EIA phase. The requirements will be incorporated in the EIR and EMPr.
GN 704 (GG 20119 dated 4 June 1999): Regulations on use of water for mining and related activities aimed at the protection of water resources	An application for a WUL will be launched once the required infrastructures associated to the storm water management plan has been determined during the EIA phase. The requirements will be incorporated in the EIR and EMPr.
Hazardous Substances Act No. 15 of 1973	Requirements will be incorporated into the EIR and EMPr. Requirements to be incorporated into the Vygenhoek Platinum Health and Safety management plan.

Petroleum Products Act of 1977 **GN R. 627 (GG 44363 dated 30 March 2021):** Regulations regarding petroleum products specification and standards	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 (GG 25404 dated 29 August 2003):** Mines and works regulations **GN R. 911 (GG 29217 dated 8 September 2006)**: Mine health and safety regulations	The requirements set out by the listed regulations must be incorporated into the Vlakfontein Coal Mine Health and Safety Management plan. Some of the requirements associated to the environmental health will be incorporated into the EIR and EMPr. The following specific sections are applicable in this report and the EMPr: • Storage of hazardous substances; • Acquisition of hazardous chemicals.
Human Tissue Act No. 65 of 1983 **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**	• Requirements incorporated into the EMPr. • Requirements to be incorporated into the ECF project's Health and Safety management plan. Requirements to be incorporated in the onsite clinic management plan.
National Road Traffic Act of 1996 **GN R. 225 (as amended by GN. 485 GG 35413 dated 8 June 2012):** National Road traffic regulations	The requirements set in these regulations have been incorporated into the EMPr. However this should also form part of the ECF project'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.
Fertilizers, farm feeds, agricultural remedies and stock remedies Act No. 36 of 1947	The requirements specifically related to the use of herbicides and pesticides will be incorporated into the EMPr.
Conservation of Agricultural Resources Act 43 of 1983 (CARA) **GN R. 1048 (GG 9238 dated 25 May 1984, as amended):** Declared Weeds and Invader plants	The requirements will be incorporated into the EIR and EMPr. This act also deals with permitting of land zoned as Agriculture.
National Veldt and Forest Fire Act No. 101 of 1998	Measures to prevent the spreading of fires will be incorporated into the EIR and EMPr.
National Forest Act No. 84 of 1998	Requirements will be incorporated into the EIR and EMPr. However, before the commencement of site clearance an application must be lodged for the removal of protected tree

	species that may be identified during the EIA phase of the mining right application process.
National Heritage Resources Act No. 25 of 2000	The EIR & EMPr to be submitted as part of the mining right application document will comply 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 aforementioned section. Any comments and recommendations of SAHRA and / or PRHAG must be taken into account prior to the granting of the consent.
Carbon Tax Act No. 15 of 2019	The Carbon Tax Act No. 15 of 2019 was promulgated on 23 May 2019 and is implemented using a phased approach, allowing emitters time to transition to cleaner and more efficient technologies resulting in lower GHG emissions. Phase One is effective from 1 June 2019 to 31 December 2022. Any person, company or entity who undertakes an activity (above a certain threshold) and is responsible for the release of GHG emissions is required to report on their emissions to the Department of Forestry, Fisheries and the Environment, (DFFE) by the 31 March each year and pay tax on those emissions by July each year. In terms of GHG emitting activities, Vlakfontein Opencast Mine would trigger the following activities in terms of Annexure 1 of the National GHG Emission Reporting Regulations (Government Gazette No. 40762 of 3 April 2017), if the applicable reporting thresholds are exceeded: Applicable activities: Sector: Energy - 1A2i – Fuel Combustion Activities, Mining and Quarrying (if exceeding the 10MW reporting threshold)
GOVERNMENT POLICIES	
Waste Management policies	In terms of waste management in South Africa, there are two main policies that will be considered in the development of

	the EIR and 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 will be incorporated into the EIR and EMPr.
National Environmental Health Policy	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	The following two SANS standards will be 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 & GUIDELINES	
Mpumalanga Nature Conservation Act (Act 10 of 1998)	Requirements will be incorporated in the EIR and EMPr.
Town-Planning and Township Ordinance (Ordinance no. 15 of 1986)	Requirements will be incorporated in the EIR and EMPr.
Mpumalanga Biodiversity Sector Plan Handbook, MTPA 2014	Used as spatial tool to inform the Site Sensitivity Verification Report (SSVR).

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).

A pre-liminary assessment of the need and desirability of the proposed development was assessed taking the following into consideration:

- Resource desirability and demand;
- Economic desirability and demand; and
- Environmental sustainability and competing land-uses.

F.1 RESOURCE DESIRABILITY AND DEMAND

The proposed Vlakfontein Coal Mine falls within the Ermelo sub-basin of the Main Karoo Basin (MKB).

The coal seams in the Ermelo Coalfield are generally flat-lying to slightly undulating and are separated by fine- to coarse-grained sandstones, siltstones and mudstones. The A, D and E seams are usually too thin to be of economic interest and historically the C Seam group was the most important in the Carolina-Breyton area, and the B Seam group in the Ermelo area.

The C Seam group has been one of the main seam packages of economic importance throughout the Ermelo Coalfield. It is usually split by several partings which can lead to miscorrelation of the seams. In general, the C Seam is subdivided into the C Upper (CU) and C Lower (CL) seams.

It is anticipated the proposed mine will produce coal within the Eskom Coal Product Specification, supplying much needed coal to the surrounding coal fire power stations i.e. Camden, Majuba and Tutuka Power Station.

F.2 ECONOMIC DESIRABILITY AND DEMAND

Mpumalanga has five urban centres, namely Mbombela, Secunda, Emalahleni, Ermelo and Middleburg that can be considered as the regional economic engines. Almost 70% of the provinces GVA is generated in or around these towns. The Spatial Development Strategy thus intends to capitalise these towns' economic bases for provincial economic development (Mpumalanga SDF, 2019).

The Gert Sibande District Municipality (GSDM) is the largest of the three districts in Mpumalanga Province at 31 841 km², covering 40% of the Mpumalanga Province's land mass. The Gert Sibande District District contributes 26.2% towards the provincial population (Mpumalanga SDF, 2019).

The following key issues can be noted:

- According to Stats SA (2016 Community Survey), the GSDM's population increased from 1,043 194 in 2011 to 1,135 409 people in 2016, making it the smallest population among the districts in the province.
- In 2016, the youth population (15-34 years) comprises 39.3% of the total population.
- In 2016, the female population's share was 50.3% and that of males 49.7%.
- The population increased by 92 215 between 2011 and 2016, which is a population growth rate of 1.9% per annum between 2011 and 2016. This was higher than the annual average economic growth of 1.1% p.a.
- The population was estimated to reach a total of 1, 263 786 or 26.6% of Mpumalanga's population in 2021. The projection for 2030 is approximately 1.31 million or 25.7% of Mpumalanga's population. Such population growth will place additional pressure on infrastructure and service delivery as well as economic and employment opportunities.
- The number of households in the GSDM increased from 273 490 in 2011 to 333 815 households (± 60 000 household increase) in 2016 which constitutes 26.9% of Mpumalanga's households. The household size declined from 3.8 to 3.4 between 2011 and 2016. The projected household figure for 2030 is approximately 467 200 households.

The main economic sectors of the district include.

- Manufacturing (49.4%);
- Agriculture (38.1%);
- Transport (31.4%);

- Trade (29.2%);
- Community services (26.9%);
- Construction (26.6%);
- Electricity (26.1%);
- Finance (23.8%); and
- Mining (23.3%).

With regards to economic development, the following two key focus areas of the GSDM were identified:

- integrate economic activities to provide local employment and job creation; and
- facilitate economic growth and development in the manufacturing, mining, agriculture and tourism sectors.

It is further proposed to integrate the small towns and deteriorating mining towns with the economic growth centres and tourism nodes by means of physical and economic infrastructure. Town specific urban regeneration strategies must further be developed. These strategies may include proposals linked to the diversification of town economies, mining heritage tourism, SMME development and human capacity building, as well as rehabilitation of the natural environment and mining landscape (Mpumalanga SDF, 2019).

It however, remains important to promote diversification of economic activities by identifying the economic potentials and providing incentives for investment.

The economic growth rate for The MLM was at 3.0% per annum on average, over the period 1996 to 2017. The forecasted average annual GDP growth for 2017-2022 was relatively low at 1.3%. The contribution of the MLM to the Mpumalanga economy was around 4.3%, making it the fifth largest local economy in the province. It is the second largest economy in the district, contributing around 15.5% (MLM SDF, 2019).

The main economic sectors in the MLM are agriculture, transport and mining as well as some timber processing. The finance and agriculture sectors achieved the highest (albeit slim) growth in contribution from 2014 to 2017, and the contribution of the utilities, mining and trade sectors declined slightly (MLM SDF, 2019).

In terms of future economic development in MLM, coal mining can be expected to remain an important sector for the short to medium term. This sector, however, can possibly decline in the medium to long term due to limited coal resources, and a move away from a coal-based economy locally and globally in view of climate change mitigation. Alternative development sectors will have to be explored, to ensure a more diversified sustainable local economy. Threats to economic growth such as inadequate infrastructure, skills shortage and distance from markets will however have to be dealt considered (MLM SDF, 2019).

The proposed BCR Vlakfontein coal mine project links into the District's intention to mining and energy related development. According to the Mpumalanga SDF (2019), the GSDM is committed to:

- Facilitating and accommodating the existing mining sector;
- Developing industries that will serve coal mines in towns like Ermelo and Standerton;
- Ensuring proper rehabilitation of mines after use;

- Establishing proper environmental management systems during the operational stage of mines; and
- Strengthening of the Richards Bay coal line rail freight corridor.

If the average annual growth of the local economy is lower than the population growth rate, poverty levels will deepen if not adequately addressed.

F.3 ENVIRONMENTAL SUSTAINABILITY AND COMPETING LAND-USES

Msukaligwa/Chief Albert Luthuli Environmental Management Framework (EMF), 2010

At the time of finalising this Scoping Report, a copy of the EMF relevant to the Msukaligwa Municipality could not be found. The Msukaligwa SDF however refers to an EMF for the year 2010. From the SDF it would appear that there are a number of Environmental Management Zones identified, namely:

- Zone 1: Conservation;
- Zone 2: Agriculture;
- Zone 3: Forestry;
- Zone 4: Tourism;
- Zone 5: Urban/Residential;
- Zone 6: Mining; and
- Zone 7: Industrial and commercial.

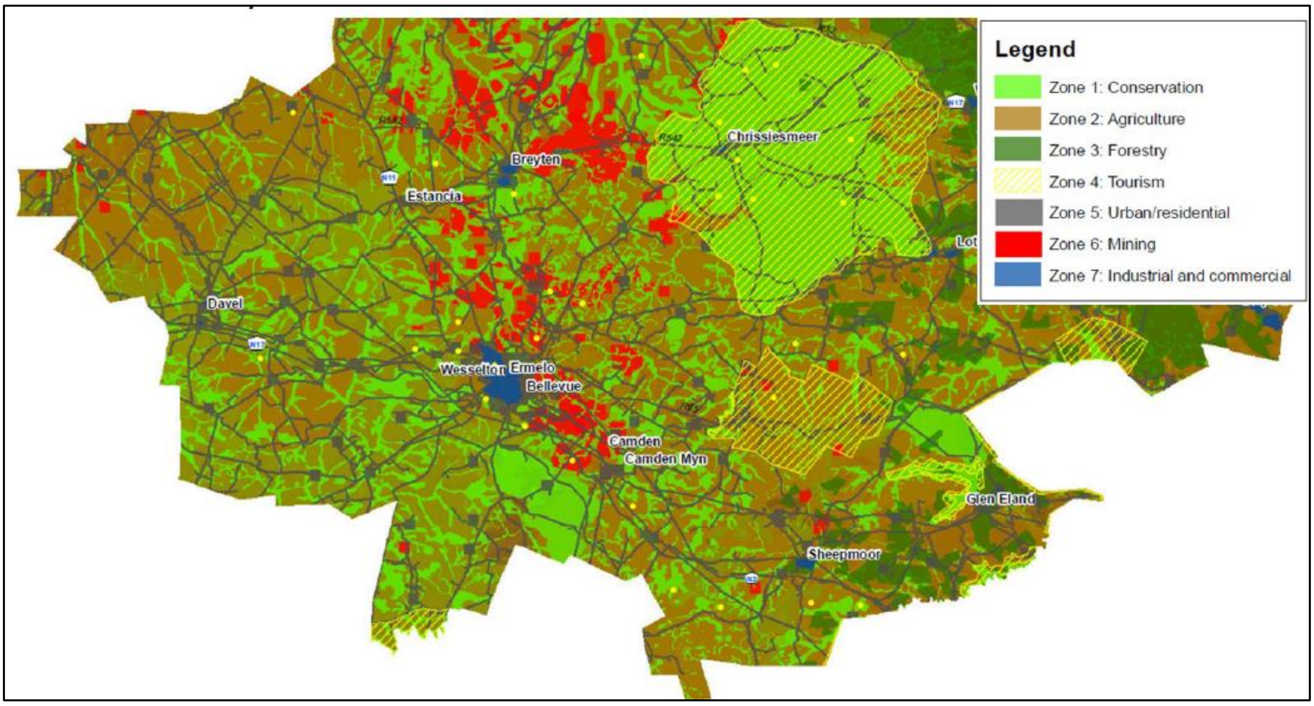

Figure 3: EMF Management Zones as per the Msukaligwa SDP, 2019

From ***Figure 3***, the proposed mine falls within the Zone 1 and Zone 2 defined areas.

Mpumalanga Biodiversity Sector Plan (MBSP), MTPA 2014

The Mpumalanga province is underlain by diverse and mineral rich geological formations resulting in the mining industry as one of the major land-use competing threats to both terrestrial and aquatic biodiversity.

At the time publishing the Mpumalanga Biodiversity Sector Plan (MBSP), half of Mpumalanga's natural habitat has already been irreversibly modified, mostly through large-scale agriculture, planation forestry and mining, with a rapid growth in the number of applications for prospecting and mining rights (covering 54.2 % and 24.5 % respectively of the land surface area of Mpumalanga), particularly for coal (more than 70%). In addition, significant impacts are recorded on the province's water security as wetlands are often drained for cultivation, plantation forestry lowers the water table and poorly located, or poorly managed open-cast mining affects the quantity and quality of the water entering and leaving wetlands and rivers (MTPA, 2014).

The MBSP, intended to be used as a decision-making spatial tool, describes five broad categories describing biodiversity objectives, which are further divided into sub-categories, namely Protected Areas (PA), Critical Biodiversity Areas (CBA's), Ecological Support Areas (ESA's), Other Natural Areas (ONA), and Moderately or Heavily Modified Areas (MA). ***Table 7*** provides a summary of the extend of each defined categories for the Gert Sibande District Municipality and Msukaligwa Local Municipality respectively.

Table 7: Summary of the extend of each defined category of the District and Local Municipality applicable to the proposed mine (MTPA, 2014)

DISTRICT AND LOCAL MUNICIPALITY	PA			CBA		ESA			ONA	MA	
	NATIONAL PARK AND NATURE RESERVES	PROTECTED ENVIRONMENT: NATURAL AREAS	PROTECTED ENVIRONMENT: MODIFIED	IRREPLICABLE	OPTIMAL	LANDSCAPE CORRIDORS	LOCAL CORRIDOR	SPECIES SPECIFIC	ONA' S	MODERATELY MODIFIED	HEAVILY MODIFIED
	LAND COVER IN %										
Gert Sibande DM	2.6	2.4	0.6	13.1	13.5	1.1	3.9	0.2	15.9	8.5	38.4
Msukaligwa LM	10.5	1.4	0.5	15.5	12	1.1	3.9	0.0	18.8	6.1	30.4

Figure 4 provides a map indicating the intersection of the proposed development with the defined categories as per the MBSP.

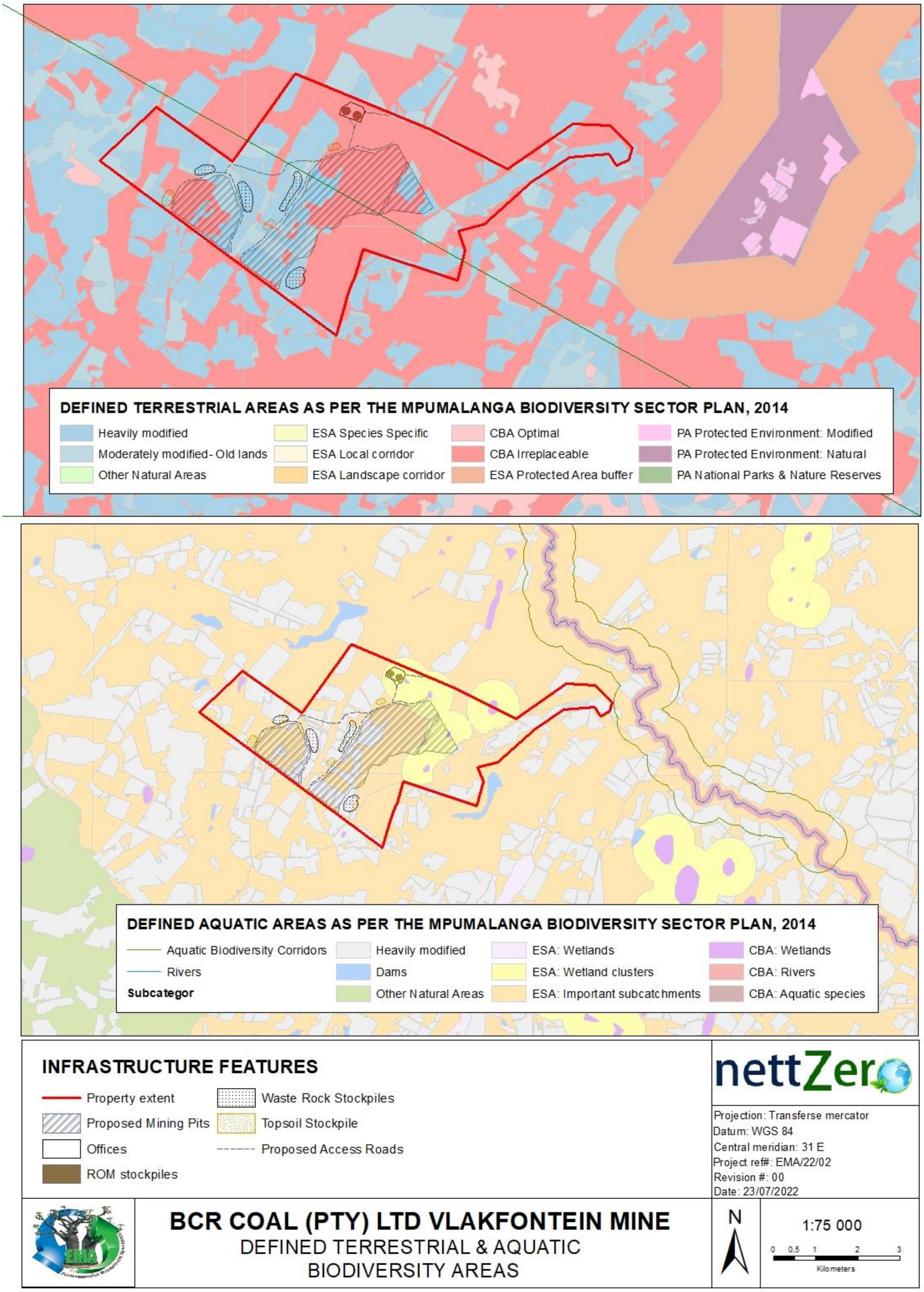

Figure 4: Defined Terrestrial and Aquatic Biodiversity categories as defined by the MBSP associated with the proposed development

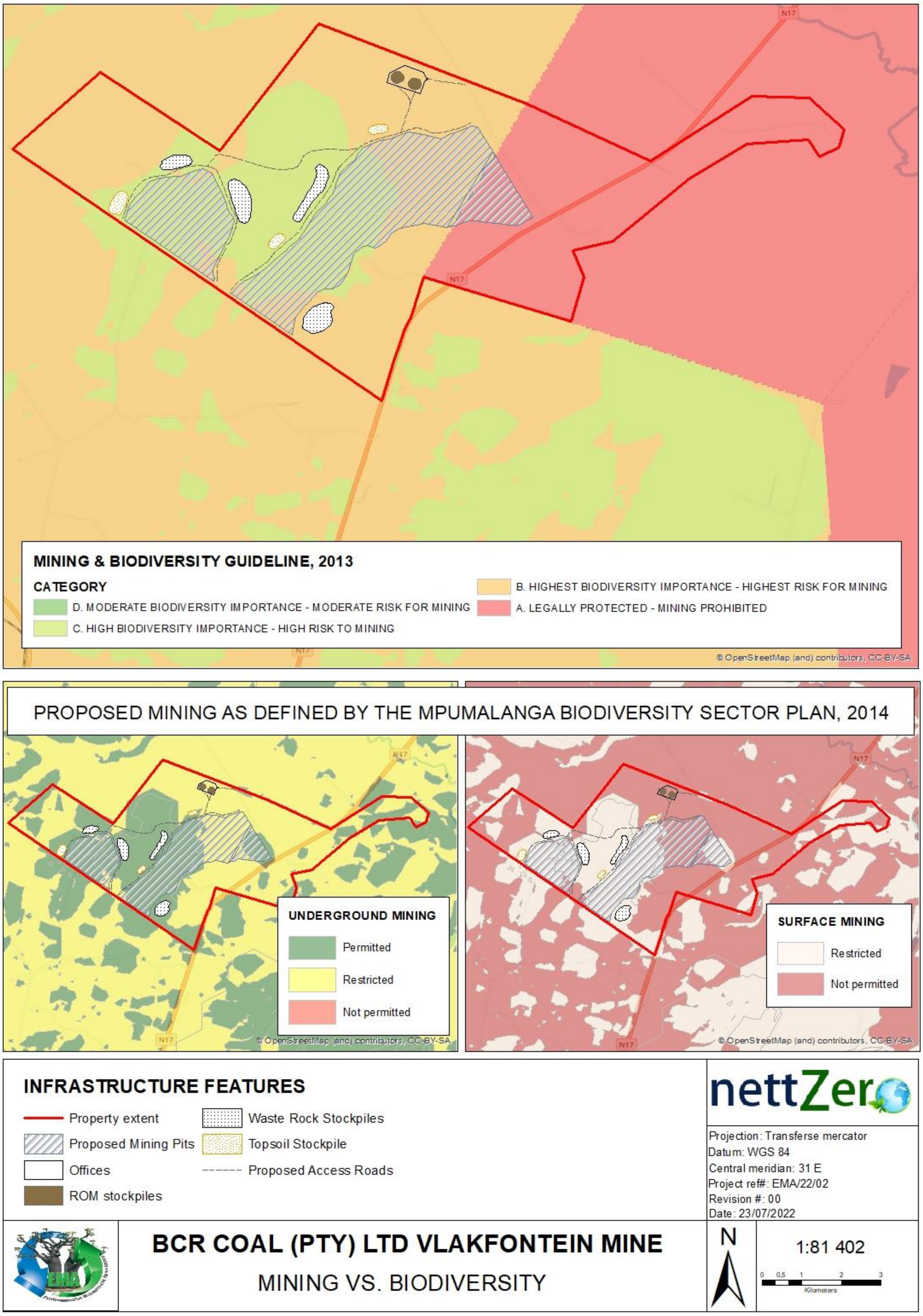

Figure 5: Defined Quarrying and Mining zones as per the MBSP and Mining and Biodiversity Guideline

The MBSP identifies Quarrying and Mining zones for open-cast and underground mining. These defined zones are not compatible with defined biodiversity objectives and should not be in PA's, CBA's or ESA's and only be located in Heavily Modified areas or in some ONA's subjected to the relevant authorisations and impact assessments (MPTA, 2014).

From ***Figure 5***, the proposed development falls within zones restricting both underground (28%) and open-cast (72%) mining in some areas. A portion of the proposed mining pit falls within an area defined as "open-cast mining not permitted" (28%).

Table 8 summarises the proposed infrastructure associated with the mine, expressed in percentage (%), in relation to defined biodiversity objective as per the MBSP.

Table 8: Summary of defined biodiversity objectives associated with the infrastructure footprint of the proposed mine as per the MBSP expressed in %

INFRASTRUCTURE	BIODIVERSITY OBJECTIVE		TOTAL AREA (HA) OF INFRASTRUCTURE	LAND-USE EXPRESSED IN %
Proposed Mining Pits	Terrestrial Biodiversity	CBA Irreplaceable	456	57
		Moderately modified		13
		Heavily modified		30
	Aquatic Biodiversity	Freshwater CBA's		0,3
		Freshwater ESA's		42
		Irreplicable		0
		Highly significant		98
		Ecosystem maintenance		2
		Heavily modified (freshwater)		16
	Underground Mining Zones	Restricted		28
		Permitted		72
	Surface Mining Zones	Not permitted		28
		Restricted		72
Proposed Waste Rock Stockpiles	Terrestrial Biodiversity	CBA Irreplaceable	35	3
		Moderately modified		21
		Heavily modified		76
		Freshwater ESA's		24
		Highly significant		93
		Ecosystem Maintenance		7
		Heavily modified (freshwater)		76
Proposed Topsoil Stockpiles	Terrestrial Biodiversity	CBA Irreplaceable	9	52
		Moderately modified		14
		Heavily modified		34
	Aquatic Biodiversity	Freshwater ESA's		74
		Highly significant		100
		Heavily modified (freshwater)		26
RoM Stockpiles & Offices	Terrestrial Biodiversity	CBA Irreplaceable	4 11	100
	Aquatic Biodiversity	Highly significant		100

The MBSP restricts underground and do not permit open-cast mining and related infrastructures within both terrestrial or freshwater CBA's (including a 1 km buffer for a freshwater CBA) and ESA's.

F.4 NEED AND DESIRABILITY ASSESSMENT

In addition to the above, the need and desirability of the proposed development was further assessed by answering the questions, as far as possible at this stage of the process, listed in the Guideline on need and Desirability (DEA, 2017).

These questions will be explored in further details as part of the EIA phase once this Scoping Report has been accepted.

Table 9: Questions indicating how the development considered ecological sustainability and the use of natural resources

QUESTION		ANSWER	CROSS-REFERENCE
1	How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?	Based on the outcomes of various of the appointed specialist desktop studies, it is clear that the proposed mine is situated in an area with highly sensitive terrestrial and aquatic species. As per the current proposed site layout plan, the following are required to be taken into consideration: • Mining pits – 57% of the proposed mining pits is situated in an area defined by the MBSP as a Terrestrial "CBA: categorised as an Irreplicable ecosystem", 14% is located in a "Moderately Modified" environment, and 30 % in a "Heavily Modified" environment. From an aquatic biodiversity perspective, 42 % of the proposed mining pits is situated in a "Freshwater ESA", 98% of this area is classified as "Highly Significant" area of importance, 2% within an "Ecosystem Maintenance" zone and 16% of the area is considered as being "Heavily Modified" already. In addition, the proposed mine falls within the Upper Vaal strategic Water Resource Area (SWRA) where 84% falls within a catchment classified as a Freshwater Ecosystem Priority Area (FEPA). The wetlands identified in the surrounds are classified as "Critically Endangered", "Poorly Protected" or "Not Protected," and at high risk to a loss, with only the associated depressional (pan) system classified as "Least Concern". In terms of the Mining and Biodiversity Guideline	Refer to the following sections within this report: • ***f) F.4***; • ***h)i)***; • ***1) (a) IV***; • ***1) (a) VII***; • ***1) (a) VIII***; • ***1) (a) IX***; and • ***1) (a) XI***.
1.1	How were the following ecological integrity considerations taken into account?:		
1.1.1	Threatened Ecosystems,		
1.1.2	Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure		
1.1.3	Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs"),		
1.1.4	Conservation targets,		
1.1.5	Ecological drivers of the ecosystem,		
1.1.6	Environmental Management Framework,		
1.1.7	Spatial Development Framework, and		
1.1.8	Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).		

<table>
<tr><td></td><td></td><td>(DEA et al, 2013), 72 % of the mining pit areas are situated in a zone defined by the MBSP as “Restricted” for “Surface Mining”.
• RoM Stockpiles and Offices – The proposed location of the RoM Stockpiles and Offices are entirely situated in areas defined by the MBSP as a terrestrial “CBA: irreplaceable” and aquatic “Highly Significant”.

The above is based on a desktop evaluation of the proposed site. At the time of finalising this Scoping Report, no onsite verifications (confirming or indicating the state) or alternative assessments were conducted.

The site is not located within a RAMSAR site. However, it is located within 5 km from the declared Chrissiesmeer Protected Environment (Provincial Gazette No. 2251 of 22 January 2014).</td><td rowspan="5"></td></tr>
<tr><td>1.2</td><td>How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?</td><td rowspan="4">This report serves as a desktop Scoping Report as at the time of finalising no filed assessments or site verification of the identified sensitivities were conducted.

Preliminary potential impacts/risks have been determined and are highlighted in Section h)v) of this report.

All potential impacts/risks will be defined, and management measures proposed to mitigate them will be assessed as part of the EIA Phase.</td></tr>
<tr><td>1.3</td><td>How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?</td></tr>
<tr><td>1.4</td><td>What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?</td></tr>
<tr><td>1.5</td><td>How will this development disturb or enhance landscapes and/or sites that constitute the nation’s cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided</td></tr>
</table>

	altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?		
1.6	How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?		
1.7	How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?		
1.7.1	Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)		
1.7.2	Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?)		

1.7.3	Do the proposed location, type and scale of development promote a reduced dependency on resources?		
1.8	How were a risk-averse and cautious approach applied in terms of ecological impacts?	As indicated previously, at the time of finalising this Scoping Report, only desktop sensitivity verifications were completed based on existing information and databases. Although the sensitivities still require to be verified with an on-site verification and assessment, it is highly likely that the proposed mine based on the current proposed site layout will require an extensive investigation into alternatives and mitigation measures, including the potential investigation of biodiversity offsetting. The Draft National Biodiversity Offset Guideline (October 2021) defines a “fatal flaw” as a major defect or deficient in a project proposal that should result in an Environmental Authorisation being refused, and from a biodiversity perspective, a residual negative impact that would have a Very High significance rating. Various specialist highlighted that based on the desktop verification outcome, there is a high possibility that the proposed mine will be considered as a “fatal flaw” and recommended as a “No-Go” alternative. Upon the approval of this Scoping Report, a detailed impact assessment and alternative assessment will be conducted during the EIA Phase.	
1.8.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?		
1.8.2	What is the level of risk associated with the limits of current knowledge?		
1.8.2	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?		
1.9	How will the ecological impacts resulting from this development impact on people’s environmental right in terms following:		
1.9.1	Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?		
1.9.2	Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?		
1.10	Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development’s ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?		
1.11	Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives /targets /considerations of the area?		
1.12	Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the “best practicable environmental option” in terms of ecological considerations?		

1.13	Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?		

Table 10: Questions indicated how the proposed development justified economic and social development

QUESTION		ANSWER	CROSS-REFERENCE
2.1	What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?:	Sections ***f) F.2*** and ***XVI*** provides information on the Baseline Socio-Economic situation of the area surrounding the proposed development. Based on the outcome of the baseline assessment, social screening and site verification, it was concluded that various socio-economic impacts can occur as a result of the proposed mining activities. Based on the information and the interim conclusions, it is recommended that a detailed Social Impact Assessment (SIA) be undertaken during the next phase of the Environmental Authorisation process. ***Negative Impacts*** The socio-economic impacts on the existing landowners will be high (negative), due to the loss of agricultural viable land resource, difficult to mitigate. Negative impacts of a more moderate significance refer to demographic changes, nuisance factors, safety and security issues, increased pressure on public infrastructure and services, external costs (e.g. negative impacts on land-use, groundwater, air quality, biodiversity, traffic, road infrastructure, health and community safety) associated with mining, as well as the impact on the sense	Sections ***f) F.2*** and ***XVI.***
2.1.1	The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,		
2.1.2	Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),		
2.1.3	Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and		
2.1.4	Municipal Economic Development Strategy ("LED Strategy").		
2.2	Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?		
2.2.1	Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?		
2.3	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?		
2.4	Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?		

2.5	In terms of location, describe how the placement of the proposed development will:	of place. At this stage, it is concluded that these impacts can be managed and mitigated to some extent. ***Positive Impacts*** Positive impacts refer to employment and income due to the operation itself and due to supply-links with local suppliers, as well as possible job creation for low-income groups throughout the life of mine, availability of social funds for socio-economic development and subsequent positive impact on poverty levels. The positive impacts can be enhanced. ***Attitude Formation*** Although attitude formation is not an impact per se, it serves an important indication of community sentiments toward the project. Attitudes can be defined as lasting, general evaluations of people. Attitudes can be formed through the individual's own experience and/or reports in the media. It could provide important information regarding the feelings and potential actions of Interested and Affected Parties (I&APs) that could become evident during the appeal period of the Environmental Impact Assessment process, and/or during the construction and operational phases of the proposed project. Initial responses to the project by the landowners and adjacent landowners, mainly from the farming communities, in the area indicates that there is already some form of attitude formation against the proposed Vlakfontein project. These relate to opposition to the proposed development, due to the negative impacts on the land- and resource use, intrusions on the rural character of the area and possible devaluation of the property values, together with concerns regarding the possible negative environmental impacts. It should however also be highlighted, that at this stage, no interviews or formal engagement, apart from those registered as I&AP were conducted. To the	
2.5.1	result in the creation of residential and employment opportunities in close proximity to or integrated with each other,		
2.5.2	reduce the need for transport of people and goods,		
2.5.3	result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),		
2.5.4	compliment other uses in the area,		
2.5.5	be in line with the planning for the area,		
2.5.6	for urban related development, make use of underutilised land available with the urban edge,		
2.5.7	optimise the use of existing resources and infrastructure,		
2.5.8	opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),		
2.5.9	discourage "urban sprawl" and contribute to compaction/densification,		
2.5.10	contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,		
2.5.11	encourage environmentally sustainable land development practices and processes,		
2.5.12	take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),		
2.5.13	the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),		
2.5.14	impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and		

2.5.15	in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	contrary of the observed comments received, a positive attitude may be experienced from job seekers within the local community. Issues raised should thus be seen as concerns, but also as inputs with regards to the way forward in terms of community involvement in the project and the detailed impact assessment phase.	
2.6	How were a risk-averse and cautious approach applied in terms of socio-economic impacts?		
2.6.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?		
2.6.2	What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability, and sustainability) associated with the limits of current knowledge?		
2.6.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?		
2.7	How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:		
2.7.1	Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?		
2.7.2	Positive impacts. What measures were taken to enhance positive impacts?		
2.8	Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?		
2.9	What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?		
2.10	What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)?		

	Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?		
2.11	What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?		
2.12	What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?		
2.13	What measures were taken to:		
2.13.1	ensure the participation of all interested and affected parties,		
2.13.2	provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,		
2.13.3	ensure participation by vulnerable and disadvantaged persons,		
2.13.4	promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means		
2.13.5	ensure openness and transparency, and access to information in terms of the process,		
2.13.6	ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge,		
2.13.7	ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were be promoted?		
2.14	Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g.. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?		

2.15	What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?		
2.16	Describe how the development will impact on job creation in terms of, amongst other aspects:		
2.16.1	the number of temporary versus permanent jobs that will be created,		
2.16.2	whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),		
2.16.3	the distance from where labourers will have to travel,		
2.16.4	the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and		
2.16.5	the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).		
2.17	What measures were taken to ensure:		
2.17.1	that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and		
2.17.2	that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?		
2.18	What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?		
2.19	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?		
2.20	What measures were taken to ensure that he costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?		

2.21	Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?		
2.22	Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?		

4.5 NEED AND DESIRABILITY STATEMENT

Although a "Need and Desirability Statement" cannot be made as part of the Scoping Phase, the following potential conflicts or positives based on the desktop findings can be noted:

- The proposed site layout plan, excluding the consideration of alternatives, is in direct conflict with the biodiversity objectives as defined by the MBSP and various other sources guiding the decision makers, including the municipal IDP's, SDP's and EMF. The Draft National Biodiversity Offset Guideline (October 2021) defines a "fatal flaw" as a major defect or deficient in a project proposal that should result in an Environmental Authorisation being refused, and from a biodiversity perspective, a residual negative impact that would have a Very High significance rating. Various specialist highlighted that based on the desktop verification outcome, there is a high possibility that the proposed mine may be considered as a "fatal flaw" and recommended as a "No-Go" alternative.
- The socio-economic impacts on the existing landowners will be high (negative), due to the loss in the land- and resource use and will be difficult to mitigate.
- Positive impacts refer to employment and income due to the operation itself and due to supply-links with local suppliers, as well as possible job creation for low-income groups throughout the life of mine, availability of social funds for socio-economic development and subsequent positive impact on poverty levels. The positive impacts can be enhanced.
- Although attitude formation is not an impact per se, it serves an important indication of community sentiments toward the project. Initial responses to the project by the landowners in the area indicates that there is already some form of attitude formation against the proposed mine. These relate to opposition to the proposed development, due to the negative impacts on the land- and resource use, intrusions on the rural character of the area and possible devaluation of the property values, together with concerns regarding the possible negative environmental impacts.

Upon the approval of this Scoping Report, a detailed impact assessment and alternative assessment will be conducted during the EIA Phase. Once completed, a final "Need and Desirability Statement" will be made.

G) PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

The expected life of mine has been determined to be 18 years. However, should the proposed mine development exceed this period, it is recommended that the environmental authorisation be amended at that time.

H) DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PROPOSED PREFERRED SITE

(NB!! – This section is not about the impact assessment itself; It is about the determination of the specific site layout having taken into consideration (1) the comparison of the originally proposed site plan, the comparison of that plan with the plan of environmental features and current land uses, the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout as a result.)

During the EIA phase of the mining right application, alternatives in terms of the site layout will be 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 will be considered during the site selection process. Reasonable and feasible alternatives have been considered during the scoping phase to determine the most suitable alternatives, however, will be further assessed during the EIA phase. These alternatives will include the assessment of the following:

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

The consideration of alternatives will consider significant constraints such as social, financial, and environmental issues during the evaluation of the alternatives. The preferred option will then be highlighted and presented to the stakeholders to ensure that their views are also taken into account. Once all the alternatives are identified, it may be necessary to focus on a few and to eliminate others. The elimination process will be 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, will be given for each of the remaining preferred alternatives during the EIA phase.

l) DETAILS OF ALL ALTERNATIVES CONSIDERED

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

Based on preliminary assessment during the Scoping Phase, the sections to follow describes the alternatives that have been considered. These alternatives will be furthered assessed during the EIA phase.

(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 previously utilised for the prospecting and where BCR Coal (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 Coal. No alternatives to mining the material listed have been considered associated to the proposed mining activity.

As per ***Figure 5*** and discussed under Section ***f)*** of this report, 72% of the proposed mining pit as per the current layout plan is situated in an area restricting open cast or surface mining and 28% not permitted at all as per the MBSP. In terms of underground mining, the proposed mining pits is in areas where 72% is permitted and 28% is restricted.

It is therefore recommended that the feasibility of considering underground mining as suppose to above ground mining be investigated by the applicant. In the event of underground mining not being a feasible option, it is recommended that the applicant reduce its open cast mining pit and restricting it to areas of least concern and in line with the biodiversity objectives as define in the MBSP.

(c) Design or layout of the activity

The preliminary site layout, as attached in ***Appendix C – Site Layout Plan, Sensitivities, and Land Use***, in terms of the positioning of haul roads, lay down areas, RoM product stockpile areas, workshops, topsoil and subsoil stockpiles, screening plant, and residue stockpiles 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 identified local communities;
- Access roads to the mining area; and
- Haul distance.

At the time of submitting this report, no alternative sites were investigated, however recommendations of alternatives to be considered during the EIA phase was provided.

As part of the EIA assessment, all alternatives will be further investigated and assessed.

(d) Technology to be used in the activity

No alternatives in terms of the technology to be used have been considered during the Scoping Phase.

(e) Operational aspects of the activity

The proposed activity relates to the open cast mining of Coal. 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 will be further assessed during the EIA phase. However, during the scoping process some sensitive areas have been predetermined based on a desktop analysis and recommendations for alternatives has been provided.

The proposed alternatives are attached as ***Appendix C – Site Layout Plan, Sensitivities, and Land Use.***

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.)

Enviroroots (Pty) Ltd was appointed by Environmental Management Assistance (Pty) Ltd on behalf of BCR Coal (Pty) Ltd to assist in conducting and managing the required Public Participation Process (PPP) required as part of the Scoping and EIA Process.

For the purpose of this section a summary of steps taken to date will be provided. The detailed PPP report and associated records is attached as ***Appendix E – Public Participation***.

IDENTIFICATION OF I&AP

The following groups were identified as potential Interested and Affected Parties (I&APs):

- Relevant National Government Departments;
- Relevant Provincial Government Departments;
- Relevant Municipal Representatives;
- Relevant Ward Councillors;
- Landowners/Occupiers;
- Adjacent Landowners/Occupiers;
- Relevant Institutional/Organisational Representatives;
- Surrounding Mining Activities;
- Land Claimants; and
- Governmental and Non-Governmental Organisations and Agencies.

To ensure that all potential I&APs were made aware of the project and had the opportunity to register and provide comments, the notification process was as thorough as possible. Registration will remain open throughout the Public Participation Process to allow Interested and Affected Parties to register and submit their input throughout.

NOTIFICATION OF I&APS

Site Notices

To inform surrounding and immediate community members, landowners, occupiers, workers and passers-by of the proposed project and to invite registrations and comments, six (6) A2 notices were erected at a visible and accessible locality throughout the study area on 27 July 2022. These notices were strategically erected along access routes throughout the study area and are summarised in ***Table 11*** below.

Table 11: Locality of Site Notices Placed

DATE	NUMBER	COORDINATES	PLACEMENT
27/07/2022	Site Notice 01	26°23'20.83"S 30°2'5.57"E	Entrance to Portions 21 and 11 of Farm Vlakfontein 108 IT
27/07/2022	Site Notice 02	26°24'25.91"S 30°3'42.03"E	South-eastern corner of Portion 2 of Farm Vlakfontein 108 IT on the N17 National Route
27/07/2022	Site Notice 03	26°23'38.89"S 30°4'9.66"E	Entrance to Portion 2 of Farm Vlakfontein 108 IT on the N17 National Route

DATE	NUMBER	COORDINATES	PLACEMENT
27/07/2022	Site Notice 04	26°23'11.90"S 30°4'49.96"E	At the Breyten Gravel Road turnoff from the N17 National Route
27/07/2022	Site Notice 05	26°22'13.33"S 30°4'16.34"E	On the Breyten Gravel Road, approximately 2 km from the N17 turnoff just north of Portion 2 of Farm Vlakfontein 108 IT
27/07/2022	Site Notice 06	26°22'28.42"S 30°5'54.54"E	On the N17 National Route opposite the entrance to Portion 14 of Farm Welgelegen 107 IT

Newspaper Advertisements

To inform a broad spectrum of individuals who might want to register as I&APs, newspaper advertisements were placed in the Highvelder newspaper (Page 4) and in The Citizen newspaper (Page 24) on Friday, 29 July 2022.

Written Notifications

Identified I&APs were directly informed of the application processes to be followed by means of email, hand delivery and registered post. Proof of written notifications sent is provided in the relevant appendices as described in the sections to follow. Note that the written notifications encouraged potential I&APs to register and provide their comments/questions on the proposed project and related application processes currently underway.

Email Notifications

I&APs were notified of the proposed project by means of email on 01 and 02 August 2022. The Background Information Document (BID) was attached to the emails and all email notifications sent provided the contact information for EnviroRoots (Pty) Ltd.

Hand Delivery

Background Information Documents (BIDs), providing information on the proposed project, were physically hand delivered to the Mooifontein Mine Manager, the Landowners for Portion 2 of the Farm Vlakfontein 108 IT and the tenants on Portion 11 of the Farm Vlakfontein 108 IT on 27 July 2022. The register of receipt for hand delivered notifications is attached to the PPP report. Proof of delivery to the Landowners for Portion 2 of the Farm Vlakfontein 108 IT is captured in the Landowner Introductory Consultation Notes which has been forwarded to PWG Attorneys, acting on their behalf.

Registered Post

Where I&APs could not be provided with the Background Information Document either electronically or by hand delivery, and postal addresses were available, the BID was sent via Registered Post on 02 August 2022.

Notification of I&AP's of reports availability

Registered I&APs will be notified of the availability of the Draft Scoping Report(s), Draft EIA Report(s), and the Draft Water Use License Application (WULA) Technical Report for Public Commenting as and when required. I&APs will be informed of the relevant commenting periods and will be encouraged to submit any comments or questions on or before the closing date (to be confirmed).

ACCESS AND COMMENTING OPPORTUNITY

Commenting and Registration opportunity will be provided for throughout this Public Participation Process. The Draft Report commenting periods have been preceded by a thorough notification process to allow I&APs to familiarise themselves with the proposed project prior to making the reports available for public commenting. The entire process will remain transparent and allow for I&APs to register and comment throughout. Further to the above, commenting periods will be provided for as part of the Draft SR, Draft EIA Report and Draft WULA phase of this Public Participation Process. This will be conducted in accordance with Section 41(4)(ii) of the National Water Act (NWA), 1998 (Act No. 36 of 1998) which indicates that a commenting period of no less than 60 days should be provided for and in accordance with Clause 3(8) of the NEMA EIA Regulations (GN No. 326 of 07 April 2017) which indicates that any public participation process must be conducted for a period of at least 30 days. Hard copies of the Draft documents will be placed at a relevant public entity and will be provided to the relevant Departments/Institutions/Organisations requiring hard copies of the documents. Further to this, an electronic copy of the draft documents will be uploaded onto the EMA's Website.

PUBLIC MEETING

A Public Meeting will be held at an appropriate time on an appropriate day to be confirmed.

LANDOWNER CONSULTATION

Landowner consultations have been undertaken as described in ***Table 12*** below.

Table 12: Landowner Consultations

PROPERTY	LANDOWNER	DESCRIPTION
Portion 2 of the Farm Vlakfontein 108 IT Portion 12 of the Farm Welgelegen 107 IT	Susanna Boerdery CC	A formal meeting was held with Susanna Boerdery at the PWG Attorneys Office in Ermelo on 27 July 2022. The meeting notes are attached in the PPP Report.
Portions 1, 7 and 14 of the Farm Welgelegen 107 IT	WPCH Trust	A telephone consultation was held with WPCH Trust on 02 August 2022 during which a brief project background was provided. WPCH Trust requested that the BID be forwarded to them which was subsequently done.
Portions 11 and 21 of the Farm Vlakfontein 108 IT	Chaldean Trading 46 (Pty) Ltd	A telephone consultation was held with Asset Disposal Consultancy (Pty) Ltd, acting on behalf of Chaldean Trading 46, in July 2022. The BID was subsequently forwarded for their perusal.

REGULATORY CONSULTATION

All Departments and State-Owned Entities listed in the I&AP Register have been and will continue to be included in the Public Participation Process. However, direct consultations will be conducted with the Regulatory Authorities relevant to this Public Participation Process. Refer to ***Table 13*** below for Regulatory Consultations relevant to this Public Participation Process thus far. Note that the table will be amended as required.

Table 13: Regulatory Consultations

ENTITY	COMMUNICATIONS DESCRIPTION
Mpumalanga Tourism and Parks Agency (MTPA)	Communications were undertaken with the MTPA to ensure that the Chrissiesmeer Lake Conservation Area was informed of the proposed mining operation. Further comments are awaited.
Eskom	Following the notification sent to Eskom, response was received from Eskom Transmission to indicate that it will not be affected by the application whereas Eskom Grid Planning requested more information to determine whether any Eskom infrastructure or servitudes will be affected. Further comments are awaited.
Department of Forestry, Fisheries and the Environment (DFFE)	The DFFE Forestry Regulation Office have formally registered as an I&AP. Further comments are awaited.
Ward Councillors	The Ward Councillor for Ward 9 has requested a meeting to be held with all relevant affected Wards to discuss the proposed project and application processes. The meeting will be arranged for an appropriate date and time. Meeting minutes will be captured and included in this report accordingly.

DISCLOSURE OF I&AP INTERESTS

Registered I&APs were informed that this process is a PUBLIC PROCESS. All comments and/or questions received from I&APs on this process is considered public knowledge. In accordance with the Environmental Impact Assessment Regulations and the Regulations regarding the procedural requirements for Water Use Applications and Appeals, EnviroRoots (Pty) Ltd will not keep any information of this nature confidential and will submit all comments and/or questions received to the Regulatory Authority in a verbatim manner as far as possible.

By registering as an I&AP and providing comments, I&APs consent to the above. Note that no contact information for I&APs will be made available to the public at any point during the process. However, names and surnames will accompany comments in the Comments and Responses Report (C&RR) to form part of this process. I&APs were requested to inform EnviroRoots if they would prefer their name and surname to not accompany their comments.

This Public Participation Process is conducted in accordance with Section 11(1)(c) of the Protection of Personal Information Act, 2013 (Act No. 4 of 2013), which allows for the processing of personal information if processing complies with an obligation imposed by law on the responsible party and in accordance with Section 11(1)(f) of the Act which allows for the processing of personal information if processing is necessary for pursuing the legitimate interests of the responsible party or of a third party to whom the information is supplied.

REGISTRATIONS AND COMMENTS RECEIVED

Identified I&APs were encouraged to submit their registrations and comments to EnviroRoots (Pty) Ltd, via any of the avenues provided for, for them to receive further correspondence regarding the BCR Coal Vlakfontein Mine Project currently underway.

ADDRESSING COMMENTS AND CONCERNS

A Comments and Response Report (C&RR) has been compiled as part of the Public Participation Process. This document records the issues of concern, questions and suggestions contributed by stakeholders during the Environmental Authorisation Process, the Waste Management License Application Process, and the Water Use License Application Process. This report also includes the responses provided by the relevant parties. It should be noted that the Comments and Response Report is an active document which will be updated throughout the process as comments and concerns are received. However, following submission of all final documents to the relevant Competent Authorities (CAs), all additional comments should be directed directly to the relevant CAs.

NOTIFYING I&AP OF THE DECISION

Following the verdict by the DMRE on whether to grant or reject the Environmental Authorisation Application and Waste Management License Application, and also the verdict by the DWS on whether to grant or reject the WULA, all registered I&APs will be informed of the decision as well as the appeal process and its timeframes for submission, if applicable.

III) SUMMARY OF ISSUES RAISED BY I&APS

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

Table 14: 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					
Chevon / Gerhardus Beukes Prinsloo (PWG Attorneys on behalf of the Landowners for Portion 2 of Farm Vlakfontein 108 IT)		2022/07/28	Good morning Please find attached hereto a letter for your attention. Kind regards **RE: THE PROPOSED BCR COAL VLAKFONTEIN MINE** We refer to the abovementioned matter and confirm that a introductive consultation was held at our offices on the 27th of July 2022. We confirm that present on our client's behalf was writer himself, Mr Nico Mentz and Mrs Maggie Mentz. We confirm that during the meeting it was indicated to your client where the proposed mining activity will take place and their consent was requested regarding entrance to the farm. We confirm that we will refer back to you as far as the availability of our clients own environmental specialist is concerned and will enquire from them their availability. We will enquire on same date and will let you know by Friday 29 July 2022.	Via email on 2022/08/03 from EnviroRoots: Good day Chevon / Erhard, Kindly find the attached notes of the introductive consultation meeting held at your offices on 27 July 2022 together with a letter from the EAP providing more detail on the Specialist Work to be conducted as part of the EIA process for the proposed BCR Coal Vlakfontein Mine. As indicated during the meeting email addresses for Susanna Boerdery CC will not be provided to us at this point in the process and all communications will take place through PWG Attorneys. Kindly therefore ensure that Susanna Boerdery CC receives the attached and provide us with confirmation of such. Regards	
Chevon / Gerhardus Beukes Prinsloo (PWG Attorneys on behalf of the Landowners for Portion 2 of Farm Vlakfontein 108 IT)		2022/08/01	Goeie more Vind asseblief heirby aangeheg 'n skrywe vir u aandag. Met dank	Via email on 2022/08/02 from EnviroRoots: Good day, We hereby acknowledge receipt of your letter (Ref.: GB Prinsloo / cs /M1642) dated 29 July 2022 pertaining to the proposed BCR Coal Vlakfontein Mine. We furthermore note that the project Applicant was CC'd in your email and therefore accept that your letter has been received by the project Applicant. However, we will follow up in this regard. Kindly note that, as mentioned during the introductive consultation meeting with the Landowners for Portion 2 of the Farm Vlakfontein 108 IT on 27 July 2022, the relevant application processes handled by the independent Environmental Assessment Practitioner (EAP), Public Participation Specialist, and all other project Specialists will remain separate	

			INSAKE: BCR COAL VLAKFONTEIN MINE Ons verwys na bovermelde aangeleentheid en die konsultasie te ons kantore. Ons bevestig dat ons kliënte Ukhozi Environmentalists aangestel het ten einde deel te neem in die konsultasie proses en toe te sien dat die proses korrek gevolg word. Ons bevestig dat ons kliënt 'n aanvanklike bydrae van R 30 000.00 plus BTW tot hulle kostes verlang. Ons verneem graag van u in die verband. Met dank Translated: *Good morning* *Kindly find herewith attached a writing for your attention.* *Thank you* *RE: BCR COAL VLAKFONTEIN MINE* *We refer to above-mentioned occasion and the consultation held at our offices.* *We confirm that our clients have appointed Ukhozi Environmentalists to take part in the consultation process and to see that the process is followed correctly.* *We confirm that our client requires an initial contribution of R 30 000.00 plus VAT towards their costs.* *We look forward to hearing from you in this regard.* *Thank you*	from any cost-related discussions/negotiations between the Landowner, their Legal Representation and the Applicant. Discussions/negotiations regarding additional Specialist Work desired, which falls outside of the Scope of the independently appointed EAP and Specialists should therefore be resolved between the Landowner, their Legal Representation and the Applicant. We trust that you find the above in order. Regards	
Peet van der Merwe (Portions 1, 7 and 14 of Farm Welgelegen 107 IT)		2022/08/02	Not verbatim – telephone conversation: A telephone consultation was held with WPCH Trust on 02 August 2022 during which a brief project background was provided. WPCH Trust requested that the BID be forwarded to them which was subsequently done.	Not verbatim – telephone conversation: Background Information Document was sent.	
Peet van der Merwe (Portions 1, 7 and 14 of Farm Welgelegen 107 IT)		2022/08/02	Received, thank you.	No response required. This email was received in response to the Background Information Document sent.	
Lawful occupier/s of the land					

HC Marais (Portion 11 of Farm Vlakfontein 108 IT)		2022/07/28	Mev Bowyer. U was gister, 27 Julie 22 hier by ons op die plaas en u het my man vir n dokument laat teken. Is dit moontlik dat u asseblief weer vir my n dokument kan email. Ons was anoggend in die dorp en my briewetas is uit die bakkie gesteel met n inbraak in die voertuig. Ek sal dit baie waardeer. Baie dankie. Translated: *Mrs. Bowyer, you were here at our place on the farm yesterday, 27 July 22 and provided us with a document for which my husband signed. Is it possible for you to please email the document? My briefcase was stolen from our car this morning whilst in town. Would greatly appreciate it. Many thanks.*	Via email on 2022/07/28 from EnviroRoots: Goeie dag Mev. Marais, Baie jammer om te hoor van die inbraak! Sien gerus aangehegde Agtergrond Kennis Dokument. Laat weet gerus indien u enige vrae of kommentaar het. Groete daar Translated: *Good day Mrs. Marais,* *Very sorry to hear about the break-in!* *Kindly see attached Background information Document. Please inform me in the event that you have any questions or comments.* *Regards*	
Leon Naude (Portions 11 and 21 of Farm Vlakfontein 108 IT)		2022/07/28	Not verbatim – telephone conversation: Mr. Naude indicated that when he sold the property to Chaldean Trading 46 in the early 2000's they went into a lease agreement whereby he leases the property back from Chaldean Trading 46. Since he leases the property, he has given permission to the current residents to stay in the house on the property. Mr. Naude indicated that he would like to have a discussion with the Applicant regarding the way forward with the lease agreement, especially considering that he initially discussed with Chaldean Trading 46 that he would eventually buy the land back from them. He is furthermore concerned about the future of the current residents since they are pensioners and cannot afford to live elsewhere.	Not verbatim – telephone conversation: Mr. Naude was informed that his concerns have been forwarded to the Applicant for their attention.	
HC Marais (Portion 11 of Farm Vlakfontein 108 IT)		2022/08/03	Thank you I have received it.	No response required. This email was received in response to the Background Information Document sent.	
HC Marais (Portion 11 of Farm Vlakfontein 108 IT)		2022/08/03	Goeie more. Ek wil graag weet of ons as inwoners van die huis op Vlakfontein, daardie vorm moet voltooi. Baie dankie. Translated: *Good morning.* *I would like to know if we, as residents of the house on Vlakfontein, have to complete that form.* *Thank you very much*	Via email on 2022/08/03 from EnviroRoots: Goeie more Chrissie, Jul is reeds geristreer as 'n Belangstellende en Belanghebbende Party en sal alle toekomstige informasie rakende die aansoek prosesse ontvang per die epos addres wat jul gegee het. Dit is dus nie nodig vir jul om die vorm te stuur nie. Laat weet gerus of dit voldoende is om alle kommunikasie na [epos nie bekend gemaak nie] te stuur? Of lys gerus ook addisionele kontak besonderhede waarheen kommunikasie gestuur moet word.	

				Groete <u>Translated:</u> *Good morning Chrissie,* *You have already been registered as an Interested and Affected Party and will receive all future information regarding the application processes via the email address you provided.* *It is therefore not necessary for you to send the form.* *Please let me know if it is sufficient to send all communications to [email not disclosed]? Or feel free to also list additional contact details where communications should be sent.* *regards*	
Landowners or lawful occupiers on adjacent properties					
Danie Spies (Portion 0(RE) of Farm Mooifontein 109 IT)		2022/08/02	Die aanspraak op mynbou het al sedert 2008 verdwyn agv die Minister van omgewingsake se uitspraak oor die besoedeling in die direkte opvang gebied van die Vaalrivier! Highveld Headwaters Protection Group het destyds teenstand gebied en is toegestaan. Een van die mynaansoekers- Billiton het dit laat vaar agv uitspraak! <u>Translated:</u> *The claim to mining has disappeared since 2008 due to the Minister of Environmental Affairs' ruling on the pollution in the direct catchment area of the Vaal River!* *Highveld Headwaters Protection Group objected at the time and was granted. One of the mine applicants - Billiton abandoned it due to ruling!*	Via email on 2022/08/03 from EnviroRoots: Goeie dag Danie, Dankie vir u epos. Kan u dalk help met kontak besonderhede vir Highveld Headwaters Protection Group? Ek sal hul graag wil inlig van die beplande myn en relevante aansoek prosesse. Groete <u>Translated:</u> *Good day Danie,* *Thank you for your email.* *Could you please assist with contact details for Highveld Headwaters Protection Group? I would like to inform them of the planned mine and relevant application processes.* *Regards*	
Municipal councillor					
Cllr. Zenzele Zulu (Cllr Ward 14)		2022/08/01	Not verbatim – telephone conversation: Mr. Zulu was provided a brief background to the proposed project and was requested an email address to which to send the Background Information Document.	Not verbatim – telephone conversation: Background Information Document was sent.	
Cllr. Tully Zulu (Cllr Ward 9)		2022/08/02	Not verbatim – telephone conversation: Ms. Zulu was provided a brief background to the proposed project and was requested an email address to which to send the Background Information Document.	Not verbatim – telephone conversation: Background Information Document was sent.	
Cllr. Tully Zulu (Cllr Ward 9)		2022/08/02	Not verbatim – telephone conversation: Ms. Zulu asked for a meeting to be held at the Municipal Offices for the proposed project to be explained and to confirm communities to be affected by the proposed mine.	Not verbatim – telephone conversation: It was agreed that a meeting will be arranged with the Ward Cllrs for all affected Wards.	
Municipality					

Marinda Booth (previously Gert Sibande District Municipality)		2022/08/01	Dear all, I took early retirement. You may communication to [email not disclosed], alternatively you may contact her on [number not disclosed]. Kind Regards	This was an automated reply to the project notification sent. No response required. The contact provided was informed of the proposed operation and application processes.	
Hendry Jele (Gert Sibande District Municipality)		2022/08/03	Not verbatim – telephone conversation: Mr. Jele enquired about the proposed project and indicated that unemployment is a concern for the area. He further stated that the Local Municipality must be informed of the proposed project and related application processes.	Via email on 2022/08/03 from EnviroRoots: Good day Mr. Jele, Many thanks for your phone call yesterday. We confirm that the Msukaligwa Local Municipality has been informed of the proposed project and related application processes. Please inform us of any additional contacts at Gert Sibande who should receive the notification. Regards	
Organs of state *(Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWS etc.)*					
Frans Krige (Mpumalanga Tourism and Parks Agency)		2022/08/02	Dear Chantal We take note of this application. Please send a hardcopy of your proposal to our head office for registration. Regards	Via email on 2022/08/03 from EnviroRoots: Good day Frans, Many thanks. I will forward a hard copy of the Background Information Document via Courier. Regards	
John Geeringh (Eskom Grid Planning)		2022/08/02	Please send me a KMZ file of the affected properties, proposed development footprint, etc. Please find attached Eskom requirements for works at or near Eskom infrastructure and servitudes. Kind regards	Via email on 2022/08/02 from EnviroRoots: Good day John, As requested, please see attached KMZ files. Kindly inform us whether any Eskom Infrastructure or Servitudes will be affected by the proposed mining operation. Regards	
Ziyanda Mdoda (Eskom Transmission)		2022/08/02	Good day, Eskom Transmission is not affected by this application. Warm Regards	Good day Ziyanda, Many thanks for the information. Regards	
Natasha Higgitt (South African Heritage Resources Agency)		2022/08/03	Good morning, Please note that all development applications are processed via our online portal, the South African Heritage Resources Information System (SAHRIS) found at the following link:	Via email on 2022/08/03 from EnviroRoots: Good day Natasha, Will do.	

			http://sahra.org.za/sahris/. We do not accept emailed, posted, hardcopy, faxed, website links or DropBox links as official submissions. Please create an application on SAHRIS and upload all documents pertaining to the Environmental Authorisation Application Process. As per section 24(4)b(iii) of NEMA and section 38(8) of the National Heritage Resources Act, Act 25 of 1999 (NHRA), an assessment of heritage resources must form part of the process and the assessment must comply with section 38(3) of the NHRA. Once all documents including all appendices are uploaded to the case applications, please ensure that the status of the case is changed from DRAFT to SUBMITTED. Please ensure that all documents produced as part of the EA process are submitted as part of the application.	Many thanks.	
Nokukhanya Khumalo (South African Heritage Resources Agency)		2022/08/03	Good Morning Please note that all development applications are processed via our online portal, the South African Heritage Resources Information System (SAHRIS) found at the following link: http://sahra.org.za/sahris/. We do not accept emailed, posted, hardcopy, faxed, website links or DropBox links as official submissions. Please create an application on SAHRIS and upload all documents pertaining to the Environmental Authorisation Application Process. As per section 24(4)b(iii) of NEMA and section 38(8) of the National Heritage Resources Act, Act 25 of 1999 (NHRA), an assessment of heritage resources must form part of the process and the assessment must comply with section 38(3) of the NHRA. Once all documents including all appendices are uploaded to the case applications, please ensure that the status of the cases is changed from DRAFT to SUBMITTED. Please ensure that all documents produced as part of the EA process are submitted as part of the application. Kind Regards,	Via email on 2022/08/03 from EnviroRoots: Good day Nokukhanya, Will do. Many thanks.	
Communities					
Dept. Land Affairs					
Carlize Knoesen (Department of Agriculture, Land Reform and Rural Development – Deeds)		2022/08/02	Good morning Attached for your attention. Regards	No response required. The project notification was forwarded between DALRRD officials.	
Hazel Tema (Department of Agriculture, Land Reform and Rural Development)		2022/08/03	Good day The Directorate: Presidential Hotline and Call Centre acknowledge with thanks receipt of your email dated 1 August 2022 regarding the subject matter. Kindly note that the matter has been referred to the office of PSSC: Mpumalanga, [name not disclosed] for further assistance. Should you wish to make a follow up on this matter please email [details not disclosed]. Regards	No response required. The contact provided has been added to the I&AP Register.	
Traditional Leaders					

Dept. Environmental Affairs					
Francois Nel (Department of Forestry, Fisheries and the Environment)		2022/08/01	Good day. I will be out of the office from 1 June 2022 – 30 November 2022 due to deployment to Mangaung Metro by the DFFE. During this time I will have limited access to E-mails but will be available for urgent matters on my Cell Phone. Kind Regards,	This was an automated reply to the project notification sent. No response required.	
Constance Musemburi (Department of Forestry, Fisheries and the Environment)		2022/08/02	Dear Chantel Please refrain from sending out notifications to everyone who is not linked to the project. I have asked this before. I am not linked to this project and I am not sure why am I receiving this notification. And you can not record my name as being notified where I am not even linked to the project. This is confusing. Regards	Via email on 2022/08/03 from EnviroRoots: Good day Constance, As requested, your details will be removed from the I&AP Register. Regards	
Kenneth Mavhunga (Department of Forestry, Fisheries and the Environment)		2022/08/02	Kindly find the attached ORGANISATION/FIRM/POSITION/NATURE OF INVOLVEMENT e.g. PROPERTY OWNER: Commenting Authority	Via email on 2022/08/02 from EnviroRoots: Many thanks Mr. Mavhunga, We confirm that you have been registered as an IA&P for the project mentioned in the subject matter above. Regards	
Other Competent Authorities affected					
OTHER AFFECTED PARTIES					
INTERESTED PARTIES					
Bradley Gibbons (Endangered Wildlife Trust)		2022/08/01	Hi I would like to be an interested and affected party for the BCR Coal (Pty) Ltd Application for a Water Use Licence: Vlakfontein and Welgelegen farms, Chrissiesmeer. Regards	Via email on 2022/08/02: Good day Bradley, We hereby confirm your registration as I&AP on the proposed BCR Coal Vlakfontein Mine project. Kindly find the attached Background Information Document for your attention. Regards	
Centre for Environmental Rights		2022/08/01	Thank you for contacting the Centre for Environmental Rights. Kindly contact the relevant staff member directly per email. Email details can be found here: https://cer.org.za/team.	This was an automated reply. No response required. The CER Executive Director, Deputy Director, Programme Head: Mining and Programme Head: Pollution and Climate Change were informed of the proposed operation and application processes.	

Harriet Davies-Mostert (previously Endangered Wildlife Trust)		2022/08/01	Thank you for your email. I am no longer with the Endangered Wildlife Trust as of 31 May 2022 and unfortunately for this reason I am unable to reply to this email. Please direct this inquiry and any future ones to [details not disclosed]. Your original email is not forwarded automatically to [name not disclosed], so I suggest you contact him directly for any inquiry. If you need to contact me directly, my phone number is [number not disclosed] and my new email address is [email not disclosed]. Regards	This was an automated reply to the project notification sent. No response required. The contact provided was informed of the proposed operation and application processes.	
Hiral Naik (previously Birdlife SA)		2022/08/01	Good day I am no longer working with BirdLife South Africa. Please contact [email not disclosed]. Kind Regards	This was an automated reply to the project notification sent. No response required. The contact provided was informed of the proposed operation and application processes.	
Melissa Whitecross (Birdlife SA)		2022/08/01	Hello, Thank you for your email. Please note that I am travelling in the Cape this week. My response to your email may be a little delayed. I ask for your patience in awaiting my reply to your email while I travel. Kind regards,	This was an automated reply to the project notification sent. No response required.	
Nkosinathi Nama (previously Endangered Wildlife Trust)		2022/08/01	Thank you for contacting EWT. We regret to inform you that Nkosinathi Nama is no longer employed here. Please direct any future correspondence to [contact details not disclosed]. This is an automated reply. For your convenience, this email has been automatically forwarded to [name not disclosed].	This was an automated reply to the project notification sent. No response required. The contact provided was informed of the proposed operation and application processes.	
Phuti Namethe (SANPARKS)		2022/08/01	Dear Sender, I am currently out of Office from 21/07/2022 until 07/08/2022. Please redirect your emails to [details not disclosed] or Call him on [number not disclosed]. Kind Regards	This was an automated reply to the project notification sent. No response required. The contact provided was informed of the proposed operation and application processes.	
Bradley Gibbons (Endangered Wildlife Trust)		2022/08/02	Hi Chantel Thanks for that Regards	No response required. This email was in response to the Background Information Document forwarded.	
Marc De Fontaine (previously SA Wetland Society)		2022/08/02	Please remove this email address from this EIA as it is not relevant to me.	No response required. The I&AP has been removed from the I&AP Register.	
Athol Stark (Highveld Tourism)		2022/08/02	Not verbatim – telephone conversation:	Via email on 2022/08/03 from EnviroRoots:	

			Mr. Stark indicated that he was the correct person from the heritage community to speak to and inform of the proposed project. He further mentioned the below important aspects to take note of: • On Farm Welgelegen there's two major heritage cave sites. One site is fully excavated. However, the other is virtually untouched, and tourists are not allowed to enter. • He further mentioned mushroom rock or murder rock. • He also stated that there are numerous heritage buildings along the N17 route through the study area prone to damage from blasting. Mr. Stark indicated grave concern for the area heritage sites as mine blasting in the area (up to as far as 22 km away) has significantly impacted on heritage sites and have caused cracks and other damage. Mr. Stark indicated that they are strongly opposed to mines in the area and will be objecting to the project. However, agreed to potentially having a conversation with the appointed Heritage Specialist.	Good day Athol, Thanks again for taking my phone call yesterday. Please remember to provide us with your comments and concerns. We look forward to hearing from you. Regards	
Robert Davel (Mpumalanga Agriculture)		2022/08/03	Good day Mrs Chantel Bowyer. With regards to: NOTIFICATION OF PUBLIC PARTICIPATION PROCESS FOR THE PROPOSED BCR COAL (PTY) LTD VLAKFONTEIN MINE ENVIRONMENTAL AUTHORISATION APPLICATION, WASTE MANAGEMENT LICENSE APPLICATION AND WATER USE LICENSE APPLICATION ON PORTIONS 2, 11 AND 21 OF THE FARM VLAKFONTEIN 108 IT AND PORTIONS 1, 7, 12 AND 14 OF FARM WELGELEGEN 107 IT NEAR ERMELO, MSUKALIGWA LOCAL MUNICIPALITY, GERT SIBANDE DISTRICT, MPUMALANGA PROVINCE Mpumalanga Agriculture is the provincial affiliate of Agri SA in our province. At our side we host thirty farmers associations across Mpumalanga This is an official request to add Mpumalanga Agriculture as an interested and affected party to this mining application. Will you please confirm the registration of Mpumalanga Agriculture as interested and affected party at [emails not disclosed]. Kind regards.	Via email on 2022/08/03 from EnviroRoots: Good day Mr. Davel, Your request to register Mpumalanga Agriculture as an I&AP is hereby confirmed. Kindly provide us with the details of the relevant Farmers Association(s) which should be informed of the proposed mine and related application processes, if relevant. Regards	

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

IV) ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE SITES

(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 Vlakfontein Coal 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 baseline/desktop studies underaken by the various appointed specialist. For the purpose of this report, only a summary of the baseline environment impacts are discussed, to indicate the feasibility of the proposed coal mine, and the terms of reference for the EIA will be provided. The detailed reports are attached as appendices.

(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 desktop assessments as part of the scoping investigation.

Information provided provides a brief summary of the verified desktop baseline, plan of study for the EIA phase and reasoned opinion of the specialist regarding the acceptability of the proposed mine.

I. REGIONAL SETTING, TOPOGRAPHY, AND SUB-CATCHMENT

The topography of the project area is characterised by mostly flat laying areas with some crests and valleys. The highest elevation at the mine site is approx. 1780 mamsl and the lowest elevation is approx. 1680 mamsl, sloping towards the river drainage in an eastern direction. Mean slope within the project boundary is 5.1%, but ranging from 0 % - 58%.

The project area falls within the quaternary catchment C11A with the Upper Vaal Water Management Area. A summary of readily available hydrological data for the catchment is provided in ***Table 15***.

The major river system is the Vaal River, flowing in a southeaster direction, located within the Welgelegen 107 IT Farm. Some unnamed tributaries of the Vaal River, hosting some dams, flow though the larger project area as well.

Table 15: Summary of information for the quaternary catchment (GRAII; DWAF 1996)

QUATERNARY CATCHMENT	AREA (KM^2)	MEAN ANNUAL PRECIPITATION (MM/A)	MEAN ANNUAL RUNOFF (MM/A)	MEAN ANNUAL BASEFLOW (MM/A)	MEAN ANNUAL RECHARGE	
					MM/A	% OF MAP
C11A	719.4	743	76	8	52.02	7

II. RAINFALL, EVAPORATION, AND AVERAGE CLIMATE

The study area falls within the summer rainfall region, with a Highveld climate of warm to hot summers and cold, dry winters.

The Mean Annual Precipitation (MAP) is according to the GRA II by the Department of Water and Sanitation from 743 mm/Anum for quaternary catchment C11A and occurs mostly in the summer months.

The mean annual runoff for this Quaternary is approximately 75.9 mm and as with the rainfall, will be highly seasonal, with the greatest runoff occurring during the summer months and the least during the winter months.

Annual evaporation in this area has a narrow range from just over 1790 to 1840 mm per year indicating that evaporation is more than double the annual rainfall.

III. GEOLOGICAL ENVIRONMENT

Regional Geology

The project area is predominantly underlain by litho-stratigraphic units from the Karoo Supergroup, illustrated in ***Figure 6***, overlain along major river courses by quaternary, alluvial deposits. The Karoo Supergroup formed during the Late Carboniferous to Middle Jurassic eras from plant assemblages, thick glacial deposits and extensive flood basalts with their associated dolerite sills and dykes. Extensive coal deposits establish the economic importance of the Karoo Supergroup. The project area is characterised by the Main Karoo Basin, more specifically the Ermelo Sub-Basin, which is underlain by the stable Kaapvaal Craton floor. The Main Karoo Basin consists of a number of sub-groups, i.e. Dwyka, Ecca, Beaufo, Drakensburg and Lebombo Groups. These sub-groups are further divided into formations. One such formation, the Vryheid Formation, forms part of the Ecca Group, and characterise the geology and geomorphology of the project area. There are no exposures of Pre-Karoo rocks in the project area as outcrops are limited to Karoo dolerite and the Ecca Group. The Vryheid Formation is mainly from deltaic origin, consisting of upwards coarsening sedimentary material such as dark-grey, muddy siltstone, sandstone, dark siltstone and mudstone units, with interbedded coal units of variable thicknesses at depths.

The dolerite intrusions present within the project area are younger than the lithologies of the Ecca Group and intruded into and through these sedimentary lithological units. The dolerite intrusions typically occur as sills or dykes and are often responsible for the devolatization of the coal adjacent to these intrusions. Typically, dolerite sills crop out on surface, occur very close to the surface or have been entirely removed through erosion in places. These sills are usually fine crystalline, although it can occur in varying degrees of texture starting from fine crystalline and grading to a medium crystalline texture.

Local Geology

The coal seams in the Ermelo Coalfield are generally flat-lying to slightly undulating and are separated by fine- to coarse-grained sandstones, siltstones and mudstones. The A, D and E seams are usually too thin to be of economic interest and historically the C Seam group was the most important in the Carolina-Breyten area, and the B Seam group in the Ermelo area.

The C Seam group has been one of the main seam packages of economic importance throughout the Ermelo Coalfield. It is usually split by several partings which can lead to miscorrelation of the seams. In general, the C Seam is subdivided into the C Upper (CU) and C Lower (CL) seams. The CU Seam is well developed over the entire coalfield and is often split by partings of different lithologies, such as sandstone, siltstone, or mudstone, reaching a composite thickness of 0.7-4 m. The

CL Seam is not developed throughout the entire coalfield, but where developed is between 0.5 and 2 m thick. It locally grades into carbonaceous siltstone and mudstone, which often form the roof of the seam, whereas the floor mostly consists of sandstone. It is the thickest of all the coal seams intersected here, reaching a thickness of more than 1.50 m over large parts of the project area. Locally seam floor rolls may negatively influence the thickness of the CL Seam in the Ermelo Coalfield. The B Seam group varies in thickness from 1-2.7 m and may be split into three units, B Lower (BL), B Upper (BU) and BX seams (BCR, 2022).

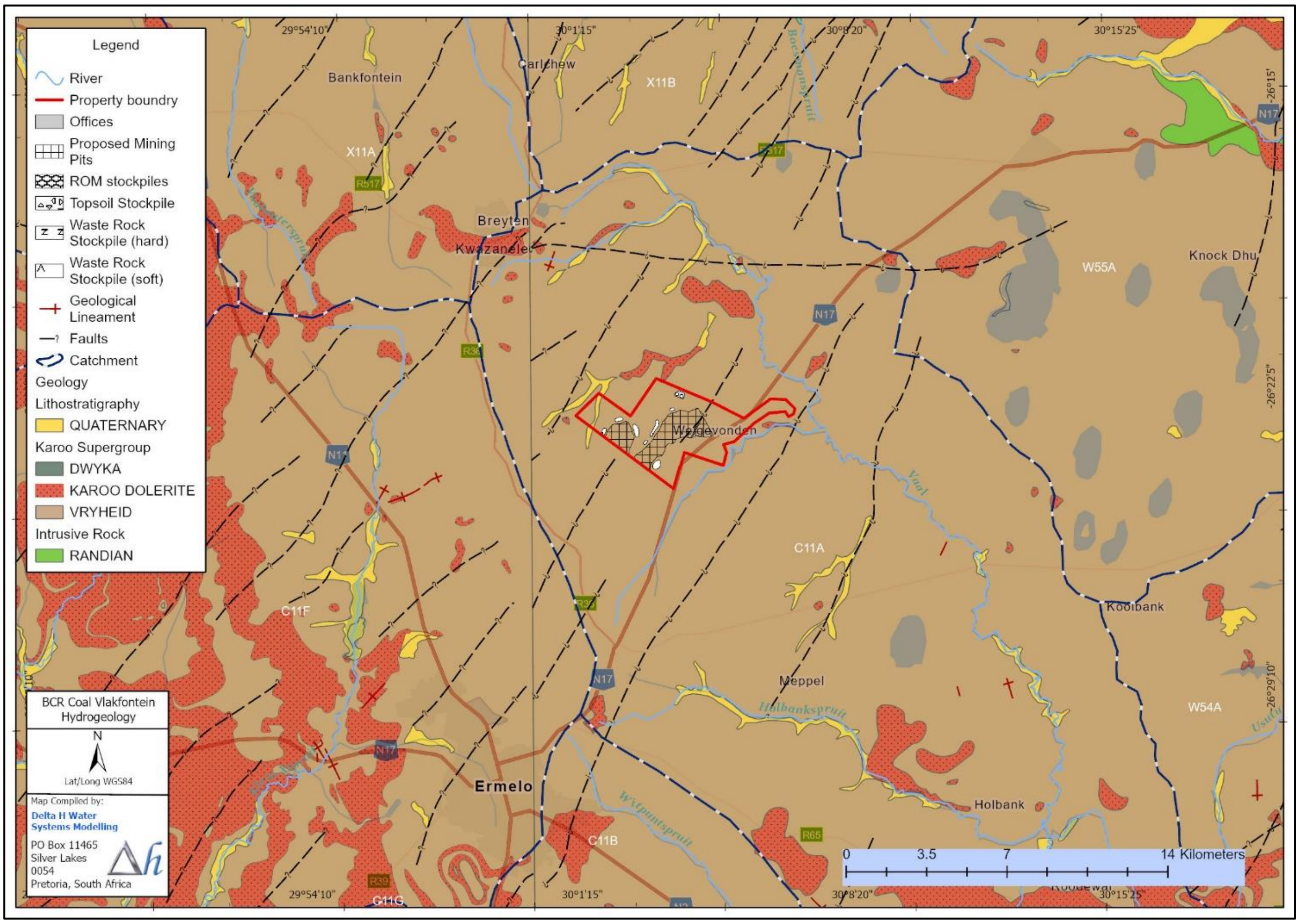

Figure 6: Geology map of the proposed mining area

IV. AGRICULTURAL AND SOIL

Land Matters Environmental Consulting (Pty) Ltd was appointed by Environmental Management Assistance (Pty) Ltd on behalf of BCR Coal (Pty) Ltd to conduct a desktop soil and agricultural potential assessment and inform the required Scoping Report (Phase 1).

The Scoping Assessment is attached as ***Appendix F.1 – Agricultural Assessment***.

TERMS OF REFERENCE

The terms of reference for the study were as follows:

- A desktop investigation of the soils associated with the study site. This was obtained from both the Soil and Terrain (SOTER) database as well as the land type database. The land type data are classified according to the Binomial System of 1977. Soil data were extracted from the land type information and re-classified as per the Soil Classification Working Group (2018).
- Describe the geology, topography, watercourses, and climate of the site.
- Describe the broad scale agricultural potential of the site based on the desktop information attained from the land type data, current activities on site, slope climatic data, and wetness.
- Confirm or dispute the project site's current environmental sensitivity classification of High for Agricultural Production as identified by the screening tool.
- Provide a plan of study for the Environmental Impact Assessment phase (Phase 2) of the soil and agricultural assessment.

Due to the desktop assessment nature of the report, a number of databases were investigated including the SOTER database, land type data, topography, and water resources to determine the broad scale agricultural productivity of the proposed mining site.

SUMMARY OF BASELINE CONDITIONS

Based on the latest available database (2016) under the SOTER model, the site has been classified as containing red, yellow, and greyish soils with low to medium base statuses. These are classified as per the South African classification system as either Oxidic soils or Plinthic soils. The land type database was then investigated to further refine the classification of soils within the site. According to the land type database, the proposed mining site is situated within an area classified as having a plinthic catena.

Potential soils to be found within the study site are therefore most likely to be associated with the plinthic soils. Plinthic soils consist of a topsoil (Orthic A horizon) which grades into a soft or hard plinthic material either directly or indirectly via a red apedal B, yellow brown apedal B or an albic horizon. These soils are identified through the presence of concentrated mottling and as a result of this, are associated with a fluctuating water table and indicate at least seasonal saturation. Soil forms are represented by either Hutton, Bainsvlei, Avalon and Longlands forms as one moves downslope from the top of a hillslope catena, with one or other gley soil (e.g. Rensburg, Willowbrook, Katspruit, Champagne forms) in the valley bottom regions.

Depending on the depth of the plinthic horizon (and therefore the depth of saturation), these soils can present problems for cultivation as a result of periodic waterlogging. However, if the plinthic horizon is identified at depth and is overlain by a red or yellow brown apedal horizon, which is freely draining, these soils can be very productive for the cultivation of crops such as maize. By combining the land type data with the information obtained from the BCR Coal Mining Work Programme and the drilling of exploration boreholes, it was determined that the soils within the proposed mining site (outside of the wetland areas) are likely to consist of a free draining upper solumn of a red apedal, yellow brown apedal, or albic horizon, which then grades into a plinthic horizon. This is the best-case scenario for crop production within the area and as such these soils are classified as productive for cultivation.

Further to the determination of the soils, topography, climate and water resources within the site, an investigation of historic aerial imagery was undertaken to determine the types of activities which have occurred was undertaken. Historic aerial imagery shows that the site has long been utilised for crop cultivation, further implying that the soils within the site are productive. Current aerial imagery of the site shows that approximately 70% of the site is utilised for crop cultivation, with the remaining 30% either classified as wetland systems or more terrestrial grasslands which may be utilised for pasture.

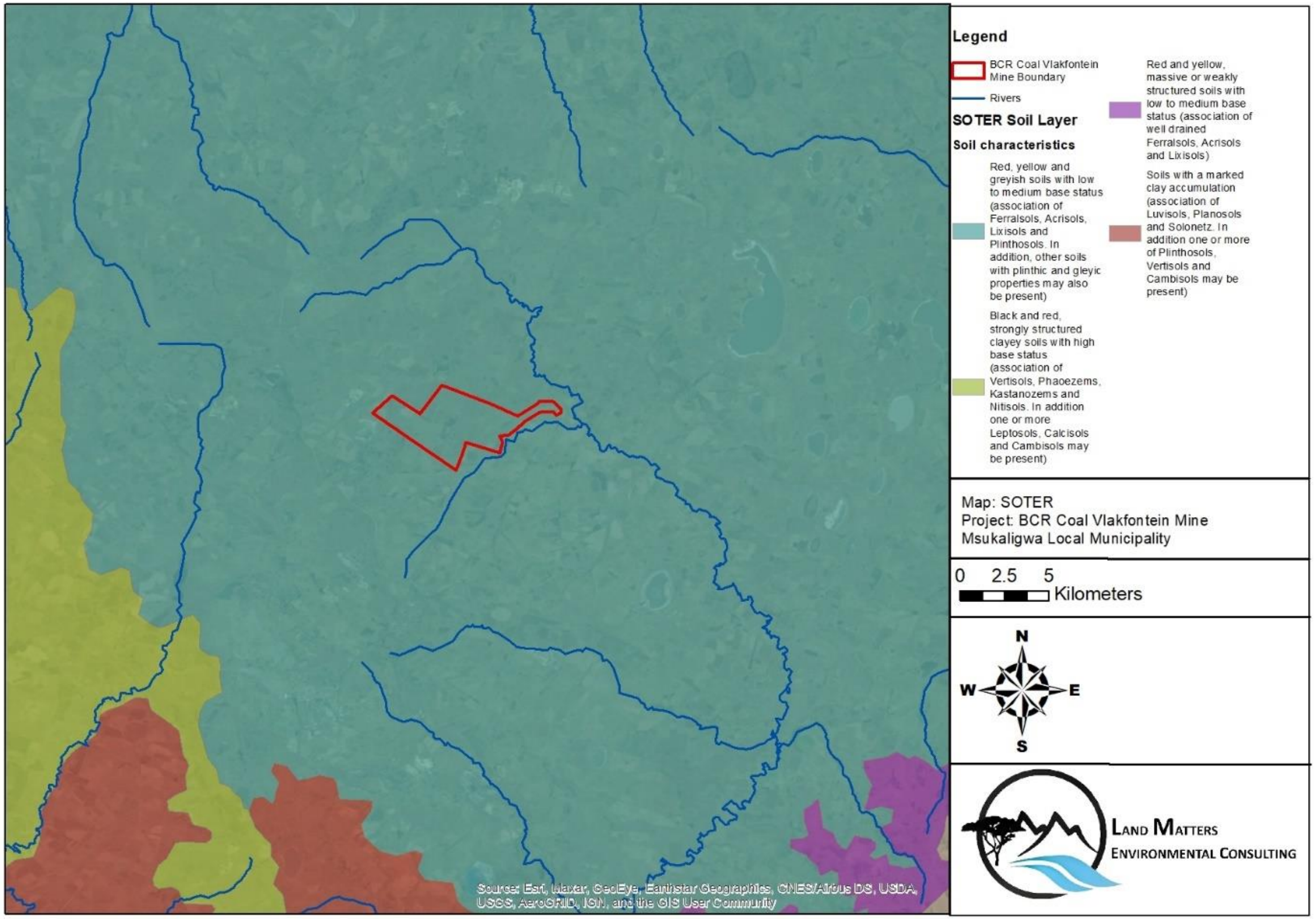

Figure 7: SOTER database for South Africa showing the potential soils identified within the BCR Coal Vlakfontein Mine site

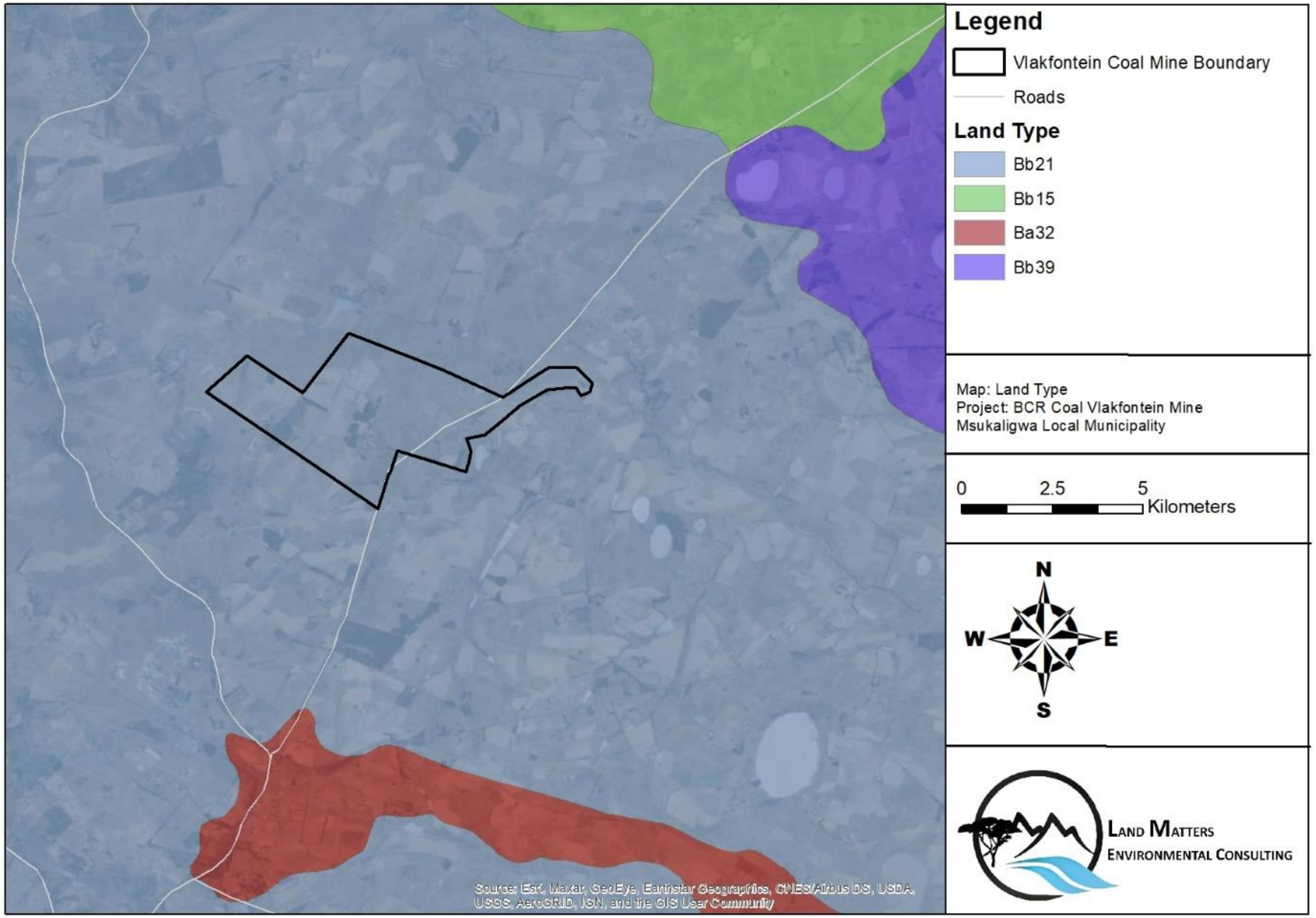

Figure 8: Land type information for the BCR Coal Vlakfontein Mine site

DESKTOP SENSITIVITY VERIFICATION OUTCOME

In order to verify the classification of the site as 'high' for agricultural production as per the 'National Web Based Environmental Screening Tool site (Department of Forestry, Fisheries, and the Environment), a number of factors were taken into consideration. These included the potential soil texture, soil depth, soil permeability, slope/topography, current activities on the site as well as the climate. With the exception of soil permeability as a result of saturation of the soils, no other factors are considered limitations to agricultural production, within the site.

The proposed BCR Coal Vlakfontein Mine site therefore consists of both areas which are classified as being productive and areas which are subject to limitations as a result of saturation and the associated presence of wetland systems. Given that the majority of the site (70%) is categorised as agriculturally productive, the site sensitivity classification of 'high' for agricultural production is verified. It must be noted that this is based on a thorough desktop assessment of the site, and a field investigation of the soils present within the site is required to ground-truth these findings.

PLAN OF STUDY FOR EIA

Given the verified 'high' classification of the proposed mining site for agricultural production, Phase 2 of the assessment must include a full Agricultural Agro-Ecosystem Specialist Assessment. This assessment must include a field investigation of the proposed BCR Coal Vlakfontein Mine site. The field investigation will include taking soil samples using an auger to a depth of 1200mm or to refusal. At each sample location the soils will be classified, and a description of the physical soil characteristics will be conducted. These characteristics will include:

- Diagnostic soil horizons and their respective sequence.
- Depth of the identified soil horizons.
- Soil field texture.
- Colour.
- Effective rooting depth.
- Surface crusting.
- Depth to saturation (water table), if encountered.
- Terrain morphological units/Landscape position (slope %); and
- Rockiness.

The field data will be utilised to refine the agricultural land capability of the specific study site for the project. This will consider the terrain and soil properties, as well as the climatic, water and vegetation data. Land use impacts of the proposed mine will be evaluated. An impact assessment will be undertaken to determine the significance of impacts to the agricultural land capability of the site for any direct, indirect, and cumulative impacts. Risk assessments and various management options must be recommended.

Further to the above-mentioned plan for phase 2 of the agricultural assessment the following minimum requirements for Agricultural Agro-Ecosystem assessments will be adhered to as per the Government Notice No. 320 published in the Government Gazette 43110. These include

- An assessment of the soil form/s, soil depth (effective and total soil depth), top and sub-soil clay percentage, terrain unit and slope.

- An assessment of the vegetation composition, available water sources as well as agro-climatic information.
- An assessment of the current productivity of the land based on production figures for all agricultural activities undertaken on the land for the past 5 years, expressed as an annual figure and broken down into production units.
- An assessment of the current employment figures (both permanent and casual) for the land for the past 3 years, expressed as an annual figure.
- An assessment of the existing impacts on the site, located on a map (e.g. erosion, alien vegetation, non-agricultural infrastructure, waste, etc.).
- An assessment of impacts, including change in productivity, and change in employment, which must be considered as a minimum in the predicted impact of the proposed development on the agroecosystem.
- The agro-ecosystem assessment must at a minimum include:
    - the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment,
    - a description of the methodology used to undertake the on-site assessment inclusive of the equipment and models used, as relevant,
    - a map showing the proposed development footprint (including supporting infrastructure) with a 50m buffered development envelope, overlaid on the agricultural sensitivity map generated by the screening tool,
    - an indication of the potential losses in production and employment from the change of the agricultural use of the land as a result of the proposed development,
    - an indication of possible long-term benefits that will be generated by the project in relation to the benefits of the agricultural activities on the affected land,
    - additional environmental impacts expected from the proposed development based on the current status quo of the land including erosion, alien vegetation, waste, etc
    - information on the current agricultural activities being undertaken on adjacent land parcels,
    - an identification of any areas to be avoided, including any buffers,
    - a substantiated statement from the soil scientist or agricultural specialist with regards to agricultural resources on the acceptability or not of the proposed development and a recommendation on the approval or not of the proposed development
- The findings of the Agricultural Agro-Ecosystem Specialist Assessment must be incorporated into the Basic Assessment Report or Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which are to be contained in the EMPr.

KEY ISSUES TO BE ADDRESSED

The proposed BCR Coal Vlakfontein Mine will involve both the operations of the open-cast coal mine as well as the development of associated infrastructure. The entire site as well as neighbouring sites will be impacted by the activities of the mine. Potential impacts to the soils and agricultural potential of the study site are associated with (i) the loss of agricultural land; (ii) soil compaction and exposure of topsoil which could lead to erosion and (iii) potential pollution of the soils as a result of both construction related activities for the associated infrastructure and the operations of the mine.

Based on the information obtained during the desktop site sensitivity verification assessment, it is concluded that impacts of the proposed BCR Coal Vlakfontein Mine is located in an agricultural productive area within the study area will be both direct and indirect Direct loss of agriculturally productive land is likely to occur from the open cast mining operations as well as the development of associated infrastructure. Indirect impacts are likely on neighbouring properties, both from soil and water pollution sources, as well as an increase in air pollution and traffic within the area, having knock-on effects on the viability of agricultural operations within close proximity to the proposed mine.

Further to this, the Preservation and Development of Agricultural Land Bill (2021) which has been introduced at the National Assembly and which aims to promote the preservation and sustainable development of agricultural land must be taken into consideration. The Bill seeks to prevent the fragmentation of agricultural land and to minimise the loss of agricultural land by promoting viable farming units and to encourage the optimal use of agricultural land for the promotion of food security, as well as increase the contribution of agriculture to the Gross Domestic Product. Given that the proposed BCR Coal Vlakfontein site is at least 70% agricultural productive and is located within an area dominated by agricultural activities, one must consider the aims of the Bill and minimise the loss of agriculturally viable land.

REASONED OPINION REGARDING THE ACCEPTABILITY OF THE PROPOSED ACTIVITY

Based solely outcomes of the desktop assessment, the agricultural productivity of the proposed mining site, coupled with the location of the site in an agricultural setting, the establishment of the proposed coal mine is not supported from an agricultural perspective. It must be noted that the opinion given in this report should be utilised as a preliminary ‘red flag’ for the proposed activity within the site. The opinion of the specialist could change depending on the outcomes of EIA assessment, as per the Plan of Study, and in particular the findings of the soil assessment, the current activities on site, as well as the assessment of the current productivity of the site. This information is not yet known and is thus a limitation to the reasoned opinion given. Furthermore, the opinion does not take into consideration any proposed mitigation measures or layout changes that could avoid more productive agricultural areas as well as be utilised to reduce impacts to the agricultural productivity of neighbouring properties.

V. LANDSCAPE AND VISUAL ENVIRONMENT

LOGIS was appointed by Environmental Management Assistance (Pty) Ltd on behalf of BCR Coal (Pty) Ltd to conduct a desktop Landscape and Visual assessment and inform the required Scoping Report (Phase 1).

The Scoping Assessment is attached as ***Appendix F.2 – Landscape and Visual Assessment.***

METHODOLOGY

The scoping report was undertaken using Geographic Information Systems (GIS) software as a tool to generate viewshed analyses and to apply relevant spatial criteria to the proposed development. A detailed Digital Terrain Model (DTM) for the study area was created from topographical data provided by NASA in the form of a 30m SRTM (Shuttle Radar Topography Mission) elevation model.

The approach utilised to identify potential issues related to the visual impact included the following activities:

- The creation of a detailed digital terrain model (DTM) of the potentially affected environment;

- The sourcing of relevant spatial data. This includes cadastral features, vegetation types, land use activities, topographical features, site placement, etc.;
- The identification of sensitive environments upon which the proposed facility could have a potential impact.
- The creation of viewshed analyses from the proposed project site in order to determine the visual exposure and the topography's potential to absorb the potential visual impact. The viewshed analyses take into account the dimensions of the proposed structures and activities.
- Site visit was undertaken on 13 July 2022.

This report (scoping report) sets out to identify the possible visual impacts related to the proposed BCR Coal Vlakfontein Mine from a desktop level. The methodology as described above has been followed for the assessment of the visual impacts in the scoping phase.

SUMMARY OF BASELINE CONDITIONS

Visual distance and observer proximity

Proximity offsets (the radial distance between the proposed development and the identified visual receptors) were determined based on the anticipated visual experience of the observer over varying distances. In general, the severity of the visual impact on visual receptors decreases with increased distance from the proposed infrastructure. Therefore, in order to refine the visual exposure of the facility on surrounding areas/receptors, the principle of reduced impact over distance is applied in order to determine the core area of visual influence for the proposed BCR Coal Vlakfontein mine. Proximity offsets for the proposed development footprint are thus established in order to indicate the scale and viewing distance of the facility and to determine the prominence of the structures in relation to their environment.

These proximity offsets are based on the anticipated visual experience of the observer over varying distances. The distances are adjusted upwards for larger facilities and downwards for smaller facilities (i.e. depending on the size and nature of the proposed infrastructure). This rationale was developed in the absence of any known and/or acceptable standards. Therefore, for the purpose of this study, proximity offsets have been calculated from the expected boundary of the site, as indicated on Map 3 and as follows:

- 0 – 2km. Short distance view where the facility would dominate the frame of vision and constitute a very high visual prominence.
- 2 - 5km. Short to medium distance view where the structures would be easily and comfortably visible and constitute a high to moderate visual prominence.
- 5 - 10km. Medium to long distance view where the facility would become part of the visual environment but would still be visible and recognisable. This zone constitutes a moderate visual prominence.
- 10km. Long distance view of the facility where the structures are not expected to be immediately visible and not easily recognisable. This zone constitutes a lower visual prominence for the facility.

Potential Visual Exposure

The result of the preliminary viewshed analysis for the proposed facility is shown on ***Figure 9.*** The initial viewshed analyses were undertaken from the mining structures, dumps, stockpiles and general infrastructure. The vantage points utilised were placed at 10m above ground level in order to simulate the infrastructure and activities. This was done in order to determine the general visual exposure (visibility) of the area under investigation, simulating the maximum height of the proposed structures and mining activities associated with the mine.

The viewshed analysis will be further refined once a final mine layout is completed and will be regenerated for the actual position of the infrastructure on the site and actual proposed infrastructure during the EIA phase of the project.

The viewshed analysis does not include the effect of vegetation cover or existing structures on the exposure of the proposed mine, therefore signifying a worst-case scenario.

Figure 9 indicates areas from which the proposed BCR Coal Vlakfontein mine could potentially be visible, as well as, proximity offsets from the proposed development area. Typically, structures of this height (i.e.10m) may be visible from up to 10km away. In this respect, the anticipated Zone of Visual Influence for this facility as calculated from the development footprint (i.e. determined from the edge of the proposed development areas) has been indicated at 10km. The extent of visual exposure within this zone is expected to be very high.

The following is an overview of the findings of the viewshed of BCR Coal Vlakfontein mine, based on the layout illustrated on the Map provided:

- The proposed facility will have a large core area of potential visual exposure on the project site itself, and within a 2km radius thereof. Small pockets of visually screened areas can be found to the far east and far south. Potential sensitive visual receptors within this visually exposed zone include:
  - observers travelling along the N17 national road and the Breyton secondary roads that bisect the site.
  - Residents of unknown homestead / farmsteads
- Potential visual exposure becomes more scattered in the medium distance (i.e. between 2 and 5km), with large pockets of visually screened areas to the east, south east, south and west. Potential sensitive visual receptors within this visually exposed zone include:
  - observers travelling along the N17 national road, R36 regional road and the Breyton secondary road that traverse the site.
  - Residents of unknown homestead / farmsteads particularly in the south west and north west
- In the longer distance (i.e. between 5 and 10km offset), the extent of potential visual exposure is significantly reduced with visually exposed areas concentrated to the north east, east and south east. Potential sensitive visual receptors within this visually exposed zone include:
  - observers travelling along the N17 national road, R36 regional road and the Breyton and Lothair secondary roads that traverse the site.
  - Residents of unknown homestead / farmsteads
  - Visitors to the Chrissiesmeer Protected Environment and to a lesser extent Ahlers Private Nature Reserve
- Beyond the 10km offset from the proposed site, potential sensitive visual receptors are not likely to be visually exposed to the proposed facility, despite lying within the viewshed.

Notwithstanding the fact that the proposed BCR Coal Vlakfontein mine may have a fairly limited area of potential visual exposure, the mine and mining activities, where visible from shorter distances (e.g. within a 2-5km radius), may constitute a high visual prominence, potentially resulting in a high visual impact. This may become evident should potential sensitive visual receptors be identified within this zone during the EIA phase of the project.

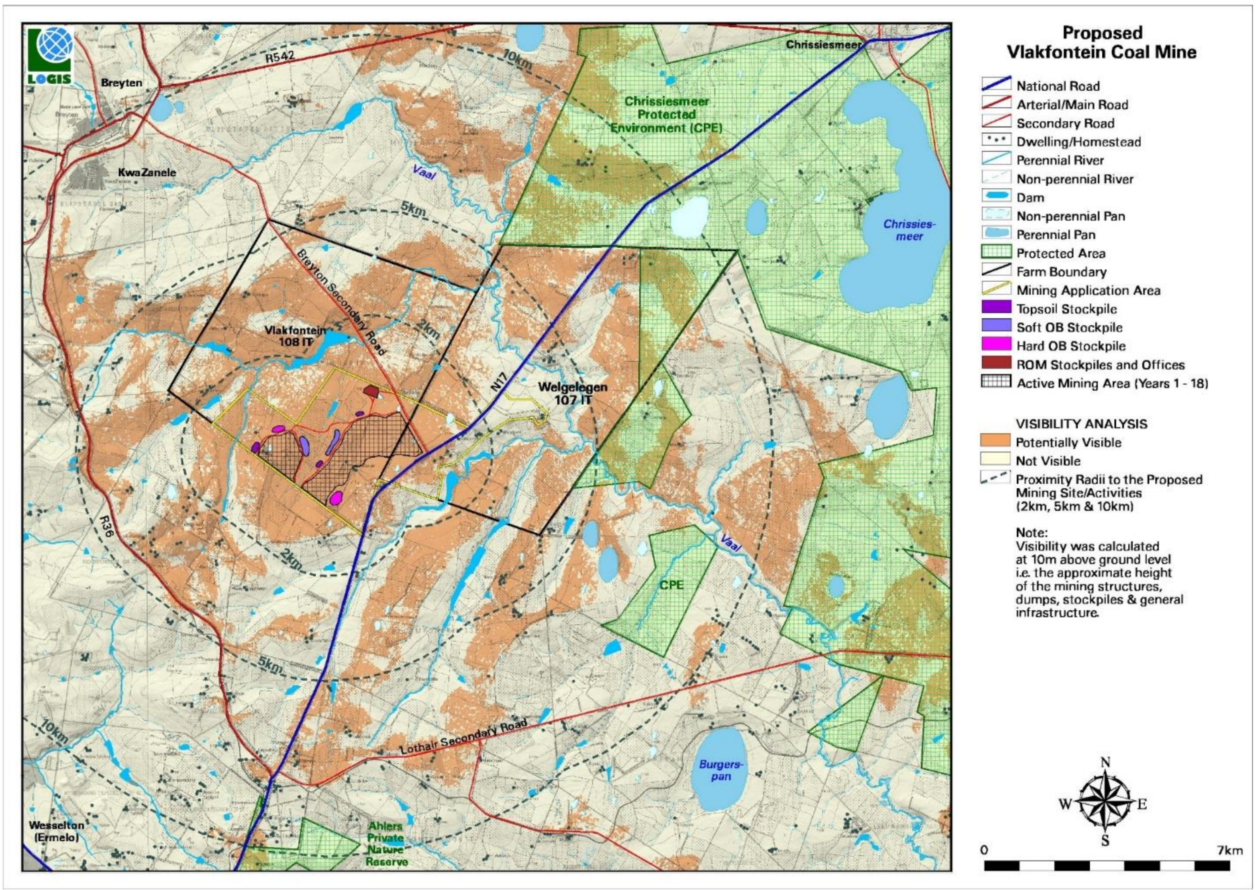

Figure 9: Potential visual exposure (viewshed analysis) of the proposed BCR Coal Vlakfontein Mine

DESKTOP VERIFICATION OUTCOME

While no specific mention to visual impact sensitivity was made in the DFFE screening tool, based on the findings of this scoping report and site visit, the sensitivity of the visual environment is considered to be moderate.

PLAN OF STUDY FOR EIA

Following the establishment of the baseline information pertinent to the development in the Scoping Phase VIA, the primary goal of the Environmental Impact Assessment (EIA) Phase VIA report will be to ensure that visual impacts are adequately assessed and considered so that the relevant authorities can decide if the proposed project has unreasonable or undue visual impacts. The secondary aim is to identify effective and practical mitigation measures, if possible.

Since the purpose of a VIA is not to predict whether specific individuals or entities will find this type of activity pleasing or not but instead to identify the important visual features of the surrounding landscape, especially the features and characteristics that contribute to scenic quality, as the basis for determining how and to what degree a particular project will impact on those scenic values. The study will include the following:

1. Refinement of the baseline study, description of the visual character of the sites and zone of visual influence, if required.
2. Adjust the list of identified visual impacts resulting from the proposed development (with consideration of any public and/or relevant authorities' comments), if required.

3. Assessment of visual impacts based on the following VIA rating criteria, namely:
    a. Quality of the affected environment (landscape) – the aesthetic excellence and significance of the visual resources and scenery;
    b. Viewer incidence, perception and sensitivity – the level of acceptable visual impact is influenced by the type of visual receptors.
    c. Determine the Visual Absorption Capacity (VAC) – the capacity of the receiving environment to absorb the potential visual impact of the proposed development;
    d. Refine the potential visual exposure (visibility) - the geographic area from which the project may be visible based on any layout changes undertaken between the Scoping and EIA Phase;
    e. Determine the cumulative visual exposure - the combined or incremental effects resulting from changes caused by a proposed development in conjunction with other existing or proposed activities;
    f. Visual Impact Index - the combined results of visual exposure, viewer incidence / perception and visual distance of the proposed facility. Values are assigned for each potential visual impact per data category and merged in order to calculate the visual impact index;
4. Assessment of the significance of the visual impacts, rated according to methodology outlined in Section 7 above, which includes:
    a. Extent, duration, magnitude and probability to determine significance; and
    b. Significance considered with status (positive, negative or neutral) and reversibility (reversible, recoverable or irreversible) following decommissioning of the proposed facility.
5. Impacts will be rated before mitigation and after, assuming mitigation is possible.
6. Development of mitigation measures to reduce visual impacts and enhance any positive visual benefits, where possible.

KEY ISSUES TO BE ADDRESSED

Anticipated issues related to the potential visual impact of the proposed BCR Coal Vlakfontein mine include the following:

- The potential visual impact of the construction of the facility and ancillary infrastructure on sensitive visual receptors in close proximity.
- The visibility of the operational facility and ancillary infrastructure to, and potential visual impact on observers (homesteads and farmsteads) in close proximity.
- The visibility of the operational facility and ancillary infrastructure to, and potential visual impact on observers within the region.
- The visibility of the facility and ancillary infrastructure to, and potential visual impact on observers travelling along the national, main roads, as well as, secondary roads within the study area.
- An investigation into the visibility of the mine to, and potential visual impact on residents of farm residences located within close proximity to the site.
- The potential visual impact of operational, safety and security lighting of the facility at night on observers residing in close proximity to the facility.
- The potential visual impact of the facility and ancillary infrastructure on the visual character of the landscape and sense of place of the region.
- The visual absorption capacity of natural or planted vegetation (if applicable).
- The potential to mitigate visual impacts.

It is envisaged that the issues listed above may potentially constitute a significant visual impact at a local and/or regional scale. These need to be assessed in greater detail during the EIA phase of the project.

REASONED OPINION REGARDING THE ACCEPTABILITY OF THE PROPOSED DEVELOPMENT

According to the Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning (DEA&DP) Guideline for Involving Visual and Aesthetic Specialists in the EIA Process (Oberholzer, 2005), the criteria that determine whether or not a visual impact constitutes a potential fatal flaw are categorised as follows:

- Non-compliance with Acts, Ordinances, By-laws and adopted policies relating to visual pollution, scenic routes, special areas or proclaimed heritage sites.
- Non-compliance with conditions of existing Records of Decision.
- Impacts that may be evaluated to be of high significance and that are considered by the majority of the stakeholders and decision-makers to be unacceptable.

Since no reported objections from stakeholders or decision-makers within the region have been communicated by the EAP to the author of this report, this assessment has adopted a risk averse approach by assuming that the perception of most (if not all) of the sensitive visual receptors (bar the landowners of the properties earmarked for the development), would be predominantly negative towards the development.

VI. ARCHAEOLOGICAL, CULTURAL AND PALAEONTOLOGICAL ENVIRONMENT

Beyond Heritage was appointed by Environmental Management Assistance (Pty) Ltd on behalf of BCR Coal (Pty) Ltd to conduct a desktop Landscape and Visual assessment and inform the required Scoping Report (Phase 1).

The Scoping Assessment is attached as ***Appendix F.3 - Archaeological, Cultural and Palaeontology Assessment.***

APPROACH AND METHODOLOGY

The assessment is to be undertaken in two phases, a scoping phase and an HIA phase as part of the required Scoping and Environmental Impact Assessment (S&EIA) process, this report concerns the scoping phase.

This was accomplished by means of the following phases:

Literature search

A literature search was conducted utilising data from published articles on the archaeology and history of the area. The aim of this is to extract data and information on the area in question, looking at archaeological sites, historical sites, and graves of the area.

Information collection

South African Heritage Resource Information System (SAHRIS) was consulted to collect data from Cultural Resource Management practitioners who undertook work in the area to provide the most comprehensive account of the history of the area where possible.

Public consultation

A full public consultation process will be facilitated by Environmental Management Assistance (Pty) Ltd. Any heritage concerns raised during this process will be addressed in the HIA.

Google Earth and mapping survey

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where archaeological sites might be located.

Genealogical Society of South Africa

The database of the genealogical society was consulted to collect data on any known graves in the area.

SUMMARY OF FINDINGS

Heritage resources

The study area is flat without focal points that would have attracted occupation in antiquity and is considered to be of low archaeological potential concurring with the DFFE screening tool that indicated the study area as of low heritage sensitivity (***Figure 10***) but with a provincial heritage site indicated to the southeast. The site is located well away from the impact area and will not impacted on. However, heritage resources including structures older than 60 years as well as graves and burial sites can be expected around farmsteads as indicated on historical topographic maps and potential sensitive areas are indicated in ***Figure 11***.

Figure 10: Sensitivity of the study area based on the DFFE screening tool. The study area is of low sensitivity. The red area to the Southeast indicates the area where the Provincial Heritage Site the Goedehoop Natural Stone Bridge is located

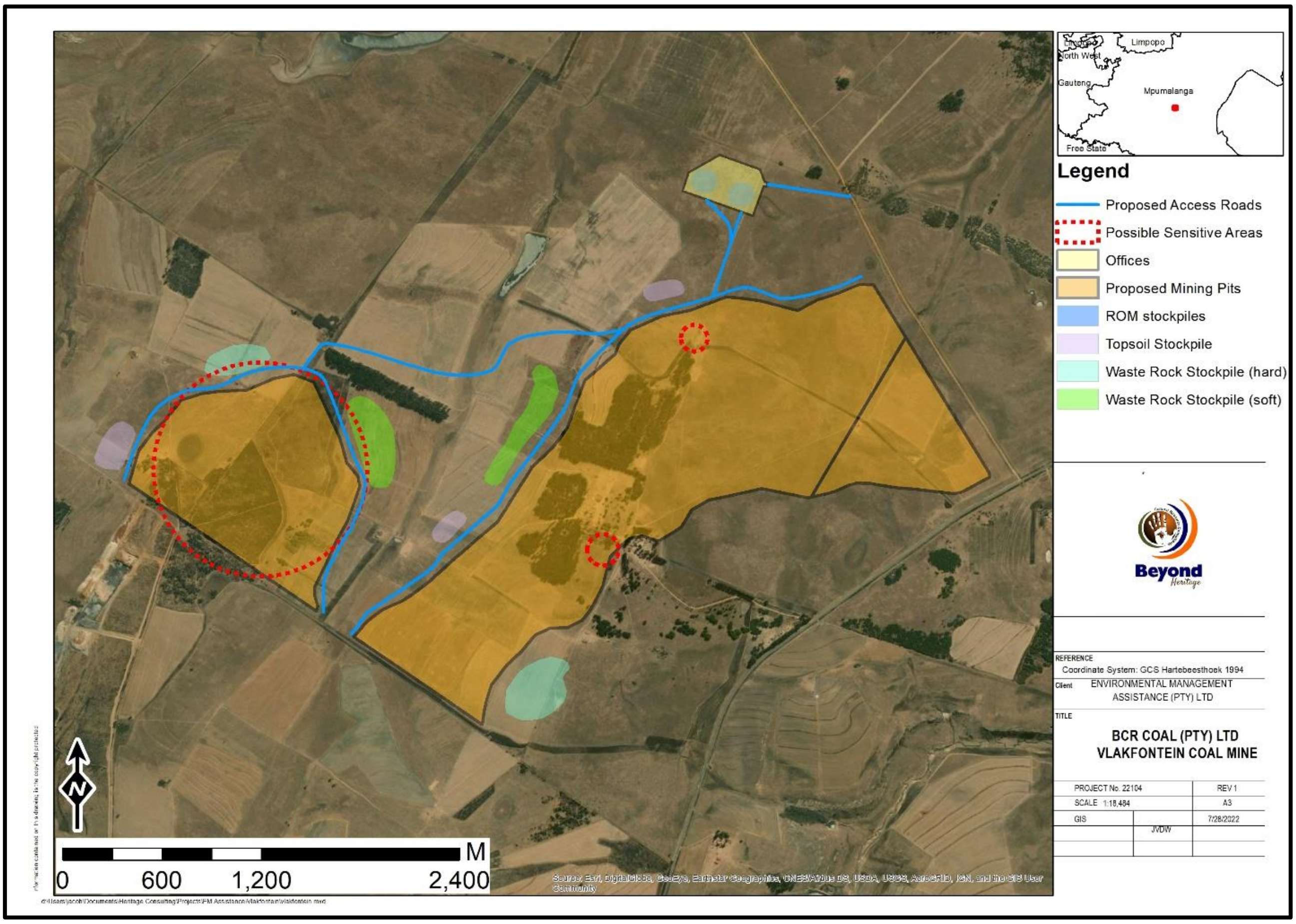

Figure 11: Potentially heritage sensitive areas in relation to the Project area and project components

Palaeontology

The study area ranges from insignificant to moderate to very high palaeontological sensitivity (***Figure 12***) on the SAHRA paleontological map. This concurs with the DFFE Screening tool (***Figure 13***). The general project area is mainly comprised of Jurassic dolerite dykes, the Vryheid Formation, Ecca Group, and Karoo Supergroup (Bamford 2020). Based on a palaeontological impact assessment by Bamford (2020), in Camden, the sediments are old enough to allow for the presence of fossils but are covered by more recent sediments that fossiliferous rocks would only be likely to occur roughly 8m below the surface level. The dolerite dykes are known for the lack of fossil preservation as they destroy potential fossiliferous materials (Bamford 2020). A survey in Camden, close to Ermelo by Bamford (2022), recorded no *Glossopteris* flora fossils in the area. Another palaeontological impact assessment in Ermelo by Millsteed (2014), also stated the unlikelihood of fossiliferous material being found. The Vryheid Formation is the most fossiliferous group in the area. Further studies will be required in the EIA phase.

COLOUR	SENSITIVITY	REQUIRED ACTION
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study; a field assessment is likely
GREEN	MODERATE	Desktop study is required
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Figure 12: Palaeontological sensitivity map of the approximate study area (yellow polygon).

Figure 13: Paleontological sensitivity of the study area as per the DEA screening tool

DESKTOP SENSITIVITY VERIFICATION

For the purposes of this section the following terms are used – low, medium and high probability. Low indicates that no known occurrences of sites have been found previously in the general study area, medium probability indicates some known occurrences in the general study area are documented and can therefore be expected in the study area and a high probability indicates that occurrences have been documented close to or in the study area and that the environment of the study area has a high degree of probability having sites.

Table 16: Desktop sensitivity probability

SENSITIVITY	PROBABILITY
PALAEONTOLOGICAL LANDSCAPE	
Fossil remains	Medium probability
ARCHAEOLOGICAL AND CULTURAL HERITAGE LANDSCAPE	
Early Stone Age (ESA)	Low Probability
Middle Stone Age (MSA)	Low to Medium Probability
Late Stone Age (LSA)	Low to Medium Probability
LSA –Herder	Low Probability
Early Iron Age (EIA)	Low Probability
Middle Iron Age (MIA)	Low Probability
Late Iron Age (LIA)	Low -Medium Probability
Historical period	Medium to High Probability
Historical dumps	Low to Medium Probability
Structural remains	Medium to High Probability

Cultural Landscape	Low probability
For example, rainmaking sites	Low Probability
Burials over 100 years	Medium to High Probability
Burials younger than 60 years	Medium to High Probability

Subsurface excavations including ground levelling, landscaping, and foundation preparation can expose any number of these.

PLAN OF STUDY FOR EIA

To comply with the National Heritage Resources Act (Act 25 of 1999) it is recommended that a Phase 1 Heritage Impact Assessment (HIA) must be undertaken for the study area. During this assessment the potential impact on heritage resources will be determined as well as levels of significance of recorded heritage resources. The HIA will also provide management and mitigation measures should any significant sites be impacted upon, ensuring that all the requirements of the SAHRA are met.

KEY ISSUES TO BE ADDRESSED

Based on the current information obtained for the area at a desktop level it is anticipated that any heritage resources that occur within the proposed development area will have a Local Significance (LS), Grade 3B or lower field rating and all sites should be mitigatable. Graves are of high social significance (Field rating GP A) and can be expected anywhere on the landscape.

Table 17: Expected impact on heritage resources

Impact on Heritage resources The construction of the proposed project could directly impact on graves, archaeological sites and historical sites.			
ISSUE	NATURE OF IMPACT	EXTENT OF IMPACT	NO-GO AREAS
Disturbance and destruction of archaeological sites, historical sites and graves.	Construction activities could cause irreversible damage or destroy heritage resources and depletion of the archaeological record of the area.	Low to Medium on a local scale.	Where known graves occur
Description of expected significance of impact Significance rating of sites, mitigation measures and magnitude of possible impacts can only be determined after the field based HIA but based on the current information the impact on heritage resources can be mitigated to an acceptable level.			
Gaps in knowledge & recommendations for further study It is recommended that a field based HIA should be conducted to comply with Section 38 (8) of the National Heritage Resources Act.			

REASONED OPINION REGARDING THE ACCEPTABILITY OF THE PROPOSED DEVELOPMENT

Based on the current information obtained for the area at a desktop level no red flags were identified, and it is anticipated that any heritage resources that occur within the proposed development area will have local cultural significance and would be graded with a Grade 3B or lower field rating. All cultural heritage resources should be mitigatable to an acceptable level but will be confirmed during the field-based impact assessment phase.

VII. TERRESTRIAL BIODIVERSITY

Various specialist has been appointed by EMA to assess all aspects associated with the Terrestrial Biodiversity of the area within the Project Area of Influence (PAOI). The appointed specialist are as follows:

- Dimela ECO Consulting conducted the Desktop Vegetation and Plant Specie Biodiversity Assessment (***Appendix F.4.1 – Desktop Vegetation and Plant Specie Assessment***);
- Barbara Kasl conducted the Desktop Mammal and Invertebrate Specie Assessment (***Appendix F.4.2 – Mammal and Invertebrate Desktop Assessment***);
- Harvey Ecological conducted the Desktop Herpetofaunal Sensitivity Verification (***Appendix F4.3 – Herpetofaunal Desktop Assessment***); and
- Feathers Environmental Services conducted the Desktop Avifaunal Scoping Assessment (***Appendix F4.4 – Avifaunal Desktop Assessment***).

The assessments are attached as ***Appendix F.4 – Terrestrial Biodiversity.***

<u>METHODOLOGY AND APPROACH TAKEN</u>

1. *<u>Vegetation and Plant Specie Biodiversity</u>*

The desktop Vegetation and Plant Specie Biodiversity Assessment was conducted by consulting various sources, determining the Project Area of Influence (PAOI), mapping sensitivities, determining desktop ecological conditions, and determining and validating sensitivities. The approach taken is briefly explained in the section to follow.

Literature- and data review

The following data and literature are available and were consulted:

- The Mpumalanga Biodiversity Sector Plan (MBSP)
- Information on plant species recorded for the Quarter Degree Square (QDS) that the site is situated in was extracted from the Botanical Database of Southern Africa hosted by SANBI on the new Plants of Southern Africa website (https://posa.sanbi.org).
- Additional info was sourced from the Mpumalanga Tourism and Parks Agency (M. Lötter email communication, 7 July 2022)
- A short list of plant species of conservation concern was derived from the above and the Threatened Species Programme, Red List of South African Plants (Red List of South African plants version 2020(http://redlist.sanbi.org/)) and species listed within the national Screening Tool Report for the site, dated 10/06/2022.
- Threatened Ecosystem data was extracted from the 2018 Nasional Spatial Biodiversity Assessment (NSBA) (Skowno *et al*, 2019), as well as the gazetted 2011 Listed ecosystems (Section 52(1)(a) of the National

Environmental Management: Biodiversity Act (Government Gazette 34809, Government Notice 1002, 9 December 2011))

- Historical aerial imagery downloaded from Chief Directorate: National Geospatial Information Geospatial Portal (http://www.cdngiportal.co.za/cdngiportal).
- Citizen Science Website: iNaturalist.org

Project Area of Influence

The PAOI is defined as per the Species Environmental Assessment Guideline (SANBI, 2020) and was based on the development footprint and the potential extent of the impacts (e.g., edge effects) of the project activities (***Figure 14***).

- The mining footprint and infrastructure were regarded as the primary PAOI.
- A buffer of 50m around the mine was assessed the secondary PAOI, where edge effects are likely to take place (e.g. an area where dust, rainwater runoff and mining activities can be expected to negatively impact on the natural vegetation).
- The mining rights area, as well as downstream habitats were considered as the tertiary PAOI. The extent of potential impacts downstream will depend on the activity and waterflow at the time of the impact, and the area indicated in ***Figure 14*** is only illustrative of the possible impact area.

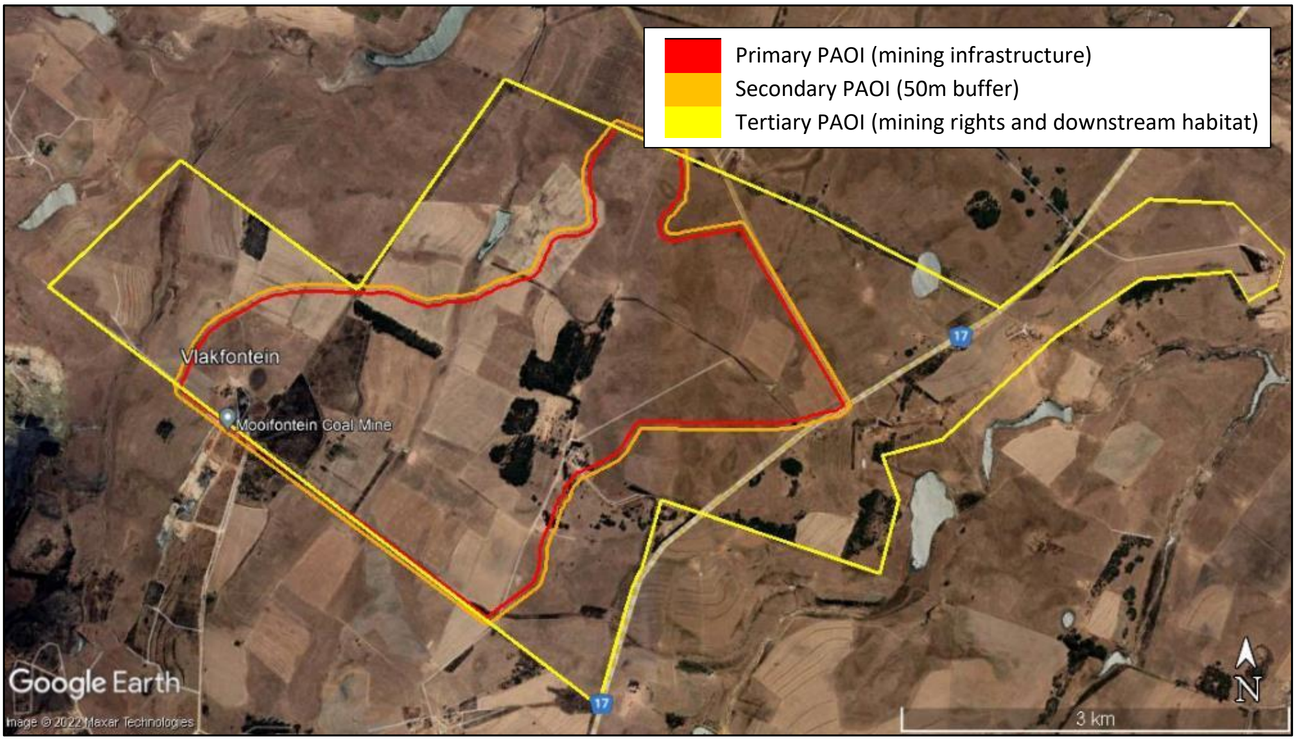

Figure 14: Determined Project Area of Influence considered as part of the desktop vegetation and plant specie survey

Mapping

Mapping was done by inspection of available Google-Earth Imagery. Delineations are therefore approximate and preliminary, and due to the intricate mosaics and often gradual mergers of vegetation associations, generalisations had to be made. Mapped associations thus show where a certain vegetation unit is likely predominant, but smaller inclusions of another vegetation association in likely present.

Vegetation / Ecological Condition

Standardised definitions, as recommended by Lexicon for Biodiversity Planning in South Africa by the South African National Biodiversity Institute (SANBI) were used to describe the *likely* state of vegetation and ecological condition (SANBI, 2016). The preliminary condition of the vegetation followed the definitions as per

Table 18: Standardised definitions used to describe the likely state of vegetation and ecological condition (SANBI,2016)

Natural or near natural:	An ecological condition class in which composition, structure and function are still intact or largely intact. Can apply to a site or an ecosystem (good ecological condition). Usually of **high** sensitivity to development.
Semi-natural or moderately modified	An ecological condition class in which ecological function is maintained even though composition and structure have been compromised (Fair ecological condition). Usually of **medium** sensitivity to development
Severely or irreversibly modified	An ecological condition class in which ecological function has been compromised in addition to structure and composition. Can apply to a site or an ecosystem (Poor ecological condition). Usually of a **low** sensitivity to development.
Good ecological condition:	An ecological condition class in which composition, structure and function are still intact or largely intact. Can apply to a site or an ecosystem. (Natural or near natural). Usually of **high** sensitivity to development.
Fair ecological condition	An ecological condition class in which ecological function is maintained even though composition and structure have been compromised (Moderately modified, semi-natural). Usually of **medium** sensitivity to development.
Poor ecological condition	An ecological condition class in which ecological function has been compromised in addition to structure and composition. Can apply to a site or an ecosystem (Severely or irreversibly modified). Usually of a **low** sensitivity to development.

Site Ecological Importance (sensitivity)

The Site Ecological Importance (SEI) in terms of vegetation should discussed and mapped as per the requirements of the Species Environmental Assessment Guideline (SANBI, 2020). This SEI assessment will be completed once the on-site vegetation assessment and likelihood of plant species of conservation concern were undertaken. Details on the method that will be used is attached as ***Appendix F.4.1 – Desktop Vegetation and Plant Specie Assessment.***

2. *Mammal and Invertebrate Specie Biodiversity*

Desktop Ecological Status

The desktop assessment utilised predominantly SANBI BGIS data as detailed in ***Table 20***, accompanied by assessment of Google Earth satellite imagery.

TOP Species Desktop Lists

A high level threatened or protected (TOP) species assessment was undertaken, which incorporates the potential SCCs. The term TOP species was coined in terms of the threatened and protected species lists published under NEM:BA's General Notice 151 of 2007 (GN151, 2007). In this report TOP species also includes threatened (Vulnerable, Endangered, Critically Endangered) Red-listed and IUCN (IUCNredlist.org) species (Near Threatened species are not included, but status is indicated where species is listed as threatened under another listing). Distribution and general information as presented in this report were sourced for:

- Mammals [sourced from Child, *et al*. (2016) as presented in the mammal Red-list on SANBI.org.za, and the Endangered Wildlife Trust Red-listed mammal fact sheets on ewt.org.za/reddata; supplemented by Stuart and Stuart (2013), Stuart and Stuart (2015), Murray (2011), Monadjem *et al*. (2010a) and Monadjem *et al*. (2010b)].
- Invertebrates [also supplemented by Picker *et al. (*2012), Woodhall (2005) and SANBI Biodiversity Advisor Animal Checklists for ants, millipedes, Orthoptera and scarabs]:
    - Butterflies [Mecenero *et al*. (2013) as obtained from the South African Butterfly Conservation Association lists].
    - Dragonflies (Samways & Simaika, 2016).
    - Spiders (Dippenaar-Schoeman *et al*., 2010).
    - Scorpions (Leeming, 2019).

Endemic species for mammals were also indicated where relevant. Variation between sources on endemic species (just South Africa or South Africa, Lesotho and Swaziland) is not seen as critical in terms of this report.

In order to determine recent fauna diversity data, various citizen science sites were consulted and Mpumalanga Parks and Tourism was contacted for species data:

- Mammal and available invertebrate species lists for the QDGS over the last 10 year period were obtained from the Virtual Museum of the Animal Demographic Unit (VMUS.ADU.org).
- iNaturalist (iNaturalist.org) was consulted for presences of potential TOP mammal and invertebrate species.
- Dr Mervyn Lötter, Control Scientist: Biodiversity Planning at the Mpumalanga Tourism and Parks Agency provided species data for the greater area.

Exotic and / or Alien Invasive (AI) Species (AIS), recorded in the area as per the citizen science sites, are also discussed where relevant.

Site Assessment

Field work is planned for spring to summer, after at least some summer rainfall to the area. In terms of the animal species protocols, medium ranks for sensitivity indicate that the species has not been confirmed in the area, but habitat may be present based on National desktop geographic modelling data. Habitat assessments will therefore be conducted with a focus on the SCCs. Meanders will be completed across the project area, focussing on the development site, with active searching completed for SCCs and signs of SCCs in appropriate habitat units, largely associated with areas designated as Irreplaceable CBAs (Plan 3). During meanders the areas will be assessed for micro-habitats, signs of fauna and fauna.

Likelihood of TOP Species

For the desktop TOP species, a probability assessment to determine the likelihood of species occurring on site was completed. The probability assessment should be seen as a ranking system rather than an absolute and is designed to reduce subjectivity of results. At this stage the assessment has been done at a desktop level and will be updated once field work is completed. Likelihood of occurrence was generally assessed as follows:

- Confirmed: either through past surveys, citizen science sites and local knowledge where provided.
- Likely: Distribution of the species occurs over the site and the site and immediate surrounds provide habitat, roosting and food requirements of the specific species. There is nothing to prevent the species from residing on site for a length of time (breeding season or year).
- Possible: Distribution of the species occurs over the site but the specific habitat, roosting and/or food requirements are absent or sparse on site, but are present in the greater area. Species are not likely to reside on site, but may forage over or traverse the site. Species population is likely to be at low density over site.
- Unlikely: Distribution is on the edge of site and habitat, roosting and/or food requirements are absent or sparse in the sites and surrounds. Species population is at low density and erratic over site or no recent records in the area.

3. *Herpetofauna Specie Biodiversity*

A Screening Report based on the National Environmental Screening Tool was generated as is required for an application for Environmental Authorisation, as per the Environmental Impact Assessment Regulations (2014). The Screening Report assesses the sensitivity of several environmental themes within the study area. The two themes relevant to herpetofauna that are assessed here are

1) Animal species assessment theme, and
2) Terrestrial biodiversity theme.

The Screening Report was generated on 10/06/2022.

The desktop site sensitivity verification was undertaken through the use of:

a) a desk top analysis, using Google-Earth satellite imagery;
b) available and relevant information, as relates to the fauna groups assessed

This included:

- strategic conservation tools,
- all available herpetofauna distribution and habitat requirement data. Much of this is available at the Quarter Degree Square (QDS) scale – given the incompleteness of existing data, records were drawn for the QDS incorporating the study site and adjacent QDS's, and
- a query to Mpumalanga Tourism and Parks Agency regarding any sensitive herpetofauna records within their database, in the QDS incorporating the study area (2630AC) and the closest QDS, immediately west of it (2629BD).

On the basis of these, the relevant features identified in the screening report are evaluated, and an initial assessment of the proposed site's sensitivity in terms of herpetofauna is made.

4. Avifaunal Specie Biodiversity

The following methods were employed for this desktop scoping assessment: The focus of this scoping assessment is primarily on the potential impacts of the proposed BCR Coal Vlakfontein Mine on priority species. Priority species are defined as those species which could potentially be impacted by displacement through habitat transformation and/or disturbance as well as those impacts associated with the ancillary infrastructure i.e. power lines based on specific morphological and/or behavioural characteristics. These include both Species of Conservation Concern (SCC) as defined by the Species Environmental Assessment Guideline: Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa (2020) i.e. those species listed on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered, Vulnerable, Near Threatened and Data Deficient, as well as certain other impact susceptible species.

- By virtue of their mobility, the identification of bird presence and abundance cannot be confined to the proposed BCR Coal Vlakfontein Mine development area, therefore the Project Area of Impact (PAOI) is defined as a 2km zone around the proposed development area. Avifaunal sensitivity has been defined for this PAOI.
- The proposed BCR Coal Vlakfontein Mine is located largely within a single South African Bird Atlas Project 2 (SABAP2) pentad grid cell (2620_3000), however a larger area is necessary to obtain a dataset that is large enough (encompassing nine pentad grid cells) to ensure that reasonable conclusions about species diversity and densities, in a particular habitat type, can be drawn. A total of 45 full protocol lists and 98 ad hoc protocol lists have been completed. The SABAP2 data is regarded as a reliable reflection of the avifauna which could potentially occur in the PAOI. The relevant pentads within the study area include: 2615_2955; 2615_3000; 2615_3005; 2620_2955; 2620_3000; 2620_3005; 2625_2955; 2625_3000 and 2625_3005 (***Figure 15***).

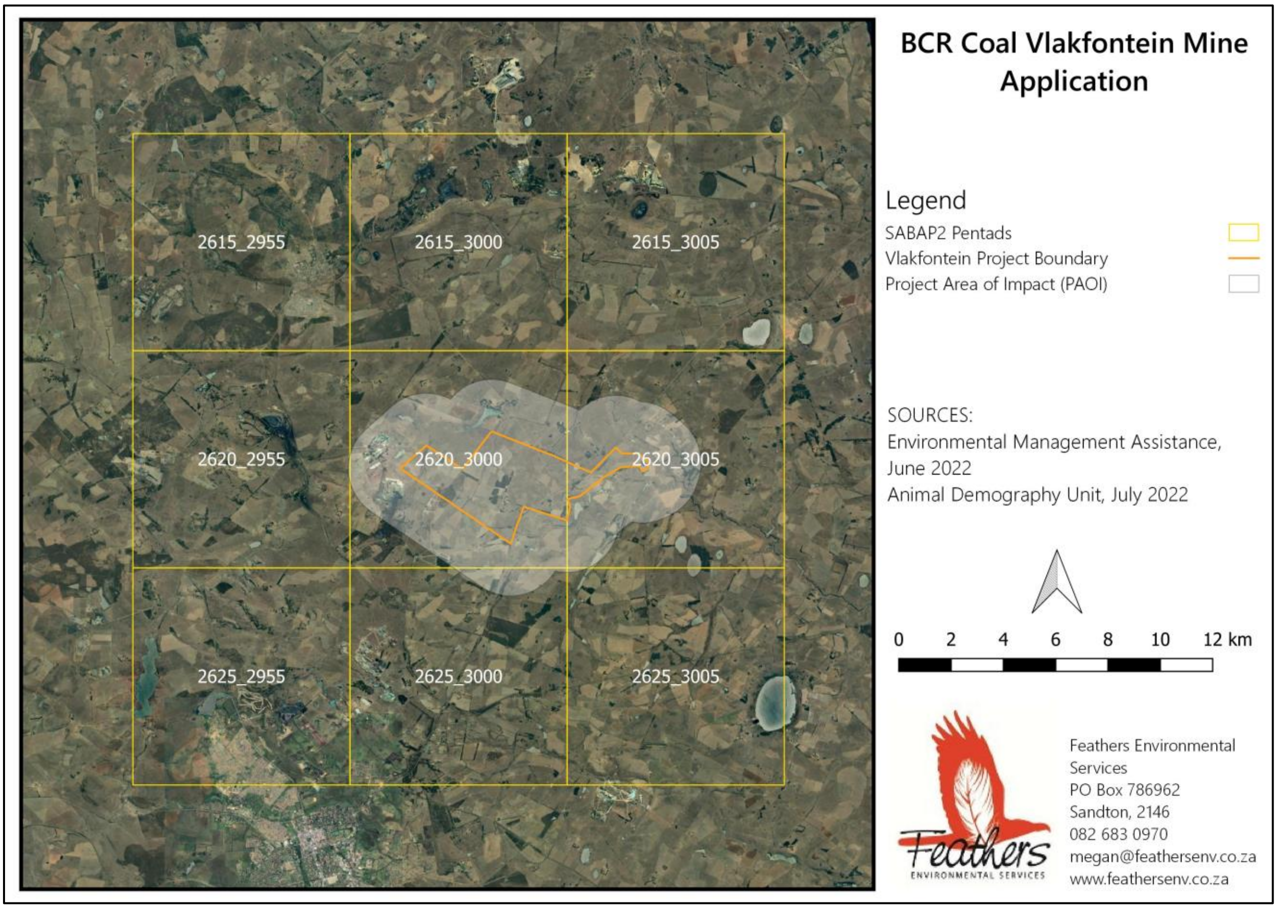

Figure 15: Location of the nine South African Bird Atlas Project 2 (SABAP2) pentad grid cells that were considered for the proposed BCR Coal Vlakfontein Mine development.

The following data sources (features) were considered in varying levels of detail for this scoping assessment. Details pertaining to each data source are presented in ***Table 23*** and ***Table 24***:

- Screening Report for an Environmental Authorisation or for an Environmental Authorisation as required by the 2014 EIA Regulations - Proposed Site Environmental Sensitivity: BCR Coal Vlakfontein Mining Right compiled by Environmental Management Assistance (Pty) Ltd, 10 June 2022;
- Bird distribution data of the South African Bird Atlas 2 (SABAP 2) (Animal Demography Unit, 29 July 2022);
- Mpumalanga Tourism and Parks Agency species data for QDS 2630AC (5 July 2022);
- The Important Bird Areas (IBAs) report (Marnewick et al. 2015). The Chrissie Pans (SA019) and Amersfoort-Bethal-Carolina (SA018) IBAs have relevance to this study;
- Co-ordinated Waterbird Count Database (CWAC – Taylor et al. 1999). Ten CWAC sites i.e., Breyten Pan, Mooiplaats Pan, Simonsdal Pan, Lake Chrissie, Tweelingspan (East & West), Driefontein Pan, Cloete Pan and Rietpan have relevance to this study;
- Coordinated Avifaunal Roadcount project database (CAR – Young et al, 2003). CAR route (MC02) intersects the PAOI and has relevance to this study;
- The global and regional conservation status and endemism information of all bird species (Taylor et al. 2015) and the latest (2022-1) IUCN Red List of Threatened Species (http://www.iucnredlist.org);
- Vulture movement, colony and roost data for the PAOI (VulPro, 2020);
- Vulture restaurant location data for the PAOI (VulPro, 2020);

- White-backed Vulture nest locations (VulPro, 2020);
- Crane breeding data (Endangered Wildlife Trust, 2020);
- Crane sightings data (Endangered Wildlife Trust, 2020);
- African Grass Owl breeding data (Endangered Wildlife Trust, 2020);
- Vulture colony data (Endangered Wildlife Trust, 7 February 2020);
- Vulture tracking data (Endangered Wildlife Trust, 7 February 2020);
- The latest vegetation classification described in the Vegetation Map of South Africa (South African National Biodiversity Institute, 2012 and Mucina & Rutherford, 2006);
- High-resolution Google Earth ©2022 imagery was used to examine the microhabitats within the proposed study area; and
- KMZ. shapefile detailing the location of proposed BCR Coal Vlakfontein Mine, provided by Environmental Management Assistance (Pty) Ltd on 23 July 2021.

SUMMARY OF BASELINE CONDITIONS

1. *Vegetation and Plant Specie Biodiversity*

Regional Vegetation Types

The study site is situated within the Grassland Biome of South Africa. This biome is dominated by grasslands wherein high summer rainfall, combined with dry winters, night frost and marked diurnal temperature variations are unfavourable to tree growth. Most plant species in grasslands are non-grassy herbs (forbs), most of which are perennial plants with large underground storage structures. Furthermore, many Rare and Threatened plant species in the summer rainfall regions of South Africa are restricted to high-rainfall grasslands, making the Grassland Biome in most urgent need of conservation.

The Grassland Biome comprises several vegetation types (Mucina & Rutherford, 2006). This site is situated within the historical extent of the Eastern Highveld Grassland (Figure 6). The vegetation is short dense grassland dominated by the usual highveld grass composition (*Aristida, Digitaria, Eragrostis, Themeda, Tristachya etc*.) with small, scattered rocky outcrops with wiry, sour grasses and some woody species (*Senegalia caffra, Celtis africana, Diospyros lycioides* subsp *lycioides, Parinari capensis, Protea caffra, P. welwitschii* and *Searsia magalismontanum*).

Eastern Highveld Grassland is a poorly conserved vegetation unit with much of its area transformed by cultivation, plantations, urbanisation, and mining. Where disturbances occur, the invasive exotic tree *Acacia mearnsii* (black wattle) can become dominant and displace the natural vegetation. The remaining portions of the Eastern Highveld Grassland are therefore of high conservation value and sensitivity and are thus classified as an Endangered vegetation type (Mucina & Rutherford, 2006). The study site must be assessed for the presence of intact (undisturbed or untransformed) Eastern Highveld Grassland, as remaining portions should be conserved to preserve this vegetation type and protect it from extinction.

Listed Ecosystems

The National Environmental Management: Biodiversity Act (Act 10 of 2004) provides for listing threatened or protected ecosystems in one of four categories: critically endangered (CR), endangered (EN), Vulnerable (VU) or Protected (Section 52(1)(a) of the National Environmental Management: Biodiversity Act (Government Gazette 34809, Government Notice

1002, 9 December 2011). Ecosystem status is based on the percentage of original area remaining untransformed (by croplands, mining, urban development & roads) in relation to the biodiversity target and a threshold for ecosystem functioning. Biodiversity target refers to the percentage of the original areas required to capture 75% of the species occurring in each vegetation type. The targets are aimed only at species conservation, and ecological processes are not considered.

According to the 2011 Listed Ecosystems, Eastern Highveld Grassland is a Vulnerable ecosystem, based on irreversible loss of natural habitat (Government Gazette 34809, Government Notice 1002, and 9 December 2011). The most northern extent of the mining rights boundary falls within the Endangered Chrissiesmeer Panveld. Although the National List of Threatened Terrestrial Ecosystems published in terms of the Biodiversity Act in 2011 remains in legal force, the data contained in the recent National Biodiversity Assessment (NBA) 2018 represents an update of the assessment of threat status for terrestrial ecosystems, but the National List of Threatened Terrestrial Ecosystems has not yet been revised and therefore the gazetted 2011 Listed Ecosystems is still in force. The updated threatened ecosystems as per the recent NBA (2018) places the site and surrounds within the Vulnerable Eastern Highveld Grassland.

Protected Areas

The site is not within a protected area; however, the Chrissiesmeer Protected Environment is situated about 1.5km north-east of the site. Chrissiesmeer was proclaimed as a Protected Environment in terms of section 28(1)(a)(i) and (b) of the National Environmental Management: Protected Areas Act 57 of 2003, on 22 January 2014 (Provincial Gazettes (Mpumalanga), No. 2251 of 22 January 2014). The site is within the 5km buffer of the Chrissiesmeer Pans Systems designated but outside of the 1km ESA buffer of this protected environment.

Threatened or Protected Plant Species (TOPS)

Chapter 4, Part 2 of the National Environmental Management: Biodiversity Act (NEM:BA Act No. 10 of 2004), (NEMBA) provides for listing of plant and animal species as threatened or protected. If a species is listed as threatened, it must be further classified as Critically Endangered, Endangered or Vulnerable. These species are commonly referred to as TOPS listed. The Act defines these classes as follows:

- Critically endangered species: any indigenous species facing an extremely high risk of extinction in the wild in the immediate future.
- Endangered species: any indigenous species facing a high risk of extinction in the wild in the near future, although it is not a critically endangered species.
- Vulnerable species: any indigenous species facing an extremely high risk of extinction in the wild in the medium-term future; although it is not a critically endangered species or an endangered species.
- Protected species: any species which is of such high conservation value or national importance that it requires national protection. Species listed in this category will include, among others, species listed in terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Certain activities, known as 'Restricted Activities', are regulated on listed species using permits by a special set of regulations published under the Act. Restricted activities regulated under the act are keeping, moving, having in possession, importing and exporting, and selling. The first list of threatened and protected species published under

NEM:BA was published in the government gazette on the 23rd of February 2007, with the most recent amended draft list and regulations published in March 2015 (Government Gazette No. 38600 of 31 March 2015)

The site offers suitable habitat for some TOP species, and the presence or likely presence of such species should be assessed during the growing season.

Plant Species of Conservation Concern (PSCC)

Plants of conservation concern are those plants that are important for South Africa's conservation decision making processes and include all plants that are Threatened, Extinct in the wild, Data deficient, Near-threatened, Critically rare, Rare and Declining (Figure 14). Chapter 4, Part 2 of NEMA Biodiversity Act, 2004 (Act No. 10, 2004) provides for listing of species that are threatened or in need of protection to ensure their survival in the wild, while regulating the activities, including trade, which may involve such listed threatened or protected species and activities which may have a potential impact on their long-term survival.

A list of plants of conservation concern was compiled using information from the South African National Biodiversity Institute's (SANBI) checklist (SANBI, 2009), Raimondo et al, (2009), information received from the Mpumalanga Tourism and Parks Agency (MTPA) for the site, the national web-based screening tool report.

Mpumalanga Biodiversity Sector Plan, 2013

The Mpumalanga Biodiversity Sector Plan (MBSP) delineates the following categories: Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs), Other Natural Areas (ONAs), Protected Areas (PAs), and Modified Area (areas that have been irreversibly modified from their natural state). The map is a fine-scale map (1:10 000 - 1:25 000) that aims to guide sustainable development by providing a map of biodiversity priority areas that can be used by planners and decision-makers in a range of sectors.

The conservation categories present on the site are geographically represented in ***Figure 16***. ***Table 19*** describes the conservation categories that are present on and around the site and tabulates the MBSP management goals for these categories.

Table 19: MBSP categories on the site and planned infrastructure in each category

CONSERVATION CATEGORY	MANAGEMENT GOALS	RELEVANT INFRASTRUCTURES
Critical Biodiversity Areas (CBAs): Irreplaceable These area the most important biodiversity areas in the Province, outside of the protected area network. They represent the last remaining options for securing critical biodiversity and ecosystems and for achieving biodiversity targets. If these areas suffer any further loss of habitat or ecological function, it is likely that the biodiversity targets will not be met, and the status of species and ecosystems will decline.	Maintaining the natural vegetation cover of CBAs in a healthy ecological state	• Proposed mining pits • Mining offices • ROM stockpiles • Topsoil stockpiles • Access roads

CONSERVATION CATEGORY	MANAGEMENT GOALS	RELEVANT INFRASTRUCTURES
Heavily modified: Transformed areas, where biodiversity and ecological function have been lost to the point that they are not worth considering for conservation	Manage the land use in a biodiversity friendly manner aiming to maximise ecological functionality	• Waste rock stockpiles • Topsoil stockpile • Access roads
Moderately modified / old lands: Areas which were modified within the last 80 years but now abandoned, including old mines and old cultivated fields	Stabilise and manage to restore ecological functionality, particularly soil carbons and water related functionality	• Proposed mining pits • Waste rock stockpiles • Topsoil stockpile • Access roads

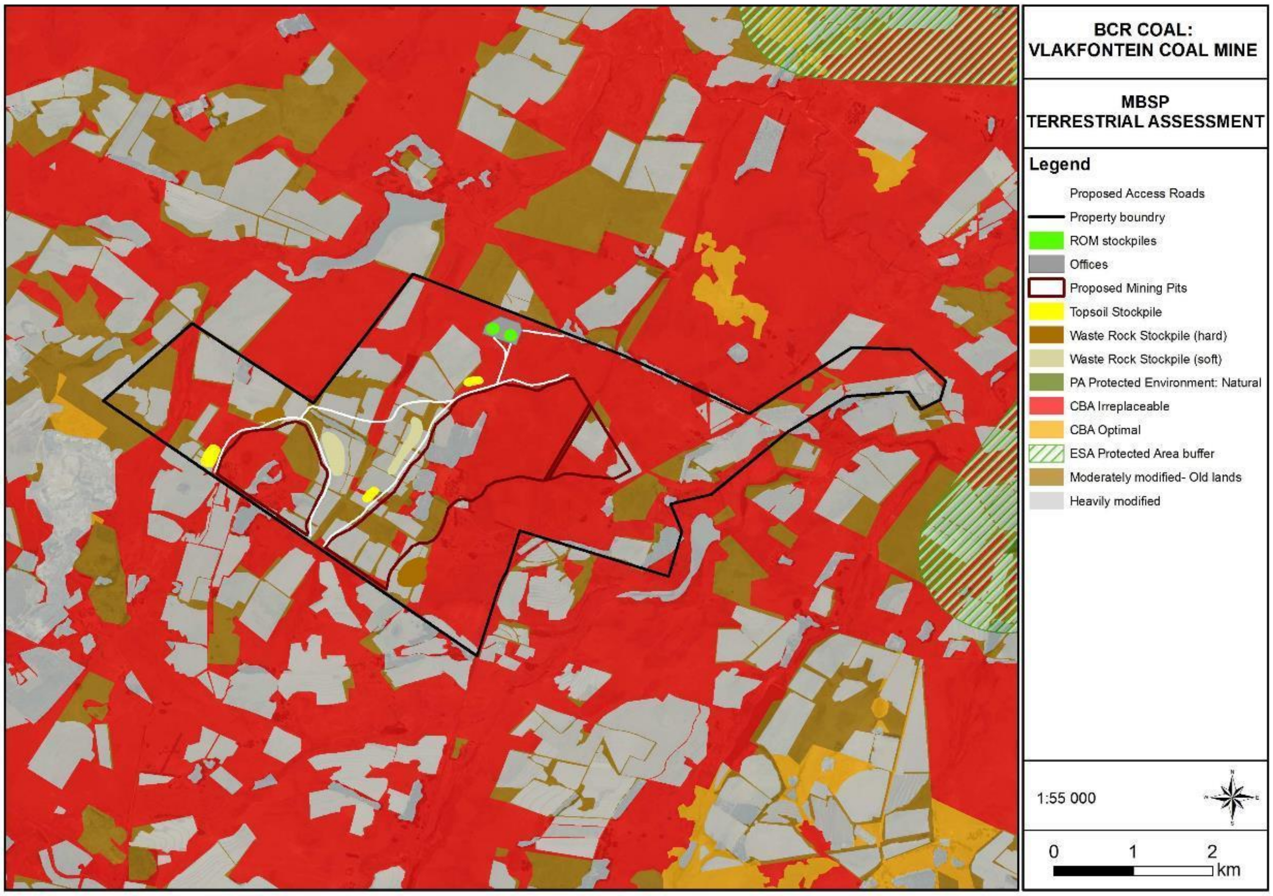

Figure 16: Proposed site layout in relation to the defined MBSP categories

Provincially Protected Plants

The project area could support several plant species that are provincially protected by the Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) (MNCA). These species may not be removed, pruned or damaged without a permit from the Mpumalanga Tourism and Parks Agency (MTPA). These species are most likely to occur along drainage lines and within undisturbed grassland. the remaining natural vegetation should be assessed during the growing season to determine which species are present.

National Protected Trees

The National Forest Act, 1998 (Act No. 84 of 1998) enforces the protection of several indigenous trees. The removal, thinning or relocation of protected trees will require a permit from the Department of Forestry, Fisheries and the Environment (DFFE) (Notice of the List of Protected Tree Species under the National Forests Act, 1998 (ACT NO 84 OF 1998), Notice 44204, Government Gazette, 1 March 2021).

The site falls within the grassland biome and are unlikely to support national protected trees. However, the natural vegetation should be assessed for the presence of such species.

Site Specific Vegetation

The assessment of literature, aerial and satellite imagery and available spatial data indicate that at least four (4) broad vegetation communities are likely present on the site:

1. Natural to near-natural Eastern Highveld Grassland
2. Secondary grassland
3. Moist grassland along drainage lines and in wetlands
4. Modified vegetation (farm buildings, cultivated land and alien invasive tree stands)

The potential broad vegetation groups are discussed below and geographically represented in ***Figure 17***. The preliminary site sensitivity is represented in ***Figure 18***.

Modified land

Modified land comprises areas where the natural vegetation was destroyed or degraded beyond a threshold of recovery. Modified vegetation can be described as land where the loss of composition, structure and ecological function of the vegetation was extensive, and the land is in a poor ecological condition (SANBI, 2016).

On site, the cultivated areas, areas that comprise infrastructure and alien invasive tree stands will likely support no or little indigenous species diversity and range from moderately to severely modified from the reference state of Eastern Highveld Grassland. No plant species of conservation concern are expected to occur in the modified land and the vegetation is considered as low sensitivity to the proposed mining.

Note that some modified areas might be fallow and comprise secondary grasslands. This must be verified during the vegetation assessment.

Secondary grassland

Secondary grasslands develop where the original, undisturbed grassland vegetation was removed (e.g. cultivation). After such disturbances cease, pioneer grassland species, as well as weedy pioneer plants, colonise the fallow lands leading to a pioneer grassland state with a much lower initial species diversity as opposed to the primary (climax) state prior to any disturbances. In the absence of further disturbances, the grassland could reach a secondary grassland state (more diverse and ecologically stable than pioneer grassland, yet much lower in species diversity than primary grassland) and theoretically the primary state over time. However, primary grasslands are species rich ecosystems, which once disturbed, are difficult, if not impossible to restore.

Secondary grassland comprises an ecological condition class in which ecological function is maintained even though composition and structure have been compromised. The secondary grasslands are therefore not expected to support plant species of conservation concern and are preliminary classified as being of medium to low sensitivity to the proposed mining.

Some portions of the site were cultivated for a short period and then left fallow, subsequently being colonised by grassland species. Also, areas where alien invasive tree species were removed seemingly comprise secondary grasslands. These areas must be assessed during the vegetation assessment to determine the state thereof, as well as potential to support plant species of conservation concern.

Eastern Highveld Grassland

According to aerial imagery and spatial data such as the Mpumalanga Biodiversity Sector Plan, about half of the proposed site comprised grassland vegetation which was not previously disturbed. These areas are likely used for grazing and may include secondary grasslands.

The remaining grassland is likely representative of the Eastern Highveld Grassland and in a good condition. Vegetation composition, structure and function are still intact or largely intact. Such grassland has a high possibility to support several plant species of conservation concern as listed in Appendix A and are considered as highly sensitive to the proposed mining. The vegetation assessment must be undertaken during the growing season and verify the state of the grassland, as well as potential to support plant species of conservation concern.

Moist grassland

Moist grasslands in this report refer to grassland vegetation that will likely support plant species with an affinity to grow in permanent, temporary, or seasonally saturated conditions. Note that the moist grasslands are an indication of where wetlands could occur, based on aerial imagery and the likely presence of plant species that are adapted to growing in inundated soils, or species that prefers moist soils, but are not necessarily wetlands. The wetland report must be consulted for the definitive wetland boundaries and recommended buffer zones.

The moist grasslands were not historically cultivated and are expected to be in a good natural condition, likely representative of the Eastern Highveld Grassland. Vegetation composition, structure and function are still intact or largely intact and the moist grassland has a high possibility to support several plant species of conservation concern as listed in Appendix A. Moist grasslands, if confirmed to be wetlands, are also protected by the National Water Act 36 of 1998 and are considered as highly sensitive to the proposed mining.

The vegetation assessment must be undertaken during the growing season and verify the state of the grassland, as well as potential to support plant species of conservation concern.

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Figure 17:Desktop level vegetation map of the area within the extent of the proposed mining right boundary

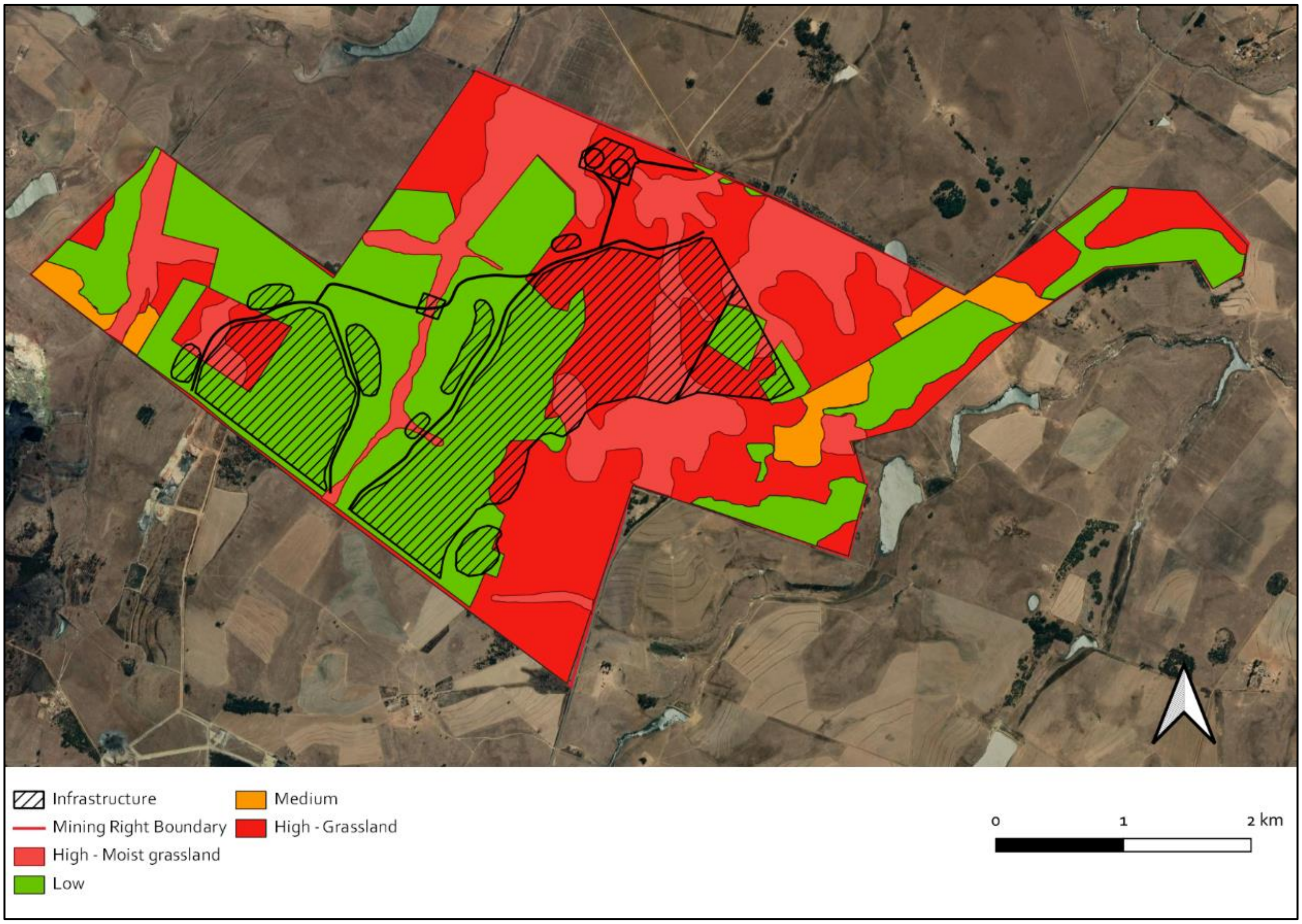

Figure 18: Desktop level sensitivity verification of the vegetation

Plant species of conservation concern desktop statement

Appendix A lists sixteen (16) species of conservation concern that has been compiled using the data listed above. Of these species, two (2) are classified as "Near Threatened", eight (8) as Vulnerable and one (1) as "Endangered". Five (5) species were historically classified as "Declining". However, the species have been reassessed to "Least Concern" or are currently listed as "Data Deficient". The numbers of these plants are still decreasing and therefor it is listed here as best practise.

Suitable habitat is present on the site for most of the listed species. Suitable habitat is within drainage lines and associated moist grasslands, as well as remaining natural grasslands on the site. Suitable habitat on the site must be assessed within the growing season for the plant species listed in Appendix A.

Land use disturbances

An historical aerial image of the year 1968 indicated that the vegetation within the proposed infrastructure footprint was largely cultivated and several stands of trees, likely exotic, can be seen (Figure 10).

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Figure 19:Aerial imagery dated 1968 (Chief Directorate National Geospatial Information Geospatial Portal)

Subsequent Google Earth Satellite imagery indicated the ongoing cultivation within the mining rights area (Figure 11). Some tree stands, likely the exotic Eucalyptus- or Acacia species can be seen. It seems the landowners are in the process of removing much of the exotic trees. The imagery also indicated the Mooifontein coal mine activities to the south-west of the site.

Several moist areas can be noted, and areas not cultivated over the years are likely too wet for ploughing. Remaining grasslands on the site are probably used for grazing cattle. Google Earth Satellite imagery taken from the N17 westward over the site, shows the remaining grassland on the site (Photo plate 1). The grasslands probably range from secondary to primary grasslands. The grassland and moist grasslands on the site are suitable habitat to several plant species of conservation concern.

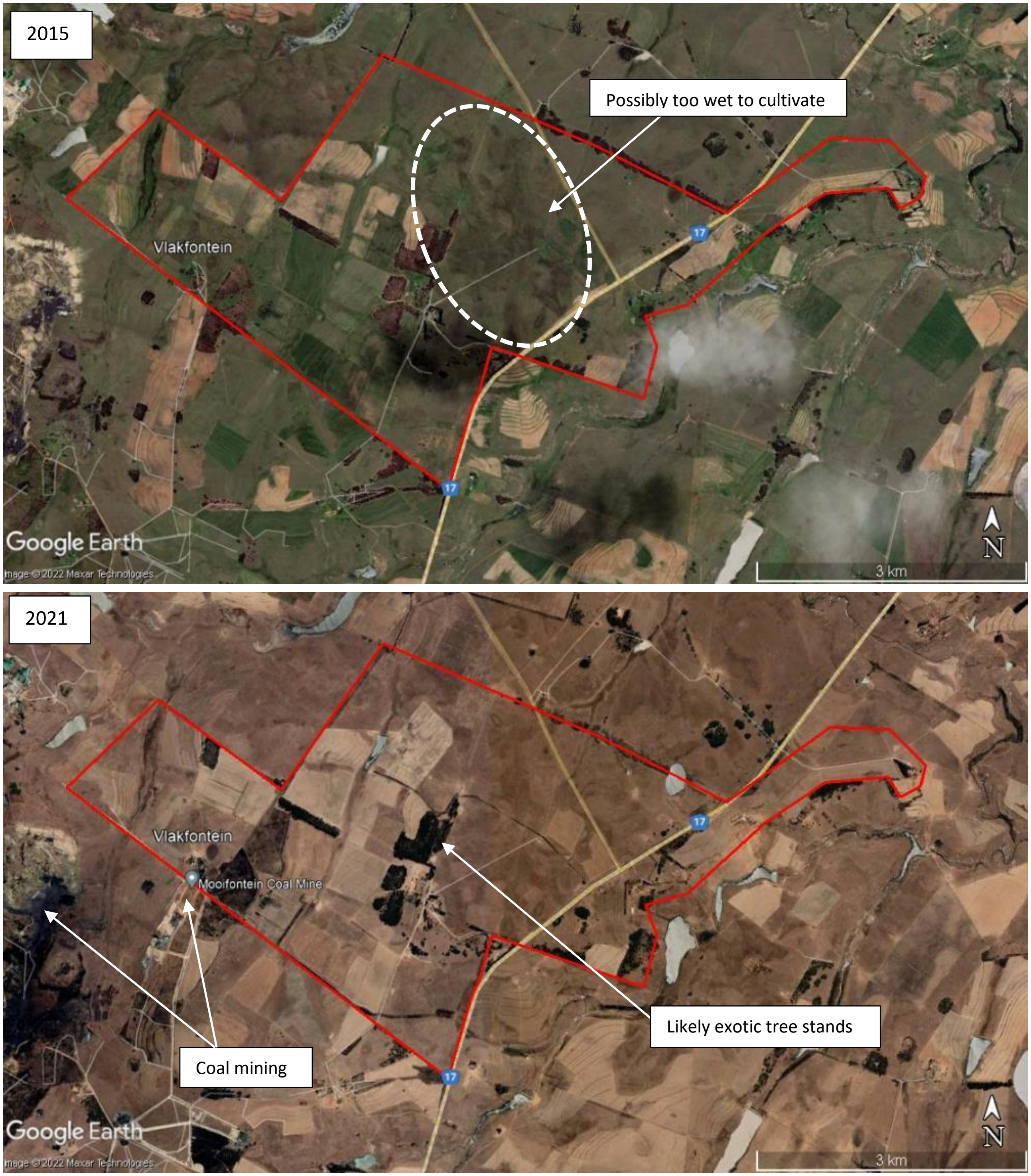


Figure 20: Google Earth satellite imagery dated 2015 (top) and 2021 (below)

Moist grassland embedded in the remaining grasslands

Photo plate 1: A collage of Google Earth Street View images taken from the N17 west and north-westward over the site (images dated January 2022). The images indicate a range of grassland vegetation on the site, including moist grasslands, secondary grasslands, and good condition primary grassland.

2. *Mammal and Invertebrate Specie Biodiversity*

Table 20 provides a summary of the desktop ecological features, and in some cases features regulated under environmental law (streams, protected areas, etc.), on and around site that are of relevance to terrestrial fauna (habitat, prey-base, ecological corridor, water provision).

Table 20: Desktop ecologically significant features (distances are "as the crow flies" approximations)

ECOLOGICAL AREA	DESCRIPTION OF FEATURE RELEVANT TO THE PROJECT AREA
International Conservation	No RAMSAR Wetlands or World Heritage Sites occur within 50km of the site.
Local conservation areas (Plan 3)	No Formal or Informal Protected Areas (PAs) occur within 10km of the project area (as per SANBI Spatial Datasets). The Chrissiesmeer Pans Systems are within a demarcated protected area in the Mpumalanga Biodiversity Sector Plan (Chrissiesmeer PA). The 1km buffer zone of this protected area is less than 700m from the project area (1.7km to the protected area) and 3.4km from the eastern extent of the eastern opencast pit (4.4km to the protected area). The protected area is contained within the Chrissie Pans Important Birds Area (IBA), which extends into the project area and incorporates the Welgelegen Properties. The pans form part of the largest cumulative inland water body in South Africa and consists of predominantly rainfall-fed pans and lakes, representing a variety of aquatic habitats, including reeds, sedges and saline pans (Marnewick *et al*, 2015). Although birds are not within the scope of this study, the site is managed as a conservancy and will support other fauna species indigenous to the area and is considered a unique habitat and biodiversity hotspot for fauna, including mammals and invertebrates. Furthermore birds and eggs are also a food source for many other fauna. No National Protected Area Expansion Strategies (NPAES) occur within 10km of the project area.
National Freshwater Ecology Priority Areas (NFEPAs)	The site is within a NFEPA Water Management sub-catchment. The project area extends into a Fish Support Area NFEPA Catchment in the south-east. Both catchments are also fish sanctuaries (aquatic species outside scope of work). The site drains via an on-site non-perennial tributary which flows north and then north-west to confluence with the Moderately Modified (Present Ecological State (PES) C; RIVCON AB) Vaal River, 4km north-west of site. The south-eastern part of the project area drains south-east into the Moderately Modified (PES C) perennial tributary of the Vaal River (Vaal Tributary), which flows outside the south-eastern boundary of the project area to confluence with the Vaal River, approximately 4.6km east of the site. Rank 1 or 2 NFEPA wetlands are designated as important habitat for Red-Listed water birds, cranes and frogs. The proposed Eastern Opencast and Infrastructure Area and associated roads are within a wetland cluster which has five (5) NFEPA Rank 2 Wetlands, all designated as potential Crane habitat. This

ECOLOGICAL AREA	DESCRIPTION OF FEATURE RELEVANT TO THE PROJECT AREA
	overlaps with the Mpumalanga Highveld Wetlands (Plan 4). There is an additional Rank 2 Wetland in the far western extent of the project area, also designated for potential Crane Habitat. There are also several Rank 2 wetlands around the project area, specifically the wetlands within the Chrissiesmeer Protected Environment.
Strategic Water Source Areas (SWSAs)	No Strategic Water Source Areas occur within 10km of site. The Upper Vaal surface water resource occurs approximately 12km downstream of site, along the Vaal River and can be considered within the potential area of influence. The Vaal River is an important perennial water supply and aquatic riverine habitat, forming a regional and provincial ecological corridor.
Biome and Ecosystem	The project area falls within the Grassland Biome and the Eastern Highveld Grassland vegetation unit. The site and most of the project area falls with in the Vulnerable Eastern Highveld Grassland Ecosystems (NEM:BA, GN1002, 2011). The far north-eastern extent of the project area falls within the Endangered Chrissiesmeer Panveld Ecosystem (NEM:BA, GN1002, 2011). Neither ecosystem is exclusively utilised by specific mammals species, but natural habitat units are important for terrestrial fauna biodiversity.
Mpumalanga Biodiversity Sector Plan (Plan 3)	The project area is mostly designated as Irreplaceable CBAs with patches of Moderately and Largely Modified Lands. As per the Mpumalanga Biodiversity Conservation Plan Handbook Land use in Irreplaceable CBAs must be in line with Conservation Management as all natural areas are required for the province to meet its biodiversity targets. Extensive game and stock farming may be considered as a land use but regulated under prescribed conditions (Ferrar and Lötter, 2007). Offsets for irreplaceable CBAs will only be considered under exceptional circumstances (Ferrar and Lötter, 2007), although what constitutes exceptional circumstances are not detailed.
Quarter Degree Grid Square (QDGS)	The site and project area are within Quarter Degree Grid Square (QDGS) 2630AC. All desktop data obtained from the citizen science sites have been sourced for this QDGS.

From ***Table 3*** the following desktop features have been identified for the project area and development site:

- The area is within the 5km buffer of the Chrissiesmeer Pans Systems designated as a protected environment composed of natural and modified land; the project area remains outside the 1km ESA buffer of this protected environment. The protected areas and the 1km ESA buffer area are indicated in Plan 3.
- The site is within a NFEPA Water Management sub-catchment and the project area extends into a Fish Support Area NFEPA Catchment; both catchments are also fish sanctuaries. Although fish are outside the scope of this study, they are critical food source to many other fauna species, including mammals.
- Although the NFEPA rivers around the area are considered modified, the Vaal River is the main receiving water body for runoff from the area and becomes a significant regional and, eventually provincial, riverine ecological corridor. It is also becoming a major water source along its downstream course.

- There are designated Mpumalanga Highveld Wetlands in the project area which incorporate Rank 2 wetlands and wetland clusters.
- The project area is mostly designated as Irreplaceable CBAs (approximately 53% of the physical development footprints overlap designated irreplaceable CBAs) with patches of Moderately and Largely Modified Lands. Irreplaceable CBAs incorporate natural areas required for the province to meet its biodiversity targets with severe land use restrictions.

The field assessment will be undertaken at during spring to early summer. Only a desktop evaluation is provided in this report.

From Google Earth Imagery (including historical imagery) the area is operated as active farms with small farmsteads, crop agricultural lands and stands of trees, most likely alien invasive trees (eucalyptus, poplars and wattles are most likely species). Expansive areas along the east appear to be largely undisturbed by extensive surface activity and are likely dominated by moist grasslands associated with the Mpumalanga Highveld Wetlands (to be verified by the flora and wetland specialist). A small non-perennial stream draining the western part of the site also has tracts of undisturbed vegetation creating a narrow ecological corridor, widening northwards along the stream's coarse. A final significant open grassland area occurs in the western extent of the development area. These seemingly natural grassland areas are all incorporated into areas designated as "Irreplaceable CBAs" in the Mpumalanga Biodiversity Sector Plan.

The complete desktop mammal list as extracted from the Animal Demographic Unit (ADU) and iNaturalist citizen science sites is included in Appendix B. The TOP and endemic species extracted from this list are further discussed below and discuss, as relevant, the SCCs, other historically recorded TOP species, other likely TOP species and endemic species, focussing on species that are highly likely to occur on site for extended periods and therefore most likely to be exposed to the development and potential impacts. Invertebrates are discussed more generally.

Mammals

In terms of the ADU list and historical species, the following is relevant:

- Unidentified species on the ADU list have not been included in this report.
- Species names are indicated as per the latest mammal Red-Lists (Child *et al.*, 2016).
- *Lepus victoriae* has a distribution over the area of interest and has replaced the ADU *Lepus saxatilis* which does not.

Historical, Likely TOP, and Endemic Species:

The previously recorded TOP and endemic mammals for the area and those with distributions across the area are indicated in ***Table 21***.
The following mammal SCCs are listed in the Environmental Screening Tool Report:

- Oribi (*Ourebia ourebia*) (GN151 Endangered; RL Endangered) (Shrader *et al.*, 2016).

  - Main threats include habitat destruction, illegal hunting, poor farm management practices, poor law enforcement, including the lack of coordinated / cooperative management and lack of awareness of the status, threats and legal repercussions of killing Oribi.
  - The project area falls within the species' main distribution range.
  - One species record is confirmed for the QDGS over the last decade in 2015.
  - The species has a preference for open, natural grasslands with a mosaic of short grass (for feeding) and tall grass (for cover and also feeding). They are often associated with floodplains and moist grasslands. The species will also utilise wooded savanna habitats. The habitat units are expected to be present and adequate for the species.
  - In terms of the above, the species is considered as likely to occur on site.

- Maquassie Musk Shrew (*Crocidura maquassiensis*) (RL Vulnerable) (Taylor *et al*., 2016).
  - Main threats are loss or degradation of moist, productive areas such as wetlands and rank grasslands within suitable habitat due to abstraction of surface water and draining of wetlands through industrial and residential expansion and overgrazing of moist grasslands.
  - The project area is within the larger distribution range of the species but no recent records occur for the species in the area or within the QDGS. No historical records occur for the species near the project area.
  - There is little conclusive information about the species, but the species is linked to moist habitats with dense matted vegetation, associated with wetlands.
  - In terms of habitat, the species may occur on site, but the lack of historical and recent records in the greater area makes it unlikely, although existing national records are scant. The species is retained as a possible species in the project area.

None of the TOP species recorded on the ADU can be conclusively excluded from site. As per limitations, the Black Wildebeest and Sable Antelope are not further discussed. The following species have been recorded for the QDGS:

- Black-footed Cat (*Felis nigripes*) (GN151 Protected; RL Vulnerable; IUCN Vulnerable). The species will be confined to the natural grasslands with appropriate cover and resources (termite mounds and dens of other borrowing species). Main threats include intra-guild predation, diseases, declining Springhare populations, habitat degradation that results in the loss of key resources (dens and prey base), and unsuitable farming practices. Occurrence is highly fragmented and patchy, which may have resulted in island sub-populations resulting in limited dispersal opportunities and restricting genetic exchange. Species numbers are also impacted through indirect persecution (Wilson *et al.*, 2016).
- Spotted-necked Otter (*Hydrictis maculicollis*) (GN151 Protected; RL Vulnerable).The species will be associated with water bodies, more likely the perennial rivers in the surrounds, but cannot be excluded from site if permanent water bodies develop during the rainy season. Species may also forage in the area or wonder through the area. Main threats include crop and livestock agricultural practices leading to bank and shoreline erosion, denuding important vegetative cover used by otters, increased human presence and disturbance, increased use of mesh nets and poisoning in fishing, and change or depletion of their prey base. Human settlement expansion and disturbance increases habitat degradation from pollution and increases incidences

of persecution. Otters are killed for food or skins, or as a perceived threat to poultry and / or fish (Ponsonby *et al*., 2016).

- Serval (*Leptailurus serval*) (GN151 Protected; RL Near Threatened). The species will be associated with moist areas with good reedy cover associated with the rivers and wetlands in the area. Main threats include loss and degradation of wetlands and associated grasslands. Wetlands generally harbour high rodent densities compared with other habitat types, and form the core areas of Serval home ranges; disruption to such habitats reduces prey-base which impacts the species (Ramesh *et al*., 2016).
- Honey Badger (*Mellivora capensis*) (GN151 Protected). The species has wide habitat tolerances and is more likely to be limited by existing human activity on site. Main threats to the species arises from conflict with, and persecution by, bee farmers (Begg *et al*., 2016).
- Southern African Hedgehog (*Atelerix frontalis*) (GN151 Protected). The species has wide habitat tolerances and is more likely to be limited by existing human activity and domesticated animal activity on site. Main threats include habitat loss, degradation and fragmentation from urban sprawl and agriculture. Also threatened by illegal harvesting from the wild for food, or for sale as pets and traditional medicine (Light *et al*., 2016).

Other TOP species with distribution over site and which cannot be excluded from site (pending site findings) include the:

- Brown Hyaena (*Parahyaena brunnea*) (GN151 Protected). Species has wide habitat tolerances but is generally associated with drier habitats. They are often shot, poisoned, trapped, snared and hunted with dogs in an attempt to reduce livestock predation events (Yarnell *et al.*, 2016).
- Cape fox (*Vulpes chama*) (GN151 Protected). Species has fairly wide habitat tolerances as long as it is open country. Cape Foxes are hunted, poisoned (directly and also indirectly by agricultural chemicals) and caught in traps for other species. Species is also affected by road mortalities (Kamler *et al*., 2016).
- Southern Reedbuck (*Redunca arundinum*) (GN151 Protected). The species will be associated with moist areas with reedy cover around the rivers and possibly the wetlands in the area, but do forage within drier terrestrial habitats. The species was impacted by habitat transformation and degradation associated with agricultural activities and settlements. On agricultural land, they are possibly subjected to persecution due to damage to pastures and crops. Species is also susceptible to hunting, snaring and poaching (du Plessis *et al*., 2016).

None of the endemic mammals recorded in the area or identified as likely on site (***Table 21***) are restricted and the area is not an area of mammal endemism.

Alien and Exotic Species:

None were recorded for the QDGSs. Domesticated animals and stock animals can be expected on site.

Ecological Services:

The various ecosystem services provided by the historically recorded fauna and likely TOP fauna are typical and include:

- Keystone species (ecologically affect the environment) and flagship / icononic species (socially associated with / designated representatives of specific ecological settings / habitats / biomes).
- Regulator of prey and / or predator numbers.
- Significant prey-base for predators / raptors.
- Control of potential vermin, pests and AI species, including potential vectors for disease.
- Seed dispersal.
- Bulk grazers facilitate new growth and specific feed for more selective grazers.
- Scavengers clean up carrion, remove potential diseases and contribute to nutrient recycling.
- Burrowing species increasing the humic content of soil, aerate soil, and enhance infiltration and the water holding capacity of soil.
- Burrows also traps seeds and create regenerating patches of vegetation.
- Burrows create refugia for other species to live and escape fires.

Invertebrates

No invertebrate SCCs are listed in the Environmental Screening Tool Report.

No TOP invertebrates were recorded for the relevant QDGS.

No Provincially protected invertebrates were recorded for the QDGS.

Ecological services provided by the invertebrates are too numerous to mention. Some of the more critical services include:

- Their enormous biomass makes them a significant food source in the food chain and many species feed exclusively on invertebrates.
- They are significant pollinators and some plants have very unique relationships and are completely dependent on specific invertebrates for their pollination (wild figs and some orchids).
- They are also significant burrowers (termites and ants often form extensive underground tunnels and chambers) and contribute to the various benefits of burrow systems (for example trapping water and seeds, improving soil moisture and organic content).
- Decomposers of all biological matter (including animal matter, plant matter, faecal matter) and therefore significantly contribute to nutrient recycling and the prevention of aquatic / terrestrial eutrophication / nitrification.

Table 21:TOP and Endemic Mammals (SCC's as per the Screening Report indicated in bold).

FAMILY	COMMON NAME	SCIENTIFIC NAME	ENDEMISM	SA GN151	SA RED-LIST	IUCN
TOP AND ENDEMIC SPECIES HISTORICALLY RECORDED WITHIN THE GREATER AREA / QDGS						
Afrosoricida	Mole, Highveld Golden	*Amblysomus septentrionalis*	Endemic		NT	NT
Carnivora	Cat, Black-footed	*Felis nigripes*		PR	VU	VU
Carnivora	Otter, Spotted-necked	*Hydrictis maculicollis*		PR	VU	NT
Carnivora	Serval	*Leptailurus serval*		PR	NT	
Carnivora	Honey Badger (Ratel)	*Mellivora capensis*		PR		
Cetartiodactyla	Wildebeest, Black	*Connochaetes gnou*	Endemic	PR		
Cetartiodactyla	Blesbok	Damaliscus pygargus phillipsi	Endemic		NT	
Cetartiodactyla	Antelope, Sable	Hippotragus niger niger			VU	
Cetartiodactyla	**Oribi**	***Ourebia ourebi***		**EN**	**EN**	
Eulipotyphla	Hedgehog, Southern African	*Atelerix frontalis*		PR	NT	
Rodentia	Mole-rat, Cape	*Georychus capensis*	Endemic			
LIKELY TOP AND ENDEMIC SPECIES						
Carnivora	Hyaena, Brown	*Parahyaena brunnea*		PR	NT	NT
Carnivora	Fox, Cape	*Vulpes chama*		PR		
Cetartiodactyla	Reedbuck, Southern	*Redunca arundinum*		PR		
Rodentia	Mole-rat, Pretoria	*Cryptomys pretoriae*	Endemic			
POSSIBLE TOP AND ENDEMIC SPECIES						
Cetartiodactyla	Rhebok, Grey	*Pelea capreolus*	Endemic		NT	NT
Cetartiodactyla	Reedbuck, Southern Mountain	*Redunca fulvorufula*	Near Endemic		EN	EN
Eulipotyphla	**Shrew, Maquassie Musk**	***Crocidura maquassiensis***			**VU**	
Eulipotyphla	Shrew, Forest	*Myosorex varius*	Endemic			
Lagomorpha	Rabbit, Hewitt's Red Rock	*Pronolagus saundersiae*	Endemic			
Rodentia	Rat, Tete Veld	*Aethomys ineptus*	Possible endemic			
Rodentia	Mouse, White-tailed	*Mystromys albicaudatus*			VU	VU
UNLIKELY TOP AND ENDEMIC SPECIES						
Carnivora	Wild Dog, African	*Lycaon Pictus*		EN	EN	EN
Carnivora	Leopard	*Panthera pardus*		VU	VU	VU

FAMILY	COMMON NAME	SCIENTIFIC NAME	ENDEMISM	SA GN151	SA RED-LIST	IUCN
Chiroptera	Bat, Percival's (Short-eared) Trident	*Cloeotis percivali*			EN	
Chiroptera	Bat, Cohen's Horseshoe	*Rhinolophus cohenae*	Endemic		VU	VU
Chiroptera	Bat, Swinny's Horseshoe	*Rhinolophus swinnyi*			VU	
Rodentia	Rat, Robert's Marsh	*Dasymys robertsii*			VU	

3. *Herpetofaunal Specie Biodiversity*

Reptiles

The site falls within an area of moderately rich reptile fauna, with 18 species recorded from the QDS and 47 species recorded from the broader area (***Table 22***) (ADU 2022, Bates et al. 2014). If habitat within the study site is fair – good, many of these species may be expected to occur there. Several of these are South African endemics, and many are habitat specialists (***Table 22***), restricted to good quality grassland. Two species listed as Red Data – Near Threatened have been recorded in the broader area and may occur within the study area.

Coppery Grass Lizard *Chamaesaura aenea*

Red Data – Near Threatened

This lizard is endemic to, and has a scattered distribution in eastern South Africa, where it is confined to higher altitude primary grassland in good condition. It is currently listed as Red Data – Near Threatened, as much of its grassland habitat has been transformed, fragmented or degraded by anthropogenic activities (Alexander et al. 2022). This species has been recorded in the adjacent QDS (2630AD) (ReptileMAP 2022, Bates et al. 2014), and may occur within the study area.

Striped Harlequin Snake *Homoroselaps dorsalis*

Red Data – Near Threatened

This snake is endemic to, and has a patchy distribution in eastern South Africa, where it is confined primarily to higher altitude primary grassland, typically with rocky outcrops or termitaria. It is currently listed as Red Data – Near Threatened, as much of its grassland habitat has been transformed, fragmented or degraded by anthropogenic activities and some subpopulations may have declined or gone extinct (Alexander et al. 2021). A record from the adjacent QDS (2629BD) with no supporting data exists in the Mpumalanga Parks and Tourism database (M. Lötter pers. comm.), and there are other records surrounding the site. This is a poorly known and highly elusive species, and it may potentially be present within the study area.

Amphibians

The site falls within an area with a moderate frog fauna, with 14 species recorded from the QDS and 17 species recorded from the broader area (***Table 22***) (FrogMAP 2022, Minter et al 2004). A small number are endemic to South Africa, and only one may be considered a habitat specialist (***Table 22***), restricted to good quality grassland. No Red Listed species have been recorded or are expected to occur in the broader area or within the study area. The site appears to have wetland areas however, and may possibly support breeding populations of many of these species, which contribute to ecosystem processes and functioning.

Table 22: Herpetofauna recorded within the broader region incorporating the study area (Minter et al. 2004, Bates et al. 2014, ReptileMAP 2022, Frog MAP 2022)

FAMILY	SCIENTIFIC NAME	ENGLISH NAME	ENDEMIC	HABITAT SPECIALIST	RECORDED WITHIN 2630AC	RECORDED WITHIN ADJACENT QDSS
Reptiles						
Pelomedusidae	*Pelomedusa galeata*	South African Marsh Terrapin			1	
Agamidae	*Agama aculeata distanti*	Distant's Ground Agama	1			1
Agamidae	*Agama atra*	Southern Rock Agama	1			1
Chamaeleonidae	*Chamaeleo dilepis*	Common Flap-neck Chameleon				1
Cordylidae	*Chamaesaura aenea*	Coppery Grass Lizard	1	1		1
Cordylidae	*Chamaesaura anguina*	Cape Grass Lizard		1		1
Cordylidae	*Cordylus vittifer*	Common Girdled Lizard	1	1	1	
Cordylidae	*Pseudocordylus melanotus melanotus*	Common Crag Lizard	1	1	1	
Gekkonidae	*Lygodactylus ocellatus*	Spotted Dwarf Gecko	1	1		1
Gekkonidae	*Pachydactylus vansoni*	Van Son's Gecko	1		1	
Gerrhosauridae	*Gerrhosaurus flavigularis*	Yellow-throated Plated Lizard				1
Lacertidae	*Nucras lallandii*	Delalande's Sandveld Lizard				1
Scincidae	*Acontias gracilicauda*	Thin-tailed Legless Skink	1			1
Scincidae	*Scelotes mirus*	Montane Dwarf Burrowing Skink	1	1	1	
Scincidae	*Trachylepis capensis*	Cape Skink				1
Scincidae	*Trachylepis punctatissima*	Speckled Rock Skink			1	

Scincidae	*Trachylepis varia sensu lato*	Common Variable Skink Complex			1	
Colubridae	*Crotaphopeltis hotamboeia*	Red-lipped Snake				1
Colubridae	*Dasypeltis inornata*	Southern Brown Egg-eater	1			1
Colubridae	*Dasypeltis scabra*	Rhombic Egg-eater			1	
Colubridae	*Dispholidus typus viridis*	Northern Boomslang				1
Colubridae	*Philothamnus hoplogaster*	South Eastern Green Snake				1
Colubridae	*Philothamnus occidentalis*	Western Natal Green Snake	1			1
Colubridae	*Philothamnus semivariegatus*	Spotted Bush Snake				1
Elapidae	*Elapsoidea sundevallii sundevallii*	Sundevall's Garter Snake	1	1		1
Elapidae	*Hemachatus haemachatus*	Rinkhals	1		1	
Lamprophiidae	*Amplorhinus multimaculatus*	Many-spotted Snake				1
Lamprophiidae	*Aparallactus capensis*	Black-headed Centipede-eater			1	
Lamprophiidae	*Boaedon capensis*	Brown House Snake				1
Lamprophiidae	*Duberria lutrix lutrix*	South African Slug-eater	1			1
Lamprophiidae	*Homoroselaps lacteus*	Spotted Harlequin Snake	1	1		1
Lamprophiidae	*Homoroselaps dorsalis*	Striped Harlequin Snake	1	1		1
Lamprophiidae	*Lamprophis aurora*	Aurora House Snake	1			1
Lamprophiidae	*Lamprophis fuscus*	Yellow-bellied House Snake	1	1		1
Lamprophiidae	*Lamprophis guttatus*	Spotted House Snake	1	1	1	
Lamprophiidae	*Lycodonomorphus inornatus*	Olive House Snake	1			1
Lamprophiidae	*Lycodonomorphus laevissimus*	Dusky-bellied Water Snake	1	1		1
Lamprophiidae	*Lycodonomorphus rufulus*	Brown Water Snake			1	
Lamprophiidae	*Lycophidion capense capense*	Cape Wolf Snake				1
Lamprophiidae	*Psammophis brevirostris*	Short-snouted Grass Snake				1
Lamprophiidae	*Psammophis crucifer*	Cross-marked Grass Snake	1			1
Lamprophiidae	*Psammophylax rhombeatus*	Spotted Skaapsteker			1	
Lamprophiidae	*Psammophylax tritaeniatus*	Striped Skaapsteker			1	

Lamprophiidae	*Pseudaspis cana*	Mole Snake			1	
Leptotyphlopidae	*Leptotyphlops scutifrons conjunctus*	Eastern Thread Snake	1		1	
Typhlopidae	*Afrotyphlops bibronii*	Bibron's Blind Snake	1	1	1	
Typhlopidae	*Rhinotyphlops lalandei*	Delalande's Beaked Blind Snake				1
Viperidae	*Bitis arietans arietans*	Puff Adder			1	
Viperidae	*Causus rhombeatus*	Rhombic Night Adder				
Amphibians						
Brevicepitidae	*Breviceps mossambicus*	Mozambique Rain Frog				1
Bufonidae	*Sclerophrys capensis*	Raucous Toad	1		1	
Bufonidae	*Sclerophrys gutturalis*	Guttural Toad			1	
Hyperoliidae	*Hyperolius semidiscus*	Yellowstriped Reed Frog	1			1
Hyperoliidae	*Kassina senegalensis*	Bubbling Kassina			1	
Hyperoliidae	*Semnodactylus wealii*	Rattling Frog	1	1	1	
Pipidae	*Xenopus laevis*	Common Platanna			1	
Ptychadenidae	*Ptychadena porosissima*	Striped Grass Frog			1	
Pyxicephalidae	*Amietia delalandii*	Delalande's River Frog			1	
Pyxicephalidae	*Amietia poyntoni*	Poynton's River Frog			1	
Pyxicephalidae	*Cacosternum boettgeri*	Common Caco			1	
Pyxicephalidae	*Pyxicephalus adspersus*	Giant Bull Frog				1
Pyxicephalidae	*Strongylopus fasciatus*	Striped Stream Frog			1	
Pyxicephalidae	*Strongylopus grayii*	Clicking Stream Frog	1		1	
Pyxicephalidae	*Tomopterna cryptotis*	Tremelo Sand Frog			1	
Pyxicephalidae	*Tomopterna natalensis*	Natal Sand Frog			1	
Pyxicephalidae	*Tomopterna tandyi*	Tandy's Sand Frog			1	

Habitat types and quality

The study area sits at approximately 1700masl, and the vegetation type that occurs here is classified as Eastern Highveld Grassland (Mucina and Rutherford 2006, 2019). Examination of the site on Google-Earth agrees broadly with the classification of the MBSP Terrestrial Plan, and shows that there is a mix of transformed landcovers and natural grassland vegetation. Within the grassland areas, it appears that there may be seasonal wetland depressions, which could support breeding frog populations. However, without a site visit or access to photographs, it is difficult to determine any further detail about the quality and detail of the habitats available within these areas. From a herpetofaunal perspective, transformed areas will be of low importance, while it is possible that the untransformed areas do have value.

4. <u>*Avifaunal Specie Biodiversity*</u>

Relevant Bird Populations

The following bird population datasets (***Table 23***and ***Figure 21***) were considered for this scoping assessment. The table provides a description of each avifaunal feature; the location of the feature either within the proposed development site or the broader PAOI; the assigned sensitivity according to the national screening tool; required buffers; priority species complements; the scoping assessment sensitivity rating and the assigned development category.

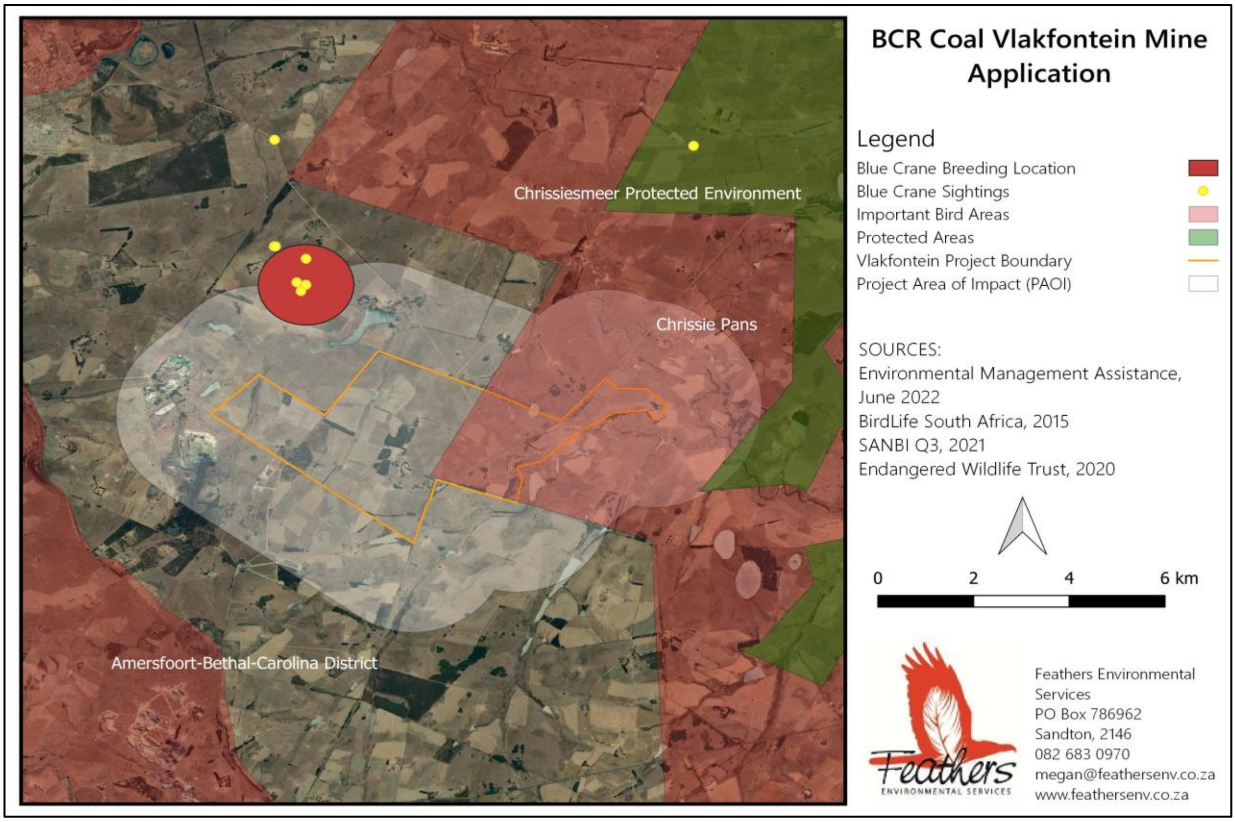


Figure 21: Regional map detailing the location of Crane Breeding Sites, Crane Sightings, Important Bird Areas and Protected Areas relevant to this project

Table 23: Avifaunal features considered for the identification of sensitive areas within the identified development area

CRITERIA	FEATURE	SOURCE	DESCRIPTION	SENSITIVITY: NATIONAL SCREENING TOOL	BUFFER	FEATURE ID	PRIORITY SPECIES	SCOPING ASSESSMENT SENSITIVITY RATING	DEVELEOPMENT CATEGORY
Birds	Important Bird Areas (IBA)	BirdLife South Africa Marnewick, 2015	Areas that are globally important for the conservation of bird populations based on species abundance and the complements they hold. These areas provide an indication of the species that are likely to occur in similar habitat types within the identified area.	**Very High** - These areas are potentially unsuitable for development owing to the presence of critical habitat (utilised for breeding, roosting and foraging) and the confirmed presence of priority species vulnerable to wind energy development	None	Amersfoort-Bethal-Carolina District (SA018) Chrissie Pans (SA019)	Wattled Crane Blue Crane Grey Crowned Crane Southern Bald Ibis Blue Korhaan Denham's Bustard White-bellied Korhaan Secretarybird Greater Flamingo Lesser Flamingo African Grass Owl African Marsh Harrier Lesser Kestrel Lanner Falcon Black-winged Lapwing Botha's Lark Black-winged Pratincole Chestnut-banded Plover	**HIGH**	**NON-PREFERRED** Areas where development is discouraged i.e. no-go areas **NOTE: Development within IBAs will be subject to intense scrutiny by environmental NGOs and I&APs and are likely to require seasonal monitoring to inform the avifaunal impact assessment report**
Birds	Co-ordinated Waterbird Count Sites (CWAC)	Animal Demography Unit of the University of Cape Town, accessed 29 July 2022 Harrison et al, 2004	Any body of water which supports a significant number (approx. 500 individuals) of birds which use the site for foraging, breeding and roosting. These areas provide an indication of the species that are likely to occur in various waterbody/wetland habitats within the identified area.	**High** - Confirmed occurrences of rare and threatened species. Habitat likely to be of importance to priority bird species sensitive to wind energy developments.	None	Breyten Pan Mooiplaats Pan Simonsdal Pan Lake Chrissie Lake Chrissie 92IT Tweelingspan Pan (East) Tweelingspan Pan (West) Driefontein Pan Cloete Pan Rietpan ***NOTE:*** *These sites occur within a 20km radius of the proposed mine. Several more occur within a 100km radius Bird movement is likely to occur*	Grey Crowned Crane Southern Bald Ibis Greater Flamingo Lesser Flamingo Yellow-billed Stork African Marsh-Harrier African Fish-Eagle *Other more common waterfowl families, also occur at these sites and may be present in similar surface water habitats within the identified area, these include: coots, cormorants, ducks, teals, herons, egrets, ibis, geese, lapwing, ruffs, and stints.*	**MEDIUM-HIGH**	**ACCEPTABLE:** Areas surrounding the CWAC sites are developable but with appropriate monitoring, assessment and mitigation.

CRITERIA	FEATURE	SOURCE	DESCRIPTION	SENSITIVITY: NATIONAL SCREENING TOOL	BUFFER	FEATURE ID	PRIORITY SPECIES	SCOPING ASSESSMENT SENSITIVITY RATING	DEVELEOPMENT CATEGORY
						between these. Similar surface water habitats present within the identified area, may support similar waterbirds			
Birds	Co-ordinated Avifaunal Roadcount Routes (CAR)	Animal Demography Unit of the University of Cape Town, accessed 29 July 2022 Young et al, 2003	Cranes, bustards, storks and other large terrestrial birds spend most of their time on the ground, need open spaces & are not restricted to protected areas. This project monitors 36 species of large terrestrial birds, gamebirds, raptors and corvids in agricultural habitats which are used extensively for feeding, roosting and breeding.	High - Confirmed occurrences of rare and threatened species. Habitat likely to be of importance to priority bird species sensitive to wind energy developments.	None	MC02	Blue Korhaan Northern Black Korhaan Denham's Bustard Black Harrier Grey Crowned Crane Blue Crane White Stork Secretarybird Southern Bald Ibis Grey-winged Francolin	**MEDIUM-HIGH**	**ACCEPTABLE:** Areas surrounding the CAR routes are developable but with appropriate monitoring, assessment and mitigation.
Birds	Southern African Bird Atlas Project 2 **APPENDIX 1**	Animal Demography Unit of the University of Cape Town, accessed 29 July 2022	The Southern African Bird Atlas Project 2 maps the distribution of birds, based on records of bird species observed during >2hour surveys within a geographical pentad (approx. 8 × 7.6 km in size).	High - Confirmed occurrences of rare and threatened species.	None	Nine pentad grid cells are relevant to this scoping assessment. Between 2007 and 2022, a total of 45 full protocol lists and 98 ad hoc protocol lists (bird surveys) have been completed for identified area.	190 species in total 9 Global Red List Species (SCC) 11 Regional Red List Species (SCC) 6 South African Endemics 7 South African Near Endemics **APPENDIX 1**	The diversity and abundance of priority species recorded within the identified area were considered when assessing the sensitivity of the habitats that support these species.	The diversity and abundance of priority species recorded within the identified area were considered when assigning the development category.

CRITERIA	FEATURE	SOURCE	DESCRIPTION	SENSITIVITY: NATIONAL SCREENING TOOL	BUFFER	FEATURE ID	PRIORITY SPECIES	SCOPING ASSESSMENT SENSITIVITY RATING	DEVELEOPMENT CATEGORY
Birds	MTPA Species Data for QDS 2629BD and 2630AC	Mpumalanga Tourism and Parks Agency, 5 July 2022	Red List species data collected and curated by the Mpumalanga Tourism and Parks Agency	High - Confirmed occurrences of rare and threatened species.	None	The Vlakfontein and Welgelegen properties occur within the QDS 2630AC.	Secretarybird African Grass Owl Southern Bald Ibis Blue Korhaan Greater Flamingo Lesser Flamingo	The diversity and abundance of priority species recorded within the identified area were considered when assessing the sensitivity of the habitats that support these species	The diversity and abundance of priority species recorded within the identified area were considered when assigning the development category.
Birds	Crane Breeding Data	Endangered Wildlife Trust, 2020	Confirmed breeding sites of Blue, Wattled and Grey Crowned Cranes in South Africa from 2000-2013	High - Confirmed occurrences of rare and threatened species.	1km	1 x Blue Crane nest location	Blue Crane	HIGH	NON-PREFERRED Areas where development is discouraged i.e. no-go areas
Birds	Crane Sightings Data	Endangered Wildlife Trust, 2020	Ad hoc sightings of Blue, Wattled and Grey Crowned Cranes in the study area, from 1991-2014	High - Confirmed occurrences of rare and threatened species.	None	6 x Blue Crane sightings occur just outside of the POAI (associated with the Blue Crane nest location	Blue Crane	MEDIUM-HIGH	ACCEPTABLE: Areas surrounding high utilisation areas developable but with appropriate monitoring, assessment and mitigation. **NOTE: Development within areas that are frequently utilised by cranes are likely to require seasonal monitoring to inform the avifaunal impact assessment report**
Birds	African Grass Owl Breeding Data	Endangered Wildlife Trust, 2020	Confirmed breeding locations of African Grass Owl from 2009 to 2014.	High - Confirmed occurrences of rare and threatened species.	1km	None	None	N/A - There are no documented African Grass Owl breeding sites within the PAOI	N/A - There are no documented African Grass Owl breeding sites within the PAOI

CRITERIA	FEATURE	SOURCE	DESCRIPTION	SENSITIVITY: NATIONAL SCREENING TOOL	BUFFER	FEATURE ID	PRIORITY SPECIES	SCOPING ASSESSMENT SENSITIVITY RATING	DEVELEOPMENT CATEGORY
Birds	Vulture Colony	Endangered Wildlife Trust, 2020	Colonies of several hundred birds on high cliffs. This data set is comprised of 18 Cape Vulture colonies.	**Very High** - These areas are potentially unsuitable for development due to the presence of critical habitat and the confirmed presence of priority species vulnerable to development	50km	None	None	N/A - There are no documented Cape Vulture colonies (or their associated 50km buffers occur within or intersect the PAOI	N/A - There are no documented Cape Vulture colonies (or their associated 50km buffers occur within or intersect the PAOI
Birds	Vulture Tracking Data	Endangered Wildlife Trust, 2020	Tracking locations of five tagged Cape Vulture individuals from 2013-2017	**High** - Confirmed occurrences of rare and threatened species. Habitat likely to be of importance to priority bird species sensitive to developments	None	None	None	N/A - There are no documented vulture sightings within the PAOI	N/A - There are no documented vulture sightings within the PAOI
Birds	White-backed Vulture Nests	VulPro, 2020	Nesting in loose colonies of 2 to 13 birds, situated in the crown or fork of a large tree.	**High** - Confirmed occurrences of rare and threatened species.	50km	None	None	N/A - There are no documented vulture nests within 50km of the development area	N/A - There are no documented vulture nests within 50km of the development area
Birds	Cape Vulture Colonies	VulPro, 2020	Colonies of several hundred birds on high cliffs.	**Very High** - These areas are potentially unsuitable for development owing to the presence of critical habitat (utilised for breeding, roosting and foraging) and	50km	None	None	N/A - There are no documented Cape Vulture colonies (or their associated 50km buffers occur within or intersect the PAOI	N/A - There are no documented Cape Vulture colonies (or their associated 50km buffers occur within or intersect the PAOI

CRITERIA	FEATURE	SOURCE	DESCRIPTION	SENSITIVITY: NATIONAL SCREENING TOOL	BUFFER	FEATURE ID	PRIORITY SPECIES	SCOPING ASSESSMENT SENSITIVITY RATING	DEVELEOPMENT CATEGORY
				the confirmed presence of priority species vulnerable to wind energy development					
Birds	Cape Vulture Roosts	VulPro, 2020	Areas where Cape Vultures will rest overnight. This can be on cliffs or on electricity poles/towers.	Very High - These areas are potentially unsuitable for development owing to the presence of critical habitat (utilised for breeding, roosting and foraging) and the confirmed presence of priority species vulnerable to wind energy development	50km	None	None	N/A - There are no documented vulture roosts within 50km of the PAOI	N/A - There are no documented vulture roosts within 50km of the PAOI
Birds	Vulture Restaurants	VulPro, 2020	To promote the survival of vultures, the practice of supplemental feeding in so called vulture restaurants, was initiated and today there are 236 documented vulture restaurants scattered throughout South Africa.	Very High - These areas are potentially unsuitable for development owing to the presence of critical habitat (utilised for breeding, roosting and foraging) and the confirmed presence of priority species vulnerable to wind energy development	10km	None	None	N/A - There are no documented active vulture restaurants within 10km of the PAOI	N/A - There are no documented active vulture restaurants within 10km of the PAOI

CRITERIA	FEATURE	SOURCE	DESCRIPTION	SENSITIVITY: NATIONAL SCREENING TOOL	BUFFER	FEATURE ID	PRIORITY SPECIES	SCOPING ASSESSMENT SENSITIVITY RATING	DEVELEOPMENT CATEGORY
Birds	Vulture Tracking Data	VulPro, 2020	Tracking locations of 18 tagged Cape Vulture, African White Backed Vulture and Lappet-faced Vulture individuals from 2018-2020	**High** - Confirmed occurrences of rare and threatened species. Habitat likely to be of importance to priority bird species sensitive to wind energy developments	None	None	None	N/A - There are no documented vulture flight paths within or across the PAOI	N/A - There are no documented vulture flight paths within or across the PAOI
Protected Areas	Nature Reserve	South Africa Protected and Conservation Areas Database 3rd Quarter, 2020	Protected and conservation areas include national parks, public nature reserves and private nature reserves and are intended for the conservation of flora and fauna.	**Very High** - These areas are potentially unsuitable for development owing to the presence of critical habitat (utilised for breeding, roosting and foraging) and the confirmed presence of priority species vulnerable to wind energy development	0-3km	Chrissiesmeer Protected Environment	Blue Crane Grey Crowned Crane Wattled Crane African Grass Owl Southern Bald Ibis Blue Korhaan Denham's Bustard White-bellied Korhaan Secretarybird Greater Flamingo Lesser Flamingo African Marsh Harrier Lesser Kestrel Lanner Falcon Black-winged Lapwing Black-winged Pratincole Chestnut-banded Plover	**HIGH**	**NON-PREFERRED** Areas where development is discouraged i.e. non-go areas

Bird Habitat Classes (Microhabitats)

Vegetation is one of the primary factors determining bird species distribution and abundance in an area. It is widely accepted within ornithological circles that vegetation structure is more important in determining which bird species will occur there. The classification of vegetation types is from Mucina & Rutherford (2006 and 2012), while from an avifaunal perspective, the Atlas of southern African Birds (SABAP1) recognises six primary vegetation divisions or biomes within South Africa, namely (1) Fynbos (2) Succulent Karoo (3) Nama Karoo (4) Grassland (5) Savanna and (6) Forest (Harrison et al. 1997). Whilst much of the distribution and abundance of bird species can be attributed to the broad vegetation types present in an area, it is the smaller spatial scale habitats (micro habitats) that support the requirements of a particular bird species that need to be examined in greater detail. Micro habitats are shaped by factors other than vegetation, such as topography, land use, food availability, and various anthropogenic factors all of which will either attract or deter birds and are critically important in mapping the site in terms of avifaunal sensitivity and ultimately informing mitigation requirements. A desktop investigation of the proposed BCR Coal Vlakfontein Mine PAOI revealed at least ten broadly described avifaunal micro habitats (***Table 24***) i.e. grassland, rivers, wetlands, pans, waterbodies, woodland, cultivated lands, fallow lands, exotic/alien tree stands and urban/industrial areas.

Table 24: Habitat features considered for the identification of sensitive areas within the identified development area and PAOI

CRITERIA	FEATURE	SOURCE	DESCRIPTION	SENSITIVITY: NATIONAL SCREENING TOOL	BUFFER	FEATURE ID	PRIORITY SPECIES	SCOPING ASSESSMENT SENSITIVITY RATING	DEVELEOPMENT CATEGORY
Habitat	Rivers	DEA National Landcover Dataset 2020 NFEPA Rivers 2014	Rivers provide important corridors of microhabitat for waterbirds that will utilise rivers as a source of drinking water, food, bathing and shelter for skulking species.	**Very High** - These areas are potentially unsuitable for development owing to the presence of critical habitat (utilised for breeding, roosting and foraging) and the confirmed presence of priority species vulnerable to WEF development	0-1km (500m)	Vaal	African Fish Eagle Hamerkop Maccoa Duck Greater Pained Snipe Coots, cormorants, ducks, teals, herons, egrets, ibis, geese, lapwing, ruffs, and stints	**HIGH**	**NON-PREFERRED** Areas where development is discouraged i.e. non-go areas
Habitat	Wetlands	DEA National Landcover Dataset 2020 NFEPA Wetlands 2014	Wetlands are characterized by slow flowing seasonal water (or permanently wet) and tall emergent vegetation (rooted or floating) and provide habitat for many water birds.	**Very High** - These areas are potentially unsuitable for development owing to the presence of critical habitat (utilised for breeding, roosting and foraging) and the confirmed presence of priority species vulnerable to WEF development	0-1km (500m)	Various	Grey Crowned Crane Black Harrier African Marsh-Harrier White Stork Marsh Owl	**HIGH**	**NON-PREFERRED** Areas where development is discouraged i.e. non-go areas

CRITERIA	FEATURE	SOURCE	DESCRIPTION	SENSITIVITY: NATIONAL SCREENING TOOL	BUFFER	FEATURE ID	PRIORITY SPECIES	SCOPING ASSESSMENT SENSITIVITY RATING	DEVELEOPMENT CATEGORY
Habitat	Waterbodies	DEA National Landcover Dataset 2020	Pans are endorheic wetlands with closed drainage systems. Water depth is shallow with ephemeral flooding. When these pans hold water, they attract waterbirds, while large raptors could use them for bathing and drinking. Although man-made, dams are very important for a variety of species.	**Very High** - These areas are potentially unsuitable for development owing to the presence of critical habitat (utilised for breeding, roosting and foraging) & the confirmed presence of priority species vulnerable to WEF development	0-1km	Dams Pans	Grey Crowned Crane Maccoa Duck Greater Flamingo Lesser Flamingo African Fish-Eagle Coots, cormorants, ducks, teals, herons, egrets, ibis, geese, lapwing, ruffs, and stints	**MEDIUM-HIGH**	**ACCEPTABLE:** Areas are developable but with mitigation
Habitat	Grassland	DEA National Landcover Dataset 2020	350 bird species occur in the Grassland biome. This includes 29 species of conservation concern, ten endemics, and as many as 40 specialist species that are exclusively dependent on grassland habitat for foraging and breeding.	**High** - Areas that contain habitat likely to be of importance to priority bird species sensitive to WEF developments	-	Natural grassland	Grey Crowned Crane Denham's Bustard Blue Korhaan White Stork Southern Bald Ibis Secretarybird Lanner Falcon Amur Falcon Grey-winged Francolin African Marsh-Harrier Short-tailed Pipit Black-winged Pratincole	**MEDIUM-HIGH**	**ACCEPTABLE:** Areas are developable but with mitigation

CRITERIA	FEATURE	SOURCE	DESCRIPTION	SENSITIVITY: NATIONAL SCREENING TOOL	BUFFER	FEATURE ID	PRIORITY SPECIES	SCOPING ASSESSMENT SENSITIVITY RATING	DEVELEOPMENT CATEGORY
Habitat	Woodland	DEA National Landcover Dataset 2020	The Woodland biome contains a large variety of bird species, but very few bird species are restricted to this biome. It is also relatively well conserved compared to the Grassland biome.	**High** - Areas that contain habitat likely to be of importance to priority bird species sensitive to WEF developments	-	Woodland	Long-crested Eagle Lanner Falcon Amur Falcon Jackal Buzzard Common Buzzard	**MEDIUM**	**ACCEPTABLE:** Areas are developable but with mitigation
Habitat	Artificial Waterbodies	DEA National Landcover Dataset 2020	Although artificial in nature, these waterbodies can be very important for a variety of species.	**Low** - These areas possibly do not support priority populations of threatened species that are susceptible to impacts from WEFs.	-	Mine Pits	Coots, cormorants, ducks, teals, herons, egrets, ibis, geese, lapwing, ruffs, and stints	**MEDIUM-LOW**	**ACCEPTABLE:** Areas are developable but with mitigation
Habitat	Commercial Agriculture	DEA National Landcover Dataset 2020	Cultivated land represents a feeding area for many bird species. Land preparation makes insects, seeds, bulbs and other food sources accessible.	**High** - Areas that contain habitat likely to be of importance to priority bird species sensitive to WEF developments	-	Cultivated Lands	Grey Crowned Crane Secretarybird White Stork Southern Bald Ibis Black-winged Pratincole	**MEDIUM**	**ACCEPTABLE:** Areas are developable but with mitigation

CRITERIA	FEATURE	SOURCE	DESCRIPTION	SENSITIVITY: NATIONAL SCREENING TOOL	BUFFER	FEATURE ID	PRIORITY SPECIES	SCOPING ASSESSMENT SENSITIVITY RATING	DEVELEOPMENT CATEGORY
Habitat	Fallow Lands	DEA National Landcover Dataset 2020	Fallow land is the cultivated land that is not seeded for one or more growing seasons. Land remaining fallow for lengthy periods may result in a grassland type habitat attracting large terrestrial species.	Medium - These areas have limited potential for supporting priority populations of threatened species that are susceptible to impacts from wind energy facilities.	-	Fallow Land Old Fields	Grey Crowned Crane Denham's Bustard White Stork Southern Bald Ibis Secretarybird	MEDIUM	ACCEPTABLE: Areas are developable but with mitigation
Habitat	Exotic Tree Plantations	DEA National Landcover Dataset 2020	Although tree plantations are strictly speaking exotic species, they have become important refuges for certain species of raptors.	Low - These areas possibly do not support priority populations of threatened species that are susceptible to impacts from WEFs	-	Exotic Tree Plantations	African Fish Eagle Lanner Falcon Amur Falcon Black-shouldered Kite Jackal Buzzard Common Buzzard Black Sparrowhawk African Harrier-Hawk	MEDIUM-LOW	ACCEPTABLE: Areas are developable but with mitigation
Habitat	Built-Up Areas	DEA National Landcover Dataset 2020	Built-up areas are of little value to sensitive SCC due habitat degradation & disturbance. They do play an important role in providing safe refuge and foraging opportunities for small passerine species.	Low - These areas possibly do not support priority populations of threatened species that are susceptible to impacts from wind energy facilities.	-	Urban Residential Villages Small Holdings Mines Industrial Roads	Lanner Falcon Black-shouldered Kite	LOW	PREFERRED: Areas that contain minimal constraints

DESKTOP SENSITIVITY VERIFICATION

1. *Vegetation and Plant Specie Biodiversity*

Biodiversity (vegetation) results

The desktop assessment of the available information indicated that about half of the vegetation that could be impacted on by the proposed mining were cultivated or modified. Such areas are preliminary classified as "low sensitivity" from a vegetation perspective. However, these areas are likely of biodiversity importance to the movement of fauna and pollinators and important to maintain function and ecological processes.

Some secondary grasslands of medium sensitivity may be present in historically cultivated lands. However, large portions of seemingly intact natural Eastern Highveld Grassland are seemingly present within the site, as well as moist grasslands. Remaining patches of this grassland unit is of "high conservation value and sensitivity" as it is poorly protected and within a vulnerable ecosystem (Skowno, et al., 2019). It is therefore imperative that the site vegetation be assessed for the presence of intact (undisturbed or untransformed) Eastern Highveld Grassland, as remaining portions should be conserved to preserve this vegetation type and protect it from extinction. Importantly, the remaining grassland on the site corresponds greatly with the CBA: Irreplaceable category of the MBSP, in which mining is not an acceptable land use.

Other than the modified areas, the desktop results are in accordance with the screening tool results that the site comprises mostly of "high terrestrial biodiversity (vegetation) sensitivity".

Plant species results

The site is classified as "medium sensitivity" for sensitive plant species, indicating that the site includes suitable habitat for plant species of conservation concern. The screening tool lists nine (9) species that has a possibility of occurring on the site. These are discussed in section 4.4 and Appendix A.

The remaining Eastern Highveld Grassland, including the moist grasslands, are highly likely to include sensitive and unique habitats, and suitable habitat for several plant species of conservation concern are likely to be present. until such time as habitat is verified or species recorded on the site, the desktop results in accordance with the screening tool sensitivity rating for plant species.

2. *Mammal and Invertebrate Specie Biodiversity*

In terms of the desktop findings the following is relevant:

- Highly sensitive areas and areas likely to support higher faunal richness or biodiversity in the project area are directly linked to the irreplaceable CBAs on site, with the eastern CBA the potential primary biodiversity hotspot in terms of mammals and invertebrates. In the surrounds, highly sensitive areas incorporate the riverine and associated grassland areas north and towards the Vaal and the Vaal Tributary south east of the project area.
- Moderately sensitive areas currently include the on-site non-perennial stream. Streams and other surface water features are normally considered highly sensitive features due to their legal status under the National Water Act, the fact that they are often form ecological corridors and provide unique habitats within the terrestrial setting (often includes habitat for ecologically significant species). In terms of this specific stream, which does not provide a

significant ecological corridor and has limited buffer habitat within the proposed development site, the sensitivity of the habitat is reduced to moderate.

- Areas with low sensitivity include the cleared and developed areas, alien invasive tree stands and areas under crop agriculture.

3. *Herpetofaunal Specie Biodiversity*

An initial desktop assessment suggests that the site is a mix of herpetofaunal sensitivities, with parts of it being of low value and some areas of higher value for herpetofauna. These higher value areas may include natural communities within CBA Irreplaceable areas, and among these may be habitat specialists and possibly two Near Threatened reptiles. Although these features aren't highlighted in the screening tool, the Near Threatened species in particular, have only recently been classified as such, and they are of potential sensitivity.

Given the CBA Irreplaceable classification of some areas, the possibility for diverse grassland herpetofaunal communities to be present, and the lack of onsite investigation to date, it is recommended that the sensitivity of the site from a herpetofaunal perspective be considered as medium-high, pending further investigation. It is recommended therefore that a more detailed assessment of the herpetofaunal communities on site be performed as part of the full impact assessment study.

4. *Avifaunal Specie Biodiversity*

A screening report for the proposed study area was generated on 10 June 2022. Parts of the proposed study area are considered to have a "High and Medium Animal Species Theme Sensitivity", as a result of the presence of Southern Bald Ibis Geronticus calvus, African Grass Owl Tyto capensis, Denham's Bustard Neotis denhamii, White-bellied Korhaan Eupodotis senegalensis and Caspian Tern Hydroprogne caspia. Based on the low number (n=2) of Southern Bald Ibis recorded in the PAOI, this preliminary assessment assigns a "Medium" rating to the PAOI. In addition, it is unlikely that African Grass Owl will occur within the PAOI, based on previous surveys conducted in the area (pers comms. Christelle Trutter, African Grass Owl Study Group Manager) and White-bellied Korhaan and Caspian Tern have not been recorded in the PAOI to date. Notable SCC that have been recorded, albeit in low numbers, include Secretarybird Sagittarius serpentarius, Deham's Bustard, Grey Crowned Crane Balearica regulorum, Black Harrier Circus maurus, African Marsh Harrier Circus ranivorus, Lanner Falcon Falco biarmicus, Greater Flamingo Phoenicopterus roseus and Lesser Flamingo Phoeniconaias minor in addition to the availability of suitable habitat, thereby confirming the "Medium sensitivity" rating. This rating will be verified further during the EIA phase of the project, following a site verification survey to the proposed development area and broader PAOI.

Several land portions are being considered for the proposed BCR Coal Vlakfontein Mine. A preferred layout for the establishment of the proposed BCR Coal Vlakfontein Mine (based on the avoidance of avifaunal sensitivities delineated in (***Figure 22***) will be identified, following a detailed assessment of the primary data collected during a site survey of the proposed BCR Coal Vlakfontein Mine development envelope during the EIA phase of the project.

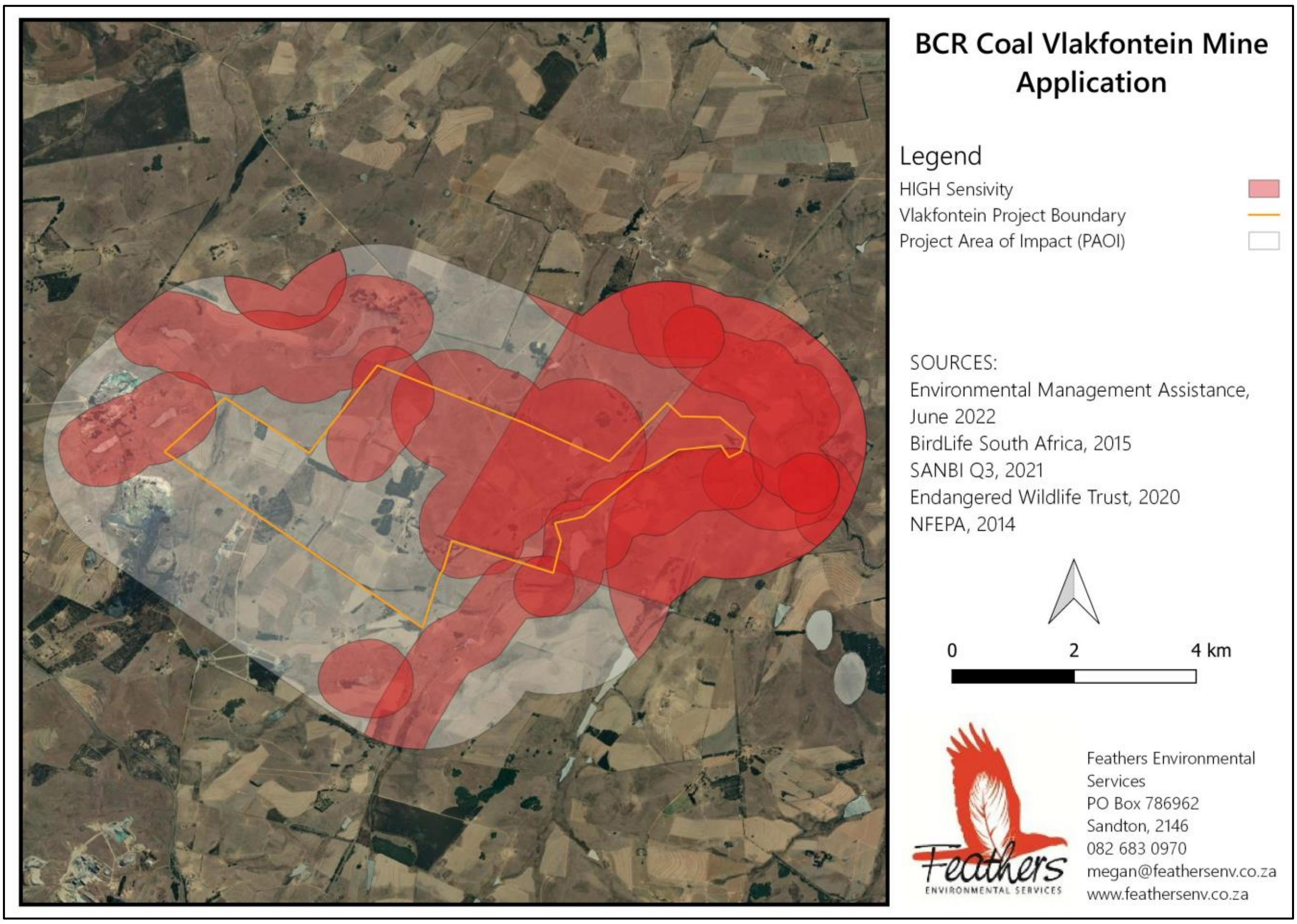


Figure 22: High sensitivity non-preferred development areas based on the presence of Protected Areas, the Chrissie Pans IBA, crane breeding sites, river systems, and various wetland areas

PLAN OF STUDY FOR EIA

1. Vegetation and Plant Specie Biodiversity

As mentioned previously, a SEI assessment will be completed once the on-site vegetation assessment and likelihood of plant species of conservation concern were undertaken.

SEI is considered to be a function of the Biodiversity Importance (BI) of the receptor (e.g. species of conservation concern, the vegetation/fauna community or habitat type present on the site13) and its 679 resilience to impacts (Receptor Resilience) as follows:

SEI = BI + RR

BI in turn is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows:

BI = CI + FI

Conservation Importance (CI) is evaluated in accordance with recognised established internationally acceptable principles and criteria for the determination of biodiversity-related value, including the IUCN Red List of Species, Red List of Ecosystems and Key Biodiversity Areas (KBA; IUCN (2016)).

Table 25: Criteria for assessing CI, FI and RR

CLASSIFICATION	CONSERVATION IMPORTANCE	FUNCTIONAL INTEGRITY	RECEPTOR RESILIENCE
Very high	• Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global Extent of Occurrence of < 10 km² • Any area of natural habitat of a CR ecosystem type or large area (> 0.1 % of the total ecosystem type extent) of natural habitat of an EN ecosystem type	• Very large (>100 ha) intact area for any conservation status of ecosystem type or >5 ha for CR ecosystem types • High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches No or minimal current negative ecological impacts with no signs of major past disturbance (e.g. ploughing)	• Habitat can recover rapidly (<5 years for >70% of the original species composition and functionality). • Species very highly likely to remain at a site during impact. • Species very highly likely to return once the impact ceases.
High	• Confirmed or highly likely CR, EN, VU species. IUCN threatened species must be listed under any criterion other than A, include if there are less than 10 locations or < 10 000 mature individuals remaining. • Small area (>0.01% but < 0.1 % of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1 %) of natural habitat of VU ecosystem type. • Presence of Rare species.	• Large (>20 ha but <100 ha) intact area for any conservation status of ecosystem type or >10 ha for EN ecosystem types. • Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches • Only minor current negative ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential	• Habitat can recover relatively quickly (5-10 years for >70% of the original species composition and functionality. • Species highly likely to remain at a site during impact. • Species highly likely to return to site once impact ceases.
Medium	• Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under A criterion only and which have more than 10 locations or more than 10 000 mature individuals. • Any area of natural habitat of threatened ecosystem type with status of VU • Presence of range-restricted species • More than 50 % of receptor contains natural habitat with potential to support SCC	• Medium (>5 ha but <20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types • Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches • Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few	• Recovers slowly (>10 years for >70 % of the original species composition and functionality • Species moderately likely to remain at site during impact. • Species moderately likely to return to site once impact ceases.

CLASSIFICATION	CONSERVATION IMPORTANCE	FUNCTIONAL INTEGRITY	RECEPTOR RESILIENCE
		signs of minor past disturbance; moderate rehabilitation potential	
Low	• No confirmed or highly likely SCC. • No confirmed or highly likely range-restricted species. • Less than 50 % contains natural habitat with limited potential to support SCC.	• Small (1 – 5ha) area. • Almost no connectivity but migration still possible across transformed / degraded habitat; very busy surrounds. Low rehabilitation potential. • Several minor and major ecological impacts.	• Unlikely to recover fully (<50% restored) after >15 years. • Species have low likelihood of remaining at site during the impact. • Species have low likelihood of returning to site once impact ceases.
Very low	• No confirmed and highly unlikely populations of SCC. • No confirmed and highly unlikely populations of range-restricted species. • No natural habitat remaining.	• Very small (<1 ha) area. • No connectivity except for flying species. • Several major current ecological impacts.	• Unable to recover from major impacts. • Species unlikely to remain at site during the impact. • Species unlikely to return once impact ceases.

Table 26: Matrix for determining BI

BIODIVERSITY IMPORTANCE (BI)		CONSERVATION IMPORTANCE (CI)				
		VERY HIGH	HIGH	MEDIUM	LOW	VERY LOW
FUNCTIONAL INTEGRITY (FI)	VERY HIGH	**Very High**	**High**	**High**	**Medium**	**Low**
	HIGH	**Very High**	**High**	**Medium**	**Medium**	**Low**
	MEDIUM	**High**	**Medium**	**Medium**	**Low**	**Very Low**
	LOW	**Medium**	**Medium**	**Low**	**Low**	**Very Low**
	VERY LOW	**Medium**	**Low**	**Very Low**	**Very Low**	**Very Low**

Table 27: Matrix for determining SEI

SITE ECOLOGICAL IMPORTANCE (SEI) (MITIGATION)		BIODIVERSITY IMPORTANCE (BI)				
		Very High	High	Medium	Low	Very Low
RECEPTOR RESILIENCE (RR)	VERY LOW	**Very High (Avoid)**	**Very High (Avoid)**	**High (Avoid & Minimise)**	**Medium (Minimise & Restore**	**Low (Minimise & Restore**
	LOW	**Very High (Avoid)**	**Very High (Avoid)**	**High (Avoid & Minimise)**	**Medium (Minimise & Restore**	**Very Low (Minimise)**
	MEDIUM	**Very High (Avoid)**	**High (Avoid & Minimise)**	**Medium (Minimise & Restore**	**Low (Minimise & Restore**	**Very Low (Minimise)**
	HIGH	**High (Avoid & Minimise)**	**Medium (Minimise & Restore**	**Low (Minimise & Restore**	**Very Low (Minimise)**	**Very Low (Minimise)**

SITE ECOLOGICAL IMPORTANCE (SEI) (MITIGATION)		**BIODIVERSITY IMPORTANCE (BI)**				
		Very High	High	Medium	Low	Very Low
	VERY HIGH	**Medium (Minimise & Restore**	**Low (Minimise & Restore**	**Very Low (Minimise)**	**Very Low (Minimise)**	**Very Low (Minimise)**

The interpretation of the SEI ranks is described in ***Table 28*** below. This table is a supplemented version of that which appears in the Species Environmental Assessment Guideline (SANBI, 2020). The SEI rating will be utilised to generate the vegetation sensitivity map.

Table 28: Guidelines for interpreting Site Ecological Importance (SEI) in the context of the proposed development activities.

SEI	**INTERPRETATION IN RELATION TO PROPOSED DEVELOPMENT ACTIVITIES (SANBI, 2020), WITH *MITIGATION ADDED BY THE SPECIALIST***
Very High	Avoidance mitigation - No destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e. last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages. Destructive impacts for species/ecosystems where persistence target remains. • *Development within these areas is not supported.* • *Impacts are difficult to mitigate, if at all* • *Such features usually protected by legislation or guiding policies*
High	Avoidance mitigation wherever possible. Minimization mitigation – Changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities. • *Development within these areas is undesirable and impacts are difficult to mitigate, if at all.* • *Impacts must be avoided or managed by an ecological management plan*
Medium	Minimization & restoration mitigation - Development activities of medium impact acceptable followed by appropriate restoration activities • *Development within these areas could proceed, limiting impact to sensitive vegetation, provided that appropriate mitigation measures are taken.* • *High impact developments should be considered with caution, if at all. Development must be restricted in footprint and impacts managed and mitigated by an approved management plan. Edge effects to higher sensitivity classes in its proximity must be mitigated / prevented.*
Low	Minimization & restoration mitigation - Development activities of medium to high impact acceptable followed by appropriate restoration activities • *Developable areas that are connected to sensitive features.* • *Edge effects must be prevented.*
Very Low	Minimization mitigation - Development activities of medium to high impact acceptable and restoration activities may not be required • *Most types of development can proceed within these areas with little to no impact on conservation worthy vegetation.* • *Edge effects to other proximate sensitivity classes must be mitigated / prevented.*

In addition to the above-mentioned, ***Table 29*** identifies specific measures that will be taken to address the key issues during the EIA Phase.

2. *Mammal and Invertebrate Specie Biodiversity*

The plan of study will incorporate the animal species protocols for "Medium Sensitivity Rating" and also include discussion of terrestrial and aquatic biodiversity features of relevance to terrestrial fauna. The following will be undertaken:

- A site assessment, by way of meanders within broader habitat units (crops, grasslands, moist grassland, riverine areas and AIS tree stands), will be undertaken after the first rainfalls in the following spring / summer season.
  - Survey will focus on the grasslands, moist grasslands and riverine areas which are more likely to host the two trigger SCCs, as well as the suspected TOP species.
  - Focusses surveys will be undertaken in the development site with less intensive surveying of the project area and visual assessment of areas beyond where visible.
  - Active searching will be completed for the SCCs in appropriate habitat units (or assumed appropriate habitat in terms of data deficient species).
- The current likelihood of SCCs and TOP species occurring on site will be updated based on field assessment findings.
- As SCCs / TOP species are likely on site, the Terrestrial Animal Species Specialist Assessment protocols will be followed and include the following items, where the information can be reasonably gathered:
  - If physically observed and where possible, photographs and the number of SCCs / TOP species observed, including any population information that can be gained during brief sighting with such species.
  - Discussion on the important ecological drivers, processes and services as may be relevant, with focus on those of importance to confirmed or likely SCCs / TOP species.
  - Detailed impact assessment on SCC / TOP species populations, their habitats, and ecological functions that may be important to the survival of local SCCs / TOP species; provide management recommendations to mitigate negative impacts of the activities on terrestrial fauna.
  - Discussion on buffer distances for the SCCs / TOP species where this is relevant to the species in the specific setting.
  - Assess site ecological importance based on site survey findings.

3. *Herpetofaunal Specie Biodiversity*

Based on the above, it is considered that the following should take place as part of the EIA phase:

- The study site is visited, and the diversity and quality of habitats present (with a focus on natural areas within and adjacent to proposed development footprints), together with the proposed layout are examined and their effect on herpetofauna considered;
- Feedback is given on the verified site sensitivity and anticipated impacts are assessed; and
- Mitigation measures are recommended if necessary.

4. *Avifaunal Specie Biodiversity*

In order to ensure the sustainable development of the proposed *BCR Coal Vlakfontein Mine* further, specialist avifaunal impact assessment studies must be conducted as part of the EIA process in order to:

- Confirm avifaunal microhabitats within the proposed development area and assess these for their suitability to support SCC and non-SCC priority species, in terms of breeding, roosting and foraging;
- Describe the avifaunal communities (both SCC and non-SCC priority species) most likely to be impacted, based on data collected as part of a systematic and quantified data collection process:

  a. Sample counts of small terrestrial species

  Small terrestrial birds are an important component of this programme. Given the spatial scale of the development, these smaller species may be particularly vulnerable to displacement and habitat level effects. Sampling these species is aimed at establishing indices of abundance for small terrestrial birds in the study area. These counts should be done when conditions are optimal. In this case this means the times when birds are most active and vocal, i.e. early mornings. A minimum of 12 point count survey points will be established across the PAOI.

  b. Counts of large terrestrial species and raptors

  This is a very similar data collection technique to that above, the aim being to establish indices of abundance for large terrestrial species and raptors. These species are relatively easily detected from a vehicle, hence vehicle-based counts are conducted in order to determine the presence and number of birds of relevant species in the study area. Detection of these large species is less dependent on their activity levels and calls, so these counts can be done later in the day. A minimum of one driven transect route will be established and conducted during the site survey.

  c. Focal site surveys and monitoring
  Any particularly sensitive sites such as wetlands, dams and breeding sites will be identified and monitored during the site survey.

  d. Incidental observations

  All other incidental sightings of SCC and non-SCC priority species (and particularly those suggestive of breeding or important feeding or roosting sites) within the PAOI will be georeferenced and documented.

- Provide a detailed description of the impacts associated with the construction, operation and decommissioning of the proposed *BCR Coal Vlakfontein Mine* and its ancillary infrastructure;
- Assess the significance (rated according to a pre-determined set of criteria, as supplied by the primary consultant) of the identified direct, indirect and cumulative impacts, during the construction, operation and decommissioning phases of the proposed development based on data collected in-field;
- Consider layout plans and advise possible changes to the layout;
- Recommend practical mitigation measures for the management of the identified impacts, at each stage of the development process, for inclusion in the draft Environmental Management Programme (EMPr);

- Propose a monitoring programme for the sensitive areas, species or receptors (if necessary); and
- Describe the gaps in baseline data will be provided. An indication of the confidence levels will be given. The best available data sources will be used to predict the impacts, and extensive use will be made of local knowledge if available.

KEY ISSUES TO BE ADDRESSED

1. *Vegetation and Plant Specie Biodiversity*

Table 29 below summarises the potential impacts that the desktop phase identified, as well as the methods that will be used to assess these impacts further during a field survey.

Table 29: Summary of issues identified during the desktop assessment

PRELIMINARY ISSUES/ IMPACT	NATURE OF IMPACT	EXTENT OF IMPACT	NO-GO AREAS OR AREAS THAT COULD CONSTITUTE A FATAL FLAW	PROPOSED METHOD TO ASSESS IMPACT
Destruction of Eastern Highveld Grassland – an endangered vegetation type and listed as a vulnerable ecosystem.	Clearing of land for mining and associated infrastructure. Mining operation.	Local	Impacts in good condition Eastern Highveld Grassland and other sensitive vegetation communities must be limited or avoided where possible.	Field survey to assist in delineating good condition Eastern Highveld Grassland and other sensitive vegetation groupings.
Degradation of vegetation around watercourses.	Clearing of land for mining and associated infrastructure. Mine operation.	Local and downstream	Buffer areas as set by wetland specialist Ares where protected and threatened plant species of conservation concern, or suitable habitat are confirmed during the field survey.	Field survey to assess watercourse vegetation and to determine areas that provide suitable habitat to SCC.
Removal and destruction of habitat for PSCC. Destruction of individuals or populations. Degradation of habitat.	Clearing of land for mining and associated infrastructure. Operational activities.	Local - regional	Confirmed and suitable habitat for PSCC that must be conserved *in situ.*	Identify suitable habitat for PSCC on the project site. Search accessible sample areas for PSCC.
Spread of alien invasive plant species.	The seed of alien invasive plant species could spread into the disturbed and stockpiled soil. Construction vehicles and equipment can introduce alien invasive plant species.	Regional	Drainage lines, moist grasslands and good condition grasslands should be avoided as much as possible to prevent spread of such species into naturally vegetated areas.	Record the dominant / common alien invasive plant species within sampled areas during the field survey.
Degradation of remaining grasslands.	Operational edge effects. Exclusion of fire and grazing, as well as changes to hydrology.	Local	Impacts in good condition Eastern Highveld Grassland and other sensitive vegetation communities must be limited or avoided where possible.	Field survey to assist in delineating good condition Eastern Highveld Grassland and other sensitive vegetation groupings.

PRELIMINARY ISSUES/ IMPACT	NATURE OF IMPACT	EXTENT OF IMPACT	NO-GO AREAS OR AREAS THAT COULD CONSTITUTE A FATAL FLAW	PROPOSED METHOD TO ASSESS IMPACT
				Recommend mitigation to maintain ecological process on the site.
Compaction and destruction of soils.	Clearing of land for mining and associated infrastructure. Mining operation.	Local	Impacts in good condition Eastern Highveld Grassland and other sensitive vegetation communities must be limited or avoided where possible.	Recommendations into the redution of footprint where possible, depending on site results.

2. *Mammal and Invertebrate Specie Biodiversity*

Table 30 provides aspects that will be further assessed as part of the EIA Phase.

Table 30: Key issues to be further assessed during the EIA Phase

ASPECT	FAUNA FINDINGS
Ecological processes	The main ecological process is the plant-based primary production of 'food' through photosynthesis, which also absorbs CO_2 and releases O_2 and forms the principal base of the food-chain in a terrestrial environment. Secondly, the associated contribution to the water cycle through evapotranspiration is also a significant ecological process provided by the plant life. Another important process is that of natural fires, although natural fire cycles in South Africa's grassland and savanna have already been impacted by humans and is not evaluated further.
Ecological drivers: climate change, AIS infestation & habitat changes	The site appears to be dominated by crop fields and moist grasslands, with scattered patches of aquatic habitats (streams / pans / dams), alien invasive arboreal habitat and man-made infrastructure (roads and farmsteads). The project area is not expected to support significant alien invasive mammals, limited to potential common and widespread rodents associated with human settlements.
Ecological services	No special or critical ecological services provided by fauna were identified for the area and were largely related to the usual services provided by fauna (invertebrate control, prey-base in food chain, pest control, burrowing).
Ecological Corridors	The non-perennial stream on site does not form a significant ecological corridor on site. The receiving stream and floodplains to the north are considered a significant riverine / wetland corridor linking to the Vaal River. The Mpumalanga Highveld Wetland in the eastern third of the development site forms an extensive node to this northern riverine corridor and is also connected to the Vaal River. Although close to its origin and still a young river in this area, the Vaal River becomes a significant regional and provincial river and riverine ecological corridor. The Vaal tributary south-east of site also provides a minor riverine ecological corridor linked to the Vaal River.

3. *Herpetofaunal Specie Biodiversity*

The effects of the proposed mining operation on the herpetofaunal species will be assessed during the EIA phase.

4. *Avifaunal Specie Biodiversity*

The effects of any development on birds are highly variable and depend on a wide range of factors including the specification of the development, the topography of the surrounding land, the habitats affected and the number and diversity of species present. The principal areas of concern for SCC and non-SCC priority species related to the proposed development are listed below:

- Displacement due to habitat loss in the physical BCR Coal Vlakfontein Mine and ancillary infrastructure footprint;
- Displacement due to disturbance associated with establishment, construction, operation/maintenance and decommissioning of the proposed BCR Coal Vlakfontein Mine and its ancillary infrastructure;
- Mortality due to collision with the power lines;
- Mortality due to electrocution on the power line poles/towers; and
- Mortality due to collision with motor vehicles.

The aforementioned impacts will be described and assessed in detail, following the site survey to the proposed BCR Coal Vlakfontein Mine development area and PAOI during the EIA phase of the project process.

REASONED OPINION REGARDING THE ACCEPTABILITY OF THE PROPOSED DEVELOPMENT

1. *Vegetation and Plant Specie Biodiversity*

The site falls in an area that is listed by the National Screening Tool as being of 'High' terrestrial biodiversity. Furthermore, the Screening Tool lists a 'Medium' sensitivity for plant species, indicating that there is a likelihood of plant species of conservation concern being present.

The desktop assessment of the available information indicated that about half of the vegetation that could be impacted on by the proposed mining were cultivated, modified or could comprise secondary grasslands. However, large portions of seemingly intact natural Eastern Highveld Grassland are likely present. Remaining patches of this grassland unit is of high conservation value and sensitivity. It is therefore imperative that the site vegetation be assessed for the presence of intact (undisturbed or untransformed) Eastern Highveld Grassland, as remaining portions should be conserved to preserve this vegetation type and protect it from extinction. Importantly, the remaining grassland on the site corresponds greatly with the CBA: Irreplaceable category of the MBSP, in which mining is not an acceptable land use.

Although some impacts could be mitigated, however, the destruction of good condition grassland vegetation cannot be mitigated as grassland vegetation is difficult, if not impossible, to rehabilitate.

In addition, much of the site is within a CBA: Irreplaceable conservation category of the MBSP. The remaining grassland within the primary PAOI corresponds greatly with the Critical Biodiversity Area: Irreplaceable category of the Mpumalanga Biodiversity Sector Plan. According to the land use guidelines of the MBSP, any form of mining or prospecting should not be located within a CBA. Permissible land uses are those that are compatible with maintaining the natural vegetation cover of CBAs in a healthy ecological state, and that do not result in loss or degradation of natural habitat., in which mining is not an acceptable land use. Such natural areas are required for the province to meet its biodiversity targets. The proposed mining is not supported by the MBSP in CBA: Irreplaceable and could potentially result in a "fatal flaw". This will be further supported if natural grassland and plant species of conservation concern are recorded on the site.

The good condition grassland that could be directly impacted on is estimated at about 300ha, including the moist grasslands. About 169023780ha of Eastern Highveld Grassland remain in a natural to semi-natural state nationally. The estimated natural grassland on the site thus amounts to about 0.00017% of the remining extend of the Eastern Highveld Grassland ecosystem. Although the potential natural grassland on the site is small, it could contribute to the conservation of the Vulnerable ecosystem as well as reach the conservation target of the Mpumalanga Parks and Tourism Agency for a Critical Biodiversity Area: Irreplaceable. The area should ideally be conserved.

2. *Mammal and Invertebrate Specie Biodiversity*

As per the Mpumalanga Biodiversity Conservation Plan Handbook, land use in Irreplaceable CBAs must be in line with Conservation Management as all natural areas are required for the province to meet its biodiversity targets. Extensive game and stock farming may be considered as a land use if regulated under prescribed conditions (Ferrar and Lötter, 2007). Offsets for irreplaceable CBAs will only be considered under exceptional circumstances (Ferrar and Lötter, 2007), although such circumstances are not detailed in the handbook. Therefore, there exists a potential "fatal flaw" which may require amendment to current proposed development and activities and consultation with Mpumalanga Parks and Tourism Agency as to the proposed development and potential for offset areas.

The following recommendations are relevant at this stage:

- The Mpumalanga Parks and Tourism Agency must be consulted as soon as possible in terms of the proposed development.
- The field assessment must be completed and this report updated with findings as per the plan of study.
- The rehabilitation plan must be drafted as part of the environmental management programme (EMPr).
- The development is likely to contribute to the exacerbation of existing AI species, which must be managed on site in line with the municipal alien invasive management strategy (where one is in place).
- The development will contribute to increased risk of contaminated and silt-loaded runoff. This could enter the natural streams during heavy rainfalls and activities must be managed to reduce the risk of such impacts. Preliminary plans to manage storm water runoff and contain and treat of contaminated water must be submitted with the EMPr.

3. *Herpetofaunal Specie Biodiversity*

It is not possible to give a fully informed opinion regarding the proposed activity, without examining the site. Nevertheless, the presence of CBA – Irreplaceable areas within the proposed development footprint, together with the possible presence of natural herpetofauna communities contributing to local ecosystems, and potentially including endemic habitat specialists and Near Threatened species, suggests that impacts may be high and undesirable under the current layout, and require further investigation.

4. *Avifaunal Specie Biodiversity*

In conclusion, this high-level assessment has identified at least ten avifaunal habitats of varying sensitivities within the proposed development area and PAOI. Despite anthropogenic impacts, mostly in the form of agricultural practices that have largely transformed the landscape, sensitive habitat persists within the study area (***Figure 22***). The establishment and operation of the proposed BCR Coal Vlakfontein Mine and its ancillary infrastructure will likely result in impacts of medium to high significance, which may be reduced through the application of stringent mitigation measures.

VIII. AQUATIC BIODIVERSITY

Ecology International (Pty) Ltd and Land Matters Environmental Consulting were appointed by Environmental Management Assistance (Pty) Ltd on behalf of BCR Coal (Pty) Ltd to conduct a desktop Aquatic Biodiversity and Wetland assessment and inform the required Scoping Report (Phase 1).

The Scoping Assessment is attached as ***Appendix F.5 – Aquatic Biodiversity & Wetlands***.

METHODOLOGY AND APPROACH

Aquatic Biodiversity Sensitivity

Data pertaining to the presence of aquatic faunal species potentially associated with the proposed BCR Coal Vlakfontein Mine was obtained from Darwall et al. (2009), Department of Water and Sanitation (2014), and various scientific collection databases including the Global Biodiversity Information Facility, Freshwater Biodiversity Information System, South African Institute for Aquatic Biodiversity, Albany Museum, and from the provincial records of Mpumalanga Tourism and Parks Agency.

Wetland Assessment

Three separate wetland mapping databases were utilised for this desktop assessment. These included both national and provincial databases, namely:

- the National Freshwater Ecosystem Priority Areas (NFEPA) project (see Section 3.6),
- the more recent National Wetland Map 5 (van Deventer et al, 2018) database, as well as the
- provincial Mpumalanga Highveld Wetlands database.

As an additional database to the NFEPA database, the more recent National Wetland Map 5 (van Deventer et al, 2018) database was utilised to assess the project area. The National Wetland Map 5 (NWM5) forms part of the National Biodiversity Assessment (2018) within the category of the Inland Aquatic (Freshwater) Realm. This project is a multi-partner project through the CSIR and SANBI. The NWM5 has significantly improved the representation of inland wetland ecosystem types. The representation of the extent of inland wetlands has improved by 123%, whereas the incorrect representation of terrestrial ecosystems as wetlands has been reduced (Van Deventer et al, 2018).

SUMMARY OF BASELINE CONDITIONS

Protected Areas

The Chrissiesmeer Protected Environment (declared in 2014) is located approximately 6 km north-west of the proposed BCR Coal Vlakfontein Mine, and the site itself does fall within a Priority Focus Area for the National Protected Areas Expansion Strategy (NPAES) of 2018 (***Figure 23***). Priority Focus Areas should however not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for fine-scale planning, which may identify a range of different priority sites based on local requirements, constraints and opportunities (Government of South Africa, 2008).

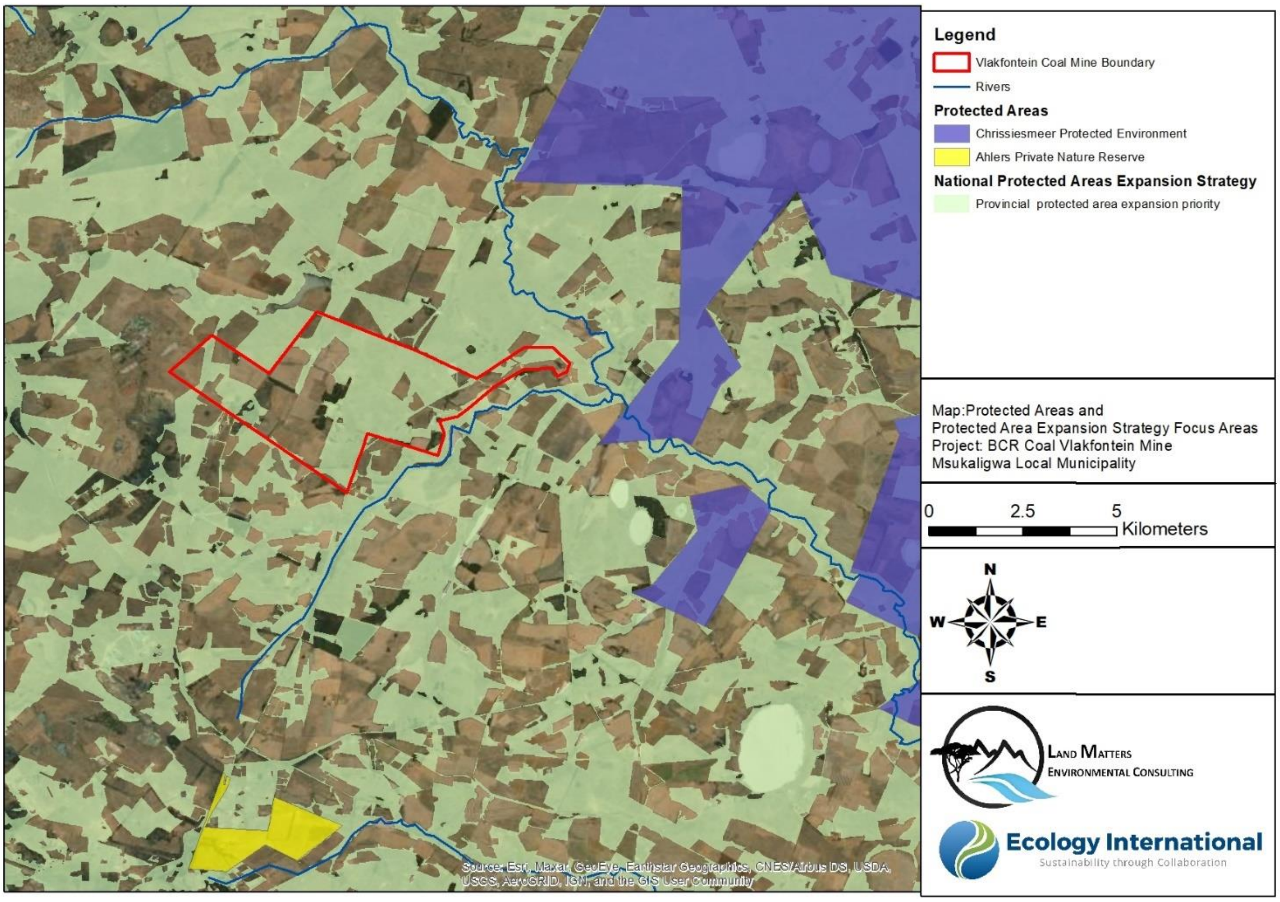


Figure 23: Protected Areas and Protected Area Expansion Strategy focus areas associated with the proposed BCR Coal Vlakfontein Mine

Mining and Biodiversity Guideline, 2013

Based on the outputs of the Mining and Biodiversity Guidelines, the proposed BCR Coal Vlakfontein Mine falls within areas classified as being of 'high and highest biodiversity importance' as well as legally protected from mining, and thus posing the highest risk for the proposed activity from a biodiversity perspective. The proposed BCR Coal Vlakfontein Mine study area also falls immediately adjacent to an area classified within the Mining and Biodiversity Guidelines as being legally protected. The 'highest biodiversity importance' category includes biodiversity priority areas where mining is not legally prohibited, but where there is a very high risk that due to their potential biodiversity significance and importance to ecosystem services (e.g. water flow regulation and water provisioning) that mining projects will be significantly constrained or may not receive the necessary authorisations. These areas include (Department of Environmental Affairs et al., 2013):

1. Critically Endangered (CR) and Endangered (EN) ecosystems, recognised as threatened ecosystems in terms of the Biodiversity Act.
2. Critical Biodiversity Areas (CBAs), or areas of equivalent status such as irreplaceable and highly significant areas from provincial spatial biodiversity plans.
3. River and wetland Freshwater Ecosystem Priority Areas (FEPAs), and a 1 km buffer of these specific river and wetland FEPAs.
4. Ramsar sites.

The importance of the biodiversity features in these areas and the associated ecosystem services (e.g. water flow regulation and water provisioning) is sufficiently high that, if their existence and condition are confirmed, the likelihood of a fatal flaw for new mining projects is very high. These areas are viewed as necessary to ensure protection of biodiversity, environmental sustainability, and human well-being. Mining in such areas may not be supported within the framework of national environmental management policies, norms and standards (Department of Environmental Affairs et al., 2013).

Freshwater Ecoregions of the World

The proposed BCR Coal Vlakfontein Mine is located within the Southern Temperate Highveld freshwater ecoregion, which is delimited by the South African interior plateau sub-region of the Highveld aquatic ecoregion, of which the main habitat type, in terms of watercourses, is regarded as Savannah-Dry Forest Rivers. Aquatic biotas within this bioregion have mixed tropical and temperate affinities, sharing species between the Limpopo and Zambezi systems. The Southern Temperate Highveld freshwater ecoregion is considered to be bio-regionally outstanding in its biological distinctiveness and its conservation status is regarded as Endangered. The ecoregion is defined by the temperate upland rivers and seasonal pans (Nel et al., 2004; Darwall et al., 2009; Scott, 2013).

Strategic Water Source Areas (SWSA)

Based on the fine-scale delineation of SWSAs for surface water in South Africa (Lötter & Le Maitre, 2021), the proposed BCR Coal Vlakfontein Mine falls within the Upper Vaal SWSA which is considered to be of national priority (***Figure 24***).

National Ecoregional Typing

Ecoregional typing at a national level is based on spatially variable combinations of causal factors including physiography, climate, geology, soils and potential natural vegetation. Accordingly, the study area is located primarily within the Highveld Ecoregion, and more specifically within Level II Ecoregion 11.02.

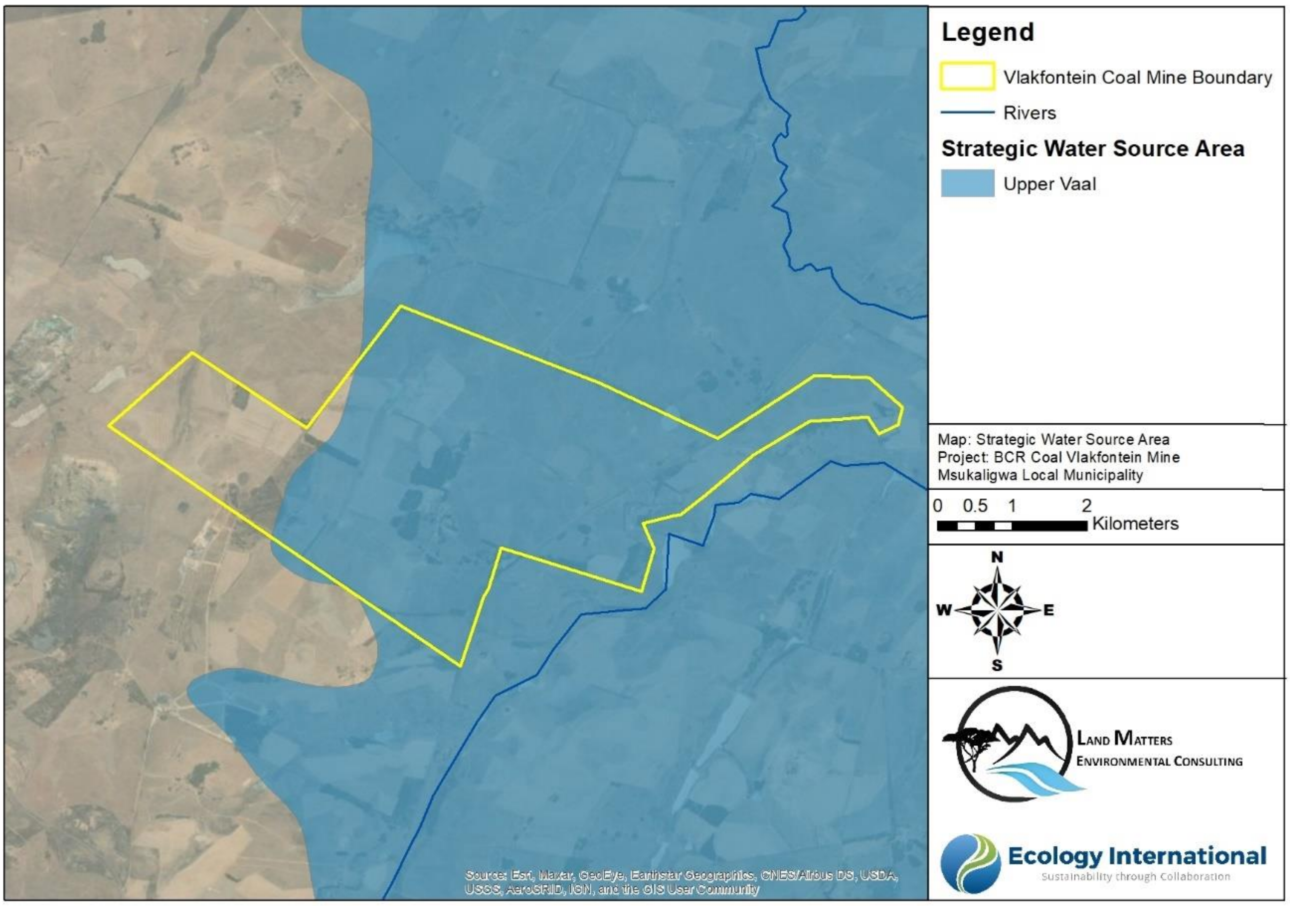


Figure 24: Strategic Water Source Area for the proposed BCR Vlakfontein Mine area

<u>*National Freshwater Ecosystem Priority Areas (NFEPA)*</u>

According to the outputs of the NFEPA project, the majority (approximately 84 %) of the proposed BCR Coal Vlakfontein Mine study area falls within a catchment classified as a Freshwater Ecological Priority Area (FEPA) catchment. FEPA catchments achieve biodiversity targets for river ecosystems and threatened/near-threatened fish species and were identified as rivers that are currently in a good condition (Ecological Category A or B). Their FEPA status indicates that they should remain in a good condition in order to contribute to national biodiversity goals and support sustainable use of water resources (Driver et al., 2011).

Interrogation of the FEPA dataset indicated that the FEPA status was largely as a result of the catchment being classified as a fish sanctuary for two fish species, namely Enteromius cf. oraniensis (Chubbyhead Barb; previously Enteromius anoplus s.l.) and Enteromius sp. pallidus cf. 'north' (Goldie Barb), the latter of which is in need of taxonomic revision and both of which are in need of a revised assessment of their threat status.

The associated catchment further supports representative riverine and wetland ecosystem types and wetland clusters (***Figure 25***). River ecosystem types comprise distinct combinations of Level 1 ecoregions, flow descriptions, and slope categories, and are used for representing the diversity of rivers across the country. Within the context of the NFEPA project, river ecosystem types were regarded as coarse-filter surrogates of biodiversity, conserving the diversity of many common and widespread species, and their associated habitats.

In addition, the reach of the Vaal River downstream of the proposed BCR Coal Vlakfontein Mine is considered to be a free-flowing river which, according to Driver et al. (2011), are rivers that flow undisturbed from their source to the confluence with a larger river or to the sea without any major dams and are a rare feature in the South African landscape and part of our natural heritage. Dams prevent water from flowing down a river and disrupt ecological functioning, with serious knock-on effects for downstream river reaches and users.

Several wetland systems were identified within the project site as well as one FEPA wetland cluster identified in the eastern section. Wetland clusters are groups of wetlands embedded in a relatively natural landscape, allowing for important ecological processes such as migration of frogs and insects between wetlands. The FEPA wetlands include channelled valley bottom systems and depressions. The wetlands are classified as FEPA wetlands (***Figure 25***) as they are located within a sub quaternary catchment that is often utilised by Wattled Cranes (Bugeranus carunculatus), Grey Crowned Cranes (Balearica regulorum) and/or Blue Cranes (Anthropoides paradiseus). The wetlands furthermore have Present Ecological State (PES) classifications of A/B (unmodified to largely natural).

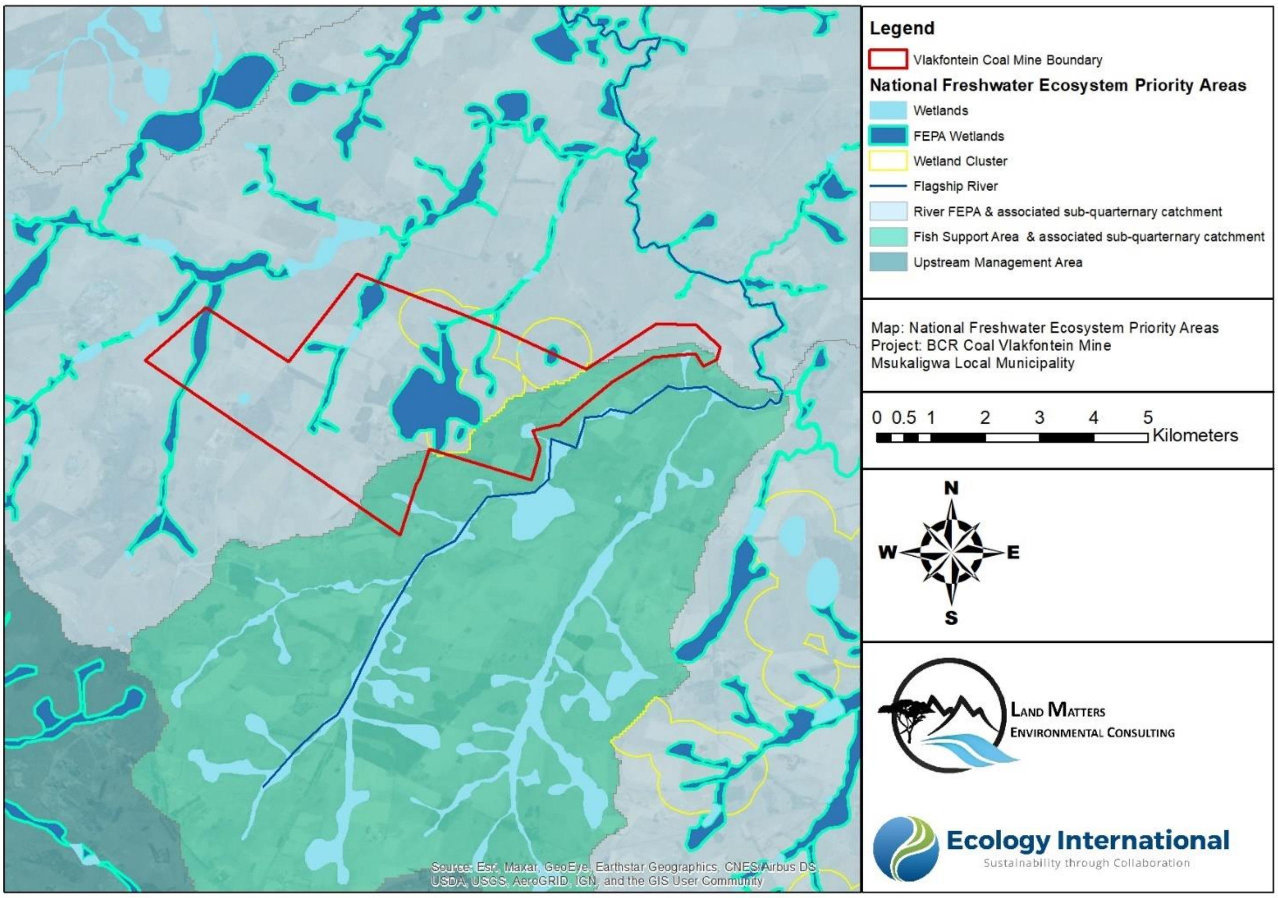


Figure 25: Wetlands within the study site as indicated by the NFEPA database (2011)

<u>*Mpumalanga Biodiversity Sector Plan, 2014*</u>

According to the latest revision of the freshwater component of the MBSP (Mpumalanga Tourism and Parks Agency, 2019), the watercourses/wetlands and wetland clusters associated with the proposed BCR Coal Vlakfontein Mine footprint are classified as Ecological Support Areas (ESAs) on the basis of wetlands and wetland clusters (***Figure 26***). ESAs are areas that are not essential for meeting biodiversity, targets, but that play an important role in supporting the functioning of protected areas or CBAs and for delivering ecosystem services. In the terrestrial assessment they support landscape connectivity and strengthen resilience to climate change. ESAs need to be maintained in at least a functional and often natural state, supporting the purpose for which they were identified. They include features such as riparian habitat surrounding rivers or wetlands, migration corridors for over-wintering sites for Blue Cranes, and so on (Mpumalanga Tourism and Parks Agency, 2014).

Based on the land-use guidelines of the MBSP, opencast mining is expected to compromise the biodiversity objective determined for the area in question and according to Mpumalanga Tourism and Parks Agency (2014) is not permissible. In contrast, underground mining within the study area, while still considered to potentially compromise the biodiversity objective, are permissible under certain conditions, although proximity to the associated watercourse needs to be taken into consideration due to identified sensitivities (Mpumalanga Tourism and Parks Agency, 2014).

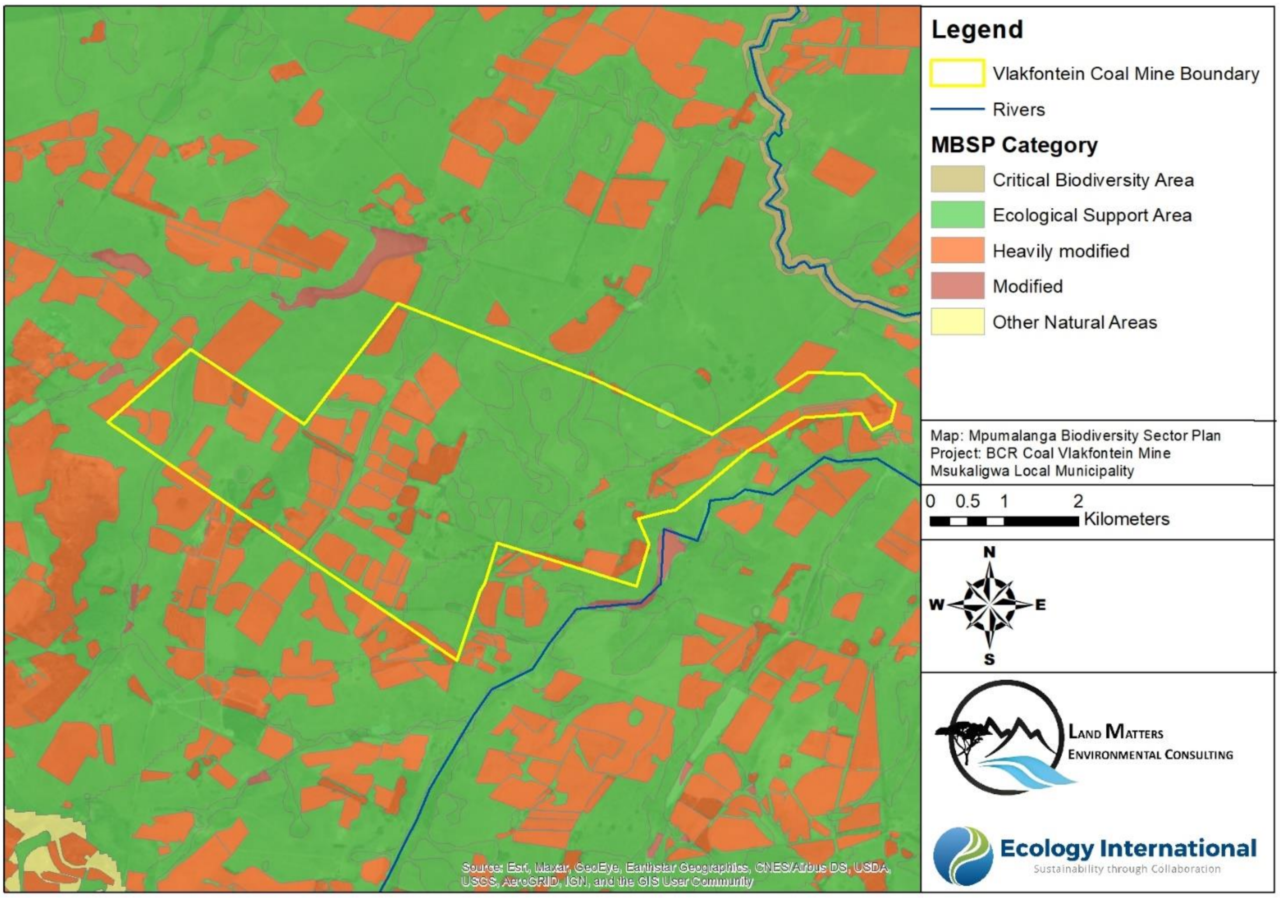


Figure 26: Mpumalanga Biodiversity Sector Plan outputs for freshwater ecosystems associated with the proposed BCR Coal Vlakfontein Mine (Mpumalanga Tourism and Parks Agency, 2014; updated 2019)

Associated Water Resources

The proposed BCR Coal Vlakfontein Mine is located within the newly revised Vaal Major WMA, which now includes the Upper, Middle and Lower Vaal catchments. Accordingly, the main rivers of the WMA include the Wilge, Liebenbergsvlei, Mooi, Renoster, Vals, Sand, Vet, Harts, Molopo and Vaal rivers. More specifically, the proposed BCR Coal Vlakfontein Mine is located within Quaternary Catchment C11A which comprises the extreme upper reaches and the source of the Vaal River.

Riverine Features

Watercourses directly associated with the study area include several unnamed tributaries of the upper reaches of the Vaal River (***Figure 27***). According to the topography of the Vaal River reach associated with the study area, as well as the unnamed tributary associated with the eastern extent of the proposed Mineral Rights Area, the reaches can be classified as having lower foothill characteristics, including a lower gradient mixed bed alluvial channel with sand and gravel dominating the bed. Reach types expected include pool-riffle or pool-rapid, and sand bars are also expected to be common in the pools (after Rowntree & Wadeson, 1999). Of additional relevance is that the reach of the Vaal River associated with the proposed BCR Coal Vlakfontein Mine is classified within the latest National Biodiversity Assessment as being free flowing. Both of the identified watercourses are considered to be Critically Endangered and poorly protected (Van Deventer et al., 2019).

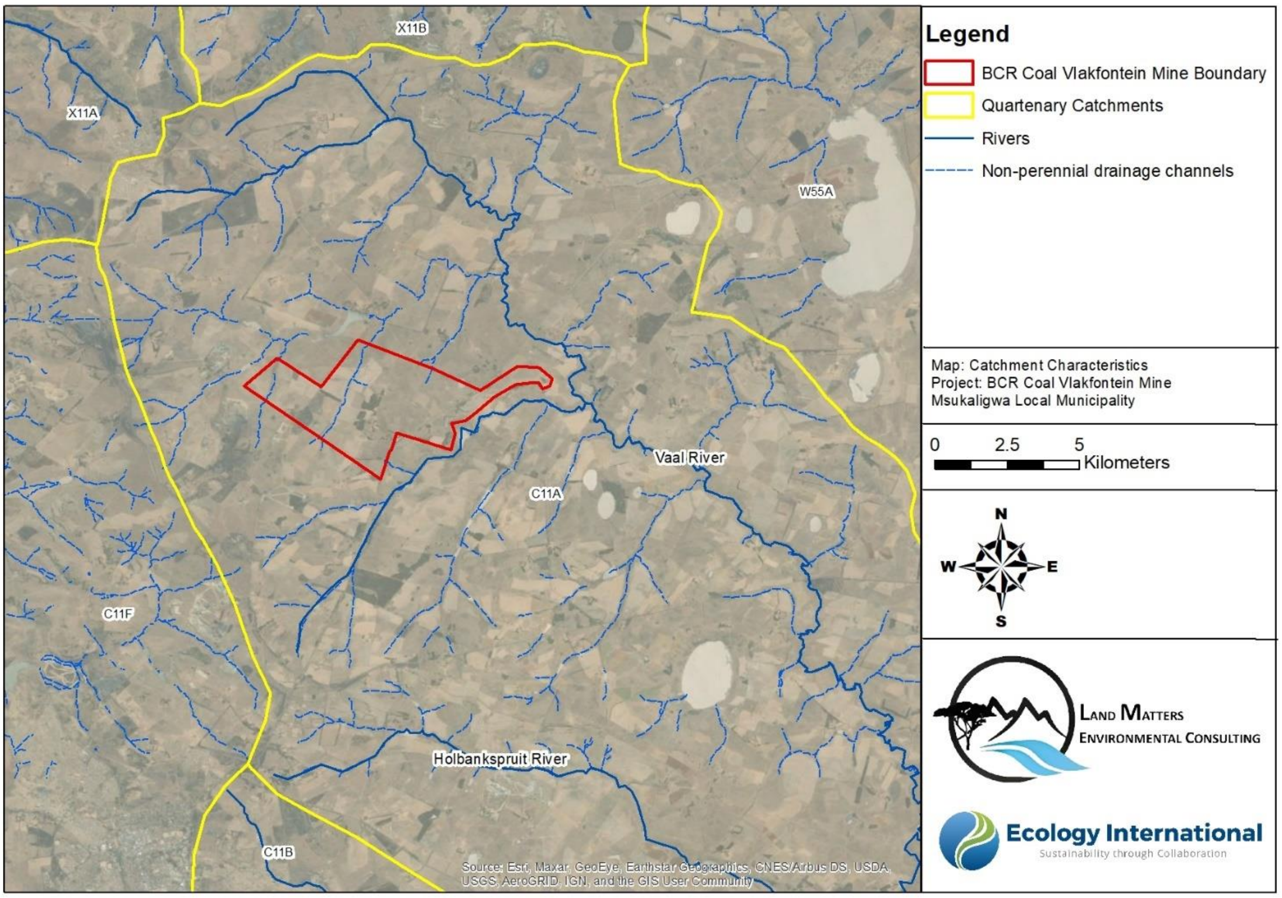


Figure 27: Catchment characteristics associated with the proposed BCR Coal Vlakfontein Mine

According to the Department of Water and Sanitation (2014), both the reach of the Vaal River (Reach C11A-01460) immediately downstream of the proposed BCR Coal Vlakfontein Mine, as well as the Unnamed Tributary associated with the eastern extent of the MRA (Reach C11A-01544), are considered to be in a moderately modified ecological state (Ecological Category C). For the Vaal River reach, the ecological importance and the ecological sensitivity are estimated to be 'moderate' and 'high', respectively, while those of the Unnamed Tributary are both estimated to be 'moderate'. ***Table 31***,

Table 32 and ***Table 33*** provide a summary of the determinants of the Present Ecological State (PES), ecological importance, and ecological sensitivity of the two watercourses.

Table 31: Present Ecological State of reach of the Vaal River immediately downstream of the proposed BCR Coal Vlakfontein Mine and the unnamed tributary associated with the eastern extent of the proposed Mineral Rights Area, according to the Department of Water and Sanitation (2014)

PRESENT ECOLOGICAL STATE		
	VAAL RIVER (REACH C11A-01460)	UNNAMED TRIBUTARY ASSOCIATED WITH EASTERN EXTENT OF MRA (REACH C11A-01544)
INSTREAM HABITAT CONTINUITY MODIFICATION	Moderate	Moderate
RIP/WETLAND ZONE CONTINUITY MODIFICATION	Small	Moderate
POTENTIAL INSTREAM HABITAT MOD ACT.	Large	Moderate
RIPARIAN-WETLAND ZONE MOD	Moderate	Large
POTENTIAL FLOW MOD ACT.	Moderate	Moderate
POTENTIAL PHYSICO-CHEMICAL MOD ACTIVITIES	Large	Small
ECOLOGICAL CATEGORY	**C (Moderately Modified)**	**C (Moderately Modified)**

Table 32: Ecological importance of reach of the Vaal River immediately downstream of the proposed BCR Coal Vlakfontein Mine and the Unnamed Tributary associated with the eastern extent of the proposed Mineral Rights Area, according to the Department of Water and Sanitation (2014)

ECOLOGICAL IMPORTANCE		
	VAAL RIVER (REACH C11A-01460)	UNNAMED TRIBUTARY ASSOCIATED WITH EASTERN EXTENT OF MRA (REACH C11A-01544)
INVERT REPRESENTIVITY (PER SECONDARY CATCHMENT)	Very High	Very High
INVERT RARITY (PER SECONDARY CATCHMENT)	Very High	Very High
FISH REPRESENTIVITY (PER SECONDARY CATCHMENT)	Moderate	Very Low
FISH RARITY (PER SECONDARY CATCHMENT)	Low	Low
ECOLOGICAL IMPORTANCE: RIPARIAN-WETLAND-INSTREAM VERTEBRATES (EXCL. FISH)	High	High
RIPARIAN-WETLAND NATURAL VEG RATING BASED ON % NATURAL VEG IN 500M	Very High	High
RIPARIAN-WETLAND NATURAL VEG IMPORTANCE BASED ON EXPERT RATING	Low	Low
RIPARIAN-WETLAND ZONE MIGRATION LINK	Very High	High
RIPARIAN-WETLAND ZONE HABITAT INTEGRITY CLASS	High	Moderate
HABITAT DIVERSITY	Low	Low
HABITAT SIZE (LENGTH)	Low	High
INSTREAM MIGRATION LINK CLASS	High	High
INSTREAM HABITAT INTEGRITY CLASS	Moderate	High
MEAN ECOLOGICAL IMPORTANCE RATING CLASS	**Moderate**	**Moderate**

Table 33: Ecological sensitivity of reach of the Vaal River immediately downstream of the proposed BCR Coal Vlakfontein Mine and the Unnamed Tributary associated with the eastern extent of the proposed Mineral Rights Area, according to the Department of Water and Sanitation (2014)

ECOLOGICAL SENSITIVITY		
	VAAL RIVER (REACH C11A-01460)	UNNAMED TRIBUTARY ASSOCIATED WITH EASTERN EXTENT OF MRA (REACH C11A-01544)
FISH PHYSICO-CHEMICAL SENSITIVITY	Moderate	Moderate
FISH NO-FLOW SENSITIVITY	Moderate	Moderate
INVERTEBRATE PHYSICO-CHEMICAL SENSITIVITY	Very High	Very High
INVERTEBRATE VELOCITY SENSITIVITY	Very High	Very High
RIPARIAN-WETLAND-INSTREAM VERTEBRATES (EXCL. FISH) INTOLERANCE TO WATER LEVEL/FLOW CHANGES	High	Low
RIPARIAN-WETLAND VEGETATION INTOLERANCE TO WATER LEVEL CHANGES	High	High
STREAM SIZE SENSITIVITY TO MODIFIED FLOW/WATER LEVEL CHANGES	Low	Low
MEAN ECOLOGICAL SENSITIVITY RATING CLASS	**High**	**Moderate**

Wetland Features

The National Wetland Map 5 database yielded a number of wetlands located throughout the proposed BCR Coal Vlakfontein Mine site. These are classified as seep wetlands, floodplain wetlands, channelled valley bottom wetlands and depressions (***Figure 28***). All wetland features associated with the proposed BCR Coal Vlakfontein Mine footprint are classified within the latest National Biodiversity Assessment as Critically Endangered, poorly protected or not protected at all, and at high risk to loss, with only the associated depressional (pan) systems being classified as Least Concern and at a moderate risk to loss (Van Deveter et al., 2019).

According to Mbona et al. (2015), all of the water resources within the study area are classified as wetland systems based on the revised wetland mapping inventory for the Mpumalanga Highveld region. These are classified as channelled valley bottom wetlands, floodplain wetland systems, seeps and depressions (***Figure 29***).

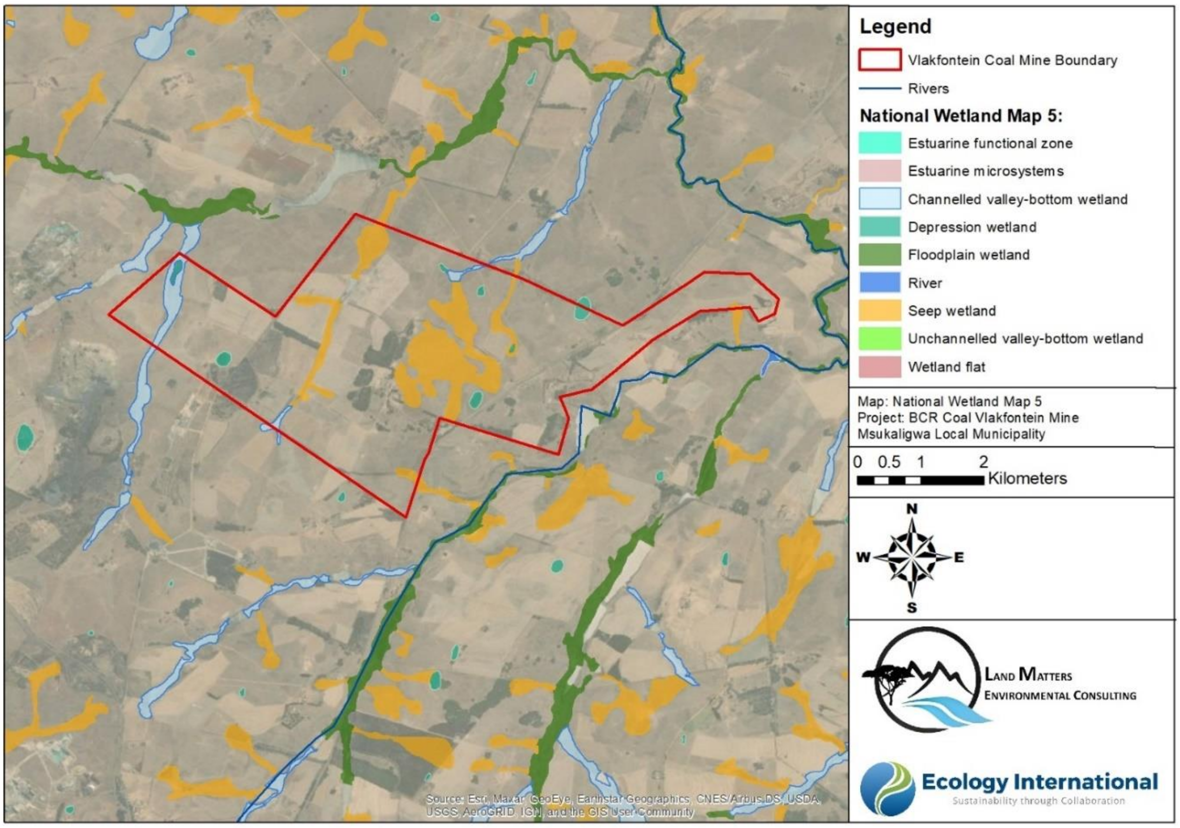


Figure 28: Wetlands within the BCR Coal Vlakfontein Mine study area as indicated by the NWM 5 (2018)

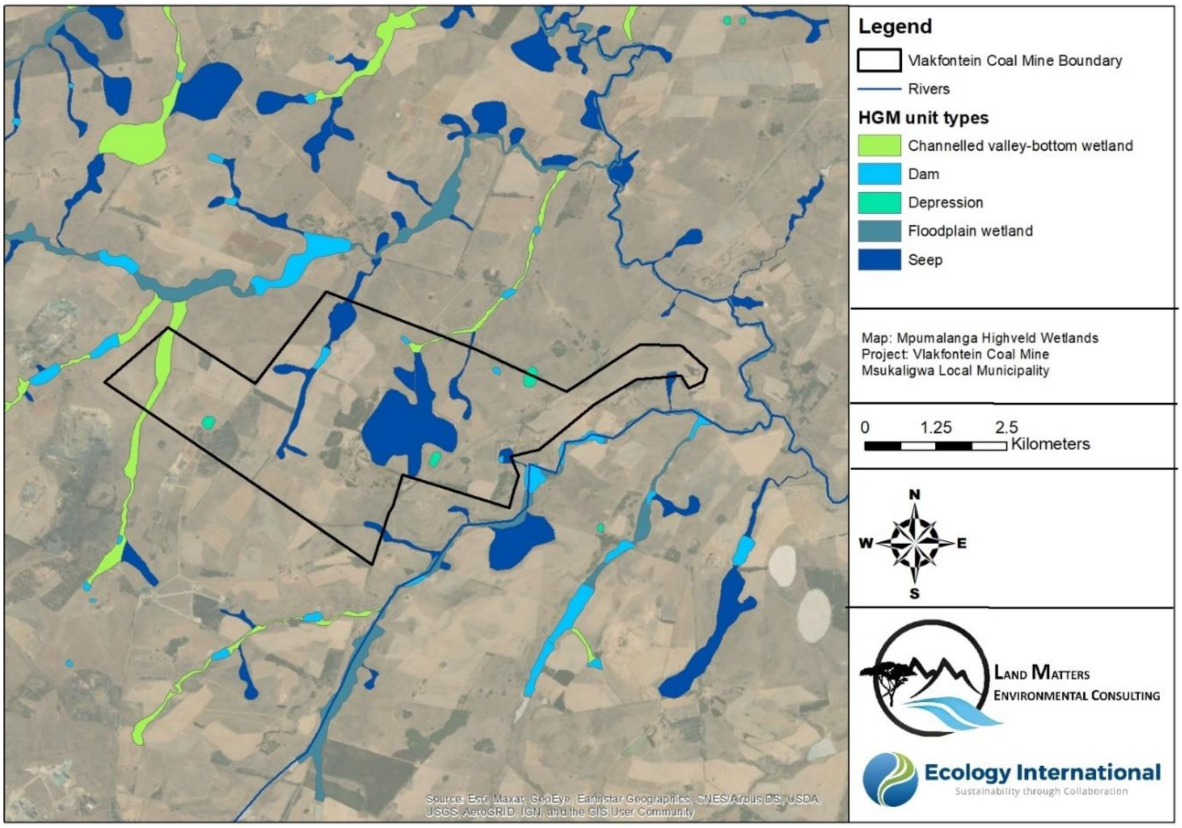


Figure 29: Wetlands within the study area as indicated by the Mpumalanga Highveld Wetland database

Wetland Delineation

The South African classification system categorises wetland systems based on the characteristics of different hydrogeomorphic areas (HGM) units. Fourteen (14) separate HGM units were delineated within the proposed BCR Coal Vlakfontein Mine study area (***Figure 30***). The characteristics of each of these HGM units are explained in detail in ***Appendix F.5 – Aquatic Biodiversity & Wetlands***.

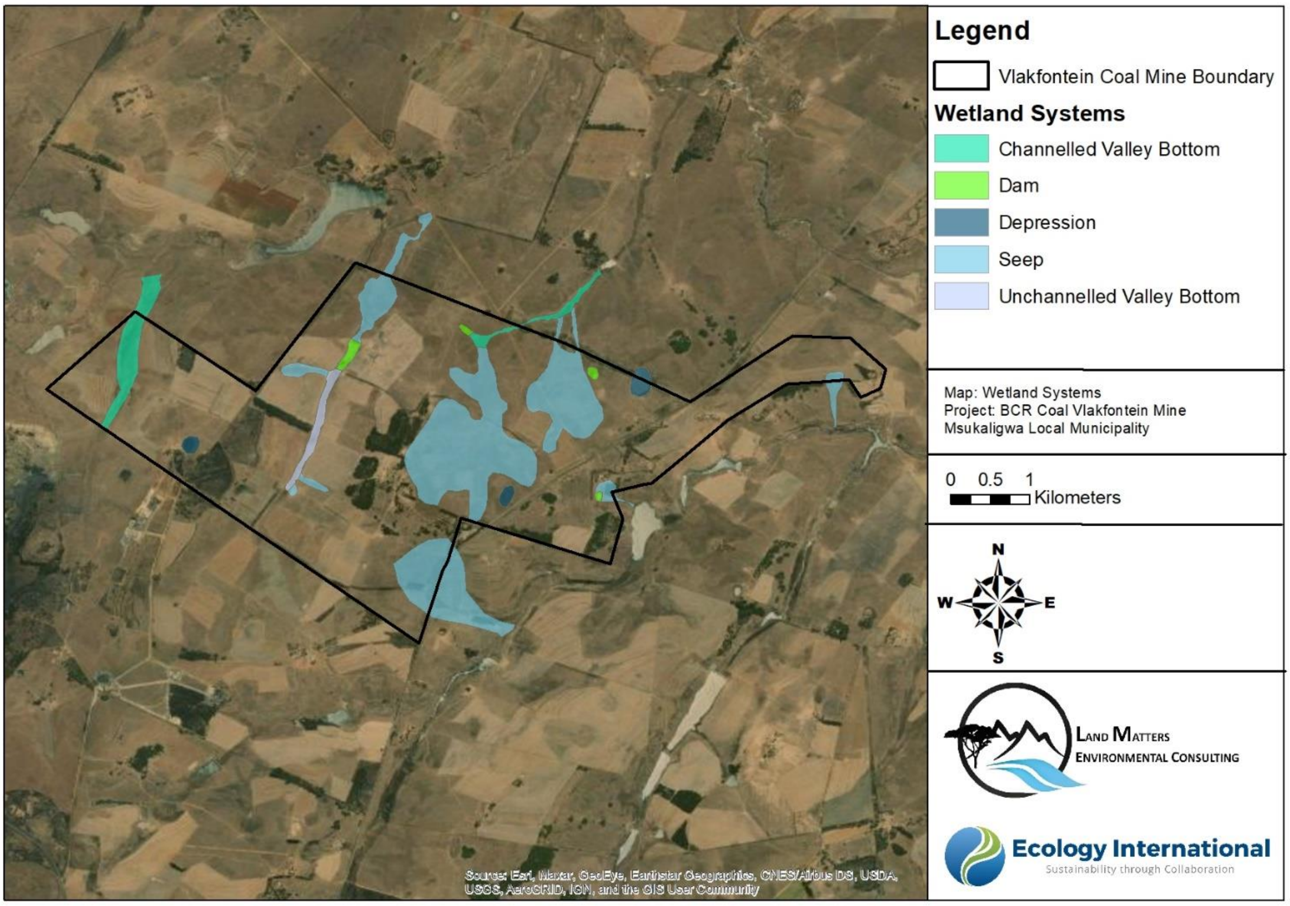


Figure 30: Wetland systems delineated at a desktop level within the proposed BCR Coal Vlakfontein Mine area

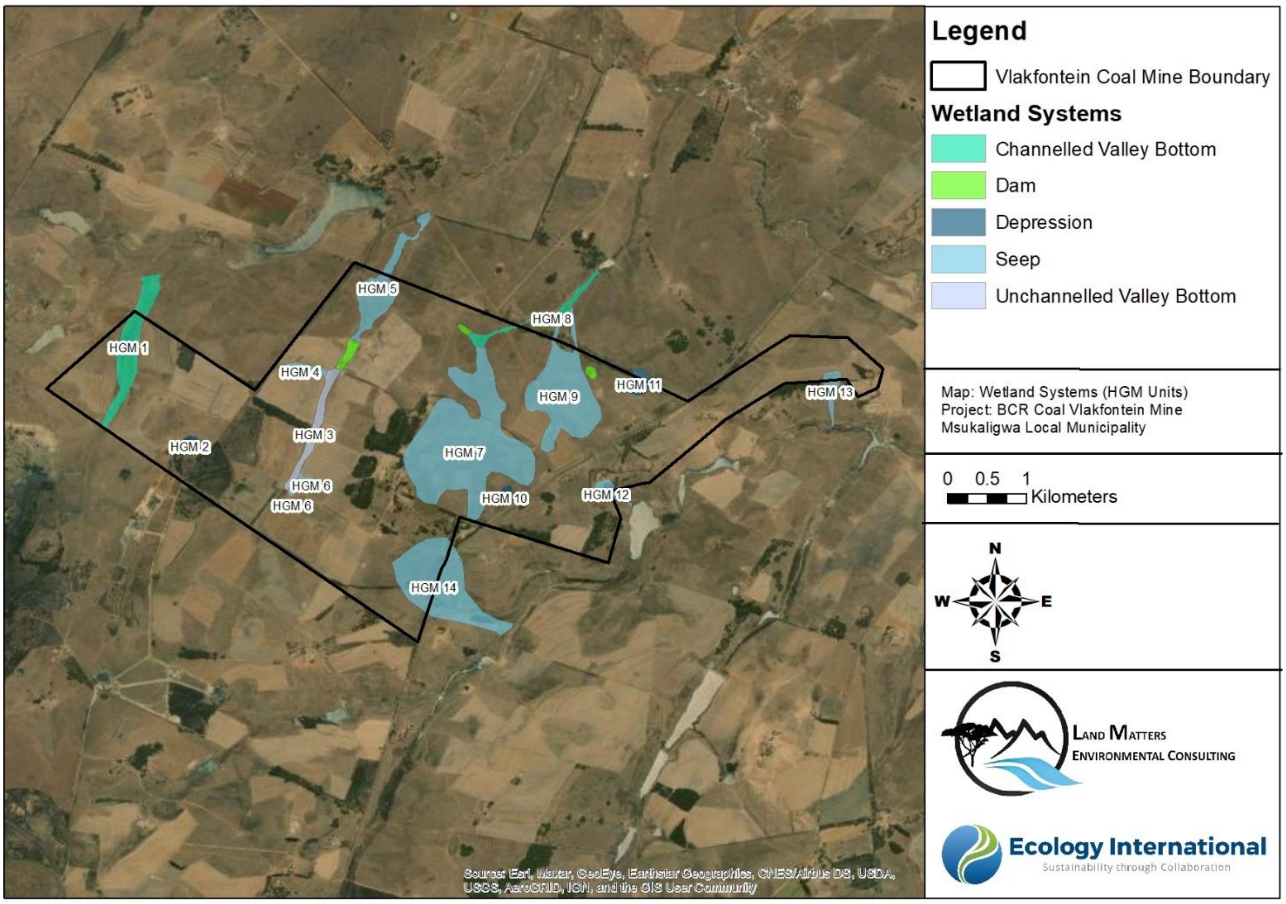


Figure 31: HGM units delineated within the proposed BCR Coal Vlakfontein Mine area

Present Ecological State

The HGM units were assessed with regards to their health according to the Wet-Health methodology4. A level 1B assessment (desktop scale) was conducted, with the results of this assessment being utilised to gain a general understanding of the health and condition of the wetlands within the BCR Coal Vlakfontein Mine area. Level 1B assessments take into consideration existing land cover data, as well as an examination of historic and current aerial imagery of the HGM unit and its associated catchment.

Through an investigation of the aerial imagery of the study area, several impacts were noted both within the wetland systems as well as their respective catchments. These impacts pertain largely to the use of the area for agricultural activities, including cultivation, the construction of numerous dams, and the construction of dirt roads to access cultivated fields. However, additional impacts within the catchments included the N17 road, which passes through the study area, the Mooifontein Coal Mine and low-density rural housing.

[4] The current size of the delineated wetlands was recorded. It must be noted that this is not the entire size of the wetland but rather the portion of the system delineated within the study area.

Agricultural earthen dams were also observed within the study area. The damming of wetland systems has long-term negative impacts on the hydrology, geomorphology, and vegetation dynamics of these systems.

The Mooifontein Coal is situated upstream of HGM 1. Coal mines within the catchment of wetland systems, cause impacts relating to pollution, sediment deposition, disruption to hydrological flow as well as the geomorphic setting of wetlands. No large-scale erosion was noted in the aerial imagery of HGM 1, however any water quality issues pertaining to the function of HGM 1 could not be determined due to the desktop approach to the study. Impacts to HGM 1 from the upstream coal mine would need to be identified during Phase 2 of the investigation.

The impacts described above were noted on a small-scale through the investigation of the aerial imagery of the site. The wetland systems as a whole appear to be intact and functional. All HGM units were therefore categorised as Largely Natural (Ecological Category B), or Moderately Modified (Ecological Category C). A summary of the PES scores obtained for the desktop-based assessment following application of the Wet-Health Level 1B approach is provided in ***Table 34***.

Table 34: Summary of PES scores following evaluation from the Level 1B Wet-Health assessment

HGM UNIT	WETLAND TYPE	HYDROLOGY	GEOMORPHOLOGY	WATER QUALITY	VEGETATION	PES SCORE (CATEGORY)
1	Channelled Valley Bottom	3.30	1.70	1.30	5.30	2.9 (C)
2	Depression	1.8	1.2	0.4	2.1	1.4 (B)
3	Unchanneled Valley Bottom	2.9	1.4	1.6	4.3	2.6 (C)
4	Seep	2.71	2.06	1.68	4.41	2.7 (C)
5	Seep	2.79	1.18	1.53	4.49	2.5 (C)
6	Seep	3.0	2.0	1.8	4.8	2.9 (C)
7	Seep	1.5	0.7	1.5	2.8	1.6 (B)
8	Channelled Valley Bottom	2.2	1.2	1.4	3.7	2.1 (C)
9	Seep	2.0	1.5	1.6	3.5	2.1 (C)
10	Depression	1.2	1.3	1.3	1.7	1.3 (B)
11	Depression	1.1	1.3	1.1	1.2	1.2 (B)
12	Seep	2.7	1.1	1.5	4.4	2.4 (C)
13	Seep	2.8	1.5	1.8	4.5	2.7 (C)
14	Seep	1.7	1.9	1.4	3.1	2.0 (C)

<u>*Aquatic Biodiversity*</u>

The following is the estimated aquatic faunal diversity that could be associated with the proposed BCR Coal Vlakfontein Mine:

- Approx. six (6) species of fish, two (2) of which have not yet been evaluated in terms of the IUCN Red Listed categories;
- Approx. eighty-eight (88) species of Odonata (Dragonflies and Damselflies), two (2) of which are of conservation concern;
- Approx. two (2) species of crab, neither of which of conservation concern; and
- Approx. seventeen (17) species of mollusc, one (1) of which is listed as Data Deficient.

Table 75 provides a list of aquatic species of conservation concern occurring or potentially occurring within the proposed BCR Coal Vlakfontein Mine study area.

It should be noted that two (2) of the fish species identified as being associated with the reach of the Vaal River associated with the proposed BCR Coal Vlakfontein Mine represent species which are in need of taxonomic revision and/or a revised assessment of their threat status, namely *Enteromius cf. oraniensis* (Orange River Chubbyhead Barb) and *Enteromius sp. pallidus cf. 'north'* (Goldie Barb), both of which have not been adequately assessed in terms of the IUCN Red List categories. Review of collection records obtained for the larger study area from the South African Institute for Aquatic Biodiversity (SAIAB) confirms collection of both species within the Vaal River downstream of the proposed BCR Coal Vlakfontein Mine on the farm Welgelegen 107 IT.

While the conservation status of the *Enteromius anoplus* species complex itself has been determined to be of Least Concern (Woodford, 2017), the very recent studies of Kambikambi et al. (2021) have described several new species from the complex, with more new species descriptions expected. Consequently, the results obtained by Kambikambi et al. (2021) indicate that the current IUCN Red List assessment of *E. anoplus* is obsolete. It is, therefore, clear that further studies are required to understand the geographic ranges and thus conservation status of the unique populations of this *Enteromius* group to determine the significance of those specimens that may be present within the reach of the Vaal River associated with the proposed BCR Coal Vlakfontein Mine. Accordingly, the conservation status for the *Enteromius cf. oraniensis* population which is the only Chubbyhead Barb described from the species complex within the larger Orange River Catchment (and within which the Vaal River falls), is also considered Data Deficient.

Similarly, according to Chakona et al. (2015), genetic analyses of *Enteromius pallidus* collected from the currently known distribution of the species within South Africa grouped specimens into two distinct lineages, namely a southern lineage from where the original type specimen was collected, and a northern lineage. Further, the deep genetic divergence between the northern and southern lineages of *E. pallidus* suggests a long history of isolation, raising two taxonomic possibilities. The first possibility is that the northern lineage of *E. pallidus* may represent an undescribed species. A second possibility is that the 'true' *E. pallidus* is confined to coastal rivers of the Eastern Cape, and the northern lineage belongs to a different, but known species or species complex. However, further research is required to resolve this taxonomic uncertainty between the two genetically distinct lineages to determine implications on conservation priorities. Accordingly, the species is regarded as not having a formal conservation status until such time as taxonomic resolution and a re-assessment of the population extent has been determined.

Table 35: Aquatic species of special concern potentially associated with the proposed BCR Coal Vlakfontein Mine

SPECIES	COMMON NAME	RED LIST CATEGORY	ASSESSMENT	ENDEMISM
MOLLUSCA				
Burnupia caffra	-	DD	Regional - South Africa	Not endemic
ODONATA				
Chlorocypha consueta	Southern Red Jewel	RE	Regional - South Africa	Not endemic
Diplacodes pumila	Dwarf Percher	EN	Regional - South Africa	Endemic
Lestes uncifer	Sickle Spreadwing	NT	Regional - South Africa	Not endemic
FISH				
Enteromius cf. oraniensis	Orange River Chubbyhead Barb	NE	N/A	Endemic
Enteromius sp. pallidus cf. 'north'	Goldie Barb	NE	N/A	Endemic

* EN = Endangered; DD = Data Deficient; NE = Not Evaluated; NT = Near Threatened; RE = Regionally Extinct;

DESKTOP SENSITIVITY VERIFICATION

The desktop investigation of the study area for the proposed BCR Coal Vlakfontein Mine has confirmed the classification of the study area as being located within an area regarded as being of very high sensitivity from the perspective of the aquatic ecosystem. As such, a detailed aquatic biodiversity specialist assessment as well as a detailed wetland specialist assessment would be required as part of the Environmental Impact Assessment phase of the study.

PLAN OF STUDY FOR EIA

Based on the results obtained during the present study, it was determined that both aquatic and wetland specialist studies will be required to inform the Environmental Impact Assessment. In this regard, all aquatic and wetland studies are to ensure compliance with 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 (Act 107 of 1998) and Water Use Licence Application process. Given the high sensitivities of the freshwater ecosystems associated with the proposed BCR Coal Vlakfontein Mine, it was further determined that such specialist studies are to be conducted at a detailed level, and that an aquatic and/or wetland compliance statement are not deemed to be applicable on the basis of the sensitivities identified during the present exercise.

A detailed Terms of Reference for the aquatic and wetland assessments is provided below and should be read together with the 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 (Act 107 of 1998), as well as the Natural Scientific Professions Act (Act 27 of 2003).

Aquatic Specialist Assessment

In addition to the general requirements for specialist studies, the following are deemed applicable to aquatic specialist assessments:

- Ideally, two (2) seasonal aquatic studies are to be conducted for the purpose of establishing a baseline for the associated aquatic ecosystem and to inform a monitoring approach to be undertaken should the proposed mine receive authorisation. Where the aquatic assessment is to be conducted during a single season only, a single comprehensive aquatic ecosystem assessment is to be conducted following sufficient summer rainfall and inundation of the associated watercourses for a period of at least six (6) weeks prior to the study commencing. As such, it is expected that unless significant early summer rainfall occurs within the upper catchment, studies of the associated aquatic ecosystem are expected to take place within the early part of the summer period (i.e. between November and December);
- Aquatic macroinvertebrates sampled within the study area, specifically Odonata, are to be identified to the lowest possible taxonomic level (i.e. lower than Family level) in order to determine the possible presence of species of conservation concern;
- A detailed ichthyofaunal assessment is to be undertaken within the reach of the Vaal River and Unnamed Tributary both upstream and downstream of the watercourses originating from the proposed Mineral Rights Area. During the assessment, the relative density and diversity of fish species is to be investigated for each site, with specific attention given to the presence of species of conservation concern and as-yet undescribed species;
- All aquatic data collection is to be done in a manner that is non-destructive, unless the relevant permits are obtained from the Mpumalanga Tourism and Parks Agency. Any samples collected on-site are to be lodged with the South African Institute for Aquatic Biodiversity (SAIAB);
- Potential spawning habitat for identified species of conservation concern, Protected and/or endemic species is to be identified;
- Determination of the PES of the associated watercourses is to be determined by the EcoStatus approach (i.e. by means of the Macro-Invertebrate Response Assessment Index, Fish Response Assessment Index, etc.);
- A detailed monitoring programme is to be developed as part of the assessment, that will take effect immediately upon authorisation so as to allow for collection of suitable pre-mining data that will inform the monitoring of potential impacts; and
- The aquatic specialist must provide input into a biodiversity management plan to be developed for the mine, with specific consideration given to the identified sensitivities.

Wetland Specialist Assessment

In addition to the general requirements for specialist studies, the following are deemed applicable to the wetland specialist assessment:

- Wetlands within the study area as well as within 1 km of the study area are to be delineated using the guidelines as published by the DWAF (2005) entitled "A Practical Field Procedure for Identification and Delineation of Wetlands and Riparian Areas". However, a pragmatic approach should be taken if any problematic soil types are encountered, and the delineation of wetlands in such soil types supported;
- The wetland delineation component of the specialist report should include the following information as a minimum:
    - A description of how and when the delineation was done;
    - A description of the catchment, landscape, landscape position, topography (slopes – concave, convex, flat etc., and slope changes), vegetation, soils and hydrological conditions including a summary of the available information used to determine the extent of wetland habitat;

  - Review of historical imagery and anecdotal evidence;
  - Site maps identifying the boundary of the wetland within the study area, plus an indication if the wetland extends outside the site boundary, albeit only at a desktop level if access is restricted or difficult in those areas, and the location of all data collection points recorded during the study. This should also include information on the type and date of imagery used to support the delineation;
  - All sample points used by the delineator to determine the boundary of the wetland must be recorded using a Global Positioning System (GPS). The GPS used during the study and the accuracy of the GPS should be stipulated in the reporting to highlight potential inaccuracies in the boundaries presented on the map;
- All delineated wetlands are to be classified according to Ollis et al. (2013);
- All delineated wetlands to be assessed in terms of health and functionality (hydrological, ecological and ecosystem services) using recognised tools (e.g. Wet-Health, Wet-EcoServices, Wet-IHI, etc.), taking cognisance of recent findings regarding the limitations of such tools on certain hydrogeomorphic types;
- Consideration should at all times be given to the drivers and responses of wetland formation/support for delineated wetlands when considering potential impacts associated with the proposed mining activity. In this regard, the wetland specialist is to take cognisance of the findings obtained from the hydropedological assessment of the site in determining the potential impact on landscape-level wetland drivers;
- The wetland specialist is to take further cognisance of the findings of the soil, floral and groundwater assessments completed for the study as all these studies may contribute to and/or support the findings of the wetland assessment.

KEY ISSUES TO BE ADDRESSED

Any activities associated with a natural system, whether historic, current, or proposed, will impact on the surrounding environment, usually in a negative way. The purpose of this phase of the study was to identify potential impacts associated with the proposed BCR Coal Vlakfontein Mine area.

The following key issues are identified that needs to be assessed during the EIA phase:

- ***Direct loss of wetland features*** - The presence of numerous wetland features within the proposed BCR Coal Vlakfontein Mine area is likely to result in the direct loss of some wetland systems. The proposed activity is further expected to 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.
- ***Erosion and sedimentation of wetlands and watercourses*** - While the placement of various infrastructure associated with the proposed BCR Coal Vlakfontein Mine may not result in the direct loss of wetland habitat, activities associated with the establishment of the mine are likely to impact the adjacent and downstream wetlands 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 bulk density and therefore reduces the infiltration rate of stormwater into the soil profile. This leads to increase in overland flow and the increased likelihood of erosion gully formation and associated deposition of sediment within the associated wetlands. 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.
- ***Water quality deterioration*** - 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 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 remaining wetlands and watercourses, affecting their ability to act as ecological corridors and provide ecosystem services within the larger 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. 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 uncontrolled 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. If no mitigatin measures are implemented following the completion of mining activities, the void of the opencast pits will be filled with unconsolidated material of differing physical properties. If there is an elevated pyrite content associated with fill material, these voids would start to generate sulphates and acid when the void fills with water. The mine drainage water exiting the mine area at the decant point then leads to the establishment of an acid and/or sulphate-rich seep, resulting in downstream water quality deterioration. This is of particular concern given the classification of the study area as being a SWSA, and origin of the Vaal River and mitigation measures would need to address this potential impact.

- ***Loss of biodiversity*** - Mining activities, including blasting, is expected to result in the loss of biodiversity features within the immediate area, and as result, a depauperate aquatic biodiversity assemblage downstream of the proposed mining activities. This impact is of particular relevance given that currently undescribed fish species of potential conservation concern are known to be present within the reach of the Vaal River downstream of the proposed BCR Coal Vlakfontein Mine 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. Noise generated through mining activities is further expected to result in a localised decrease in amphibian species as a result of decreased mate attraction during breeding periods. The further likelihood of acid or sulphate-rich decant emanating from the filled void is further likely to result of a loss of aquatic diversity within the Vaal River system, resulting in the dominance of aquatic biota having a high tolerance to modified water quality, with the diatom assemblage expected to be dominated by species with a high affinity for industrially impacted waters and a high proportion of valve deformities.
- ***Invasive alien plant species encroachment*** - Alien invasive trees and shrubs are expected to increase within the area as these species 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.

REASONED OPINION REGARDING THE ACCEPTABILITY OF THE PROPOSED DEVELOPMENT

Based on information obtained during the desktop site sensitivity verification assessment, it is concluded that the proposed BCR Coal Vlakfontein Mine is likely to result in a direct loss of wetlands determined to be in a largely natural state and identified as being FEPAs within a designated SWSA and Fish Sanctuary. While it is acknowledged that some mining activities are already located within the catchment of HGM 1, such activities were determined to fall outside the boundaries of the designated SWSA and not directly located within wetlands identified as being FEPAs. It should also be noted that it is understood that the Department of Water and Sanitation were to propose an amendment to Chapter 3 of the National Water Act to include general prohibitions and restrictions within SWSAs for various activities including opencast and underground mining (Atwaru, 2020), thereby acknowledging the importance of such areas on water security at a national level.

In addition, according to the Resource Quality Objectives set for the Upper Vaal (Department of Water and Sanitation, 2016), the Recommended Ecological Category (REC) determined for the catchment within which the proposed mine is to be located is set as an Ecological Category B, and is reflected as such within the numerical limits set for instream habitat, aquatic macroinvertebrates, fish, riparian vegetation, hydrology and water quality. In addition, the Resource Quality Objective set for the catchment state that 'salt concentrations must be maintained to meet quality requirements for agriculture and to maintain the ecosystem wellbeing', an objective that will be unlikely to be achieved should additional mining activities impact the water quality and quantity within the catchment through mining of wetlands and inadvertent or unintentional release of mine-affected water into the catchment.

Based solely on the outcomes of the thorough desktop assessment of the of the freshwater ecosystem assessment, it is the opinion of the authors that the mine is not supported from a freshwater ecosystem perspective. It must be noted that the opinion given in this report should be utilised as preliminary 'red flag' for the proposed activity within the site. The opinion of the authors could change depending on the outcomes of the EIA phase of the assessment, and in particular the findings of the field-based investigation. This information is not yet known and is thus a limitation to the reasoned opinion given. Furthermore, the opinion does not take into consideration any proposed mitigation measures or layout changes that could reduce to impact of the mining activities on the freshwater ecosystems identified. These factors will form part of the EIA phase of the assessment.

IX. HYDROLOGY

Isikhungusethu Environmental Services (Pty) Ltd was appointed by Management Assistance (Pty) Ltd on behalf of BCR Coal (Pty) Ltd to conduct a desktop Hydrological assessment and inform the required Scoping Report (Phase 1).

The Scoping Assessment is attached as ***Appendix F.6 – Hydrological Assessment***.

SUMMARY OF BASELINE CONDITIONS

As discussed in previous sections (section ***1)(a) I*** and ***II***), the proposed development is situated in Quaternary Catchment C11A within the greater Vaal catchment, specifically the Upper Vaal.

The monthly rainfall values show that most rainfall in this area occurs during the summer months (December, January and February). Furthermore, as a result of the topography and climate found within this area most rainfall will occur as convective rainfall from high intensity events. This indicates a high stormflow and potential for erosion if correct measures are not put in place.

Temperatures in this area also show high levels of seasonality with the highest occurring during the summer months (December to February) and the lowest occurring during June, July period. This, in turn, will influence the evaporation of this area.

Annual evaporation in this area has a narrow range from just over 1790 to 1840 mm per year indicating that evaporation is more than double the annual rainfall. Hence, there is a significant deficit. Consequently, the smaller stream systems may not flow during the dry season; if there is water flowing it is likely to be due to baseflow contributions from larger catchment areas (Pitman and Bailey, 2016; Schulze et al, 2007).

The mean annual runoff for this Quaternary is approximately 75.9mm and as with the rainfall, will be highly seasonal, with the greatest runoff occurring during the summer months and the least during the winter months. There are several water courses that flow through proposed site, and these then flow into the upper tributary of the Vaal River system. Furthermore, it is highly probable that these smaller systems are non-perennial, while the larger systems will be perennial throughout the year (Pitman and Bailey, 2016). As such these water courses will be one of the greatest sensitivities on this site, especially as they flow directly into the Vaal system, and inputs into this system could have significant impacts on downstream users.

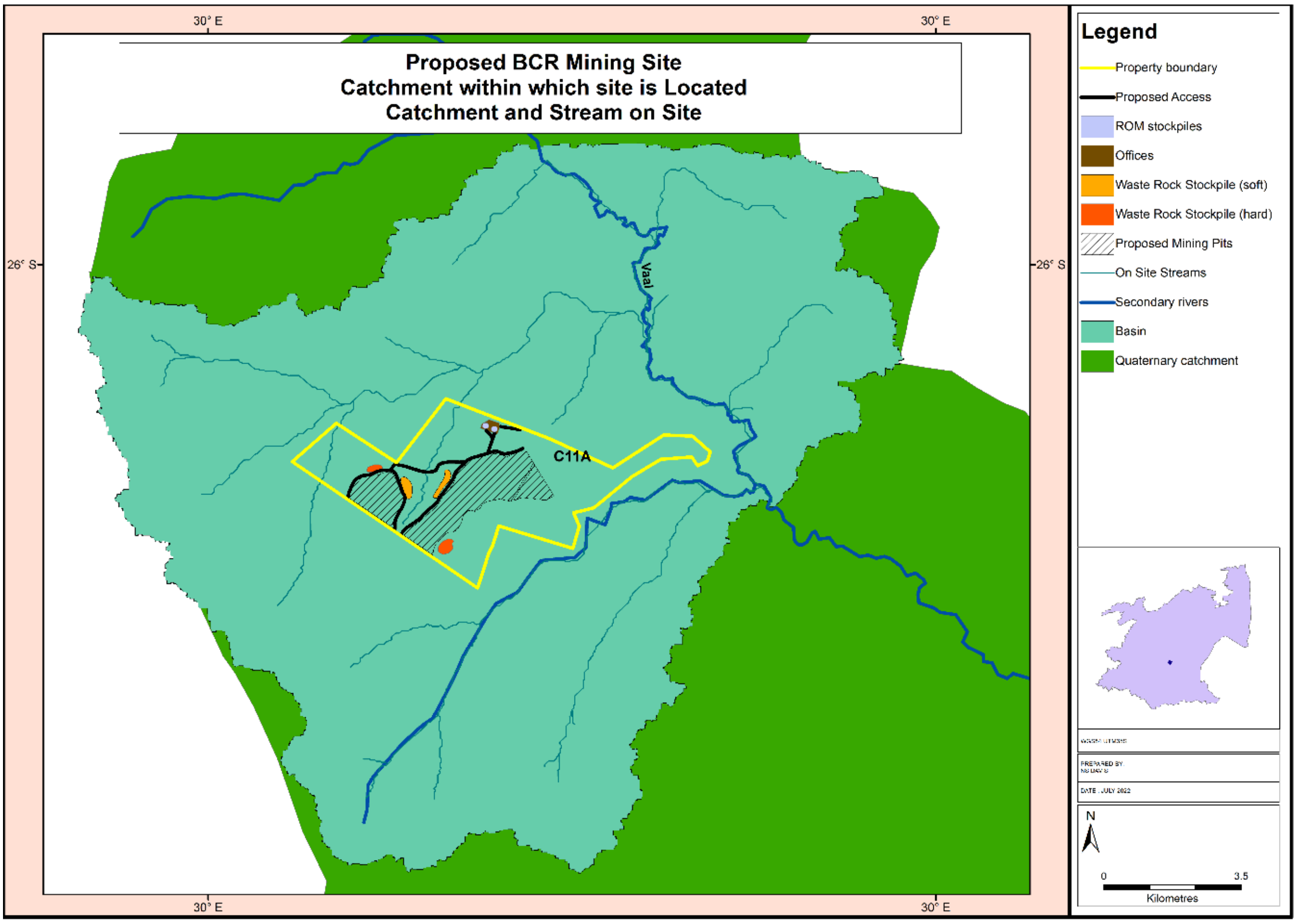


Figure 32. Streams flowing through the site and draining into the Vaal system

The topography in the project area is variable, with numerous ridgelines forming watersheds within the C11A Quaternary catchment (***Figure 33***). The majority of the site for the proposed flat to gentle slope, with a steeper southern facing sloped towards the water course that bisects the site. A similar pattern is shown with a steeper north facing slope on the more southern mining site.

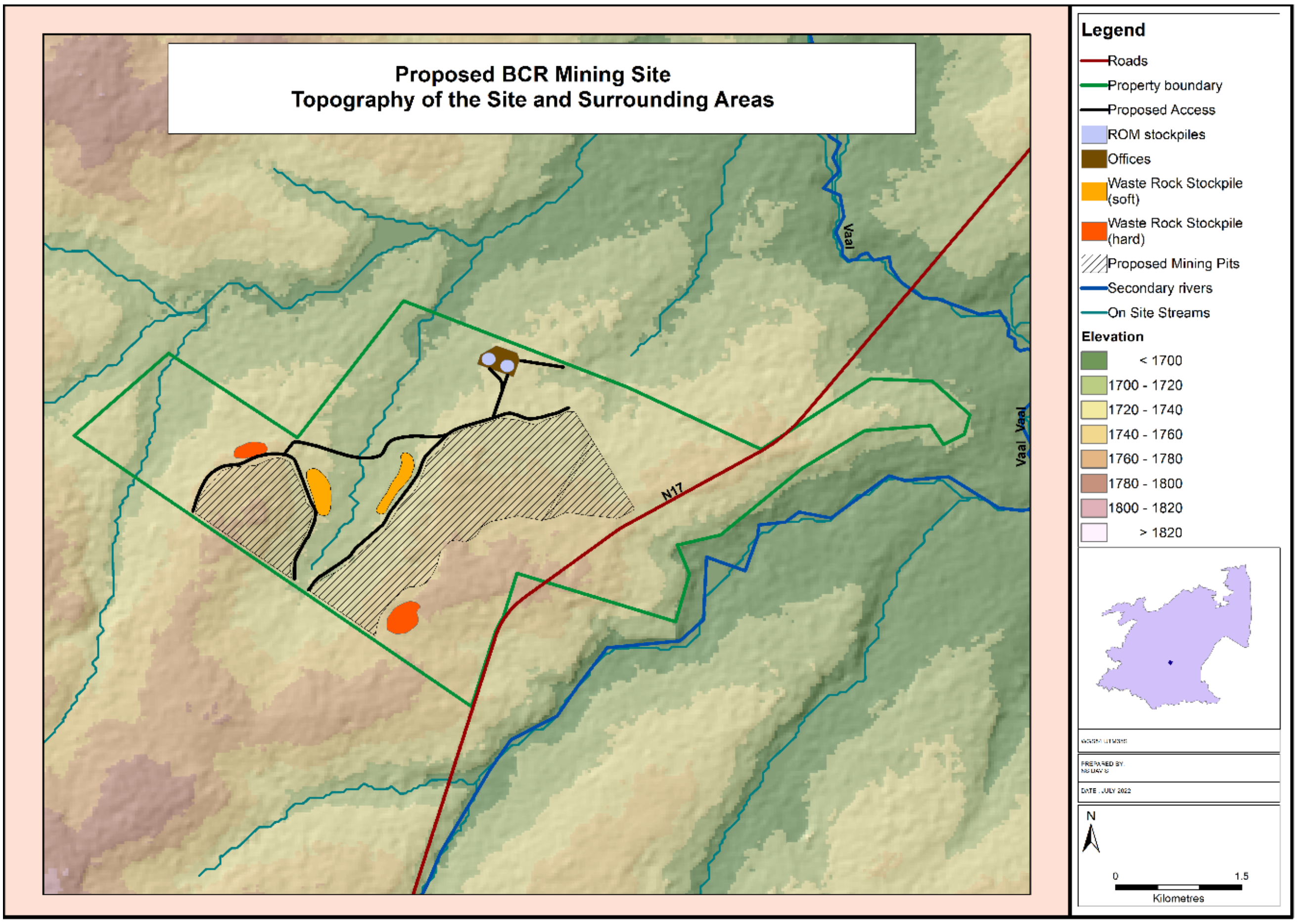


Figure 33. Elevation of the proposed coal mine and immediate surrounds (Earth Explorer, 2022)

Runoff within the project area currently will occur at a low rate, due to the flat to gentle slope, as well as the land cover which comprises of a mixture of grass species. However, towards the lower north-eastern edge of the property the rate of runoff will increase as a result of the increased slope and will eventually form a small ephemeral/episodic water course. The steeper slope in the small valley of the stream that bisects this mining site could result in excess runoff entering this system and eventually entering the Vaal system downstream. Additionally, this project area is located in a region where medium to high rainfall thresholds are exceeded (10mm to 25mm respectively), it is implied that during the wet season higher intensity rainfall events occur. Soils in this area are composed of sandy loam with a low clay content (15-20%). Owing to the relatively sandy nature of the soil, this is classified as an area of high erosion potential. Hence, significant erosion is expected to occur in the event that surface cover is removed (Schulze and Bulcock, 2011, Bailey and Pitman, 2016). Under current conditions, there is no significant evidence of erosion on the proposed site nor the farm portion within which the proposed site is located.

DESKTOP VERIFICATION OUTCOME

The water resources in relation to the proposed activity was verified to be high from a desktop perspective.

A high sensitivity classification is defined as a water resource that is located in the vicinity of a high-risk activity such as mining, as well as being in the upper reaches of a major catchment system with a significant number of water users downstream.

In the context of this study this area was classified as high sensitivity due to the following:

- Water courses are located downstream of the proposed activity. As such any spillage of pollutants or incidents could result in these chemicals entering the water system.
- Quaternary catchment C11A is the highest catchment in the upper Vaal catchment, as consequence any pollutants that enter this system could, if significant enough, pollute virtually the whole Vaal system.
- There will be a complete replacement of the current surface vegetation on site. Until the closure of the mine a large portion of this site will remain exposed to the elements which could result in considerable erosion and therefore, potential pollution of the downslope water courses.
- If there are contaminants from the excess mine water stored in the proposed raw water dam, it is possible that in an extreme rainfall event that this dam may overflow into the water courses downslope.
- A lowering of the ground water table as it is indicated that boreholes will be drilled to accommodate some of the water requirements for the mine. This could in turn affect flows during the drier period, most of which rely on recharge from the ground water system.

PLAN OF STUDY FOR EIA

The approach and key issues that will be dealt with during the assessment phase are:

- Site visit to identify areas that are likely to be most impacted upon by the establishment of the proposed mine as summarised in Section 7, as well as the potential alternatives identified in Section 8.
- Identification of possible impacts of the mine on water resources during the assessment phase will be undertaken through:
    - A 1 in 100 year flood line determination
        - This is to be undertaken to prevent the development of any infrastructure within the 1 in 100 year or within 100 metres of a water resource as per GN 704.
        - In the case of this project the Rock stockpile (soft) appears to be in close proximity to a small water course (Figure 11).
        - A proposed road crosses the same water course indicated above, as such a floodline assessment is required to ensure appropriate infrastructure is used and that minimal damage is done to the water course (Figure 11).
    - The development of a conceptual storm water management plan
        - To prevent pollution of water resources which may result during high intensity rainfall events (NWA No. 36 of 1998)
        - As indicated above this pollution may occur during high intensity rainfall events and as stock piles and infrastructure is located upslope of the streams an appropriate mitigation strategy needs to be put in place.
    - A surface hydrological assessment

    - To identify any further risks that may result from the development of the proposed mine (NWA No 36 of 1998, GN 704)
- Based on the findings of these assessments appropriate mitigation measures will be developed to minimise the impacts that have been identified.

KEY ISSUES TO BE ADDRESSED

The proposed site will result in the removal of soil surface cover and the presence of hard surfaces and drainage systems, which will accelerate flows and could result in the occurrence of erosion if storm water runoff is not properly controlled and disposed of. This could result in a deterioration in the water quality of downstream areas.

It is suggested that the two waste rock piles (soft), yellow polygon, be moved to the alternative location as indicated by the two green points (***Figure 34***). The reason for this is that the distance to the nearest water course will be increased, and the slope is decreased. This immediately reduces the risk of possible pollutants entering the system. This will increase the distance of the waste stockpiles from the 100m buffer, furthermore, it is recommended that a small area, circled in red be removed from the mining pit as this is also in close proximity to the water course. In the case of the rock pile on the eastern edge of the river, if it was moved to above the mining site, as per the green point, the risk would be virtually eliminated as any pollutants would flow into the mining site rather than the water course. The other infrastructure on the site appears to be in suitable location.

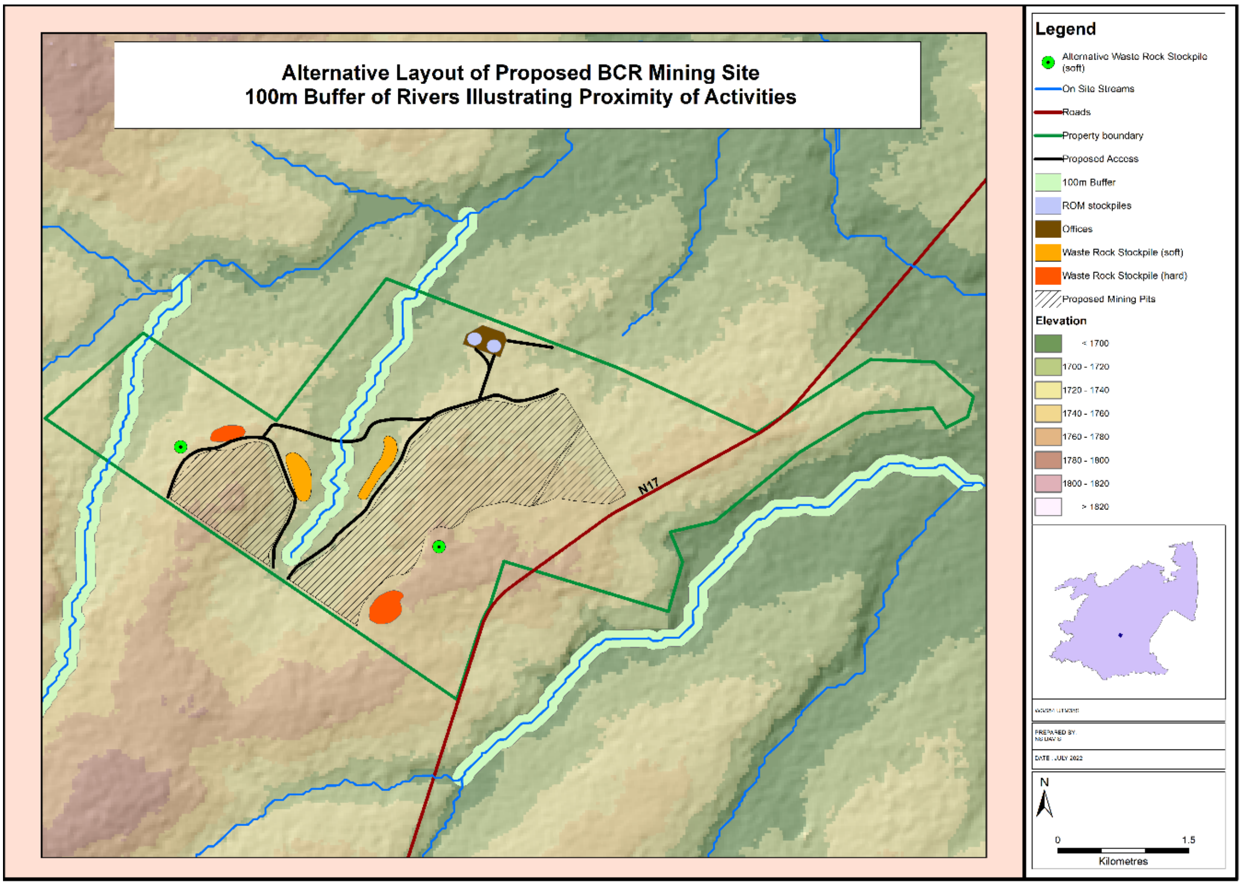


Figure 34. Alternative location of some of the support infrastructure to reduce risk to the water courses on site

REASONED OPINION REGARDING THE ACCEPTABILITY OF THE PROPOSED DEVELOPMENT

The conversion of a significant portion of the site to an open cast coal is likely to negatively impact on water resources. The risks of this proposed mine could be significantly reduced if all mitigation measures proposed during the assessment phase are followed.

Owing to the nature of the activity and the potential risks it is recommended that a full surface hydrological assessment be undertaken to determine the possible impacts on the streams in the vicinity of this proposed mining site, especially the stream that bisects this site.

X. GEOHYDROLOGY

Delta h Water System Modelling was appointed by Environmental Management Assistance (Pty) Ltd on behalf of BCR Coal (Pty) Ltd to conduct a desktop Geohydrology assessment and inform the required Scoping Report (Phase 1).

The Scoping Assessment is attached as ***Appendix F.13 – Geohydrological Assessment***.

METHODOLOGY AND APPROACH

The desk study entailed a review of the available groundwater related information at the project area. The information relied on the following:

- Geological information based on the 1:250 000 scale geology map.
- National hydrogeological map of South Africa, 1:500 000 scale hydrogeology map.
- Digital Elevation Model (DEM) based on a 30m x 30 m grid, Advanced Spaceborn Thermal Emission and Reflection Radiometer (ASTRA) data.
- National Groundwater Achieve (NGA) borehole database, upheld by the Department of Water and Sanitation (DWS).

At the time of finalising this report, access to the site associated with the proposed development could not be gained to conduct the required hydrocensus. The National Groundwater Achieve (NGA) database, upheld by the Department of Water and Sanitation (DWS), have been accessed to obtain regional borehole information to assist in the conceptualisation of the groundwater occurrence, such as groundwater flow, for quaternary catchment C11A.

At the time of finalising this report, access to the site associated with the proposed development could not be gained to conduct the required hydrocensus. The water quality was based on the NGA database for quaternary catchment C11A. Three (3) water samples for catchment C11A could be obtained.

The groundwater recharge rate at site is based on the GRAII data held by DWS. No independent measurements of recharge and seepage rates for the geology were taken.

SUMMARY OF BASELINE CONDITIONS

Hydrogeology

Based on the conceptual hydrogeological understanding of the site, the following hydro-stratigraphic zones are differentiated within the model area:

- **Weathered Karoo aquifer -** The weathered zone of the Karoo sediments hosts the unconfined or semi-confined shallow weathered Karoo aquifer or hydro-stratigraphic zone. The weathered zone is typically around 2 m to 21 m thick and water levels within this aquifer are often shallow (few meters below ground level). Due to direct rainfall recharge and dynamic groundwater flow through the unconfined aquifer in weathered sediments, the water quality is generally good, but in the absence of an overlying confining layer also vulnerable to pollution. Localised perched aquifers may occur on clay layers or lenses but are due to their localised nature of no further interest in the context of the current study. Water intersections in the weathered aquifer are mostly above or at the interface to fresh bedrock (sandstone or sills), where less permeable layers of weathering products and capillary forces limit the vertical percolation of water and promote lateral water movement. Groundwater daylights as springs where the flow path is obstructed by less permeable dolerite sills (contact springs) or where the surface topography cuts into the groundwater level at e.g., drainage lines (free draining springs).
- **Fractured Karoo aquifer -** The fractured Karoo aquifer consists of the various lithologies of siltstone, shale, sandstone and the coal seams. Groundwater flow is governed by secondary porosities like faults, fractures, joints, bedding planes or other geological contacts (including coal seams), while the rock matrix itself is considered impermeable. Geological structures are generally better developed in competent rocks like sandstone, which subsequently show better water yields than the less competent silt- or mudstones and shales. Not all secondary structures are water bearing due to e.g. compressional forces by the neo-tectonic stress field overburden closing the apertures. The fractured Karoo aquifer is considered a semi-confined aquifer, depending on the prevailing sedimentary succession. Fractured Karoo aquifers have typically a low hydraulic conductivity (<0.001 m/d) but are known to be highly heterogeneous with yields ranging from 0.5 to 2 L/s. Higher yields are typically associated with higher hydraulic conductivities along shallow coal seams and at contact zones with intrusive rocks. Depending on the residence time of the water in the aquifer, groundwater quality can be poor.
- **Dolerite intrusions -** The Karoo rocks in the project area were intruded by dolerite sills or dykes, with their contact zones with the host rock providing preferential flow paths, while the dolerite itself is rather impermeable or semi-permeable (hydraulic conductivity of approximately 1E-8 m/s). This setting promotes groundwater ponding and flow along, but not across the sills and dykes.

Basic Aquifer Information

1. *Borehole Database Information*

Basic borehole information data was obtained from the NGA database upheld by DWS including borehole depth, water strike depth and yield as well as water levels. The data was obtained for catchment C11A. Additional water levels were obtained from previous studies conducted in the area for quaternary catchment C11A as well. The prevailing geology of quaternary catchment C11A is similar to the project area, mostly rocks form the Vryheid Fm and Dolerite intrusions, therefore the borehole information on catchment scale provides some indication of onsite aquifer conditions. A summary of the borehole information is provided in ***Table 36***.

Although the spatial distribution of the borehole information obtained from the NGA database is limited to a plotting accuracy within a farm central point, the statistical analysis provides information of the aquifer characteristics. The borehole depth typically ranges from 10 m to 100 metres below ground level (m bgl) with the average depth is approx. 42 m bgl. Water strikes are typically located at 26 m bgl with an average blow yield of approx. 1 L/s. The groundwater levels range from 2.9 m bgl to 45.7 m bgl with average of 13.7 m bgl. A total of 49 water levels were obtained located within the project area, with groundwater levels ranging from 0.4 m bgl to 55.2 m bgl within an average of 9.9 m bgl. Shallower groundwater levels are expected closer to surface water drainage lines and depressions.

Table 36: Borehole information for catchment C11A based on the collated database.

INFO	WATER LEVEL [M BGL]	BH DEPTH [M BGL]	WATER STRIKE [M BGL]	BLOW YIELD [L/S]
Mean	13.3	41.6	25.7	1.0
Median	9.1	37.1	21.3	0.7
Standard Deviation	12.2	19.0	15.1	1.0
Minimum	0.4	9.3	2.4	0.1
Maximum	65.9	108.0	101.0	5.1
Count	189	96	126	105

2. *Groundwater Quality*

The DWS keeps a database record of basic water quality parameters that forms part of the NGA database. Three boreholes have been obtained from the database within quaternary catchment C11A. The closet water quality borehole is located approx. 5km southeast from the project area. A summary of the water quality data is shown in ***Table 37***, while the spatial distribution is shown in ***Figure 35***. The concentrations of selected constituents of groundwater samples were compared against the South African National Standards for Drinking Water (SANS, 241-1 2015) and South African Water Quality Guideline Volume 1 Domestic Use (DWAF, 1996). None of the observed chemical constituents were above any target concentrations values. The water quality should provide some indication of baseline / background water quality associated with rocks form the Vryheid formation, therefore similar to the project area.

Table 37: Groundwater quality data for catchment C11A based on the NGA database.

SITE ID	DATE	PH	EC (MS/M)	TDS	TOTAL ALKALINITY	CL	SO_4	F	NO_3+ NO_2	PO_4-P	NH_4-N	NA	K	CA	MG
DWAF: Drinking Water			**70**	**450**	**NS**	**100**	**200**	**1**	**6**	**NS**	**NS**	**100**	**50**	**32**	**30**
SANS 241-1: 2015		**5-9.7**	**170**	**1200**	**NS**	**300**	**500**	**1.5**	**11**	**NS**	**NS**	**200**	**NS**	**NS**	**NS**
97132	1991/12/09	7.14	24.30	195.00	107.40	3.20	10.00	0.24	0.49	0.02	0.02	24.50	3.16	14.00	6.50
169110	1992/01/17	8.11	23.20	188.00	103.20	1.50	7.70	0.18	2.45	0.01	0.08	5.50	1.24	20.50	14.40
172687	1994/07/12	7.53	12.80	110.00	61.20	3.00	2.00	0.34	1.60	0.05	0.08	2.70	1.43	10.50	7.20

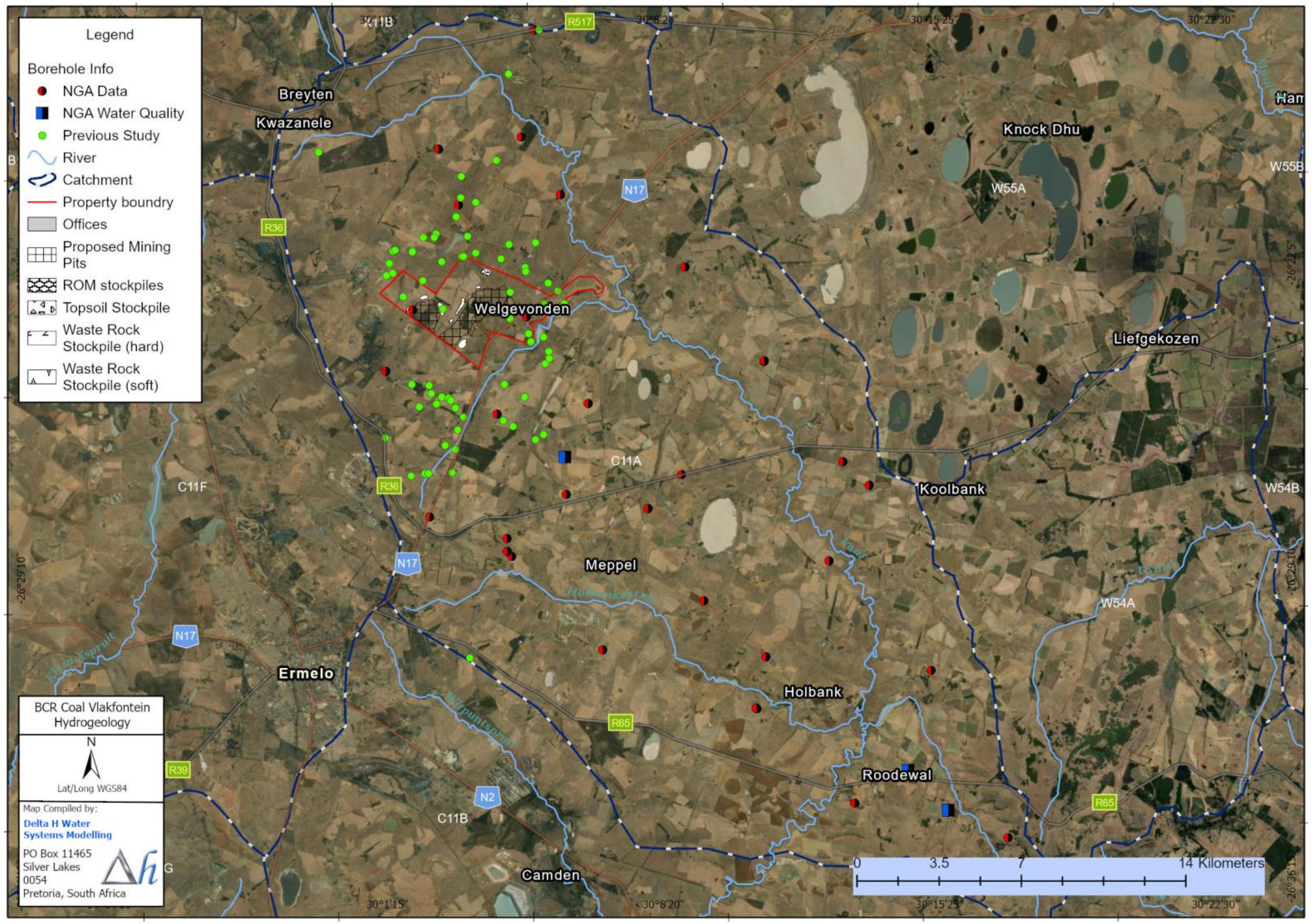


Figure 35: Spatial distribution of the borehole database for catchment C11A

Aquifer Characteristics

1. *Groundwater Vulnerability*

Groundwater vulnerability gives an indication of how susceptible an aquifer is to contamination. Aquifer vulnerability is used to represent the intrinsic characteristics that determine the sensitivity of various parts of an aquifer to being adversely affected by a contaminant load imposed from surface. ***Figure 36*** shows the national groundwater vulnerability ratings underlying the project area, indicating the tendency or likelihood for contamination to reach a specified position in the groundwater system after introduction at some location above the uppermost aquifer. The method is based on the DRASTIC method which includes the following parameters: Depth to water table; Recharge (net); Aquifer media; Soil media; Topography; Impact of the vadose (unsaturated) zone; conductivity (hydraulic).

Based on the national results, the aquifer underlying the project area has a low to medium vulnerability rating.

2. *Aquifer Classification*

According to the Hydrogeological Map (1:500 000) series, the regional hydrogeology is characterized as an 'intergranular and fractured aquifer' with a typical potential yield of 0.1 – 2.0 litres per second (L/s). A micro-fractured matrix in the fractured aquifers provides the storage capacity with limited groundwater movements, while secondary features such as fractures / faults and bedding planes enhance the groundwater flow. Based on the aquifer classification map (Parsons and Conrad, 1998), the aquifer system underlying the project area is regarded a "minor".

A summary of the classification scheme is provided in ***Table 38***. In this classification system, it is important to note that the concepts of Minor and Poor Aquifers are relative and that yield is not quantified. Within any specific area, all classes of aquifers should therefore, in theory, be present.

Table 38: Aquifer classification scheme after Parsons and Conrad (1998)

AQUIFER	DESCRIPTION
Sole source aquifer	An aquifer used to supply 50% or more of urban domestic water for a given area, for which there are no reasonably available alternative sources, should this aquifer be impacted upon or depleted.
Major aquifer region	High-yielding aquifer of acceptable quality water.
Minor aquifer region	Moderately yielding aquifer of acceptable quality or high yielding aquifer of poor-quality water.
Poor aquifer region	Insignificantly yielding aquifer of good quality or moderately yielding aquifer of poor quality, or aquifer that will never be utilised for water supply and that will not contaminate other aquifers.
Special aquifer region	An aquifer designated as such by the Minister of Water

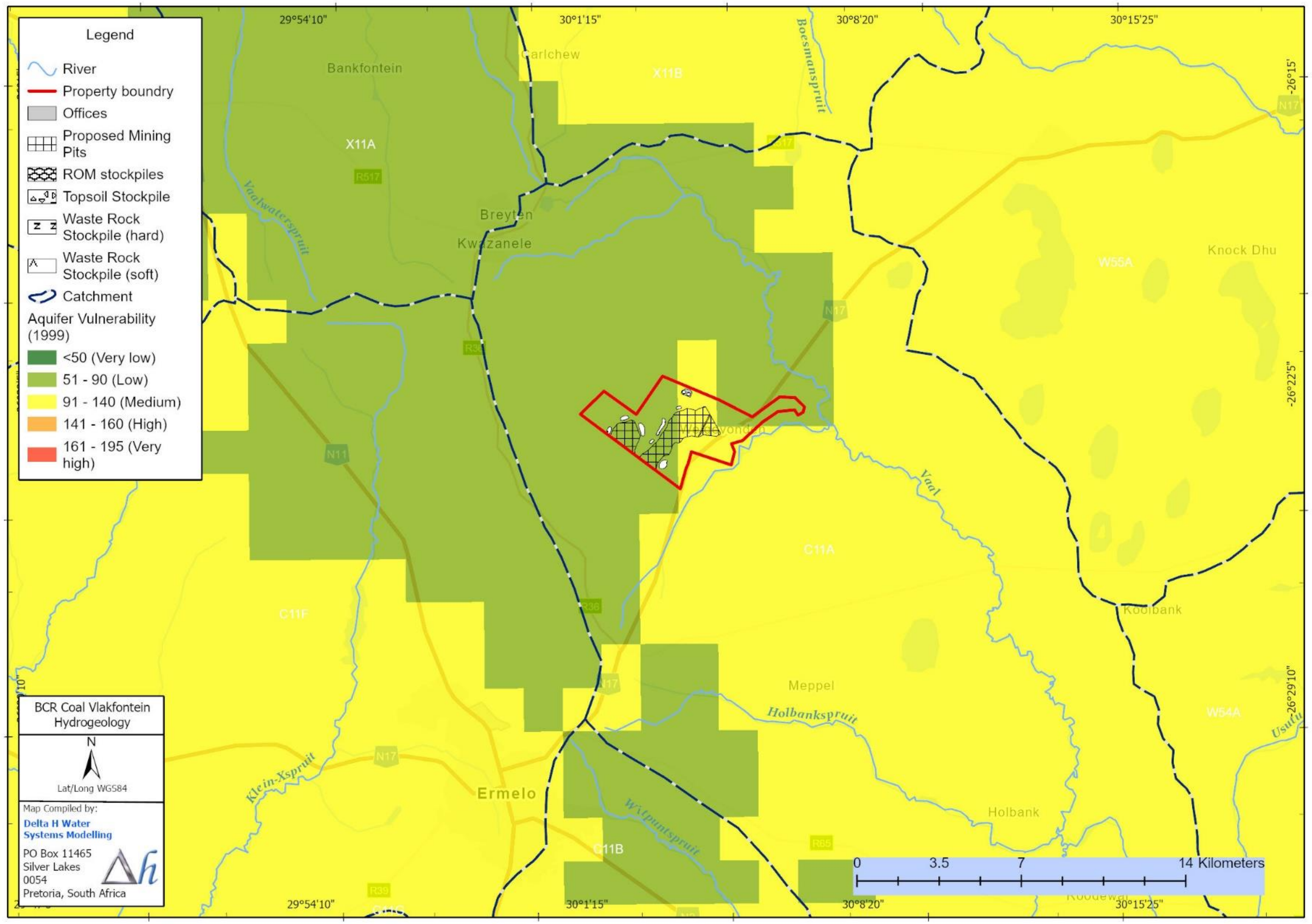


Figure 36: Groundwater vulnerability map of the project area associated with the proposed development

3. *Aquifer Protection Classification*

As part of the aquifer classification, a Groundwater Quality Management (GQM) Index is used to define the level of groundwater protection required (Parsons 1995). The point scoring system and classification of the site-specific project area are presented in ***Table 39***.

Table 39: Groundwater Quality Management (GQM) Classification System.

AQUIFER SYSTEM MANAGEMENT CLASSIFICATION		
CLASS	POINTS	PROJECT AREA
Sole Source Aquifer System: Major Aquifer System: Minor Aquifer System: Non-Aquifer System: Special Aquifer System:	6 4 2 0 0 – 6	**2**
AQUIFER VULNERABILITY CLASSIFICATION		
CLASS	POINTS	PROJECT AREA
High: Medium: Low:	3 2 1	**2**

The recommended level of groundwater protection based on the Groundwater Quality Management Classification is calculated as follows:

GQM Index = Aquifer System Management x Aquifer Vulnerability = 2 x 2 = 4

A Groundwater Quality Management Index of 4 was estimated for the project area from the ratings for the Aquifer System Management Classification (***Table 40***). According to this estimate, a low to medium level groundwater protection is required. Reasonable groundwater protection measures are recommended to ensure that no cumulative pollution affects the aquifer, even in the long term. DWS's water quality management objectives are to protect human health and the environment. Therefore, the significance of this aquifer classification is that if any potential risk exists, measures must be taken to limit the risk to the environment, which in this case is the protection of the underlying aquifer.

Table 40: GQM index for the project area.

INDEX	LEVEL OF PROTECTION	PROJECT AREA
<1 1 - 3 3 - 6 6 - 10 >10	Limited Low Level Medium Level High Level Strictly Non-Degradation	**4**

DESKTOP SENSITIVITY VERIFICATION

Aquifer Characteristics

The study area is underlain by sedimentary rocks from the Karoo supergroup consisting of sandstone, shales, siltstone, and coal from the Vryheid formation. Typical weathering depth is between 2 and 20 metres deep.

Two main aquifer systems are associated with the project area, i.e. a shallow and deeper fractured aquifer system. The shallow weathered aquifer (intergranular water table aquifer) that may be laterally connected to alluvial aquifers associated within the major river systems and/or non-perennial streams. The weathered aquifer unit (or weathered overburden) varies in thickness from 2 m to 20 m (or deeper) and is derived from the in-situ decomposition of the underlying rocks. The weathered overburden is considered to have low to moderate permeability but high storativity. The unweathered and fractured semi-confined bedrock aquifer consists of fractured rocks underlying the upper weathered aquifer. The intact bedrock matrix has a low matrix hydraulic conductivity, and its effective hydraulic conductivity is determined by the interconnectivity of the fractures. Water is generally stored and transmitted in fractures and fissures within a relatively impermeable matrix.

Groundwater level and flow

Site specific groundwater levels range from 0.4 m bgl to 55.2 m bgl with an average of 9.9 m bgl within the project area. Typical groundwater levels expected on catchment level is 13.3 m bgl. Such shallow groundwater levels potentially indicate a shallow driven aquifer system that could be acceptable to groundwater contamination from surface related impacts. In general, groundwater levels mimic the surface topography, indicting regional groundwater flow direction is generally towards the southeast. Lateral groundwater flow in the shallow weathered and fractured aquifer is driven by topographic gradients.

Groundwater quality

Background water quality is expected to be within the SANS and DWS drinking water guidelines. Mining exposes sulphide bearing minerals which may impact on the ambient groundwater quality.

Aquifer vulnerability

Based on the vulnerability assessment the underlying aquifer is regarded as a low to medium vulnerability aquifer system requiring reasonable groundwater protection measures to ensure that no cumulative pollution affects the aquifer.

PLAN OF STUDY FOR THE EIA

Based on the limitation of the desktop level hydrogeological assessment, the following scope of work is recommended for the EIA phase:

- Establish the baseline hydrogeological conditions in and around the proposed mining area (i.e., hydrocensus and sampling)
- Assess alternative mining plans that could reduce the potential impacts on groundwater receptors.
- Pumping test to inform aquifer characterisation and parametrisation
- Geochemical assessment of the potential pollution sources (i.e., overburden, waste rock, stockpiles).
  - Representative samples can be retrieved from existing exploration holes.
  - Determine acid generation potential
- Development of a site-specific conceptual groundwater model.
  - The main objective of this task is to accurately conceptualise the aquifer, groundwater levels and flow regimes, groundwater qualities from the ongoing monitoring programme, potential pollution sources and concentrations of constituents of concern, which will form the basis for the numerical model development.
- Development of a numerical flow and transport model that will be used to:
  - Predict mine inundation, inflow rates and diffuse decant volumes.
  - Assess the spatial and extent of surface-groundwater interaction and to inform management decisions.

- Establish cones of dewatering for the mine workings during life of mine.
- Determine the potential migration of constituents of concern from mine residue deposits during life of mine and post closure for the open pits mining scenario.

KEY ISSUES TO BE ADDRESSED

It is expected that long term groundwater related impacts are expected at BCR Coal Vlakfontein Mining activities, and potentially include:

- Lowering of the groundwater levels from dewatering resulting in a cone of depression (or dewatering) which may affect third party groundwater users.
- Interception of ambient (and a decrease in) groundwater flow, which would under natural conditions discharge into the surface drainages, provided baseflow to the rivers, or contributed to deeper regional groundwater flow.
- Exposure of sulphide bearing minerals (i.e., coal) during mining may negatively affect the ambient groundwater quality in the immediate vicinity of the Mine. Sources of pollution such may include stockpiles, discharges from mine workings and backfilled open pit (post-closure) (decant).
  - Opencast mining involves blasting and removal of the rocks overlying the coal layer, which is removed completely. The fragmented cover rock is then replaced (backfilled) and covered with soil and the terrain is landscaped ('rehabilitated'). Rainwater penetrating through the soil into the backfill becomes acidified by pyrite in the backfill material and can potentially decant to the surface.
  - As for most coal mines (in the Mpumalanga Highveld) there's a risk for acid rock drainage and should be managed as such.
- Diffuse pollution of groundwater from backfilled and flooded voids.

REASONED OPINION REGARDING THE ACCEPTABILITY OF THE PROPOSED DEVELOPMENT

It is recommended to conduct a higher confidence level hydrogeological assessment to determine site-specific impacts related to the proposed mining activity.

XI. BASELINE NOISE ENVIRONMENT

Enviro-Acoustic Research CC was appointed by Environmental Management Assistance (Pty) Ltd on behalf of BCR Coal (Pty) Ltd to conduct a desktop Environmental Noise assessment and inform the required Scoping Report (Phase 1).

The Scoping Assessment is attached as ***Appendix F.7 – Noise Assessment***.

METHODOLOGY

Appendix 2 of GNR 982, as amended, requires the identification of the significance of potential impacts during scoping. To this end, an impact screening tool has been used in the scoping phase. The screening tool is based on two criteria, namely probability (***Table 41***); and, consequence (***Table 42***), where the latter is based on general consideration to the intensity, extent, and duration. The scales and descriptors used for scoring probability and consequence are detailed in ***Table 43*** and ***Table 44*** respectively.

Table 41: Probability Scores and Descriptors

SCORE	DESCRIPTOR
4	**Definite**: The impact will occur regardless of any prevention measures
3	**Highly Probable**: It is most likely that the impact will occur
2	**Probable**: There is a good possibility that the impact will occur
1	**Improbable:** The possibility of the impact occurring is very low

Table 42: Consequence Score Descriptions

SCORE	NEGATIVE	POSITIVE
4	Very severe: An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated.	Very beneficial: A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this benefit.
3	Severe: A long term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these.	Beneficial: A long term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these.
2	Moderately severe: A medium to long term impacts on the affected system(s) or party (ies) that could be mitigated.	Moderately beneficial: A medium to long term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this way.
1	Negligible: A short to medium term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary.	Negligible: A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.

Table 43: Significance Screening Tool

		CONSEQUENCE SCALE			
		1	2	3	4
PROBABILITY SCALE	1	Very Low	Very Low	Low	Medium
	2	Very Low	Low	Medium	Medium
	3	Low	Medium	Medium	High
	4	Medium	Medium	High	High

The nature of the impact must be characterised as to whether the impact is deemed to be positive (+ve) (i.e., beneficial) or negative (-ve) (i.e., harmful) to the receiving environment/receptor. For ease of reference, a colour reference system (***Table 74***) has been applied according to the nature and significance of the identified impacts.

Table 44: Impact Significance Colour Reference System to Indicate the Nature of the Impact

NEGATIVE IMPACTS (-VE)	POSITIVE IMPACTS (+VE)
Negligible	Negligible
Very Low	Very Low
Low	Low
Medium	Medium
High	High

SUMMARY OF BASELINE CONDITIONS

The project focus area (PFA) is an area selected to enclose all potential project infrastructure. The area up to 2,000m from the PFA is considered in this Scoping Noise Report (SNR) as the study area.

The topography can be described as strongly undulating plains. It is unlikely that topographical features will limit the propagation of sound from the mining related activities.

The paved N17 highway pass the PFA to the south-east, with the unpaved D1246 (as per the Mpumalanga Road Asset Management System5) district road branching from the N17 to pass the PFA to the north-east. There are also a number of small access roads to the farms leading from the N17. Traffic volumes vary during the day and could influence ambient sound levels up to 1,000m from these roads during certain times, but vehicular traffic is low and will only influence ambient sound levels within a few hundred meters from the N17. Noise from vehicular traffic will not be considered in this Scoping, nor in the future Environmental Noise Impact Assessment reports.

Land use within the PFA is complex, being a combination of residential activities associated with the farms, dryland agriculture and animal husbandry, together with some mining activities to the west and south-west.

Excluding potentially noise-sensitive developments identified, there are no formal residential areas, communities or towns close (within 5,000m) from the PFA.

Most of the area falls within the Grassland biome with the natural vegetation being described as moist sandy highveld grassland. Agriculture and other anthropogenic activities did impact on the ground surface, though most of the area is well covered by (seasonal) crops, grasses, sedges, shrubs and trees. Considering a worse-case scenario, 50% medium-hard ground conditions will be used for modelling purposes in the future Environmental Noise Impact Assessment (ENIA). It

[5] http://mp-rams.co.za/rams/rams.html

should be noted that this factor is only relevant for air-borne waves being reflected from the ground surface, with certain frequencies slightly absorbed by the vegetation.

Ambient sound levels will only be measured during the future ENIA process, but, considering the developmental character, ambient sound levels are expected to be variable over the PFA. Locations closer to the N17 as well as the mining activities will generally have higher ambient sound levels, though most of the area would have a soundscape more typical of a rural to suburban noise district. Wind-induced noises does influence ambient sound levels during periods with increased winds, with the ambient sound levels determined by numerous factors (vegetation type and density, faunal species in the area, etc.). Additional ambient sound levels will be measured in the future in terms of Government Notice Regulation 320 of March 2020.

Noise-sensitive receptors or developments

Potential Noise-sensitive receptors (NSR) were initially identified using aerial images as well as the Online Environmental Screening Tool. The status of the NSR will be verified during a future site visit. The NSR as identified are highlighted in ***Figure 37***, with ***Figure 38*** illustrating areas identified by the National Web based Environmental Screening Tool to have a “very high” sensitivity to noise.

Also indicated on this figure are generalized 500 m, 1,000 m and 2,000 m buffer zones. Generally, noises from mining and industrial activities:

- are limited to a distance of less than 500 m from active mining access roads, though this would normally be less than 200 m with low traffic volumes and speeds associated with such roads (night-time impacts). This can be increased to a distance of 1,000 m, normally associated with very busy roads (such as a busy national road where average speeds exceed 100 km/h);
- are generally significant within 500 m, with receptors staying within 500 m from active mining/industrial activities normally subject to noises at a sufficient level to be considered disturbing;
- are normally limited to a distance of approximately 1 000 m from the active mining activities. Ambient sound levels are increased due to noises from the activities, with the potential noise impact measurable. Noise levels from such activities are generally less than 45 dBA further than 1 000 m from these activities; and
- are audible up to a distance of 2 000 m at night, though the noises may be audible up to 4 000 m during very quiet periods at night with certain meteorological conditions. These noises are normally of a low concern at distances greater than 2 000 m from activities at night (though it may be audible up to 4 000 m during very quiet periods).

These buffer distances may not be valid with very large mining or industrial operations, or in areas with very low ambient sound levels. It should be noted that each dot may represent a number of different dwellings that are or could be used for residential activities. The status of these dwellings will only be confirmed during a future site visit.

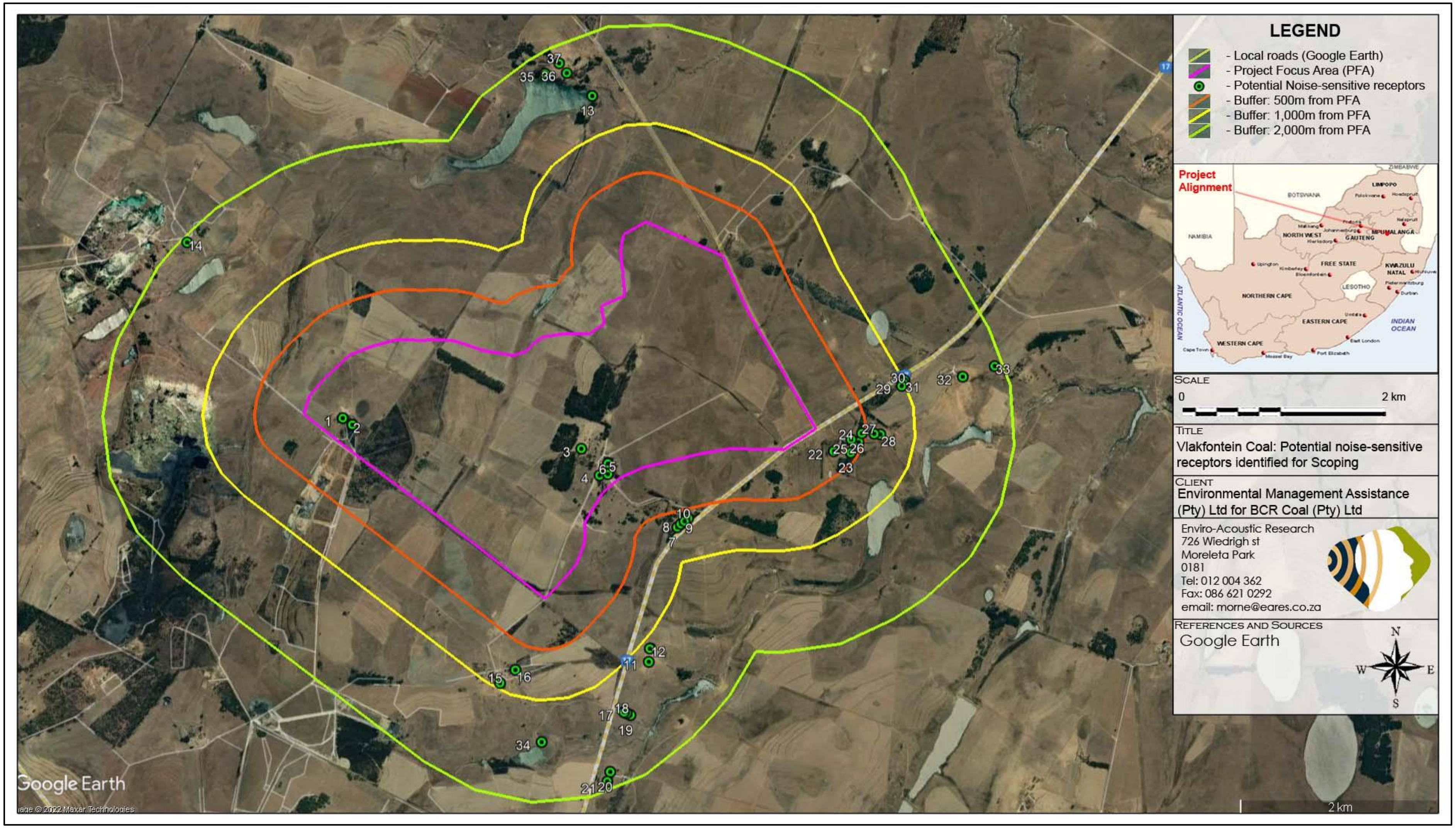


Figure 37: Aerial Image indicating closest identified Noise-sensitive receptors

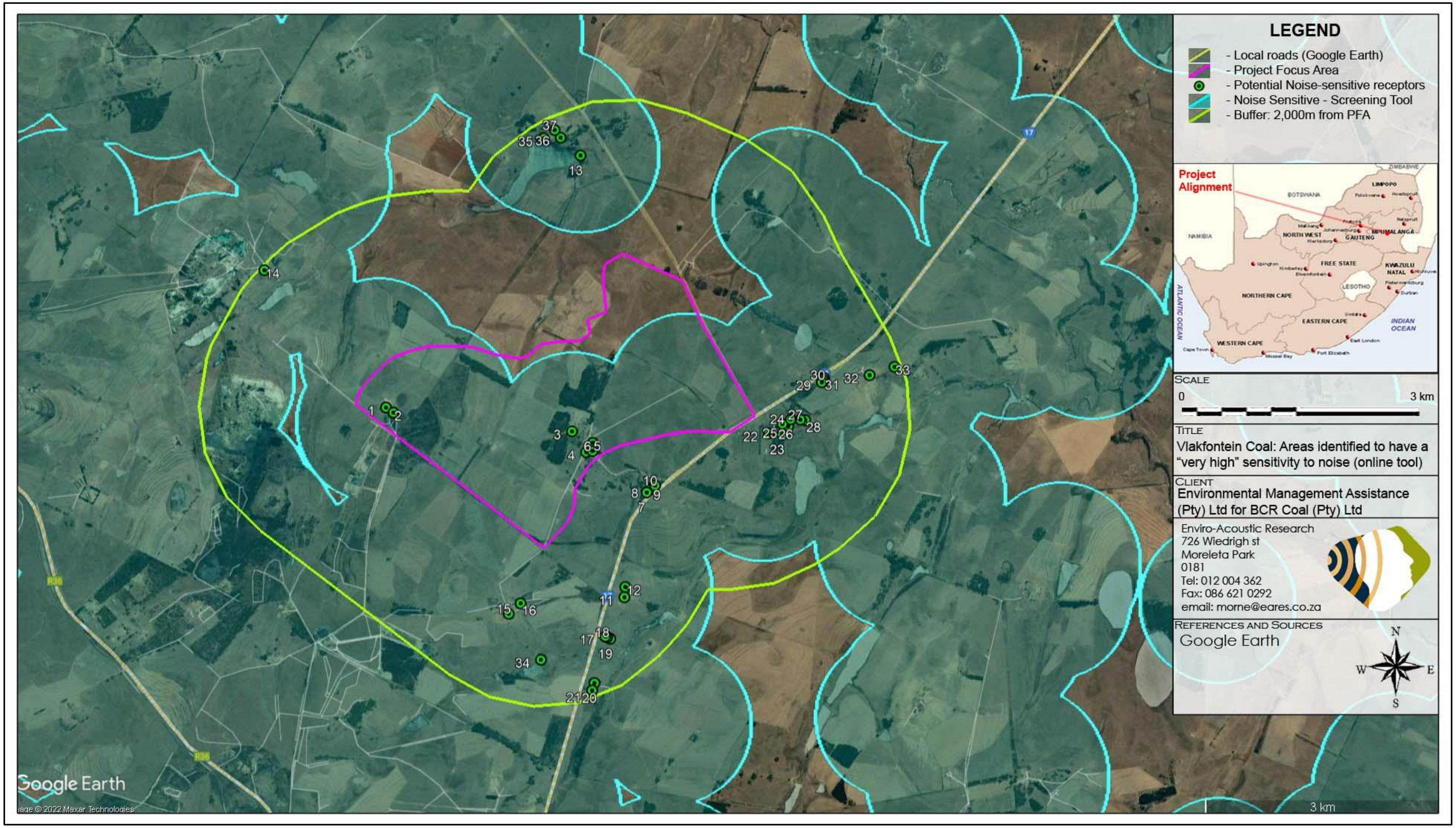


Figure 38: Aerial Image indicating output of the online screening tool

DESKTOP SENSITIVITY VERIFICATION

The project site was assessed in terms of the Noise Sensitivity Theme using the National Web-based Environmental Screening Tool. The output of the Screening Tool is presented on ***Figure 38,*** highlighting a number of areas identified to have a "very high" noise sensitivity. The screening report generated for the category *Mining => Mining Right* does stipulate:

- that a Noise Specialist Study should be appended to the EIA, and
- that the GNR320 Assessment Protocol be followed when doing the noise impact assessment.

A preliminary desktop verification was done using aerial images available on from GoogleEarth ©. Aerial images available on Google Earth © is recent (dated 21 August 2021) and of sufficient resolution to identify and verify potential noise sensitive areas and receptors as illustrated on ***Figure 38***.

Table 43: Summary of findings of Desktop Verification

SCREENING TOOL SENSITIVITY	VERIFIED SENSITIVITY	OUTCOME STATEMENT/PLAN OF STUDY
Very High	**Very High**	Full Environmental Noise Specialist in terms of GNR320 of March 2020 required.

A site verification report will again be completed after the site visit and included in the future Environmental Noise Impact Assessment (ENIA).

PLAN OF STUDY FOR THE EIA

The purpose of an environmental noise impact investigation and assessment is to determine and quantify the acoustical impact of, or on a proposed development.

In this regard the following will be included to assist the EAP in the compilation of the Plan of Study (PoS) for the EIA:

- A site visit to confirm the status of the identified NSR and areas identified to have a "very high" sensitivity to noise (as identified by the online screening tool);
- The semi-continuous measurement of ambient sound levels over a minimum period of 2-nights in the vicinity of the project area, in compliance with the requirements of GNR 320. The data will be analysed to motivate appropriate noise limits;
- Data as received from the developer will be used to model the potential noise impact. The following information will be considered:
  - The Sound Power Emission details of various equipment and activities associated with a typical colliery;
  - The surface contours of the project focus area;
  - Surface and meteorological constants;
- The potential impact will be evaluated (where possible) in terms of the nature (description of what causes the effect, what/who might be affected and how it/they might be affected) as well as the extent of the impact;
- The potential significance of the identified issues will be calculated based on the evaluation of the issues/impacts;
- The development of an Environmental Management Plan and a proposal of potential mitigation measures (if required); and
- Recommendations.

KEY ISSUES TO BE ADDRESSED

Table 44 and ***Table 45*** summarises potential impacts that will be further assessed during the EIA phase.

Table 44: Scoping Level Noise Impact Assessment: Construction Activities

<table>
<tr><td colspan="4">Potential Impacts/risks:
Increases in noise levels at closest receptors.
Noise levels exceeding the SANS 10103 rating level.</td></tr>
<tr><td colspan="4">Desktop Sensitivity Analysis:
Potential rural area with daytime $L_{R,d}$ rating level of 45 dBA during low-wind conditions, setting an upper noise limit of 52 dBA.</td></tr>
<tr><td>Issue</td><td>Nature of Impact</td><td>Extent of Impact</td><td>No-go areas</td></tr>
<tr><td>Increase in noise level at receptors.
Disturbing noises.
Noises exceeding rating level.</td><td>Increased noises or disturbing noises may increase annoyance levels with project. Noise levels could exceed 45 dBA during construction. (temporary construction of access roads, construction of infrastructure as well as construction traffic passing close to NSR)</td><td>Multiple construction activities taking place simultaneously may impact an area up to 1,000m from the activities</td><td>As a preliminary guideline, construction activities within 160m from an identified and verified NSR is not recommended considering daytime noise limits (considering only construction noises). This buffer would be more considering night-time noise rating levels (not applicable for this project).</td></tr>
<tr><td colspan="4">Description of expected significance of impact:
Without noise propagation modeling where cumulative effects are included, it is difficult to assess the potential significance of the noise impact, though considering the projected noise levels, the significance may be very low to high at the different NSR.
Construction noise impacts however:
(a) are highly reversible;
(b) will not result in the irreplaceable loss of resources; and
(c) potential noise impacts can be managed, mitigated or even avoided.</td></tr>
<tr><td colspan="4">Gaps in Knowledge & recommendation for further study:
Insufficient information is available to consider the potential noise impact.</td></tr>
<tr><td colspan="4">Recommendations:
Scoping level assessment is insufficient and a full ENIA is required.</td></tr>
</table>

Table 45: Impact Assessment: Operational Activities

<table>
<tr><td colspan="4">Potential Impacts/risks:
Increases in noise levels at closest receptors.
Noise levels exceeding the SANS 10103 rating level.</td></tr>
<tr><td colspan="4">Desktop Sensitivity Analysis:
Potential rural area with daytime $L_{R,d}$ rating level of 45 dBA during low-wind conditions, setting an upper noise limit of 52 dBA. Noise Limits will be recommended during the EIA phase.</td></tr>
<tr><td>Issue</td><td>Nature of Impact</td><td>Extent of Impact</td><td>No-go areas</td></tr>
<tr><td>Increase in noise level at receptors. Noises exceeding rating level.</td><td>Increased noises may increase annoyance levels with project.</td><td>Multiple mining activities and equipment operating simultaneously could impact on</td><td>No-go areas cannot be confirmed during the scoping phase.</td></tr>
</table>

		an area up to 2,000m from the mine.	
Description of expected significance of impact: Mining activities may take place very close to NSR, and noise levels would be higher than the preliminary upper noise limit of 52 dBA. This is considering the output of a basic noise model, not considering the cumulative effect. The potential noise impact could be of a **low** to **high** significance at the various NSR. The potential significance of the noise impact will be assessed in more detail in EIA phase using a more detailed noise model.			
Gaps in Knowledge & recommendation for further study: Insufficient information is available to consider the potential noise impact, as the cumulative effect should be considered with the status of the identified NSR confirmed.			
Recommendations: Scoping level assessment is insufficient, and a full ENIA is recommended.			

REASONED OPINION REGARDING THE ACCEPTABILITY OF THE PROPOSED DEVELOPMENT

This assessment is based on a desktop assessment as well as a basic predictive model to identify potential issues of concern. Mining activities and equipment do emit noises at sufficient levels to propagate over large distances and this assessment indicates a potential noise impact on the closest receptors.

Considering the project infrastructure layout, there is a potential of a low to high significance of a noise impact during the construction phase, and of a low to high significance during the operational phase.

Further study is required, and it is recommended that a full Environmental Noise Impact Assessment study be conducted for the BCR Coal Vlakfontein Mine.

XII. BASELINE TRAFFIC ASSESSMENT

Siyazi Nkangala Transportation Services (Pty) Ltd was appointed by Environmental Management Assistance (Pty) Ltd on behalf of BCR Coal (Pty) Ltd to conduct a desktop baseline Traffic assessment and inform the required Scoping Report (Phase 1).

The Scoping Assessment is attached as ***Appendix F.8 – Traffic Assessment***.

METHODOLOGY

Four access options were investigated as part of the Baseline Traffic Study in order to determine the most suitable point of access.

In order to assess the options, it was required to determine the current status quo of the land-uses as well as the existing road network characteristics surrounding the location of the proposed mine. This included data collection and further investigation using the following information:

- Existing land use information;
- Existing road characteristics and modal distribution; and
- Traffic counts as a basis for making traffic-engineering calculations.

Based on the road network characteristics relevant to the proposed mining the following were considered in the assessment:

- Information regarding existing and future proposed development in the area; and
- Determination of vehicle trips expected to be generated by the proposed mine.

In addition to the above, the following information was considered in this scoping assessment:

- Access to and from the proposed mine;
- The current levels of service at the relevant intersections under investigation.
- Other traffic-related matters.

SUMMARY OF BASELINE CONDITIONS

The relevant property of the Proposed Mining Development is currently mostly vacant with some agricultural activities taking place, and some residential dwellings on the farms (Farmhouses). For the purpose of this Baseline Traffic Study, it is assumed that the vehicle traffic absorption rate (rate at which existing developments attract vehicular traffic) by all other types of completed developments will maintain the same status for the next ten years.

Figure 39 provides the existing road network layout for the area under investigation.

Table 2.1 contains information related to the existing and proposed intersections under investigation.

Tables 2.3 and 2.4 provide information on typical road characteristics and access management requirements as per the guideline COTO TRH26 “South African Road Classification and Access Management Manual, Version 1.0, August 2012” Rural areas.

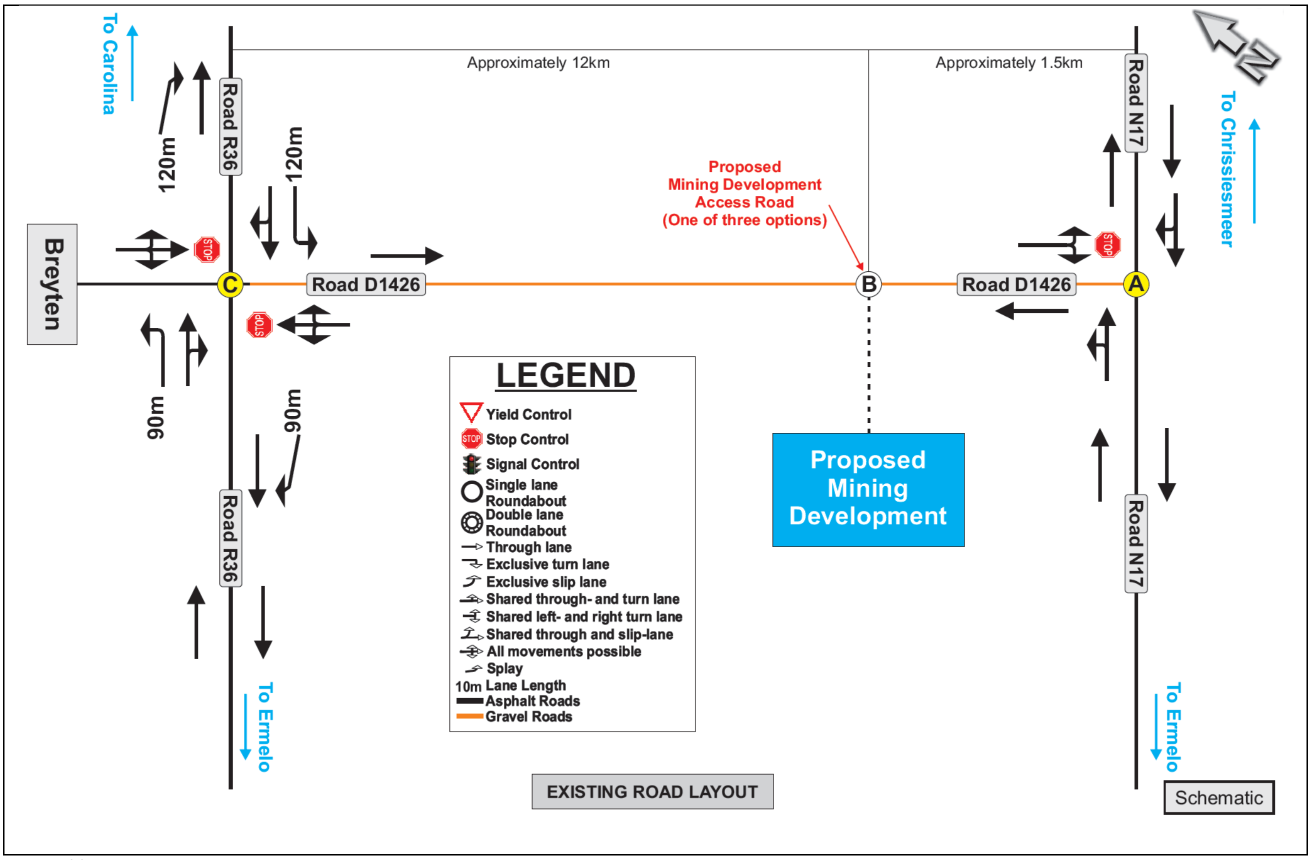


Figure 39: Existing Road network layout

Table 46: Summary of intersection control at existing intersections under investigation

POINT	DESCRIPTION	INTERSECTION CONTROL	PEDESTRIAN ACTIVITIES	INTERSECTION PHOTO
A	Roads N17 and D1426	Free flow along Road N17	No Pedestrian activity observed during surveys	
B	Road D1426 and Proposed Mining Development Access Road	Proposed intersection.		
C	Roads R36, D1426, and Breyten Access Road	Free flow along Road R36	Pedestrian activity observed during surveys	

Table 47: Summary of road characteristics

RELEVANT ROAD SECTION	PICTURE OF ROAD SECTION	EXISTING FUNCTIONAL CLASS OF ROAD	PROPOSED FUNCTIONAL CLASS OF ROAD	Road Authority	Road Reserve (M)	Number of Lanes	Lane Width	Type of Surface	Median	Anticipated Traffic Growth per Annum over 10 Years	Speed Limit
Road Section 1 **Road N17** National Road linking Ermelo with Bethal and Eswatini Border		**Primary Function:** Mobility **Class:** Major Arterial **Class No.:** R2 **Route Number:** R **Description:** Highway **Spacing between Intersections:** 5km	**Proposed Function:** Mobility **Class:** Major Arterial **Class No.:** R2 **Route Number.:** R **Description:** Highway **Spacing between Intersections:** 5km	SANRAL	±40m	One lane per direction	3.7m wide	Asphalt	None.	3%	120km/h
Road Section 2 **Road R36**		**Primary Function:** Mobility **Class:** Major Arterial **Class No.:** R2 **Route Number:** R **Description:** Highway **Spacing between Intersections:** 5km	**Proposed Function:** Mobility **Class:** Major Arterial **Class No.:** R2 **Route Number.:** R **Description:** Highway **Spacing between Intersections:** 5km	Mpumalanga Department of Public Works, Roads, and Transport	±30m	One lane per direction	3.5m wide	Asphalt	None.	3%	100km/h
Road Section 3 **Road D1426**		**Primary Function:** Access / Activity **Class:** Collector road **Class No.:** R4 **Route Number:** T or D **Description:** Collector **Spacing between Intersections:** 600 – 800m	**Proposed Function:** Access / Activity **Class:** Collector road **Class No.:** R4 **Route Number.:** T or D **Description:** Collector **Spacing between Intersections:** 600 – 800m	Mpumalanga Department of Public Works, Roads, and Transport	±20m	One lane per direction	3.5m wide	Gravel	None.	3%	60km/h

Note: Information on Classification of relevant roads obtained from the Mpumalanga Department of Public Works, Roads, and Transport GIS database.

The relevant 12-hour manual traffic count was conducted on Friday 01 July 2022 at the following points:

- Point A: Intersection of Roads N17 and D1426.
- Point C: Intersection of Roads R36, D1426, and Breyten Access Road.

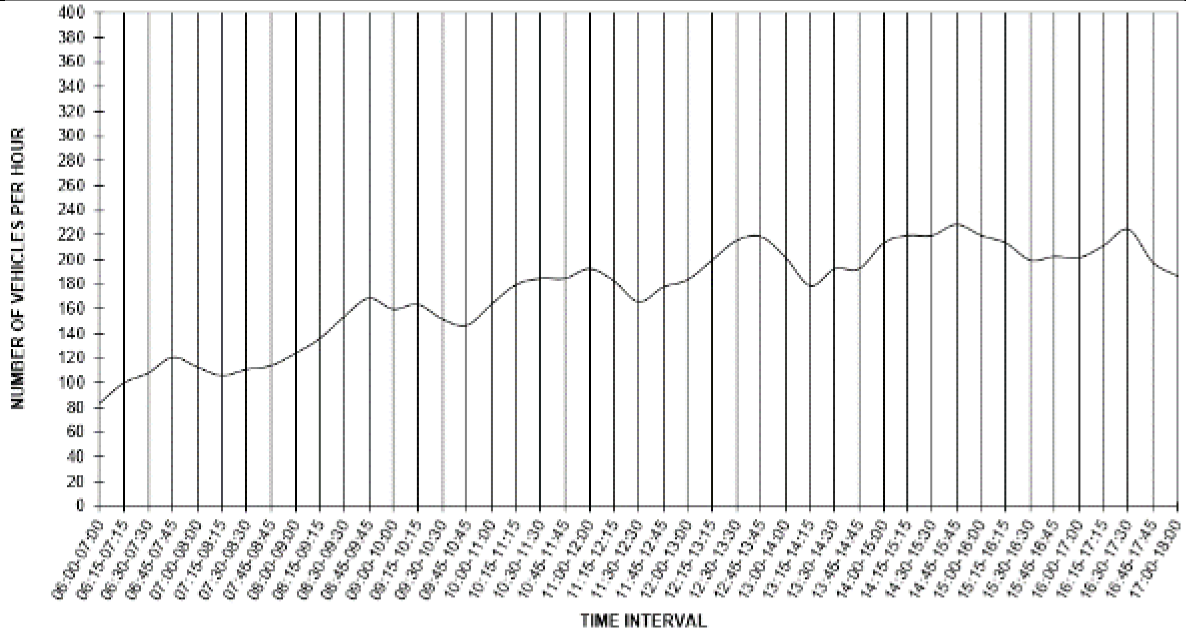
The respective peak-hour flows for the traffic count at the relevant intersections were identified as indicated in ***Table 48*** below.

Table 48: Peak hour periods at the relevant intersections

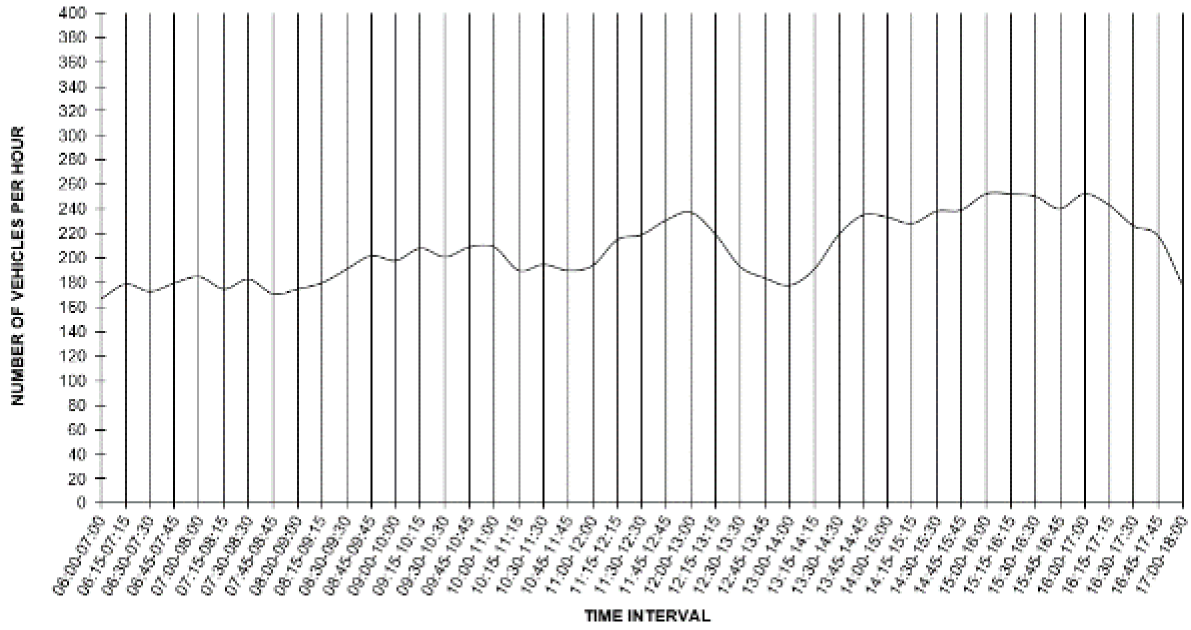
POINT	INTERSECTION	AM PEAK		PM PEAK	
		TIME INTERVAL	NUMBER OF VEHICLES	TIME INTERVAL	NUMBER OF VEHICLES
A	Roads N17 and D1426	06:45 to 07:45	121	16:30 to 17:30	225
C	Roads R36, D1426, and Breyten Access Road	07:00 to 08:00	185	16:00 to 17:00	252

The identified peak hour periods between Points A and C are different due to the roads being parallel to each other and 16 kilometres apart and located on two different functional roadways. Points A and B is located in rural areas. No nearby towns are near Point A, while Point B is located at one of the access roads to Breyten.

Figure 40 indicates the hourly traffic pattern, per 15-minute interval, for all modes of vehicles at the relevant intersections between 06:00 and 18:00 on 01 July 2022.



INTERSECTION OF ROADS N17 AND D1426 (POINT A)



INTERSECTION OF ROADS R36, D1426, AND BREYTEN ACCESS ROAD
(POINT C)

Figure 40: Hourly traffic pattern per 15-minute interval for all modes of vehicles (06:00 to 18:00) at the relevant intersections

DESKTOP SENSITIVITY VERIFICATION

As mentioned previously, four access options were investigated as part of the Baseline Traffic Study in order to determine the most suitable point of access.

Tables 2.6.1 to 2.6.4 provides information in terms of the sight distances and viability of the potential access options from Road D1426 to and from the Proposed Mining Development, to assist in the decision-making process as part of the detail input and design phases, while Figure 2.3 provides a graphical presentation of the identified proposed access options.

Table 49: Available intersection stopping and decision sight distance at access option 1 along Road D1426

VIABILITY OF ACCESS POINT	**Option 1: Not viable due to sight distance constraints.**	
ROAD TYPE	Gravel	
RELEVANT PICTURES		
	Road D1426 Northbound	Road D1426 Southbound
COORDINATES	S 26°22'16.12"	E 30° 4'17.33"
REQUIRED STOPPING SIGHT DISTANCE AT RECOMMENDED 60 KM/H	85m	85m

AVAILABLE STOPPING SIGHT DISTANCE	**Less than 85m**	More than 85m
REQUIRED DECISION SIGHT DISTANCE AT 60 KM/H	170m	170m
AVAILABLE DECISION SIGHT DISTANCE	**Less than 170m**	More than 170m

Table 50: Available intersection stopping and decision sight distance at access option 2 along Road D1426

VIABILITY OF ACCESS POINT	**Option 2: Viable.**	
ROAD TYPE	Gravel	
RELEVANT PICTURES		
	Road D1426 Northbound	Road D1426 Southbound
COORDINATES	S 26°22'19.85"	E 30° 4'19.33"
REQUIRED STOPPING SIGHT DISTANCE AT RECOMMENDED 60 KM/H	85m	85m
AVAILABLE STOPPING SIGHT DISTANCE	More than 85m	More than 85m
REQUIRED DECISION SIGHT DISTANCE AT 60 KM/H	170m	170m
AVAILABLE DECISION SIGHT DISTANCE	More than 170m	More than 170m

Table 51: Available intersection stopping and decision sight distance at access option 3 along Road D1426 (recommended access point)

VIABILITY OF ACCESS POINT	**Option 3: Viable, recommended point of access from traffic engineering perspective.**	
ROAD TYPE	Gravel	
RELEVANT PICTURES		
	Road D1426 Northbound	Road D1426 Southbound
COORDINATES	S 26°22'28.02"	E 30° 4'23.43"
REQUIRED STOPPING SIGHT DISTANCE AT RECOMMENDED 60 KM/H	85m	85m
AVAILABLE STOPPING SIGHT DISTANCE	More than 85m	More than 85m

Required Decision Sight Distance at 60 km/h	170m	170m
Available Decision Sight Distance	More than 170m	More than 170m

Table 52: Available intersection stopping and decision sight distance at access option 4 along Road D1426

Viability of Access Point	**Option 4: Viable.**	
Road Type	Gravel	
Relevant Pictures		
	Road D1426 Northbound	Road D1426 Southbound
Coordinates	S 26°22'35.05"	E 30° 4'27.09"
Required Stopping Sight Distance at recommended 60 km/h	85m	85m
Available Stopping Sight Distance	More than 85m	More than 85m
Required Decision Sight Distance at 60 km/h	170m	170m
Available Decision Sight Distance	More than 170m	More than 170m

Access can potentially be provided for options 2, 3 and 4 from and to Road D1426. Access option 3 is deemed as the most suitable and therefore the recommended point of access based on:

- The available sight distances.
- The proposed layout of the Proposed Mining Development (where infrastructure will be located).
- From a road geometric perspective.

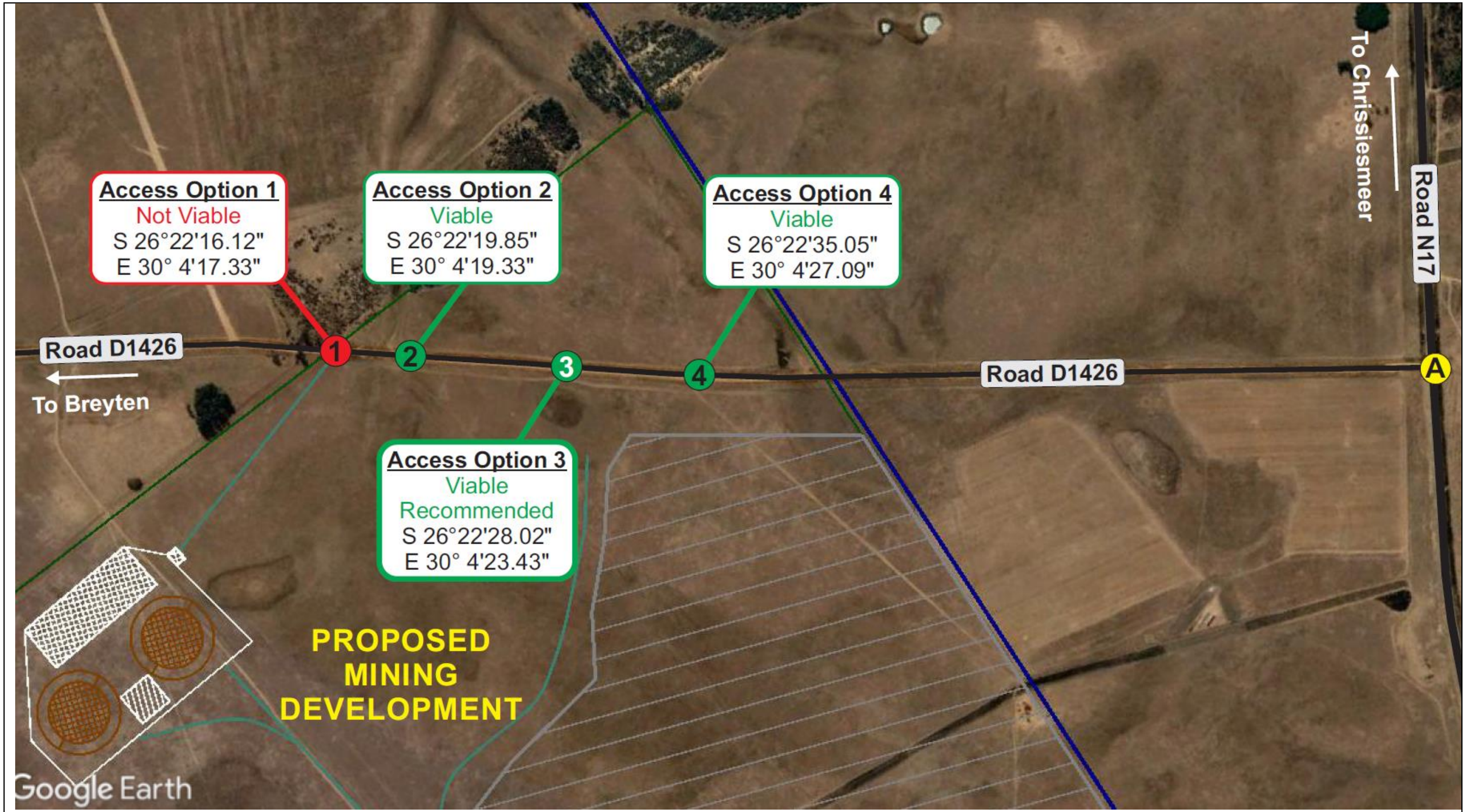


Figure 41: Graphical presentation of the proposed access options

Table 53 provides a summary of the findings as part of the desktop verification outcome.

Table 53: Summary of desktop verification outcome

ELEMENT	SCREENING TOOL SENSITIVITY	VERIFIED SENSITIVITY	OUTCOME STATEMENT/PLAN OF STUDY
Road Safety: Vehicle/non-motorized transport conflict	No protocol.	Low	Low number of non-motorized movement observed in area. No further input required.
Road Safety: Need for dedicated turning lanes	No protocol.	Low	No dedicated turning lanes provided at Points A and C, not currently required due to low vehicle volumes. Assess change with the anticipated vehicle traffic to be generated by the Proposed Mining Development.
Road Safety: High volumes of vehicular traffic conflicts (turning movements)	No protocol.	Low	Currently low volume of vehicle traffic in area. Assess change with the anticipated vehicle traffic to be generated by the Proposed Mining Development.
Pavement Condition (Road D1426)	No protocol.	Medium	Road D1426 is a gravel road (unpaved). Visually the road is in a poor condition between Points B and C. Depending on the intended load on the roadway, a Pavement Design Specialist will have to comment on the road.
Speeding	No protocol.	Low	No excessive speeding was observed on relevant road sections under investigation. No further input required.

PLAN OF STUDY FOR THE EIA

The following recommendations are made from a traffic engineering point of view and need to form part of the EIA process:

- It is recommended that a full Traffic impact Assessment be prepared in order to assess the potential road related impact that the transportation of coal from the Proposed Mining Development would have on the relevant intersections under investigation from a road capacity and safety perspective, and to determine the required mitigating measures in order to mitigate the potential road related impact that the Proposed Mining Development might have.
- Further investigation at the relevant proposed access intersection to and from the Proposed Mining Development should be conducted regardless of whether Access options 2, 3 or 4 will be implemented in order to determine the intersection performance (impact) of the anticipated vehicle trips to be generated by the Proposed Mining Development.
- Further investigation is recommended for on-site traffic related matters which include vehicle circulation and parking layouts.

KEY ISSUES TO BE ADDRESSED

Based on the investigations conducted as part of this study, the following findings will require further investigation as part of the EIA phase:

- Access to and from the Proposed Mining Development would be required from Road D1426 which is a gravel (unpaved) provincial class R4 road. Three viable access options (options 2, 3 and 4) were identified, therefore determining that access to and from the Proposed Mining Development would be possible from Road D1426. Access can potentially be provided for options 2, 3 and 4 from and to Road D1426. Access option 3 is deemed as the most suitable and therefore the recommended point of access based on:
    - The available sight distances.
    - The proposed layout of the Proposed Mining Development (where infrastructure will be located).
    - From a road geometric perspective.
- Road D1426 is currently a gravel road between Points A and C, providing access from and to farms within the area, and as proposed in the future to the Proposed Mining Development. Broader access by Road D1426 is provided to Road N17 on the south, and Road R36 on the north. Currently Road D1426 is in a poor state from the northern boundary of the Proposed Mining Development (Point B) up to Point C.
- In general, no public transport is available within the area of the Proposed Mining Development along Road D1426, with the nearest possible public transport operations available being approximately 16 kilometres to the north of the Proposed Mining Development at Breyten. Depending on where workers will be sourced from, workers of the Proposed Mining Development might have difficulties to get to and from work if making use of public transport.
- The existing intersections investigated (Points A and C) does not have dedicated right-turn lanes.
- Intersection performance evaluations concluded that the relevant existing intersections with existing vehicle traffic volumes are currently operating at acceptable levels of service and would remain relevant for at least the next ten years with an anticipated background vehicle traffic growth (which includes latent developments) of 3% per annum.
- Reserve vehicle capacity along Roads N17, R36 and D1426 is available and is anticipated to remain relevant for the next ten years.

REASONED OPINION REGARDING THE ACCEPTABILITY OF THE PROPOSED DEVELOPMENT

Anticipated vehicle traffic to be generated by the Proposed Mining Development, with specific reference to heavy vehicles transporting coal, would have an impact on the existing gravel road, Road D1426. This could contribute to the deteriorating condition of the roadway and could lead to the Proposed Mining Development not being accessible via Road D1426 should the road not be maintained.

No further road related constraints, fatal flaws or red flags that could have an impact on the feasibility of the Proposed Mining Development are envisaged or could be identified as part of this study for the existing road network in terms of road safety and capacity. Further investigation by means of preparing a full Traffic Impact Assessment is although required in order to determine the road related impact that the Proposed Mining Development might have, and the required mitigating measures should any be required.

XIII. CLIMATE CHANGE

Rayten Engineering (Pty) Ltd was appointed by Environmental Management Assistance (Pty) Ltd on behalf of BCR Coal (Pty) Ltd to conduct a desktop baseline Climate Change Assessment assessment and inform the required Scoping Report (Phase 1).

The Scoping Assessment is attached as ***Appendix F.9 – Climate Assessment***.

SUMMARY OF THE BASELINE CONDITIONS

Climate Change in the South African Context

South Africa's climate change response is part of a broader global effort to mitigate and manage the effects of global warming, embedded within the United Nations Framework Convention on Climate Change (UNFCCC), and associated international mechanisms (Department of Environmental Affairs (DEA), 2018). On the international front it is in the interest of developing countries to maintain the spirit of the Paris Agreement, for its ultimate test lies in the elements contained under article 2 of the Agreement. This speaks to the enhanced collective efforts to limit the increase in global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels (DEA, 2018).

South Africa is at an advanced stage with formulating its national policy on mitigating the effects of climate change. The National Climate Change Bill is expected to be passed in the near future (with it currently being in Draft phase).

According to South Africa's 3rd Climate Change Report (DEA, 2018), South Africa has warmed considerably in the last 80 years. Some parts of South Africa have "warmed at twice the global rate of warming". South Africa is expected to experience extreme warming of between 4-6°C over the next six decades.

Changes in rainfall intensity, magnitude and seasonality, as well as extreme weather events and sea level rises are expected. The impacts of climate change on water resources will be particularly challenging. "Different human settlement types and locations have varying vulnerabilities and capacities and will experience the hazards associated with the present and future climate changes to an unequal extent, with informal settlements and their populations being the most exposed" (DEA, 2018). South Africa is most likely to experience climate change impacts primarily affecting water resources (DWA, 2013). South Africa is classified as a water-stressed country, with less than 9% of annual rainfall ending up in the rivers, and only 5% filling groundwater aquifers (DEA, 2018). Impacts on water are due to changes in rainfall and evaporation rates, which themselves are influenced by wind speed and air temperatures. With a drier future climate scenario, it is expected that there will be reduced surface water availability.

The greatest warming has been observed in the west over the Western and Northern Cape, and in the north-eastern provinces of Limpopo and Mpumalanga, extending southwards to the coastal areas of Kwa-Zulu Natal. Moreover, increases have not been observed only in the annual and seasonal averages of minimum and maximum temperature, but also in their extremes. According to South Africa's 3rd Climate Change Report (DEA, 2018), "the Western and Northern Cape, Gauteng, Limpopo, and eastern Kwa-Zulu Natal, in particular, have experienced warming at a rate that is more than twice the global rate of warming".

Drier conditions also have adverse effects on people, with changing wind patterns leading to increased dust generation, resulting in respiratory problems.

Climate Change from Mpumalanga's context

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.

Impact studies in terms of water should be able to indicate whether the area can handle additional rainfall (additional volumes of water in the river system) or whether, for example, the area where the mine will be located is low-lying and may become flooded. It would need to be assessed whether, at a worst-case scenario, how much rainfall the river system can handle, and at what point this would adversely affect the mine, such as from the river bursting its banks, the pit being flooded, river crossings becoming damaged, roads being washed away, etc. The ground quality in terms of drainage may also need to be looked at, such as whether the soil is able to drain properly and not become waterlogged.

It must be noted that water demand in Mpumalanga has increased rapidly, and it has been stated that the province is unlikely to meet the water availability requirements. This may then result in water restrictions, which could adversely affect the mine.

Finally, there are predictions by the Mpumalanga Spatial Development Framework. In terms of temperature in the area (2019-2021 met data obtained), it's more or less the same over the 3 years. Average temperatures don't seem to have changed much over the last 3 years. However, looking at meteorological data over 3 years only discusses the weather, and not the climate itself. Higher temperatures over the next few decades could be over the next 30 years or more, with no indication of how many degrees higher they expect it to be. Increased temperatures may lead to more evaporation from water sources (both those feeding the borehole, as well as evaporation from the pollution control dams, etc, which will then lead to a need to utilise more water). These temperature changes could be accompanied by increasing incidence and intensity of drought, possibly even in regions where total rainfall increases (such as along the Mpumalanga escarpment). Increased temperatures may also lead to more frequent heat waves as well, potentially adversely affected employees.

Greenhouse gasses (GHG) in South Africa

GHG aerosols and trace gases impact climate through their effect on the radiative balance of the earth. Aerosol particles have a direct effect by scattering and absorbing solar radiation and an indirect effect by acting as cloud condensation nuclei. Atmospheric aerosol particles range from dust and smoke to mists, smog and haze particles. Trace gases such as greenhouse gases absorb and emit infrared radiation which raises the temperature of the earth's surface causing the enhanced greenhouse effect. Common greenhouses gases include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride. Of these, carbon dioxide and methane are the major contributors to climate change.

South Africa has already signed and/or ratified several international conventions and agreements for climate change including the:

- Vienna Convention for the Protection of the Ozone Layer in 1990
- Montreal Protocol on Substances that Deplete the Ozone Layer in 1992
- United Nations Framework Convention on Climate Change (UNFCCC) in August 1997
- Kyoto Protocol in July 2002
- Stockholm Convention on Persistent Organic Pollutants in 2002
- Paris Agreement on Climate Change in April 2016

On a National level, South Africa currently has a number of laws relating to the protection and management of the environment. The overarching legislation is contained within the provisions of the National Environmental Management Act of 1998. Climate change is referred to explicitly in the White Paper on Integrated Pollution and Waste Management of 2000 and referenced in the White Paper on a National Water Policy for South Africa, 1997. It is also specifically addressed in the Government's imminent National Water Resource Strategy.

South Africa's primary energy consumption is ranked 16th in the world. This energy intensity is high primarily due to the largescale, energy-intensive primary minerals beneficiation industries and mining industries (DEA, 2016). Additionally, the energy sector is heavily reliant on fossil fuels to generate this electricity. GHGs emitted as a result of the combustion of these fossil fuels are CO2, CH4, N2O and H2O. The industrial sector, which includes mining, is South Africa's largest consumer of energy. South Africa's energy demand shows that industry/manufacturing sectors consume the highest percentage of electricity (45%), followed by mining (20%).

Total GHG emissions in 2015 attributable to the energy sector were estimated at 429 907 Gg CO2e. Of this, 400 948 Gg CO2e were due to fuel combustion activities, equivalent to 93.2% of the energy emissions. Refer to Table 4.2.1 which shows the emissions per GHG from the energy sector in South Africa. According to DEA (2018), "energy efficiency has been the largest contributor to climate change mitigation in the country, accounting for approximately 82% of GHG emission reductions since 2010".

Mining and Quarrying (with IPCC code 1A2i), falling under the Energy sector, reports under 'Manufacturing Industries and Construction' (IPCC code 1A2). The manufacturing industries and construction sector in South Africa produced an estimated 36 870 Gg CO2e GHG emissions in 2015, equivalent to 8.6% of the emissions from the energy sector. A breakdown was not provided for each category reporting under "Manufacturing Industries and Construction", therefore the percentage contribution of Mining and Quarrying towards these GHG emissions was not available.

The largest category of fuel consumed in 2015 in South Africa was sub-bituminous coal (77% of total fuel consumed) (DEA, 2016). The second highest fuel consumed was natural gas (15.72% of total fuel consumption in the manufacturing industries and construction category) in 2015.

In terms of the National Greenhouse Gas Emission Reporting Regulations (NGERs) (DEA, 2016), Road Transportation (IPCC sub-category 1A3b) is excluded from reporting. This means that companies are not expected to report their GHG emissions associated with their vehicle use and on-site mobile equipment. However, it is nonetheless useful to calculate these GHG emissions so as to understand the fuel consumption and its contribution towards climate change.

Among the sectors that contribute to the increasing quantities of GHGs into the atmosphere is the waste sector (DEA, 2016). The waste sector comprises 3 sources: Solid waste disposal, incineration and open burning of waste, and wastewater treatment and discharge. South Africa's Waste sector produces mainly CH_4 (95.6%), with smaller amounts of N_2O (4.2%) and CO_2 (0.2%). In 2015 the Waste sector produced 19 533 Gg CO_2e (3.6% of South Africa's gross GHG emissions). The largest source category is the Solid waste disposal which contributed 80.7% (15 756 Gg CO_2e) towards the total sector emissions.

Wastewater treatment contributes to anthropogenic emissions, mainly CH_4 and N_2O. The generation of CH_4 is due to anaerobic degradation of organic matter in wastewater from domestic, commercial, and industrial sources. Wastewater can be treated on site (mostly industrial sources) or treated in septic systems and centralised systems (mostly for urban domestic sources) or disposed of untreated (mostly in rural and peri-urban settlements). Most domestic wastewater CH_4 emissions are generated from centralised aerobic systems that are not well managed, or from anaerobic systems (anaerobic lagoons and facultative lagoons), or from anaerobic digesters where the captured biogas is not flared or completely combusted. Wastewater treatment and discharge were estimated to produce 3 427 Gg CO_2e in 2015, of which 78.2% (2 678 Gg CO_2e) was from CH_4.

Key GHG emission sources associated with proposed development

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 wash plant
- Septic/chemical ablution facilities for containing sewage
- Electricity consumption from the workshop, administrative office, weighbridge, and additional lighting of stockpile areas (supplied by the generator)
- Construction of required infrastructure onsite

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

- Employee commute and business travel
- Transportation of the pump the septic tank/ablution facilities and waste treatment offsite.
- Transportation of general and hazardous waste offsite

As part of the Scoping Phase, GHG calculations were not undertaken, however a general overview of potential contribution of certain activities towards climate change are discussed. These calculations will be made during the EIA phase.

DESKTOP SENSITIVITY VERIFICATION

Vlakfontein Opencast Mine is expected to have a relatively small footprint in terms of infrastructure, with a few offices, workshop, contractor yard, etc to be constructed. The mining will be completely outsourced to a mining contractor. The mining contractor owns the mining machinery and equipment. The mine will not have a processing plant. Ore will be stored until there are sufficient stockpiles to send to the preferred wash plant for processing, however the mine will set up a mobile crusher and screening facility.

Mines in general of large consumers of electricity, fossil fuels and water. The water to be utilised will be obtained from a borehole. It will be used for dust suppression and water at the offices. It is therefore assumed that water will not be used at the pit, thus water requirements may be considered to be lower. Water usage should remain relatively stable (no expected sudden increases required, unless drier temperatures and more frequent stronger winds require more frequent dust suppression to be undertaken).

It was indicated that diesel generators will be used for electricity, and an assumption was therefore made that grid electricity will not be used. Diesel usage will however be predominantly for use in mining vehicles and machinery. Fossil fuel use is thus expected to have a relatively low impact, compared to other mines that have conveyor belts, smelters, processing plants, etc. Additionally, depending on the distance to the preferred wash plant that will be used to process the ore, fuel consumption can be reduced if the wash plant is close to the mine, as less diesel for transportation of the ore to the plant will be required.

Climate change itself can have various impacts on mines. With Vlakfontein Opencast Mine relying on water extraction from a borehole, there is a risk of the water drying up. Research has shown that the Mpumalanga Province has had water shortages, an increase in average temperatures, and varying weather and rainfall patterns. Increased temperatures can result in faster evaporation rates, which may impact the mine in terms of their water storage capacity (in their water supply dams, mine residue facility return water dams, and pollution control dams). Increased rainfall can also impact the mine in terms of flooding of the pit resulting in downtime, as well as damage to river crossings and infrastructure, etc. increased wind speeds and evaporation rates may also result in increased dust flareups, resulting in the requirement of increased dust suppression. Not only will this require additional water requirements, but the dust itself will have adverse impacts on the employees and any surrounding communicates in the area.

The clearing of land during the construction and operational phase will result in the loss of a carbon sequestration source. Current Google Earth images show the land as partially barren, however at the proposed pit location there are numerous trees and bushes that would most likely be cleared away. When terrestrial carbon sinks are cleared, stored carbon is released into the atmosphere. Thus, the clearing of land will not only result in a potential loss of a carbon sequestration source, but also the release of stored carbon dioxide.

The LoM does indicate that the land will be rehabilitated and the void filled, however, the carbon sequestration capacity will take time get back to its full capacity preclearance.

Site sensitivity and desktop verification is not applicable for CCIAs, as these have not been developed for the South African screening tool. Furthermore, climate change is spatially homogeneous, therefore, emissions that result from the mining activity will affect the climate regardless of where the mine is sited. Thus, ratings for the screening tool and verified sensitivity cannot be provided in this baseline assessment report. Climate change impacts associated with the proposed project can only be determined through an emissions inventory and GHG calculations.

PLAN OF STUDY FOR THE EIA

It is recommended that, for the EIA phase of the project, that an in-depth GHG calculation (as per tier 1) project be undertaken to obtain a clear understanding of the proposed impact of the project on climate change (during construction, operation and closure), in terms of its GHG emissions. This will assist in confirming the preliminary risks identified (in terms of the mine's potential contribution towards climate change) and will look at minimum values as well as maximum worst case scenario figures, to gain a holistic view of potential emissions.

KEY ISSUES TO BE ADDRESSED

Anticipated impacts of the project on climate change

During the EIA phase, GHG emissions will be calculated taking the following into consideration:

- *Blasting* – BCR Coal expects to use explosives to break through the hard overburden, as well as blasting of the coal seams. Explosives will not be used on topsoil and soft overburden. Waste volumes including topsoil, soft and hard overburden over the 18-year LoM is expected to be 52 792 258 m^3, of which 85% will be overburden. To determine the potential contribution of this blasting (in terms of GHG emissions) to climate change, one would need to calculate the GHG emissions thereof. Information on the type of explosives used, the mass of the fossil fuel (if applicable) in the explosives, and the carbon content of the fossil fuel may be required.
- *Diesel consumption* – Diesel consumption is expected to be 180 000 litres per month. This equates to 38 880 000 litres over the 18-year LoM. 2.5% of the diesel used will be for the generators to generate electricity, while 7.5% will be used for mobile transport. The remaining 90% will be for the mining operations. Based on the use of a diesel combustion generator, GHG emissions can be expected over the duration of the LoM.
- *Liquefied Petroleum Gas (LP Gas) consumption* – It is expected that 180 kg of LP Gas (used on a rental basis from a service provider) will be consumed by the mine per month, which equates to 46 656 kg over the 18-year LoM. GHG emissions can be expected from the use of LP Gas.
- *Electricity consumption* – The mine will have 2 stationary generators (with 1 being a back-up generator). The mine expects to consume about 4 500 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). GHG emissions thereof will be included under diesel consumption. In future grid electricity may be used. Information has not been provided on whether the mine will make use of grid (Eskom) electricity on-site during future operations. The current mine works plan indicates that electricity will be generated from the two stationary generators.
- *Construction of infrastructure onsite* – Infrastructure expected to be constructed onsite include a workshop, administration office, security and access control area, onsite change houses / ablution facilities, contractor yard, surface water management areas (such as stormwater diversion berms and trenches, pollution control dams), storage areas, etc. It has not been established whether the buildings to be constructed will be permanent

structures, or if they will be temporary, such as in the form of moveable storage containers for the workshop and offices. The physical construction of buildings will generate more GHG emissions that the placement of temporary structures that can be used elsewhere after closure of the mine. However, the footprint in terms of infrastructure is relatively small compared to other mines. If a processing plant were constructed onsite, this would have resulted in a greater GHG emissions profile. Larger mines may have processing plants, concentrator plants, smelters, etc., all onsite, and owned, which would result in a substantially larger GHG emission profile. It should however be noted that, although the ore will be processed by a wash plant not owned and managed by BCR Coal, the mine is in part responsible for the GHG emissions generated by the wash plant, due to the role they play in feeding the wash plant with the raw materials needed to undertake their own processes.

- *Sewage treatment* – A sewage treatment plant is not planned on being installed, however there will be a septic tank. This septic tank sewage waste will be pumped out by a designated service provider every 3 months. The sewage will then be treated offsite. Information has not been provided on the amount of sewage that will be contained in the septic tank. Tanks thanks contain sewage emit CH_4, and additional information would be required to calculate the GHG emissions thereof. That being said, the emissions from the septic tank are expected to be low. The tank will not be at full capacity throughout the 3-month periods between being emptied, and the tank itself will only service the 7 employees from BCR Coal and 89 employees from the mining contractor, and any service providers that may visit the mine.
- *Waste* – The mine will undertake temporary handling and storage of general and hazardous waste on-site. Hazardous waste may include oils, chemical waste, lubricants, fuels, explosives, raw material stockpiles, etc. General non-hazardous waste may include office waste, food waste, scrap metal, plastics and wood waste. It is assumed that this will either be collected by an external contractor or transported by the mine to a landfill site capable of handling hazardous waste. To estimate GHG emissions from waste generated by the mine, the waste would need to be categorised into the appropriate waste streams, after which the required IPCC waste stream model will be applied to calculate the GHG emissions. 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.
- *Other indirect GHG emissions* – The impact of other indirect GHG emissions cannot be assessed at this stage, however, will have an impact. A contractor yard will be constructed onsite, however, the staff and sub-contractors won't be staying on site which would have significantly reduced the majority of employee commute. In terms of transportation of the ore from the mine site, it is assumed that transportation thereof will be undertaken by the mining contractor, and that the GHG emissions thereof have been accounted for under diesel consumption emissions. The ore will be transported to either market or the plant depending on the grade. The distance to market and the plant have not yet been identified, but distance should be considered, as reducing the distance travelled will reduce fuel consumption, and subsequently GHG emissions. The general and hazardous waste generated by the mine, as discussed above, will be ultimately managed by another organization (presumable the waste disposal site selected), and the GHG emissions are therefore also considered to be other indirect GHG emissions.

- _Other impacts on climate change_ – During the construction and operational phases, 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 LoM does indicate that the land will be rehabilitated, therefore, there will be a period of time where the carbon sink is lost. However, once the land has been rehabilitated, the vegetation will sequestrate carbon. Current Google Earth images show the land as partially barren, however at the proposed pit location there are numerous trees and bushes that would most likely be cleared away.

Anticipated impacts of climate change on the proposed development

The impacts of climate change are already being seen in South Africa and are projected to intensify over the coming decades. These impacts vary across the country but are projected to include changes to long-term temperature and rainfall patterns (MSDF, 2018). An increase in extreme weather events including floods and droughts is also projected. Climate change is more than simply an increase in global temperatures; it encompasses changes in regional climate characteristics, including temperature, humidity, rainfall, wind and severe weather events, which also have economic and social dimensions.

Climate change poses significant threats to the basic provisions of life including water, the environment, health, and food production. Assuming moderate to high increases in greenhouse gas concentrations such as carbon dioxide, regional modelling scenarios indicate that the in north-eastern South Africa (which includes Mpumalanga) there have already been notable shifts in climate with significant increases in average temperatures (MSDF, 2018). This is further illustrated by stating that for the period 1995-2006, 11 of the 12 years ranked among the 12 warmest years on record since 1850. Observed trends include more frequent heat waves, and colder days and nights becoming less frequent. The following climate change impacts can be anticipated to affect the mine (MSDF, 2018):

- Higher minimum, average and maximum temperatures over the next few decades Increased extreme weather events such as drought and floods
- Increased total annual rainfall by between 85 and 303 mm per year
- Increased water demand in Mpumalanga due to rapid industrialisation, mining, urbanization, and population growth will result in the province being unlikely to meet its water demand capacity

It must be noted that water demand in Mpumalanga has increased rapidly, and it has been stated that the province is unlikely to meet the water availability requirements. This may then result in water restrictions, which could adversely affect the mine.

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 CO2 emissions vary across the industry, largely depending upon the type of resource 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 mine waste, thereby raising energy consumption, and increasing the industry's climate footprint" (Ruttinger, 2016). Some of the world's largest mining operations currently operate in remote, climate sensitive regions. The industry is not relocatable should natural environmental conditions become unsupportive for varying reasons. The mining sector requires a number of suitable natural conditions including, but not limited to, a habitable climate, access to water resources and supporting infrastructure to extract resources and process them for future domestic and/or international use.

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.

As discussed by Ruttinger (2016), key climatic impacts on various stakeholders across the resources sector, can include, but are not limited to:

- Increased demand for water conservation during droughts;
- Increased demand for emergency services during flood events;
- Reduced asset operating life;
- Health and Safety risks for workforce;
- Inability to meet performance targets resulting in impacts on share prices;
- Increased demand for changing infrastructure design standards;
- Increase in costs of water;
- Disrupted access routes, leading to forced mine closures;
- Potential employment loss due to lack of safe access to sites;
- Conflicts with other water users in the region over water availability;
- Force Majeure, sometimes also leading to disputes around delivery obligations; and
- Supply chain breakdowns.

The potential impact of climate change remains uncertain, and it is not possible to predict specific trends of the possible impacts it may have on the area. However, it can be anticipated that seasonal variations and fluctuations in water availability may increase. The variations between wet and dry periods may also become more pronounced and severe.

Flooding associated with high rainfall events has the potential to result in unplanned discharges from water storage dams at the operations. Infrastructure at Vlakfontein Opencast Mine such as buildings, storm water controls, water dams, wastewater collection and treatment systems, tailings and waste disposal ponds, transportation infrastructure such as river crossings and roads can all be easily affected by extreme conditions caused by changes in weather patterns.

Therefore, based on the above, adverse impacts that may occur could be increased temperatures resulting in heat waves, drought resulting in drying up of water resources (despite additional rainfall expected), and possible flooding in the area (depending on the site location versus the adjacent river). Therefore, the mine needs to take these impacts into consideration, and possibly consider what mitigation measures they could put in place to reduce these potential impacts.

REASONED OPINION REGARDING THE ACCEPTABILITY OF THE PROPOSED DEVELOPMENT

An impact verification statement cannot be determined from the baseline study, as this requires the quantification of GHG emissions and the activity's contribution to the carbon budget of South Africa. Climate change is spatially homogeneous, therefore, emissions that result from the mining activity will affect the climate regardless of where the mine is sited. Climate change impacts associated with the proposed project can only be determined through an emissions inventory and GHG calculations.

Overall, the mine is expected to have an impact on climate change, in terms of GHG emissions, the degree of which will be assessed in the CCIA report as part of the EIA phase, based on the information provided, and assumptions based on researched information only.

XIV. BASELINE AIR QUALITY

Rayten Engineering (Pty) Ltd was appointed by Environmental Management Assistance (Pty) Ltd on behalf of BCR Coal (Pty) Ltd to conduct a desktop Air Quality baseline assessment and inform the required Scoping Report (Phase 1).

The Scoping Assessment is attached as ***Appendix F.9 – Climate Assessment***.

SUMMARY OF BASELINE CONDITIONS

Highveld Priority Area

The HPA was declared a priority area by the Minister of Environmental Affairs and Tourism on 23 November 2007 under the National Environmental Management Air Quality Act (Act No. 39 of 2004) (NEM:AQA) (Government Gazette, No. 30518 of 23 November 2007). A Priority Area is usually associated with elevated ambient concentrations of criteria air pollutants such as PM10, PM2.5, SO2 and NOx. Generally, a high number of emitters (industrial and non-industrial) are also concentrated in these areas. In order to meet the requirements of the NEM: AQA, an Air Quality Management Plan (AQMP) was compiled for the HPA and provides a management tool that can be used and implemented by departments and industry to ensure effective air quality management within the area.

Sensitive Receptors

Identified sensitive receptors, which are located within a 20km radius of the proposed mine are given in ***Figure 42***. Receptors were identified through a desktop study.

These points are located at the centre of residentials areas, or near schools, hospitals and old age homes, in order to determine the maximum concentrations that could be expected near sensitive receptors. Discrete points are not plotted for each individual sensitive receptor but are used to represent a group of sensitive receptors located near to each other (e.g. several Schools). Maximum predicted incremental concentrations will be provided for the identified discrete receptors in the final AQIA report once dispersion modelling has been conducted.

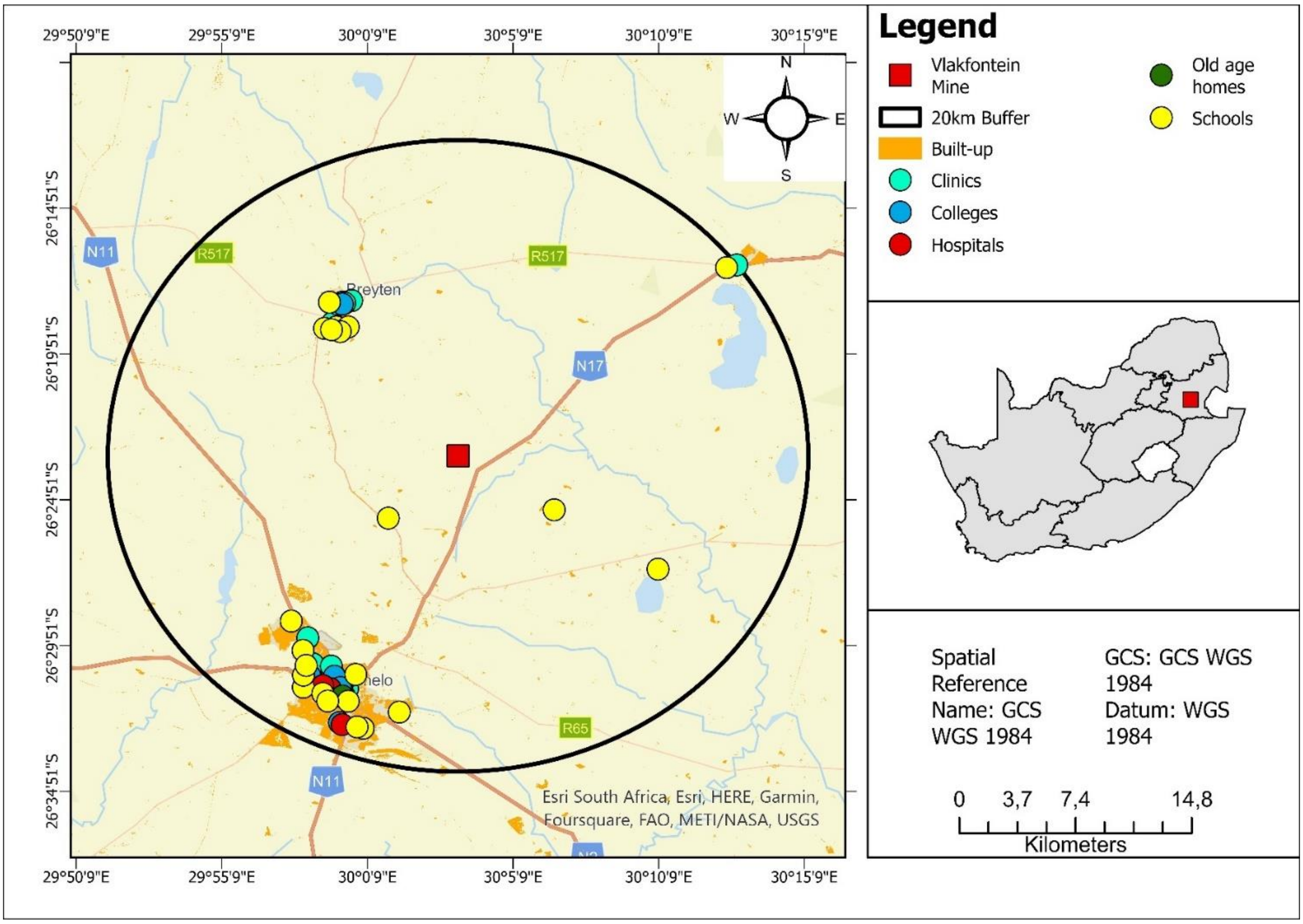


Figure 42: Sensitive receptors within 20 km of the proposed Vlakfontein Coal Mine

Meteorological Overview

MM5 modelled meteorological data was used for the project area. MM5 meteorological data was obtained from Lakes Environmental for the period January 2019 to December 2021. MM5 is a PSU/NCAR meso-scale model used to predict meso-scale and regional-scale atmospheric circulation. The model provides integrated model meteorological data, which can be used in a wide range of applications. This model is often used to create weather forecasts and climate projections. Details of the meteorological data obtained are summarised in ***Table 54*** below.

The South African dispersion modelling regulations requires a minimum of 3-years of meteorological data for input into the dispersion model. The meteorological overview given below is with reference to the data used for input into the model. The meteorological data is representative of recent prevailing weather conditions that will likely be experienced at the project site.

Table 54: Meteorological Data Details.

METEOROLOGICAL DATA DETAILS	
MET DATA INFORMATION	**DESCRIPTION**
Met data type	MM5 AERMET-Ready(Surface & Upper Air Data)

Datum	WGS 84
Closest Town	Ermelo - South Africa
Co-ordinates of centre of met grid:	
Latitude	26.383180°S
Longitude	30.050841°E
Time zone	UTC +2 hours
Period of record	January 2019 - December 2021
MET STATION PARAMETERS	**DESCRIPTION**
Anemometer height	13 m
Station base elevation	1718 m
Upper air adjustment	-2 hours
GRID CELL INFORMATION	
Cell centre	26.383180°S, 30.050841° E
Cell dimension	12km * 12km
SURFACE MET DATA	**DESCRIPTION**
File format	SAMSON file
Output interval	Hourly
UPPER AIR DATA	**DESCRIPTION**
Format	TD-6201- Fixed Length
Reported in	GMT
Output interval	00Z and 12Z
MODELS USED TO PROCESS MET DATA	
Model used to process data for wind roses	WR Plot
Model used to process data for AERMOD	AERMET

Local Wind Field

Figure 43 below provides the period wind rose plot for the proposed Vlakfontein Coal Mine for the period January 2019 to December 2021. The predominant wind directions for the period are observed from the north-northeast (9.2% of the time), north-east (8.28% of the time) and west-northwest/east-south-east (8.28% of the time). Wind speeds for the three-year period are generally moderate to fast with calm conditions, defined as wind speeds less than 1 m/s, observed for 8.34% of the time (***Figure 43***).

The morning (AM) and evening (PM) period wind rose plots for the period January 2019 to December 2021 are given in ***Figure 44*** below and show significant diurnal variation in the wind field data. During the morning (AM) period, high frequency winds are observed from the north-west, north-northeast and north; as opposed to the evening (PM) period, where winds are predominantly observed from the north-east, east-southeast and west-northwest (***Figure 44***). Greater variation in winds is observed during the evening period.

Seasonal variation in winds at the proposed Vlakfontein Coal Mine is shown in ***Figure 45*** below. Prevailing winds in summer originate from the north-eastern quadrant, similar to prevailing winds observed in spring. However, additional north-westerly winds are observed in spring. During the autumn season, north-easterly and west-north westerly winds prevail, while the winter season is characterised by high frequency west-north westerly and east-south-easterly winds. Additional less frequent north-westerly/south-westerly and east-south-easterly/north-north-easterly winds are observed in winter and autumn, respectively. Wind speeds were generally high during all seasons, which could subsequently facilitate dust emissions from stockpiles, onsite and offsite activities.

Based on the prevailing wind fields for the period January 2019 to December 2021, emissions from activities at the proposed Vlakfontein Mine will likely be transported towards the south-westerly, east-south-easterly and west-north-westerly wind directions. Moderate to fast wind speeds observed during all the time periods, may result in effective dispersion and dilution of emissions from the proposed mine operations; however, higher winds speeds can also facilitate fugitive dust emissions from open exposed areas such as stockpiles and opencast areas.

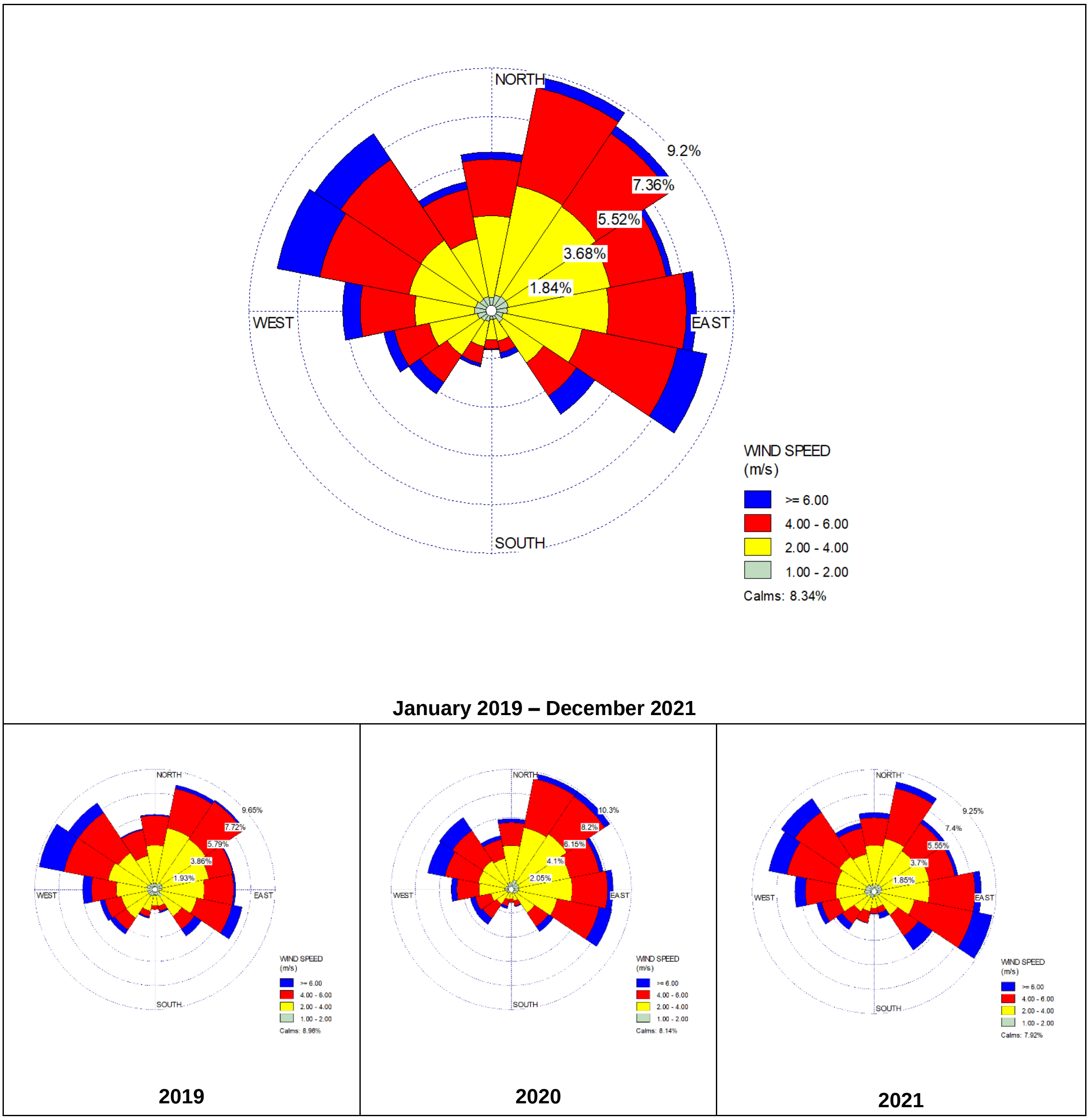
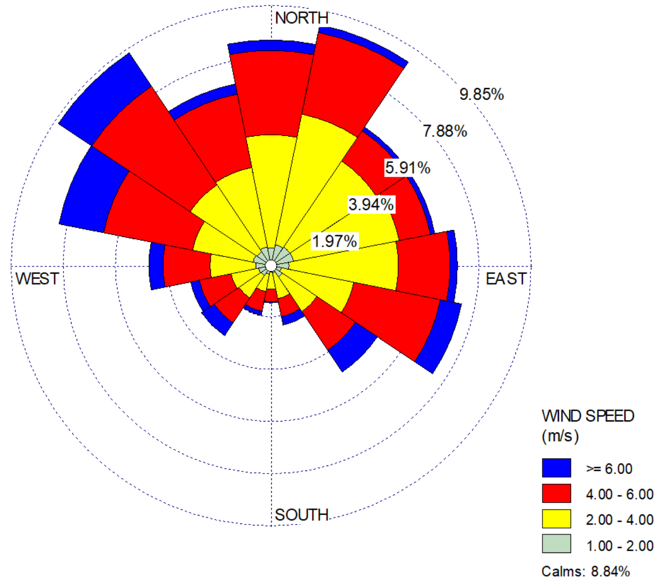
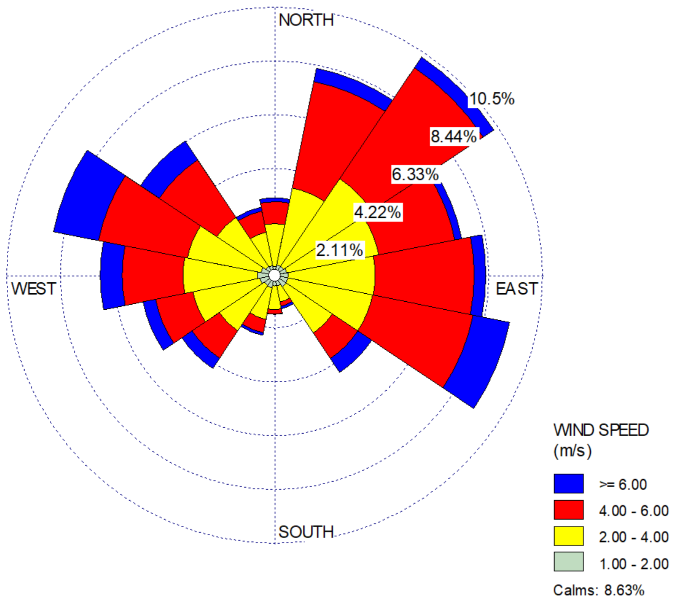


Figure 43: Period Wind Rose Plots for the proposed Vlakfontein Coal Mine for the period January 2019 - December 2021.



Morning (AM) (00:00 – 12:00)



Evening (PM) (12:00 – 23:00)

Figure 44: Morning (AM) (00:00 - 12:00) and Evening (PM) (12:00 - 23:00) Period Wind Rose Plots for proposed Vlakfontein Coal Mine for the Period January 2019 - December 2021.

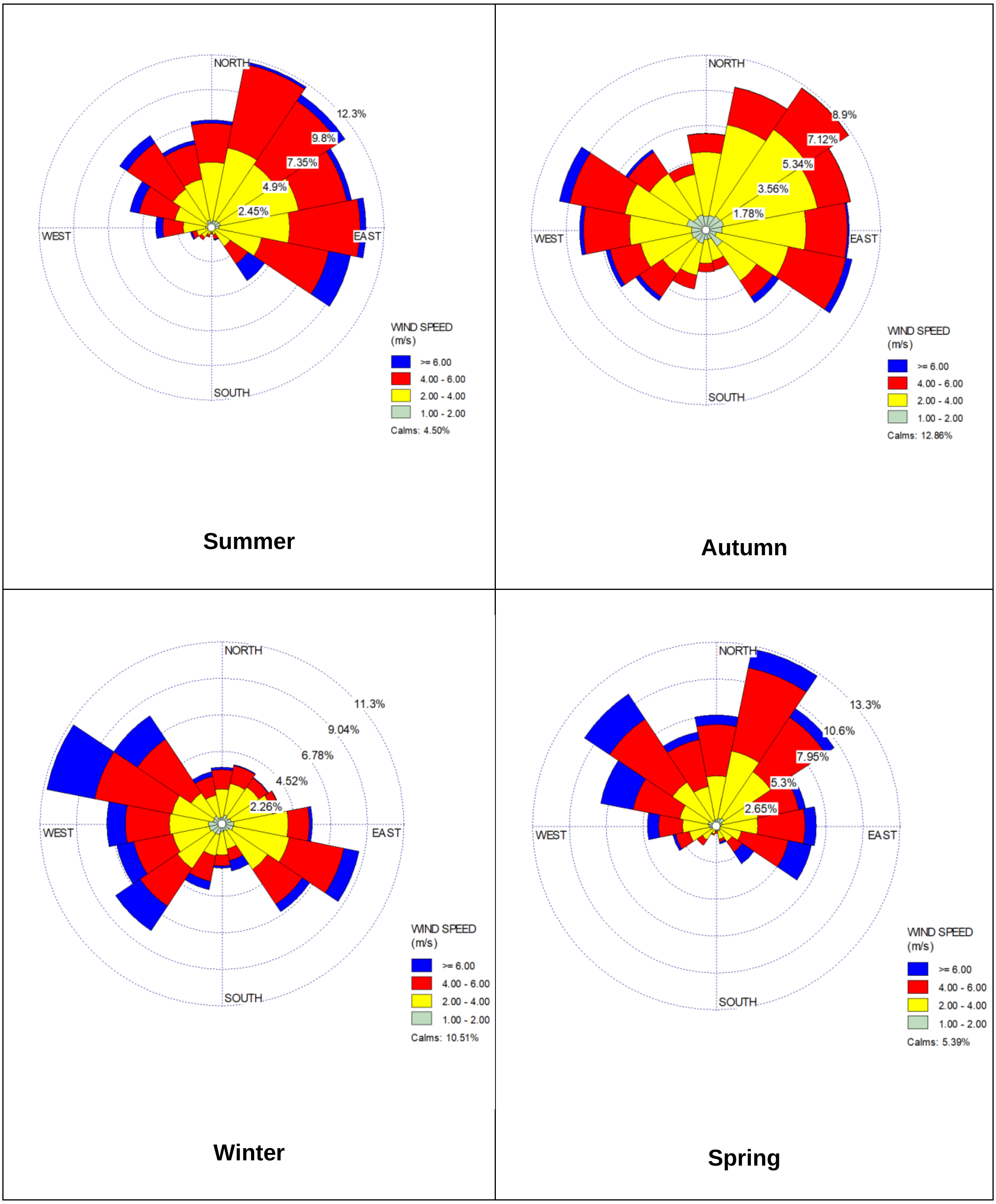


Figure 45: Seasonal Variation of Winds for the proposed Vlakfontein Coal Mine for the Period January 2019 - December 2021.

Baseline Air Quality Concentrations

$PM_{2.5}$ concentrations

$PM_{2.5}$ concentrations at the Ermelo AQMS for the period 01 January 2016 to 31 December 2021 are provided in ***Figure 46 to Figure 49*** below. There was 50.4% data capture in terms of $PM_{2.5}$ concentrations at the Ermelo station, with little to no data recorded between January 2019 and June 2020. Daily average $PM_{2.5}$ concentrations range between 0.03 µg/m³ – 293.78 µg/m³, with an average of 34.16 µg/m³ (***Figure 47***). A total of 215 exceedances of the $PM_{2.5}$ daily standard of 40 µg/m³ were observed over the monitoring period.

This is expected due to existing $PM_{2.5}$ sources located in the area, such as solid fuel combustion in the townships/informal settlements and small-scale agricultural activities.

Annual average $PM_{2.5}$ concentrations range between 16.12 µg/m³ – 34.14 µg/m³ for the period (Table 55), with four (4) exceedances of the annual standard of 20 µg/m³ recorded for the years 2017 - 2018 and 2020 – 2021. Higher $PM_{2.5}$ concentrations were observed between April and September (mid- autumn to early spring), with the highest daily concentration being recorded on 16 June 2021 (293.78 µg/m³).

In terms of the South African NAAQS, no exceedances of the $PM_{2.5}$ 24-hour standard and annual standard are permitted within a calendar year.

Table 55: Annual Average Concentrations for PM2.5.

YEAR	ANNUAL AVERAGE (µG/M³)	ANNUAL NAAQS (µG/M³)
2016	16.12	20
2017	24.05	20
2018	24.98	20
2019	19.15	20
2020	32.84	20
2021	34.14	20

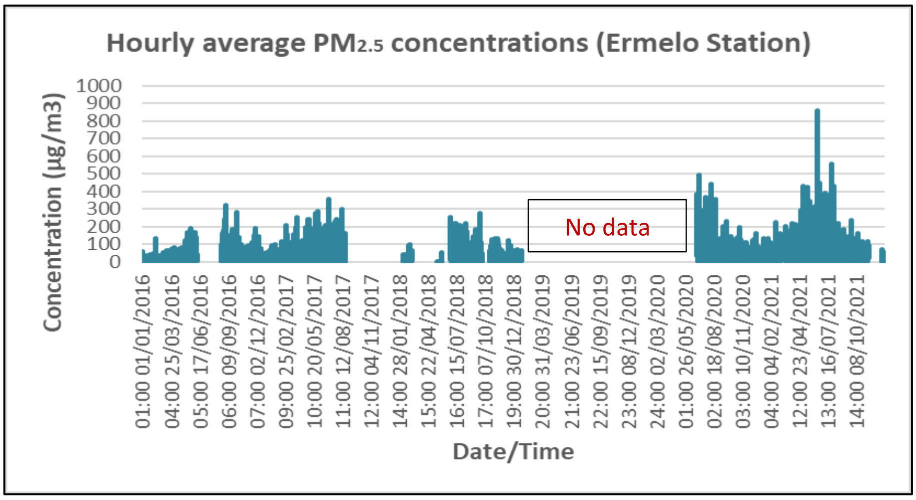


Figure 46: Hourly $PM_{2.5}$ concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

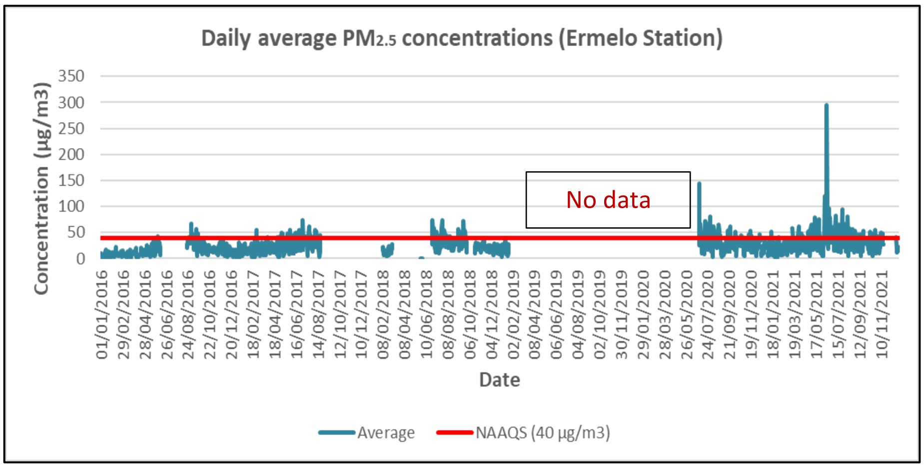


Figure 47: Daily $PM_{2.5}$ concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

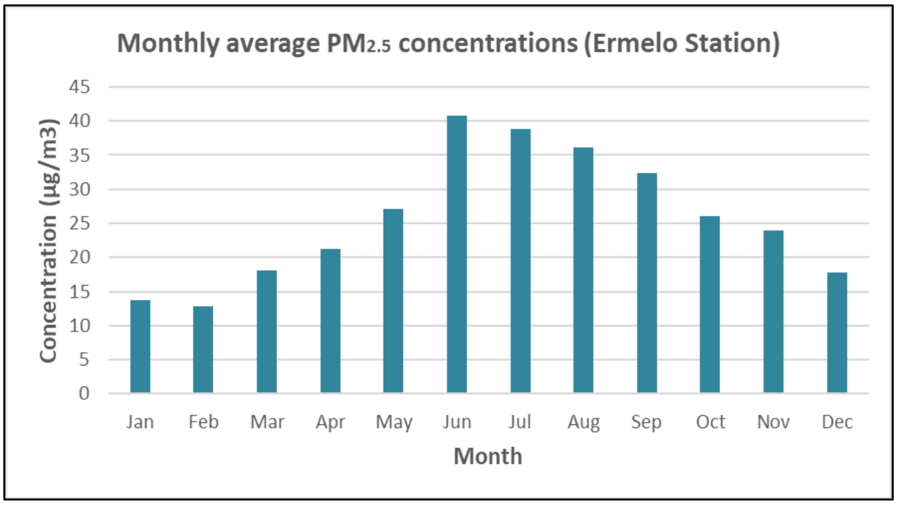


Figure 48: Monthly $PM_{2.5}$ concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

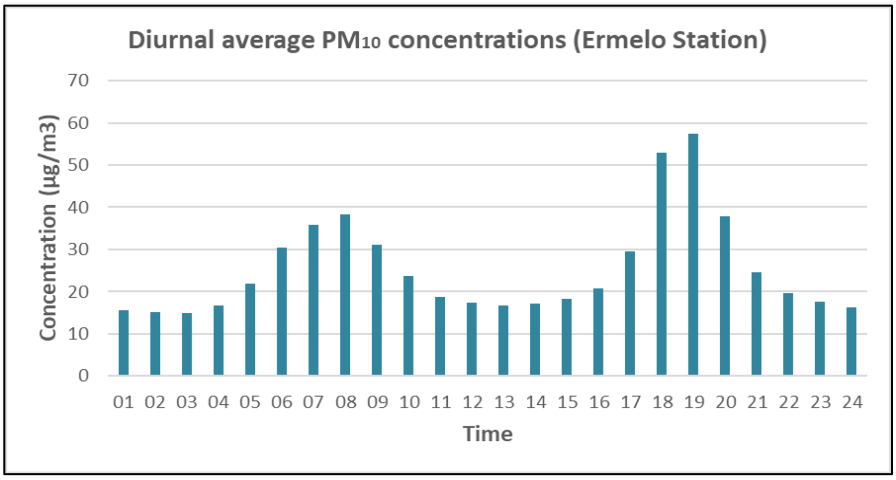


Figure 49: Diurnal $PM_{2.5}$ concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

CO_2 concentrations

SO_2 concentrations at the Ermelo AQMS for the period 01 January 2016 to 31 December 2021 are provided in ***Figure 50*** to ***Figure 53*** below. There was 86.8 % data capture in terms of SO_2 concentrations at the Ermelo station. Hourly and daily average SO_2 concentrations range between 0.00 – 187.96 ppb and 0.01 ppb – 59.87 ppb, respectively, with average hourly and daily concentrations of 9.02 ppb and 8.96 ppb, respectively (***Figure 50 to Figure 51***). There were seven (7) exceedances of the hourly standard of 134 ppb and four (4) exceedances of the SO_2 daily standard of 48 ppb observed over the monitoring period.

Existing sources of SO_2 within 20km radius of the proposed mine include solid fuel combustion in the townships/informal settlements and vehicle exhaust emissions from surrounding roads.

Annual average SO_2 concentrations range between 7.92 ppb – 9.87 ppb for the years 2016 – 2021, with no exceedances of the annual standard of 19 ppb (***Table 56***). Higher SO_2 concentrations were observed between April – August (mid-autumn to late winter), with the highest daily concentration being recorded on 16 June 2021 (59.87 ppb).

In terms of the South African NAAQS, a total of 88 exceedances of the SO_2 hourly standard are permitted within a calendar year, while only 4 exceedances of the SO_2 24-hour standard are permitted. No exceedances of the SO_2 annual standard are permitted within a calendar year.

Table 56: Annual Average Concentrations for SO2

YEAR	ANNUAL AVERAGE (PPB)	ANNUAL NAAQS (PPB)
2016	9.87	19
2017	9.79	19
2018	9.36	19
2019	8.05	19
2020	8.82	19
2021	7.92	19

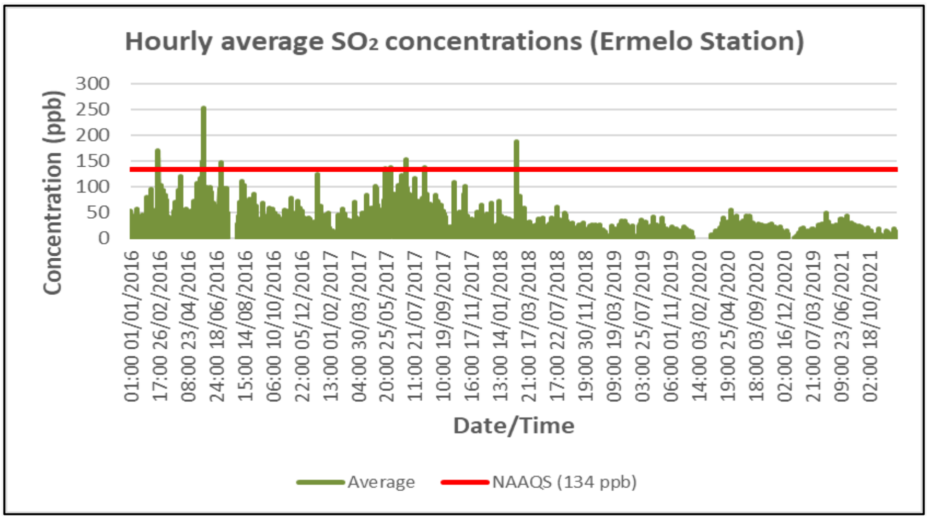


Figure 50: Hourly SO2 concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

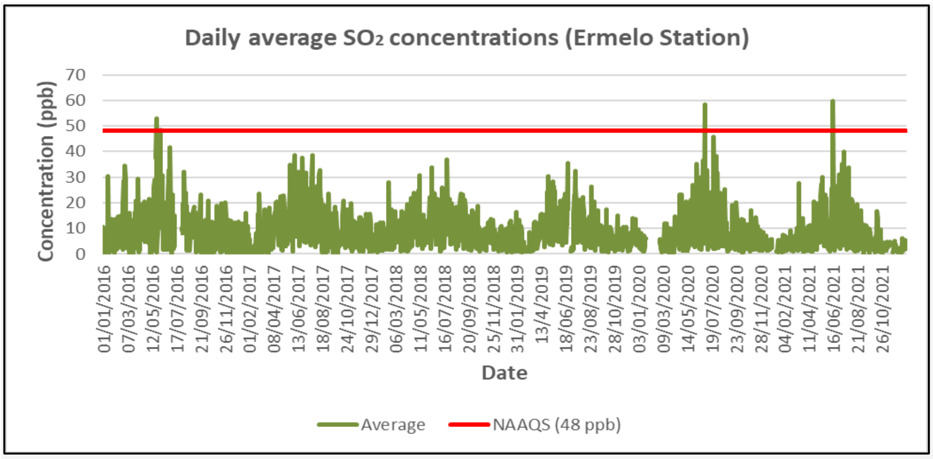


Figure 51: Daily SO2 concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

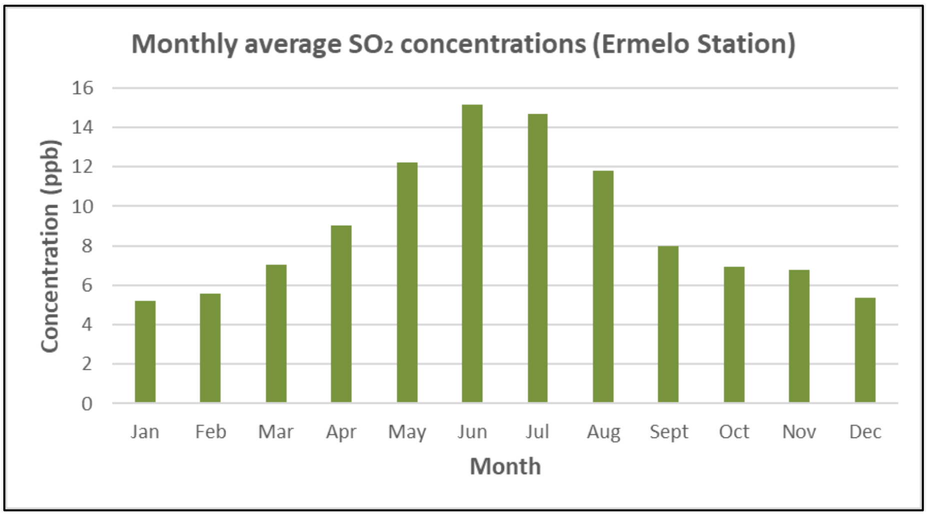


Figure 52: Monthly SO2 concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

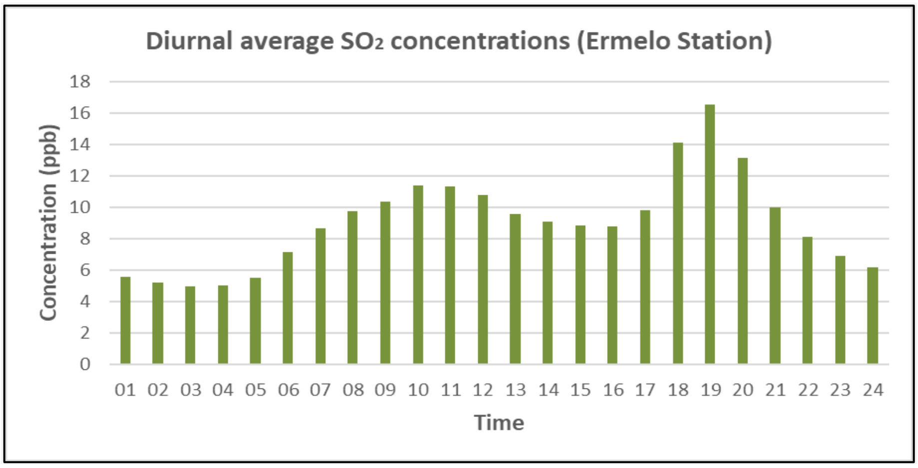


Figure 53: Diurnal SO2 concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

NO_2 concentrations

NO_2 concentrations at the Ermelo AQMS for the period 01 January 2016 to 31 December 2021 are provided in ***Figure 54*** – ***Figure 57*** below. NO_2 data capture at the Ermelo station was 52.7%, with no data recorded in 2021. Hourly and annual average NO_2 concentrations range between 0.00 ppb – 152.63 ppb and 3.93 ppb – 11.69 ppb, respectively, with five (5) exceedances of the hourly standard of 106 ppb and no exceedances of the annual standard of 21 ppb recorded (***Figure 54 and Table 57***).

Higher NO_2 concentrations were observed between April and November (mid-autumn to late spring), with the highest hourly concentration being recorded on 06 May 2019 (152.63 ppb).

In terms of the South African NAAQS, a total of 88 exceedances of the NO_2 hourly standard are permitted within a calendar year, while no exceedances of the NO_2 annual standard are permitted.

Table 57: Annual Average Concentrations for NO_2

YEAR	ANNUAL AVERAGE (PPB)	ANNUAL NAAQS (PPB)
2016	11.44	21
2017	11.69	21
2018	10.26	21
2019	8.29	21
2020	3.93	21
2021	No data	21

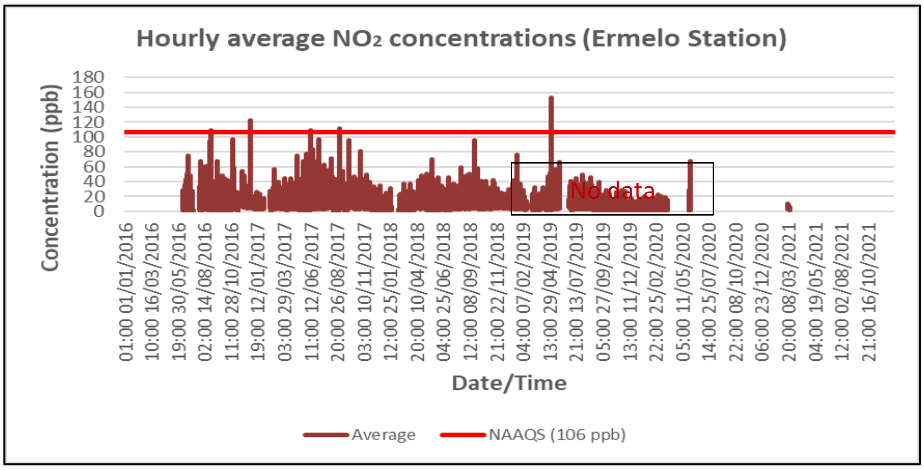


Figure 54: Hourly NO_2 concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

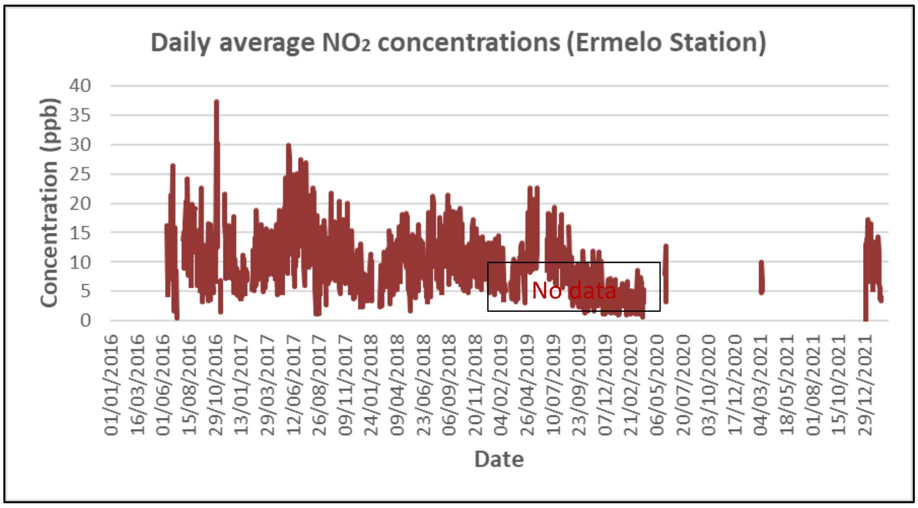


Figure 55: Daily NO_2 concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

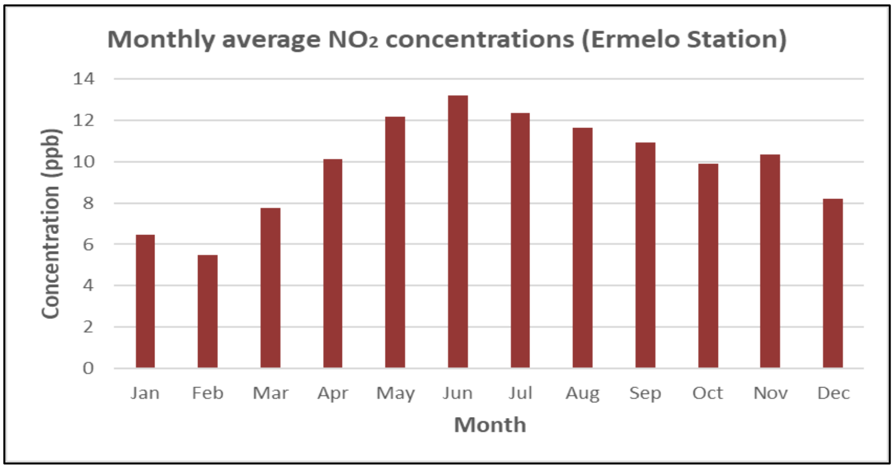


Figure 56: Monthly NO_2 concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

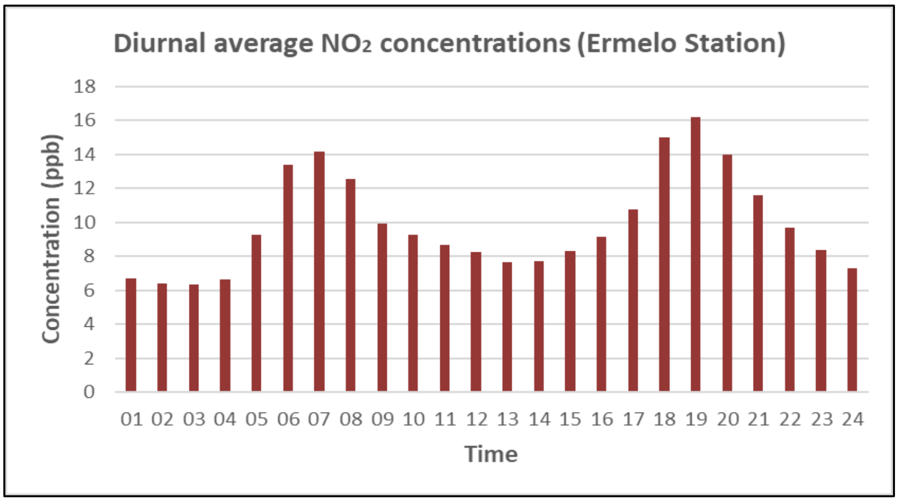


Figure 57:Diurnal NO_2 concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

CO concentrations

CO concentrations at the Ermelo AQMS for the period 01 January 2016 to 31 December 2021 are provided in ***Figure 58*** to ***Figure 62*** below. There was 74.0% data capture in terms of CO at the Ermelo station. Hourly and 8-hourly average CO concentrations range between 0.00 ppb – 448 ppb and 0 ppb – 4 227.63 ppb, respectively, with average hourly and 8-hourly concentrations of 440.83 ppb and 440.91 µg/m^3, respectively. No exceedances of the hourly and 8-hourly standards of 26 000 ppb and 8 700 ppb, respectively, were recorded (***Figure 58 – Figure 59***).

Surrounding sources of CO, within a 20 km radius of the proposed mine, include vehicle exhaust emissions and solid fuel combustion in nearby informal settlements. Monthly average CO concentrations were higher between May and September (late-autumn to early spring), with the highest hourly (448 ppb) and 8-hourly (4 227.63 ppb) concentrations being recorded on 03 June 2016.

In terms of the South African NAAQS, a total of 88 exceedances of the CO hourly standard are permitted within a calendar year, while 11 exceedances of the CO 8-hourly standard are permitted.

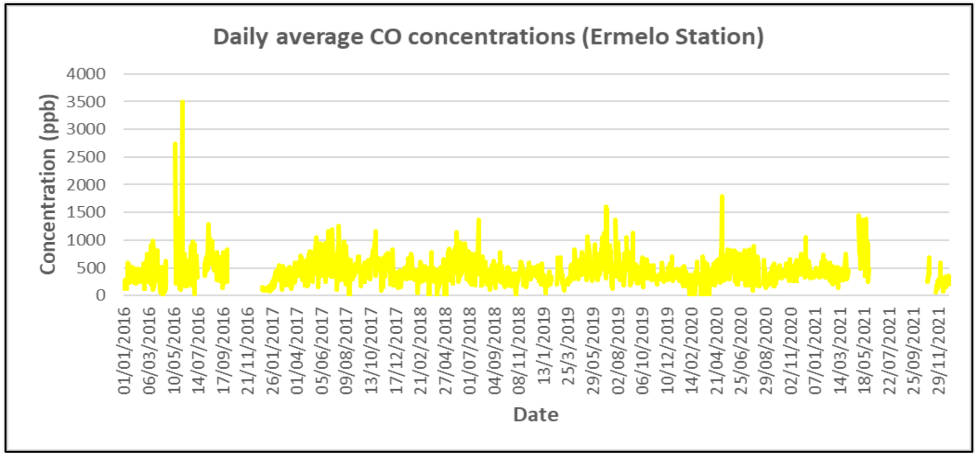


Figure 58: Hourly CO concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

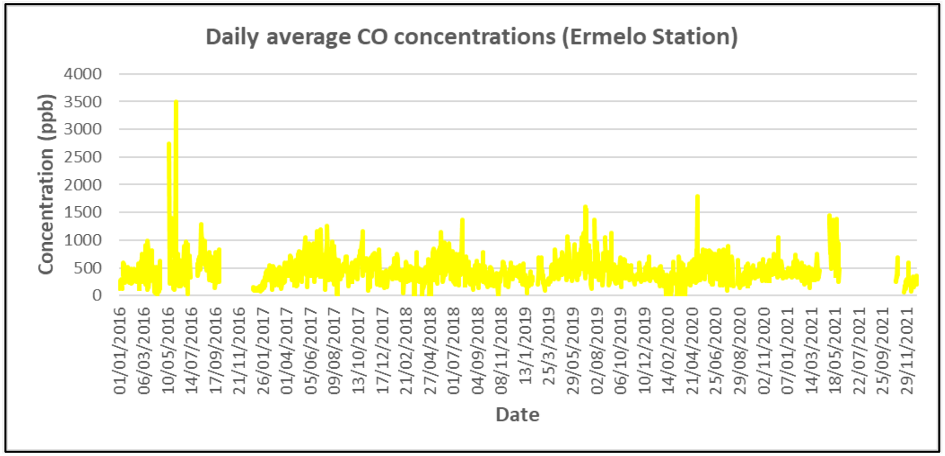


Figure 60: Daily CO concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

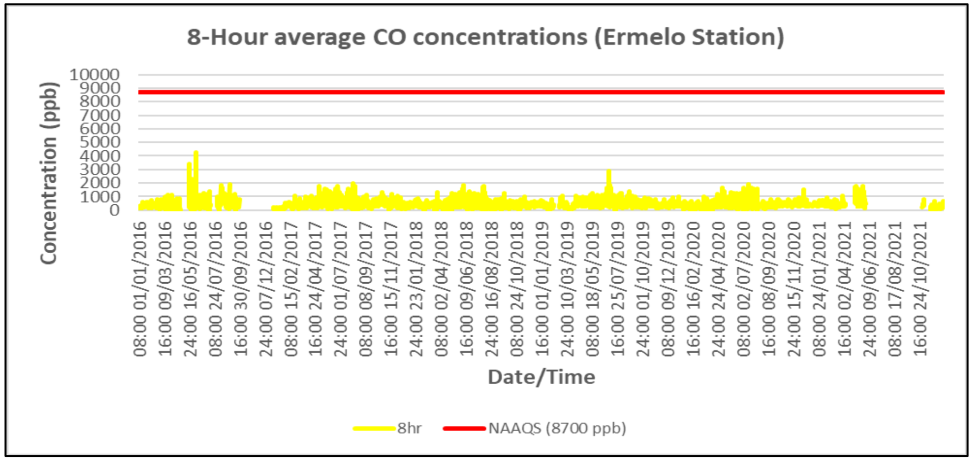


Figure 59: 8-Hour CO concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

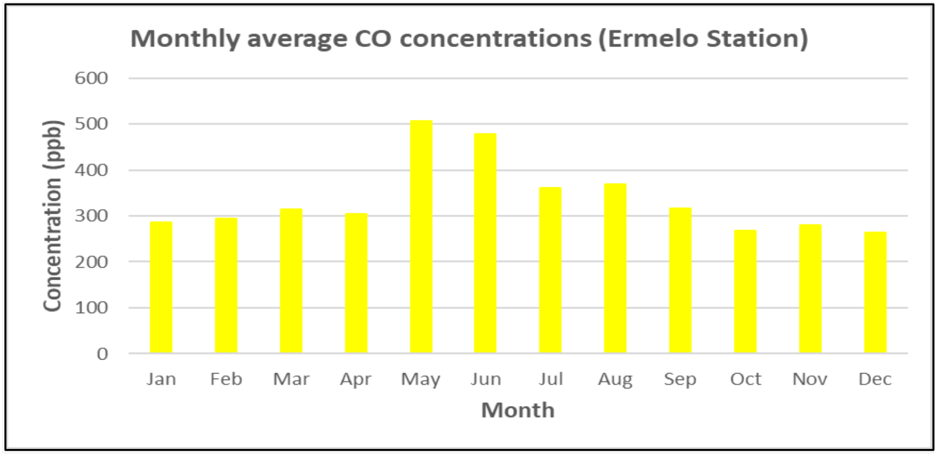


Figure 61: Monthly CO concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

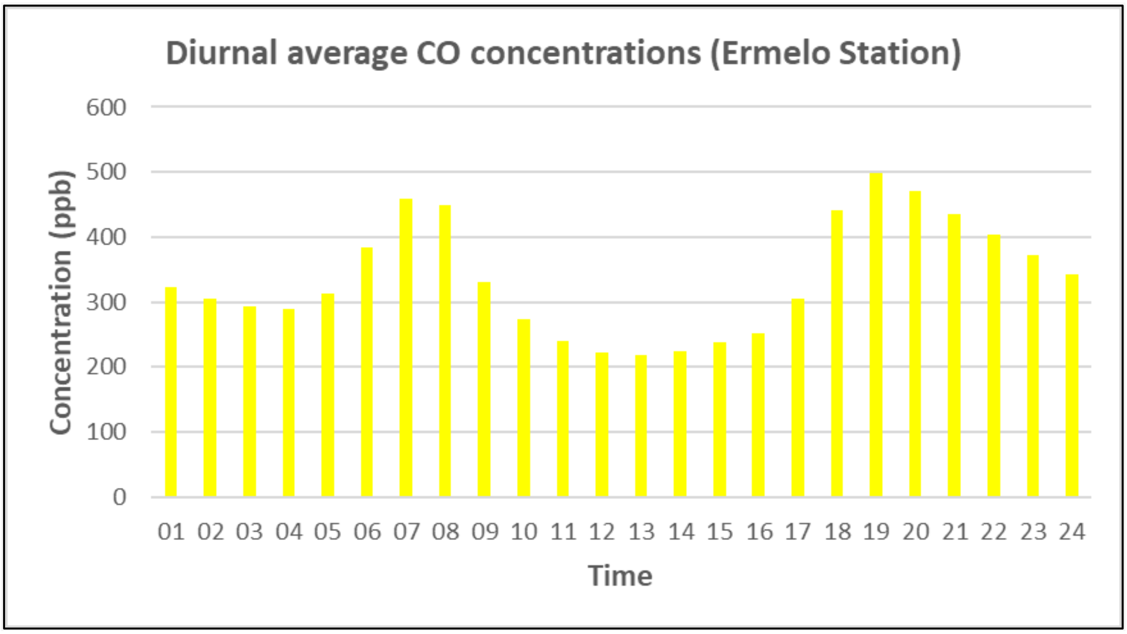


Figure 62: Diurnal CO concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

O_3 concentrations

Ozone concentrations at the Ermelo AQMS for the period 01 January 2016 to 31 December 2021 are provided in ***Figure 63*** to ***Figure 67*** below. There was 87.4% data capture in terms of O_3 at the Ermelo station. 8-hourly average O_3 concentrations range between 0.02 ppb – 96.96 ppb, with an average of 27.69 ppb. Ninety-two (92) exceedances of the 8-hourly standard of 61 ppb were recorded (***Figure 64***).

Surrounding sources of O_3, within a 20 km radius of the proposed mine, include vehicle exhaust emissions from surrounding roads and solid fuel combustion in nearby informal settlements. However, it must be noted that O_3 is a secondary air pollutant, which is not directly emitted into the atmosphere and is dependent on the amount of sunlight and the concentration of other pollutants such as VOCs and NOx. Higher O_3 concentrations were observed between September to November and from January to February (spring and summer).

In terms of the South African NAAQS, a total of 11 exceedances of the O_3 8-hourly standard are permitted within a calendar year.

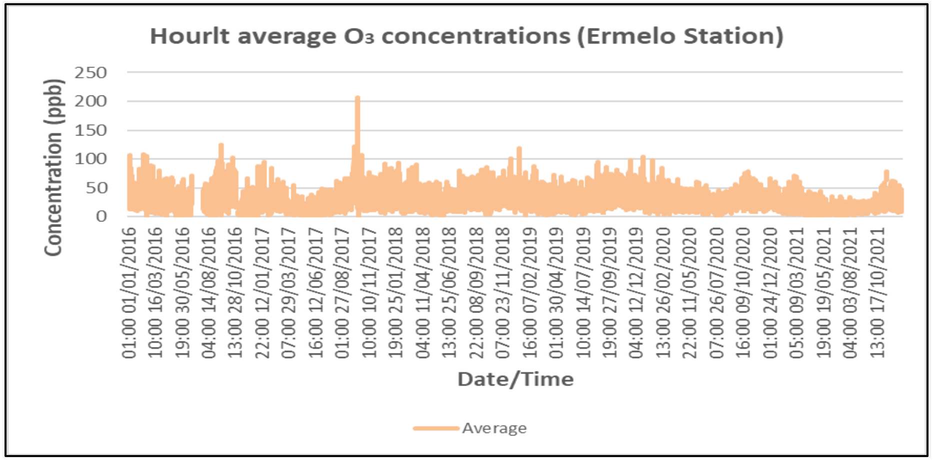


Figure 63: Hourly O_3 concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

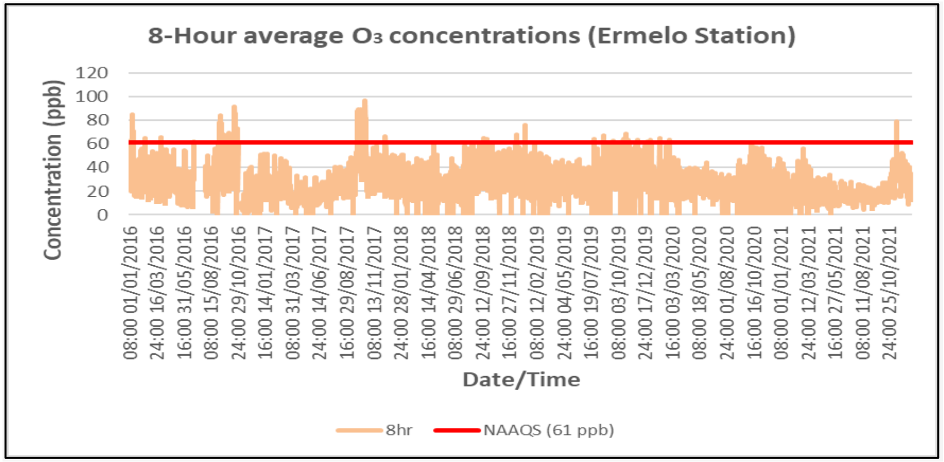


Figure 64: 8-Hour O_3 concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

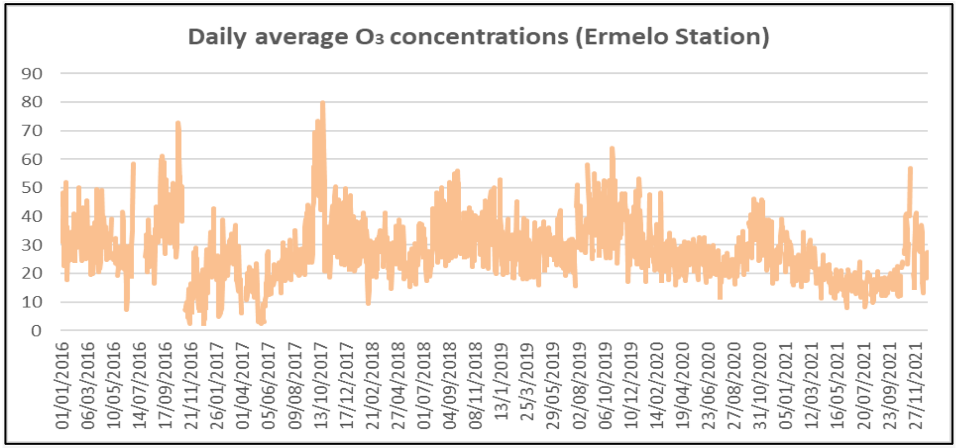


Figure 65: Daily O_3 concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

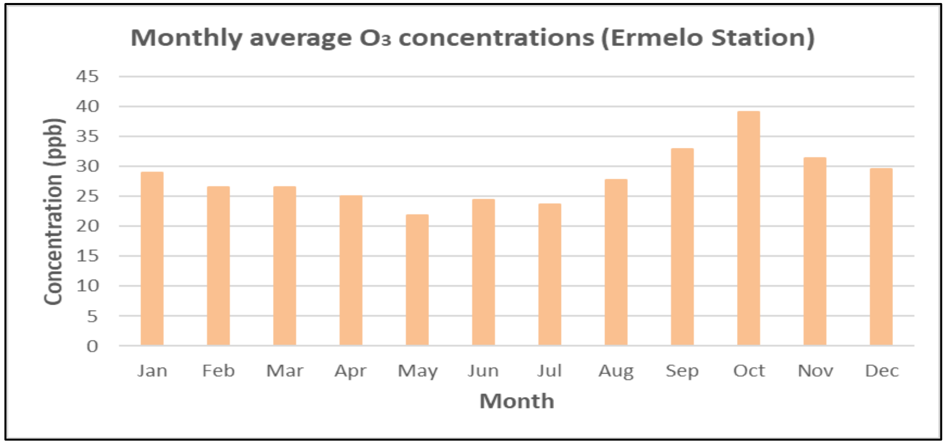


Figure 66: Monthly O_3 concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

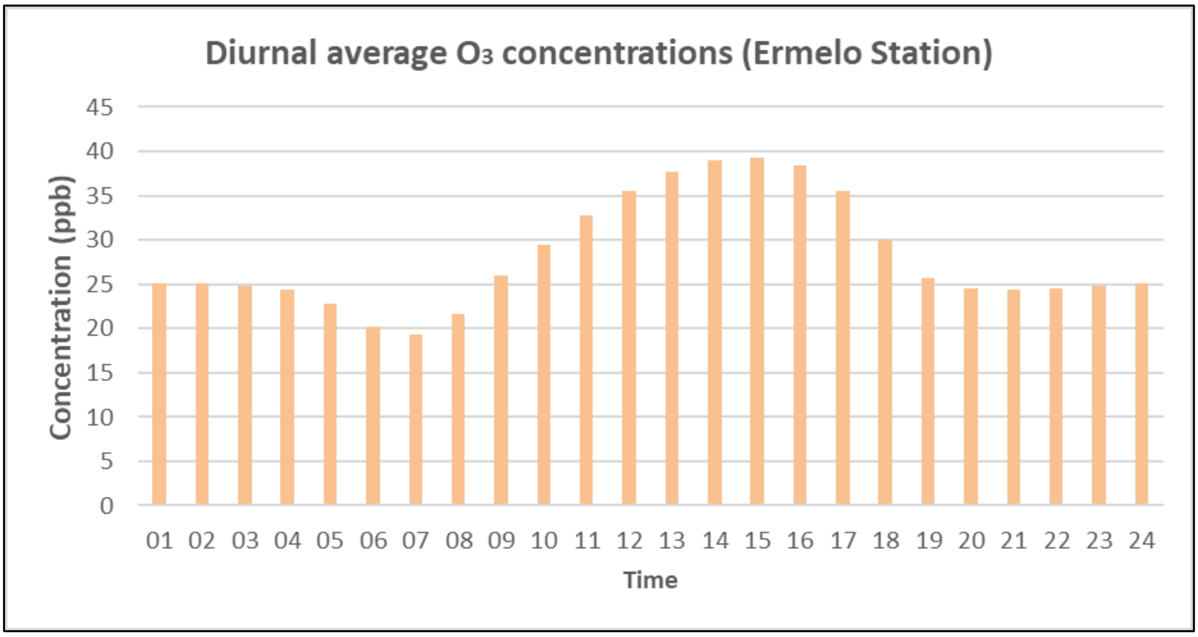


Figure 67: Diurnal O_3 concentrations at the Ermelo AQMS for the period January 2016 – December 2021.

DESKTOP SENSITIVITY VERIFICATION

According to the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and Environmental Impact Regulations, 2014 (as amended) (EIA Regs), site sensitivity and desktop verification must be undertaken to inform the Scoping Phase and EIA process for any proposed development, where applicable. However, site sensitivity and desktop verification are not applicable for AQIAs, as these have not been developed for the South African screening tool. Furthermore, air emissions that result from the proposed mining activity will affect air quality regardless of where the mine is sited.

PLAN OF STUDY FOR THE EIA

For the Environmental Impact Assessment (EIA) phase, it is recommended that a detailed emissions inventory be compiled for the proposed Vlakfontein Coal Mine operations and that the impact of these emissions on air quality be assessed through dispersion modelling using AERMOD. As there is a need to determine the distribution of pollutant concentrations and depositions in time and space for the proposed mine, a Level 2 assessment would be required. The level of assessment required (i.e. Level 2) has been determined in accordance with the National Environmental Management: Air Quality Act (Act No. 39 of 2004) (NEM:AQA) and Dispersion Modelling Regulations (Government Gazette No. 37804 of 11 July 2014). A detailed questionnaire will be given to the client prior to modelling to obtain specific details needed for input into the model and for calculation of emission rates. The conservative scenario will be assumed where information is not known for input into the model.

Regulations that must be considered during the EIA phase include the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and Environmental Impact Assessment Regulations, 2014 (as amended) (EIA Regs) - Requirements for Specialist Reports (Appendix 6), where applicable, the Dispersion Modelling Regulations (Government Gazette No. 37804 of 11 July 2014) and the regulations prescribing the format of an Atmospheric Impact Report

(Government Gazette No. 36904 of 11 October), as amended (General Notice 284 in Government Notice 38633 of 02 April 2015).

To investigate the potential impact of operations associated with the proposed mine on local ambient air quality, the following air pollutants will be chosen in the quantification of emissions for the construction, operational and decommissioning phases of the project. This project will focus on dust emissions as this is a key pollutant emitted from operations at the proposed mine:

- Dustfall; and
- Particulate matter (PM_{10} and $PM_{2.5}$)

The results of the assessment would include dispersion isopleth plots and a summary of predicted incremental PM concentrations and dustfall rates at the proposed mine boundary and at the identified discrete receptors. These results would be presented in the final AQIA report.

KEY ISSUES TO BE ADDRESSED

It is expected that emissions from activities at the proposed mine will most likely result in air quality impacts in terms of dustfall, PM_{10} and $PM_{2.5}$.

Few existing key sources of air pollution surrounding the project site were identified during a desktop exercise and include (***Figure 68*** and ***Figure 69***):

- Agricultural activity (temporary crops) and potential biomass burning ((surrounding areas);
- Planted forest (surrounding areas);
- Solid fuel combustion in nearby townships/informal settlements (south-west and north-west quadrants); and
- Vehicle dust entrainment on unpaved roads (surrounding areas).

Waste and resource dumps and permanent agricultural activities were identified as additional sources of air pollution in surrounding areas but to a minimal extent. Waste and resource dumps are in localised areas north, west, south-west and south of the proposed mine within a 7 – 20km radius, while permanent agricultural activities occur over 3 very small areas south-east, north-west and north-east of the proposed mine within a 5 – 20km radius.

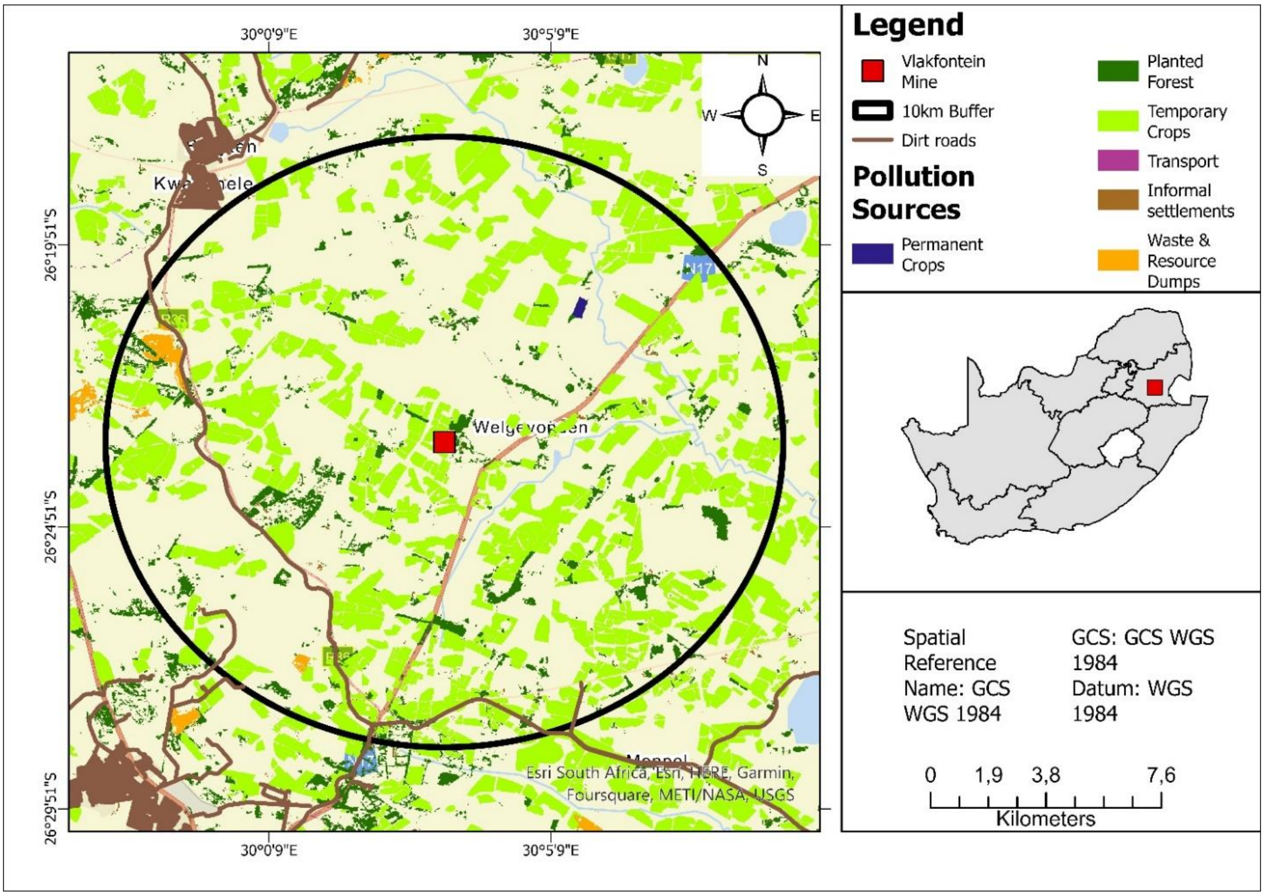


Figure 68: Identified surrounding emission sources within 10km of the proposed Vlakfontein Coal Mine.

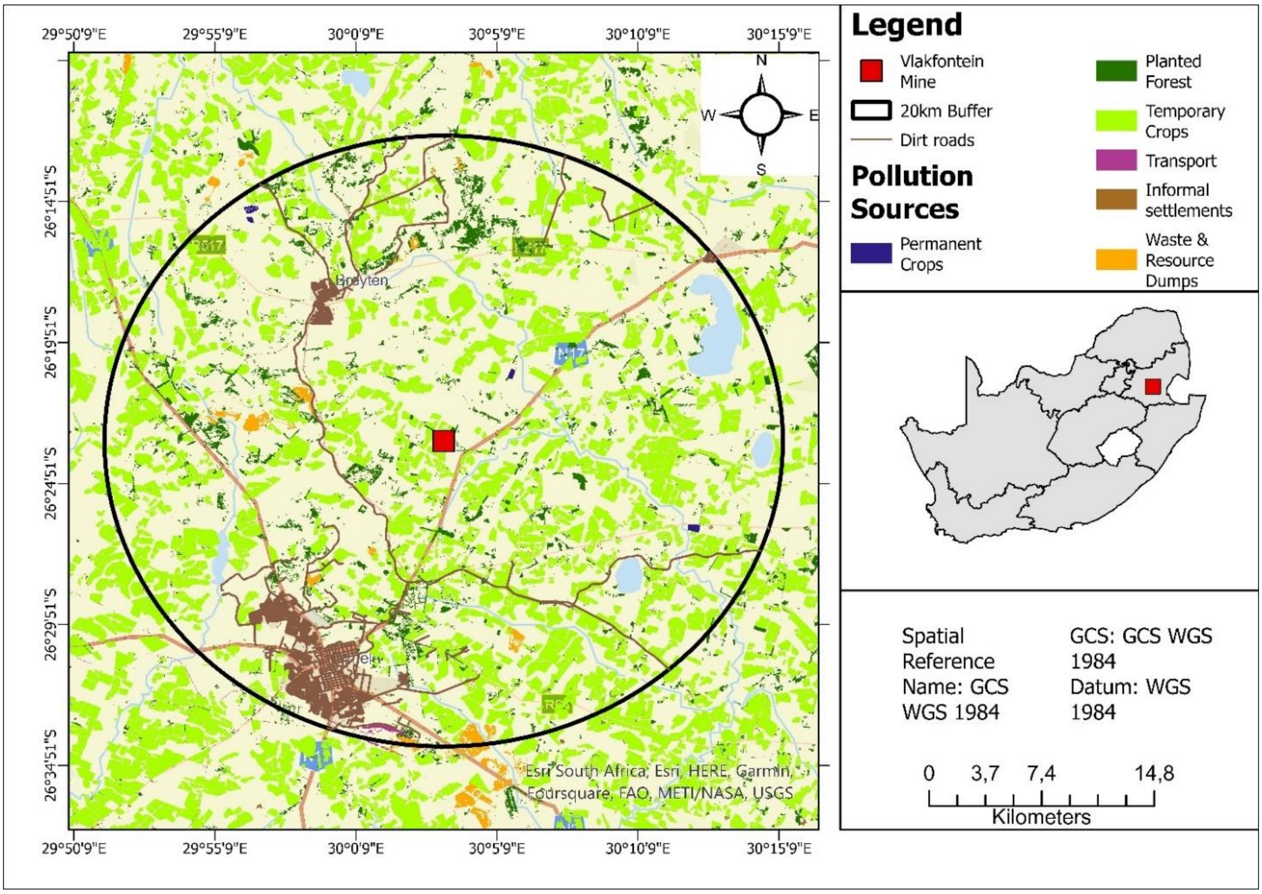


Figure 69: Identified surrounding emission sources within 20km of the proposed Vlakfontein Coal Mine.

REASONED OPINION REGARDING THE ACCEPTABILITY OF THE PROPOSED DEVELOPMENT

The anticipated impact of activities at the proposed Vlakfontein Coal Mine will be quantitatively assessed through dispersion modelling and presented in the final Level 2 AQIAr. The level of assessment (i.e. Level 2) required has been determined in accordance with the NEM:AQA (Act 39 of 2004) and Dispersion Modelling Regulations (Government Gazette No. 37804 of 11 July 2014).

It is expected that emissions from activities at the proposed mine will most likely result in air quality impacts in terms of dustfall, PM_{10} and $PM_{2.5}$. However, as the impact assessment has not yet been conducted (this will be done after the dispersion modelling exercise), no fatal flaws and red flags that could impact on the feasibility of the Mine could be determined in this baseline assessment report. Furthermore, a reasoned opinion regarding the acceptability of the project cannot be provided at this stage. These factors will be determined in the final AQIAr.

XV. HEALTH

INFOTOX (Pty) Ltd was appointed by Environmental Management Assistance (Pty) Ltd on behalf of BCR Coal (Pty) Ltd to conduct a desktop Health assessment and inform the required Scoping Report (Phase 1).

The Scoping Assessment is attached as ***Appendix F.10 - Health Assessment***.

DESKTOP SENSITIVITY VERIFICATION

Reference is made to site sensitivity verification requirements where a specialist assessment is required but no specific assessment protocol has been prescribed, as published in Government Notice No 320, Government Gazette 43110, 20 March 2020.

The site sensitivity verification requirements do not apply to a RAHIA, as the assessment is conducted on the basis of the site footprint, dispersion of hazardous substances from the operations, and potential health impacts on neighbouring communities. Vulnerability of potentially affected members of the community is taken into account in the RAHIA.

PLAN OF STUDY FOR THE EIA & KEY ISSUED TO BE ADDRESSED

Elements of the assessment

According to the IFC, the RAHIA is a limited in-country assessment that does not require new data collection within the communities of concern. Data necessary to assess potential health impacts of proposed developments on potentially affected communities are extracted from existing data sources. It is evident that this requires a review determining the availability of existing data sources and a review of such sources to identify and select data relevant to the communities of concern. The IFC suggests that a limited desktop review will suffice.

With regard to the BCR Coal open pit mining operation, it is expected that potential impacts on air quality, and potential resultant impacts on the health of receptor communities, will be of primary interest. The main focus of the RAHIA is the impact of substances released or dispersed into air on the health of surrounding communities. Due to this focus, air dispersion modelling of the potential impact on air quality will be necessary. This should involve the potentially impacted geographical area, done according to the terms of reference for the Air Quality Impact Assessment (AQIA), by air quality specialists appointed by EMA.

Assessment focus areas

Integral to the RAHIA is the environmental human health risk assessment (HHRA), which will be conducted by INFOTOX. In terms of the RAHIA, the geographical study area considered as impacted include those areas and communities where the proposed developments may have an impact on the environmental quality. The assessment of the impacts via air is performed using the results of the HHRA, which is based on concentrations of hazardous substances in air, whether measured or modelled. EMA has appointed air dispersion modelling specialists to investigate the potential impacts of the proposed mining operation and publish an Atmospheric Impact Report (AIR).

INFOTOX requires PM2.5 dispersion modelling data provided in the AIR, which will serve as source of input data for the health risk assessment. The AIR should identify the locations of sensitive receptors and ambient air concentrations of PM2.5 across the study area, averaged over specified exposure periods. INFOTOX has to liaise with the air dispersion modelling specialists prior to the initiation of air quality modelling, because INFOTOX requires the information in a specific format. Air quality specialists normally present data in the format of exceedances of air quality standards, whereas INFOTOX requires exposure concentrations of pollutants.

Simplistic comparisons between exposure concentrations and ambient air quality guidelines or standards are inadequate to quantify health outcomes, mainly because ambient air quality guidelines are used for management of air quality and are not intended for risk quantification. Air quality guidelines or standards also do not relate exposures to specific health endpoints, which limits the effectiveness of risk communication.

Occupational health risk assessment is not included in this assessment.

The human health risk assessment paradigm

The original paradigm for regulatory HHRA in the USA was developed by the USA National Research Council (NRC 1983). This model has been adopted and refined by the US Environmental Protection Agency (USEPA) and other international agencies as published under the International Programme on Chemical Safety (IPCS 1999; IPCS 2010) and is widely used for quantitative human health risk assessments. The elements of the HHRA approach are described below.

Hazard assessment

Hazard assessment is the identification of chemical contaminants suspected to pose hazards and a description of the types of toxicity that they may evoke. The air contaminant of concern in this study is PM2.5.

Exposure-response assessment

The exposure-response assessment addresses the relationship between levels and periods of exposure and the manifestation of adverse health effects in humans, and/or how humans can be expected to respond to different concentrations of contaminants in air.

Mortality or hospitalisation rates for respiratory or cardiovascular causes are the measures of associated illness that are mostly applied in epidemiological studies of community health risks associated with exposure to PM2.5. The international scientific literature is not static and major regulatory agencies such as the US Environmental Protection Agency (USEPA) and the UK Committee on the Medical Effects of Air Pollutants (COMEAP) regularly review their risk models.

This requires timely reviews of the literature by the health risk assessor and the status of information is checked prior to conducting health risk assessments.

The community health risk assessment involves the calculation of the potential increase in or contribution to the risk of hospital admissions or mortality due to specific causes, associated with air concentrations of specific pollutants. These calculations are based on results of epidemiological studies reported in the international scientific literature in which statistical methods were used to compare hospitalisation or mortality rates with air quality. Current statistical methods use the concept of relative risk to derive the potential increase in or contribution to effects. The potential increase or contribution associated with the pollutant contributed by a specific source, in this case, emissions from the proposed mining operation, is calculated using the approach of the World Health Organization (WHO), which will be discussed in the human health risk assessment report.

In the assessment of health risks, it is of critical importance to focus on health outcomes for which adequate scientific evidence has been documented. The issue of causality is fundamental in this regard, because assessments have to be based on health impacts linked to exposure with a significant degree of confidence.

Health effects in the "likely to be causal", "suggestive of a causal relationship" and "inadequate to infer a causal relationship" categories are weakly characterised and can mostly not be used in health risk assessments.

The percentage change in personal risk of a specific health effect associated with a specific criteria pollutant emitted from the mining operation is calculated by INFOTOX. Please note that INFOTOX will thus not calculate the number of individuals experiencing a specific health effect, because the affected population numbers are too low. Basing interpretations on personal risk is adequate and acceptable in the assessment of health risks in small communities.

Exposure assessment

In the case of emissions to air, exposure assessment includes estimates of concentrations and duration of exposure of hazardous substances in air and identification of potentially exposed individuals or communities. Exposure assessment in this study is based on the air pathway of exposure and the route of exposure is by inhalation.

Exposure scenarios are also defined in terms of the length of periods of exposure. In the case of PM2.5, short-term (acute) exposure is based on the 99^{th} and 75^{th} percentiles of the modelled average 24-hour air concentrations. The 99^{th} percentiles are used to calculate the reasonable upper risk limits and the 75^{th} percentiles, if made available by the air dispersion modeller, are used to calculate a conservative central risk estimate. Chronic exposure is based on the modelled annual average concentrations of PM2.5.

Risk characterisation

Risk characterisation involves the quantification of health risks and the integration of the HHRA components described above, with the purpose of determining whether specific exposures to an individual or a community might lead to adverse health effects.

Uncertainty review

This review identifies the nature and, when possible, the magnitude of the uncertainty and variability inherent in the characterisation of risks. The results of any risk assessment are inherently affected by, firstly, scientific uncertainty associated with limitations in available data and assumptions that are made in the absence of such data. Secondly, the results are subject to variability in exposure and toxicological response expected, given the diversity within the human population. These uncertainties, assumptions and limitations that form part of all risk characterisation must be discussed in the uncertainty review of the risk assessment report. The uncertainty review also demonstrates the level of confidence in the outcome of the risk assessment and indicates whether additional data might be required, or whether elements of the precautionary principle should be applied.

Input from the Air Quality Impact Assessment

The results of air dispersion modelling are estimates of the resultant air concentrations of dispersed contaminants in the vicinity of impacted communities. Estimates of incremental air concentrations are the input needed to estimate potential human health risks in terms of selected health effects of interest according to the airborne contaminants of interest. The results of the HHRA, together with the baseline health status of the impacted communities, are used to conduct an HIA.

INFOTOX data requirements from the AQIA are as follows:

Particular matter as PM2.5

- 75^{th} percentile of daily (24-hours average) concentrations;
- 99^{th} percentile of daily (24-hours average) concentrations; and
- Annual average concentration.

The air dispersion modelling domain is determined by the expert air dispersion modeller and the HHRA is focused on the receptor communities within the air dispersion modelling domain.

Desktop review of available health literature

The baseline health status of the exposed communities is an important determining factor considered in the assessment of health impacts. The baseline health status assessment is compiled by INFOTOX, based on a desktop study of available health data for the receptor area. The intention of the desktop review of available published health literature is to provide baseline health data on the underlying burden of disease for the RAHIA and to identify specific vulnerabilities that might influence health impacts associated with the proposed operations. The following aspects are covered:

Evaluate the underlying burden of disease, based on information gathered by INFOTOX from available open sources. Examples of open sources are World Health Organization health data and data potentially available from South African National, Provincial and Local Government Departments.

Various burden-of-disease indicators are examined, such as:

- Vector-related diseases;
- Soil- and waterborne diseases, if applicable;
- Sexually transmitted diseases;
- Nutrition-related diseases;
- Communicable and non-communicable diseases; and
- Health impact assessments related to the project and the area, if available.

Identification and consideration of sensitive groups are important activities in the RAHIA. Examples of sensitive groups are elderly individuals, infants and young children. It is also important to identify localities where sensitive groups might congregate, such as schools, old age homes, sports fields and community halls. Community-specific information, such as the adequacy of health care facilities, may also be considered in the RAHIA. Sensitive groups and their likely localities are usually identified in the Social Impact Assessment, from which INFOTOX will obtain the necessary data.

Rapid appraisal health impact assessment output

The output of the RAHIA is a contextualised rapid assessment of the potential health impact of the proposed open pit mining operation. The significance of various identifiable impacts is assessed as suggested by the IFC (2009) based on factors such as:

- The likely perception of risks by potentially affected communities;
- The nature of the impacts, whether direct, indirect or cumulative;
- The timing and duration of impacts; an
- The extent, magnitude and frequency of impacts.

The IFC (2009) also suggests that risks should be ranked in terms of severity and the probability of occurrence.

Criteria for the evaluation of impacts and impact significance ratings to be used in the impact assessment should be provided to INFOTOX. This will ensure consistent rating and assessment with impact assessments that will be compiled by other specialists. The construction and operation phases will be rated separately.

REASONED OPINION REGARDING THE ACCEPTABILITY OF THE PROPOSED DEVELOPMENT

It is not possible to express an opinion about the acceptability of the proposed project in the baseline assessment, as INFOTOX requires details of the AQIA. Furthermore, INFOTOX must review available health information of potentially affected members of the community.

Once all the data are available an informed decision can be made following the EIA phase.

XVI. SOCIO-ECONOMIC

Batho Earth was appointed by Environmental Management Assistance (Pty) Ltd on behalf of BCR Coal (Pty) Ltd to conduct a desktop Health assessment and inform the required Scoping Report (Phase 1).

The Scoping Assessment is attached as ***Appendix F. 11 - Socio-economic Assessment***.

METHODOLOGY

Batho Earth undertook a site visit on 05 July 2022 as part of the of site verification process, to gain a better understanding of the socio-economic context of the area and gather information to support the desktop research.

Scope of Assessment

This involves an investigation to identify the framework of the project through the identification and demarcation of the study area. Once the study area has been determined, an evaluation framework was developed which assisted in identifying the main anticipated social impacts. For this study, it aimed to:

- Consider the extent of the proposed project and social environment within which the project will be placed and accordingly identify the potential social impacts/ risks that are likely to arise as a result of the proposed project;
- Compile a detailed socio-economic baseline profile;

- Undertake a site sensitivity verification to confirm the current land use and environmental sensitivity of the proposed project area as identified by the Environmental Screening Tool.

Literature review, analysis, and desktop studies

The literature review assisted the consultants to establish the social setting and characteristics of the study area, as well as the key economic activities. Secondary data, which was not originally generated for the specific purpose of the study, were gathered and analysed for the purposes of the study.

A review of available documents was undertaken to obtain information regarding the baseline socio-economic conditions of the project area. Documents reviewed include the following:

- Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDF) of the affected local and district municipalities (GSDM and MLM);
- Socio-economic and demographic statistics (sourced from Statistics South Africa's 2001 and 2011 Census data); and
- Available maps and satellite imagery.

Profiling

Profiling involves a description of the social characteristics and history of the area being assessed, an analysis of demographic data, changes in the local population, and the land-use pattern in the study area, as well as any other significant developments in the area and thus social character over time. The profiling process is a combination of secondary and primary research and the site visit.

The broad profiling will typically include descriptions regarding the following:

- The social trends and current conditions;
- The land-use in the area;
- The demographical profile and social characteristics of the host community e.g. population and household size; age and gender profile; access to basic services; education profile; dwelling units; tenure status type; employment status; sector of employment; and household income levels;
- Culture, attitudes and socio-psychological conditions (e.g. attitude formation and evidence of previous protest actions);
- Community and institutional structures;
- Community resources;
- Land-use in the area (e.g. agricultural, business/commercial, open veld, recreational areas, nature conservation areas, cultural and heritage sites, residential etc.);
- Challenges, strength and weaknesses of the communities;
- Other potential developments in the area (to assess cumulative impacts);
- Local and regional economy;
- Local economic networks;
- Economic development initiatives in the local area; and

- Past community experiences with projects in the area.

The baseline conditions refer to the local social context prior to development being implemented.

Social Screening

On completion of the baseline assessment, social screening was undertaken to assess and analyse the data about the socio-economic environment to determine possible sources of impact and risks. It forms part of the process of identifying important cause-and-effect relationships and a comparative framework for anticipated changes and impacts.

SUMMARY OF BASELINE CONDITIONS

General Description of the Study Area

The study area is defined as a geographical area within which social and environmental studies are completed to determine direct, indirect and cumulative impacts attributable to the project.

The following sections provide a description of the socio-economic conditions within the identified project study area, which will be used to inform the Social Impact Assessment (SIA).

Regional Context

Mpumalanga is the second smallest province in South Africa and is located in the north-eastern part of the country, bordering Swaziland and Mozambique. Mpumalanga covers an area of 76 495km² and has a population of 4 335 964, making it one of the most populous provinces in the country.

As per the Community Survey, 2016 (Stats SA, 2016) the province's number of households were 1 238 861. The population of Mpumalanga has grown at an annual rate of 1.63% p.a. between 2011 and 2018, which is higher than the national average of 1.57% (Mpumalanga SDF, 2019).

The province is rich in coal reserves and home to South Africa's major coal-fired power stations (eMalahleni is the biggest coal producer in Africa). Mpumalanga is known for its mining, manufacturing, forestry and service sectors. The tourism and agro-processing sectors have shown major growth potential over the years. Agriculture in Mpumalanga is characterised by a combination of commercial and subsistence farming practices.

The Maputo Corridor, which links Mpumalanga with Gauteng and Maputo in Mozambique, harbours extensive potential in terms of economic development and growth for the region. The N17 also is an important transport corridor linking Gauteng with Kwa Zulu Natal through the southern part of Mpumalanga.

The five primary nodes where developments are to be concentrated in the province are Witbank/ Emalahleni, Middleburg, Mbombela/ Nelspruit, Secunda and Ermelo.

The following focus areas were identified with regard to mining and energy related development in the province: (i) facilitate and accommodate the existing mining sector, (ii) develop industries that will serve coal mines in towns like Ermelo and Standerton, (iii) proper rehabilitation of mines after use, (iv) establish proper environmental management systems during the operational stage of mines, (v) strengthening of the Richards Bay coal line rail freight corridor (Mpumalanga SDF, 2019).

Gert Sibande District Municipality

The GSDM is the largest of the three districts in Mpumalanga Province at 31 841 km², covering 40% of the Mpumalanga Province's land mass. The Gert Sibande District (GSD) contributes 26.2% towards the provincial population (Mpumalanga SDF, 2019).

The GSDM comprises of the following local municipalities:

- Chief Albert Luthuli Local Municipality;
- Dipaleseng Local Municipality;
- Dr Pixley Ka Isaka Seme Local Municipality;
- Govan Mbeki Local Municipality;
- Lekwa Local Municipality;
- Mkhondo Local Municipality; and
- MLM.

The following key issues can be noted:

- According to Stats SA (2016 Community Survey), the GSDM's population increased from 1,043 194 in 2011 to 1,135 409 people in 2016, making it the smallest population among the districts in the province.
- In 2016, the youth population (15-34 years) comprises 39.3% of the total population.
- In 2016, the female population's share was 50.3% and that of males 49.7%.
- The population increased by 92 215 between 2011 and 2016, which is a population growth rate of 1.9% per annum between 2011 and 2016. This was higher than the annual average economic growth of 1.1% p.a.
- The population was estimated to reach a total of 1, 263 786 or 26.6% of Mpumalanga's population in 2021. The projection for 2030 is approximately 1.31 million or 25.7% of Mpumalanga's population. Such population growth will place additional pressure on infrastructure and service delivery as well as economic and employment opportunities.
- The number of households in the GSDM increased from 273 490 in 2011 to 333 815 households (± 60 000 household increase) in 2016 which constitutes 26.9% of Mpumalanga's households. The household size declined from 3.8 to 3.4 between 2011 and 2016. The projected household figure for 2030 is approximately 467 200 households.

The main economic sectors of the district include.

- Manufacturing (49.4%);
- Agriculture (38.1%);
- Transport (31.4%);
- Trade (29.2%);
- Community services (26.9%);

- Construction (26.6%);
- Electricity (26.1%);
- Finance (23.8%); and
- Mining (23.3%).

The proposed BCR Vlakfontein coal mine project links into the District's intention to mining and energy related development. According to the Mpumalanga SDF (2019), the GSDM is committed to:

- Facilitating and accommodating the existing mining sector;
- Developing industries that will serve coal mines in towns like Ermelo and Standerton;
- Ensuring proper rehabilitation of mines after use;
- Establishing proper environmental management systems during the operational stage of mines; and
- Strengthening of the Richards Bay coal line rail freight corridor.

Msukaligwa Local Municipality

The MLM is a predominantly rural area, covering 6016 km^2. The municipality has a total population of approximately 164 608 people with a relatively low population density of 27.3 people per square kilometre.

MLM is one of the seven local municipalities within the GSD and the main settlements include Ermelo/Wesselton; Breyten/KwaZanele; Chrissiesmeer/KwaChibikhulu; Davel/KwaDela; Warburton/Nganga; Lothair/Silindile; and Sheepmoor (Msukaligwa SDF, 2019).

The towns nearest to the proposed development are Ermelo to the south, Breyten to the northwest, and Chrissiesmeer to the northeast.

Ermelo/Wesselton is the highest order urban settlement in MLM, located at a central point to a range of regional routes (road and rail) including the N17, N11 and N2. Ermelo is regarded as a key economic growth and innovation centre with a focus on mining, transport/logistics and agriculture. It is also defined as a regional service centre that should provide high level social services to surrounding areas. MLM is set to play an increasingly important role in provincial connectivity and corridor development, with Ermelo as a central node for a number significant existing and future corridors (freight rail, passenger transport, road transport) (Msukaligwa SDF, 2019).

Information from the 2010 Msukaligwa Environmental Management Framework (EMF) indicated that there were 33 mines within the municipal area, of which 55% were located around Ermelo and between Ermelo and Breyten. This EMF further noted that six of these mines were located around Chrissiesmeer within close proximity to the sensitive lakes district. There was also some sand mining and quarrying taking place for road materials (Msukaligwa SDF, 2019).

Chrissiesmeer/Kwachibikhulu has been identified as a tourism node within the larger municipal area. This is mainly due to Chrissiesmeer situated at a very large natural body of fresh water that has a circumference of 25 km, and expands 1500 ha. These pans do not have inlet or outlets, it is only rainwater that fills it (www.chrissiesmeer.co.za).

Breyten was established as a railway town. Common freight was agricultural produce and livestock, but most predominantly coal from the local collieries. Due to losses in the manufacturing sector, the town has since experienced high unemployment. Breyten/Kwazanele continues to be a mining community, with the majority of the population still employed in collieries such as the Tselentis and Spitzkop Collieries of the Imbawula Group. The town does not have a very diverse economic base and the key activities revolve around mining related activities, agriculture and retail. The R36 runs through the town and links with the R542 to link with Chrissiesmeer.

The Breyten-Kwazanele node is seen as a Rural Intervention area, and is located between Bethal, Ermelo and Carolina. This area is characterised by a number of Land Reform initiatives. In addition it must be noted that the Msukaligwa SDF designates the area between Ermelo and Breyten for urban peripheral uses. These uses include rural residential and agricultural holdings, mining and related uses, low intensity service industries and transport-related concerns, intensive agriculture and beneficiation of agricultural produce (Msukaligwa SDF, 2019).

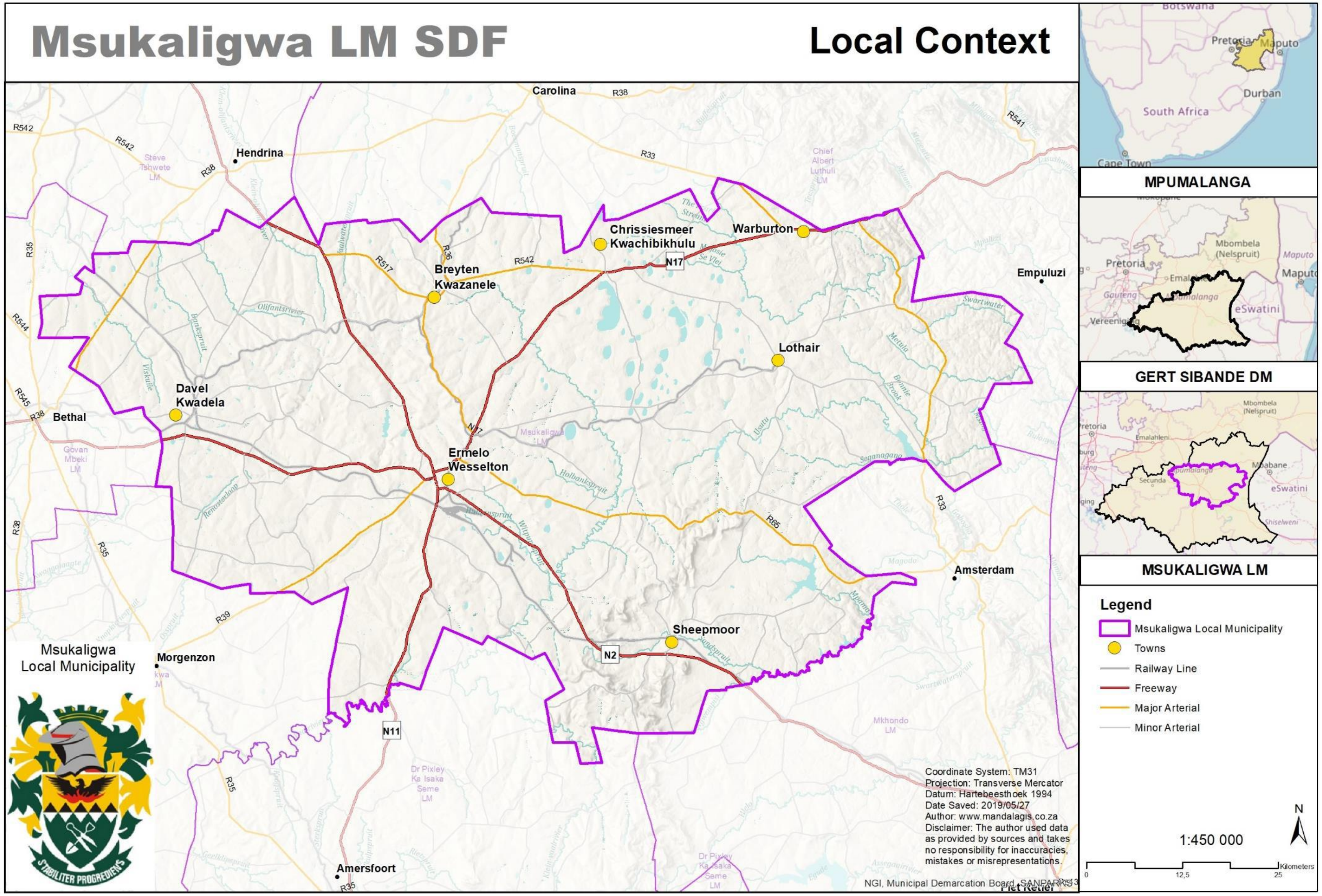


Figure 70: Msukaligwa Local Municipality

__The local study area__

The proposed mining development is situated in the northern section of the MLM area in Ward 14. The following figure indicates the location and extent of the MLM and the location of Ward 14 (www.wazimap.co.za)

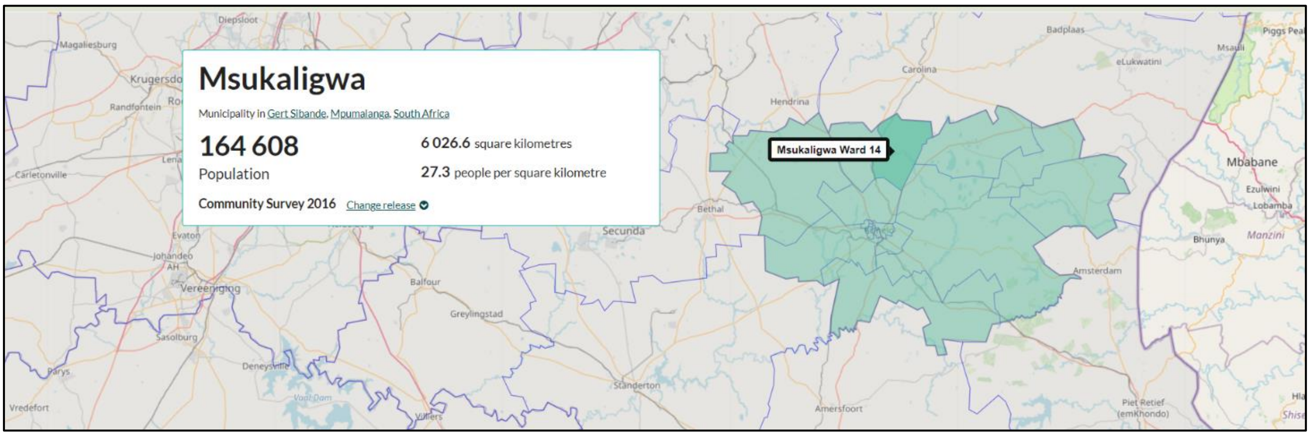


Figure 71: Msukaligwa Local Municipality and Ward 14

The directly affected properties are outlined as part of ***Figure 72: Surface owners***.

Figure 72: Surface owners

The area surrounding Ermelo is characterised by agriculture and related activities, mining, utilities and power generation, transport, business and commercial activities. Various wetlands occur in the Chrissiesmeer area near Ermelo. These wetlands represent a high value ecological infrastructure for securing water for human use (Mpumalanga SDF, 2019).

Land-uses in the area adjacent the proposed mining area are mainly agricultural, with the wetlands area to the north of the study area towards Chrissiesmeer. The Chrissiesmeer Protected Environment was declared one of the four strategic water sources in the province. It is highly likely that the landowners in the area are conscious of the environmental value of these wetlands.

Social Profile

Population Figures

The population figures in the study area are as follows:

Table 58: Population figures within the study area

POPULATION FIGURES WITHIN STUDY AREA			
Municipal area / Ward	**Population**	**Number of Households**	**% Under 18 Years Age Group**
GSDM	1 135 409	333 811	37%
MLM	164 608	51 090	35%
Ward 14 (2011 statistics)	6 090	1 640	38%

(Source: Mpumlanga SDF, 2019; Wazimap; Community Survey 2016; StatsSA Census 2011)

The MLM has a relatively small population, with a fairly high growth rate of 2.2%. The total population increased from 149 377 in 2011 to 164 608 in 2016. In 2016, just more than 14% of people in the GSD resided in the MLM. The average household size decreased from 3.6 to 3.2 from 2011 to 2016 (MLM SDF, 2019 & MLM IDP, 2020)

From the above it is clear that approximately a third of the population falls in the under 18 years age group. This indicates a definite need for future employment creation, education facilities and housing infrastructure.

Population Age

The following table provides an outline of the population per age category.

Table 59: Age Groups

AGE GROUP						
AGE CATEGORY	**MLM: WARD 14 (83002014)**		**GSDM**		**MPUMALANGA**	
	% IN AGE CATEGORY	**TOTAL**	**% IN AGE CATEGORY**	**TOTAL**	**% IN AGE CATEGORY**	**TOTAL**
0-9	23.3%	1,353	22.7%	226,445	22.4%	864,331
10-19	20.9%	1,215	21.2%	211,506	21.3%	820,626
20-29	18.3%	1,060	18.7%	186,174	19%	733,862
30-39	12.9%	750	12.5%	125,061	13%	499,874
40-49	10.2%	592	10.8%	107,503	10.6%	410,678
50-59	6.2%	362	7.2%	72,064	6.7%	258,444
60-69	3.9%	225	3.8%	38,084	3.8%	144,830

70-79	3%	175	2.1%	20,762	2.2%	82,978
80+	1.3%	74	1%	9,517	1.1%	42,520

(Source: StatsSA Census 2011)

The above table indicates that the age categories found in Ward 14 correlates with the trends of the province and district.

The population pyramid show that the MLM has a fairly young population, with the youth population (15-34 years) forming 41.2% of the total population. Approximately half of the population (51.1%) was female in 2016.

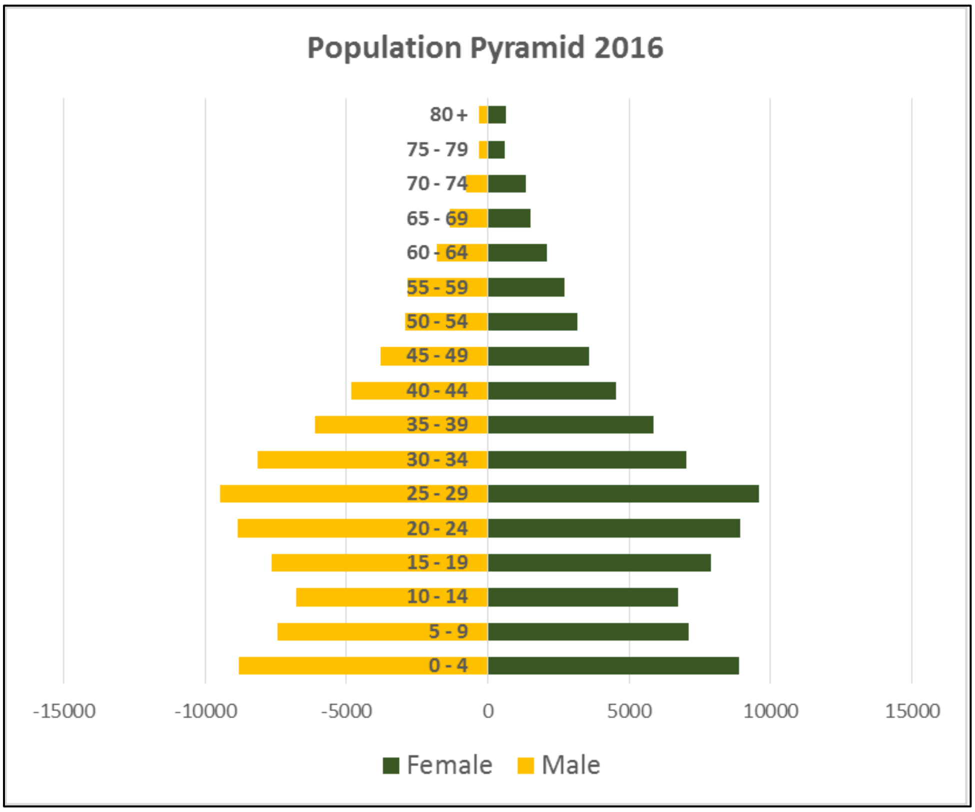


Figure 73: Population pyramid (Source: MLM SDF, 2019)

<u>*Population group*</u>

Table 60: Population Group

POPULATION GROUP						
GROUP	**MLM: WARD 14 (83002014)**		**GSDM**		**MPUMALANGA**	
	% IN AGE CATEGORY	**TOTAL**	**% IN AGE CATEGORY**	**TOTAL**	**% IN AGE CATEGORY**	**TOTAL**
Black African	99.2%	6,042	88.6%	923,976	90.7%	3,662,219
Coloured	0.2%	10	1%	10,767	0.9%	36,611
Indian or Asian	0.3%	15	1.1%	11,002	0.7%	27,917
Other	0.1%	7	0.3%	3,171	0.2%	9,597

Unspecified	0%	0	0%	0	0%	0
White	0.3%	16	9%	94,279	7.5%	303,595

(Source: StatsSA: Census 2011)

Population Stability

The population of the MLM grew with 15 231 persons during the period from 2011 to 2016 with an annual average growth of 2.2%. Noticeably is the decrease in the White and Asian population category over the past five years, although no change with regards to the Coloured community were noted. A possible explanation to the decline in the White population could be a result of internal migration where other municipalities become recipients of in-migrants. Despite the negative net migration of the White population, the overall population of the municipality has continued on an upward trajectory (MLM IDP, 2021).

Formal settlements in the MLM, especially Ermelo/Wesselton, are experiencing in-migration, putting pressure on the provision of housing and services.

Education and Skills Levels

Similar education levels with regards to no schooling and those that have completed secondary school are found within the affected ward, municipal area and district. The workforce in the affected ward however, has an overall low level of education and skills with limited higher education levels. Individuals would thus find it difficult to enter the job market.

Table 61: Population by highest educational level

EDUCATION LEVELS WITHIN STUDY AREA			
MUNICIPAL AREA / WARD	**NO SCHOOLING**	**COMPLETED SECONDARY**	**HIGHER EDUCATION**
GSDM	11%	34%	6%
MLM	11%	34%	7%
Ward 14 (2011 statistics)	10.6%	35.6%	1.6%

(Source: StatsSA: Census 2011)

Taking into consideration the way in which the municipality is growing and the shortage of skills within communities, there is a need for at least a tertiary institution within the district. With the development of Ermelo extension 32, 33 and 34 with a total of ± 2134 housing units, and the neighbouring New Ermelo settlement with ± 1650 housing units, there is a need for a high school in that area (MLM IDP, 2020).

Below is an outline of the number of educational facilities in the MLM.

Table 62: Educational Facilities

EDUCATIONAL FACILITIES IN THE MLM	
Day Care Centres	40
Primary Schools	71
Secondary/High Schools	17

Combined Schools	12
Private Schools	3
FET Colleges	1
ABET Centres	9

(Source: MLM SDF, 2019)

Employment and Income

Although various mines operate in the area between Breyten and Ermelo, these mines cannot accommodate all the jobseekers. Relative few other types of employment opportunities remain in the municipal area.

The official unemployment rate for the MLM, according to the Census 2011 statistics, amounts to 16%, with 36% not being economically active and 5% classified as discouraged work seekers. Ward 14 in the MLM has a higher unemployment profile.

According to newer information, the unemployment rate in the MLM deteriorated slightly from 23.1% in 2014 to 24.1% in 2017. Unemployment rates were also higher for females at 29.8% than for males at 24.1%. Of specific concern are the high youth unemployment rate of 34.5% (MLM SDF, 2019).

Poverty in MLM increased slightly, as measured by the share of the population living below the poverty line, i.e. 42.9% of the total population. This is a very high percentage, and represents a total number of people of 68 491 in 2017. The number of indigent households in MLM was 10 891 (MLM SDF, 2019).

The table below provides an indication of the employment status of those that would be in close proximity to the proposed mine (Ward 14). These figures, however, were still based on the 2011 statistics, and taking the overall rise in unemployment into account, as well as the impact of Covid-19, these figures below can even be much higher. This just emphasises the critical need for employment opportunities in the area, although focused on lower level skills.

Table 63: Employment status Ward 14

EMPLOYMENT STATUS IN WARD 14		
STATUS	**MLM WARD 14**	
	PERCENTAGE OF WORKFORCE	**NO. OF INDIVIDUALS**
Discouraged work-seeker	8.5%	321
Employed	29.1%	1,100
Other not economically active	35.6%	1,346
Unemployed	26.9%	1,016
Unspecified	0%	0

(Source: StatsSA: Census 2011)

Table 64 indicates that those in Ward 14 that are employed, are functioning in the formal employment system, followed by those in private households, with a small percentage of the workers in the informal sector.

Table 64: Sector of employment

SECTORS OF EMPLOYMENT IN WARD 14		
STATUS	MLM WARD 14 (83002014)	
	PERCENTAGE OF WORKFORCE	NO. OF INDIVIDUALS
Do not know	0.4%	4
In the formal sector	71.1%	793
In the informal sector	8%	89
Private household	20.6%	230
Unspecified	0%	0

(Source: StatsSA: Census 2011)

Safety, Security and Health

There are two police stations in the Ermelo/Wesselton area, and one in Breyten/KwaZanele and one in the Chrissiesmeer/Kwachibikhulu area (MLM SDF, 2019).

The proposed project site falls under the Breyton Police Precinct. The 2022 annual statistics indicate that there have been 412 crimes in total for the first six months. This is a decrease from criminal incidents reported from December 2021 to March 2022.

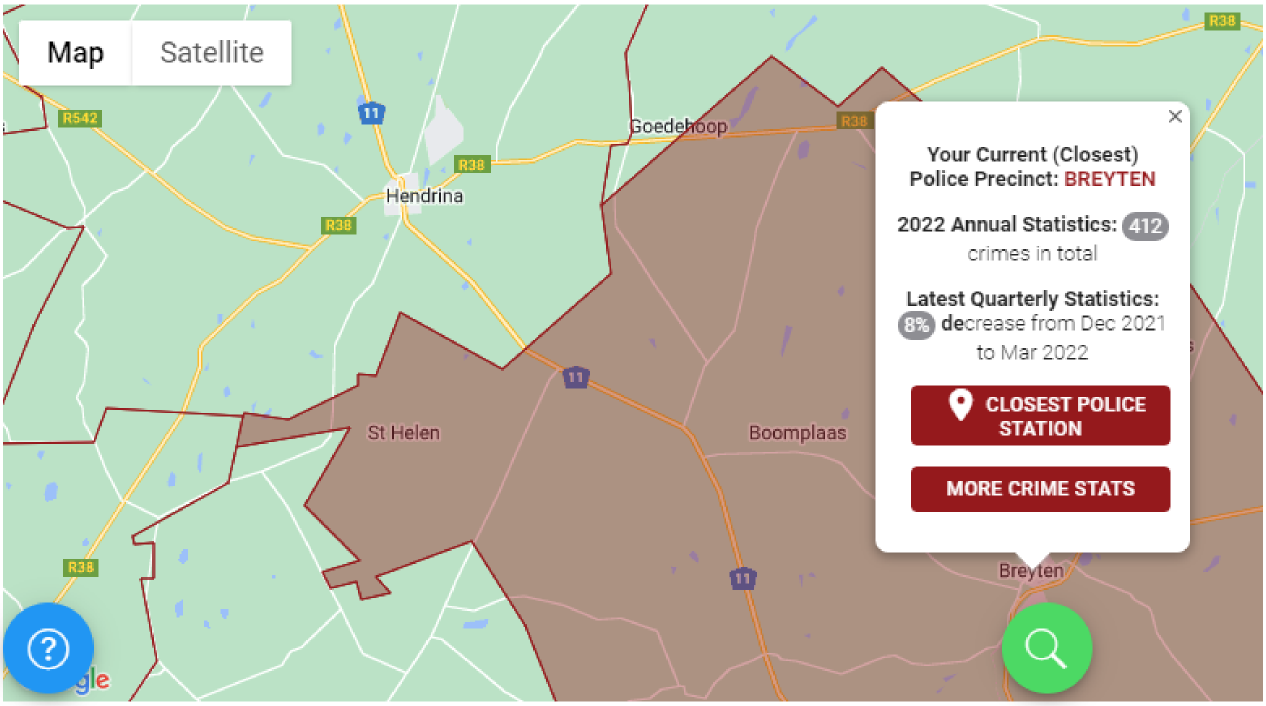


Figure 74: Police Precinct (Source: Crime Stats SA)

In terms of safety and security, a Community Safety Forum has been established between the South African Police Service (SAPS), South African Defence Force, Taxi Associations, Transport industry and the community (MLM SDF, 2019).

Health care facilities in the MLM are:

Table 65: Health Care Facilities

HEALTH CARE FACILITIES IN THE MLM	
FACILITY	**NUMBER**
Private Hospital	1
Primary Health Care Clinics	10
Mobile Clinics	4
Government Hospitals	1
Infectious Hospital (TB)	1
Dentist	4
Gynaecologists	1
Social workers	12
Private Doctors	20

(Source: MLM SDF, 2019)

Housing and Related Infrastructure

Human settlements are scattered throughout the MLM area resulting in some areas still lacking services and infrastructure. Close to 60% of the total population in MLM lives in the main node of Ermelo/Wesselton, followed by 10% in Breyten/KwaZanele. Around 16% of the population lives across the rural wards. It is estimated that due to urban migration that the population living in Ermelo/Wesselton will increase by 67% of the total population in 2050 (MLM SDF, 2019).

The migration into urban areas give rise to the fact that the municipality is facing a challenge of getting rid of the growing informal settlements.

The MLM has made some progress with regards to the provision of housing, but due to the influx of outsiders to the area, and the estimated continuous increase in-migration, the need will probably remain higher than the actual approved allocations. The low cost housing demand is currently estimated at 20,000 units. Further concerns in the area also relate to the provision of water, sanitation and electricity (MLM SDF, 2019).

The MLM is continuously aiming to address the issues of basic service delivery and the provision of housing, but significant issues still need to be addressed.

The following table indicates that the majority of households in Ward 14 are residing in formal structures.

Table 66: Households by type of dwelling Ward 14

HOUSEHOLDS IN WARD 14		
TYPE OF HOUSEHOLD	**MLM WARD 14 (83002014)**	
	PERCENTAGE	**NO. OF HOUSEHOLDS**
House	84.4%	1,385
Shack	9%	147
Traditional	5.7%	94

HOUSEHOLDS IN WARD 14		
TYPE OF HOUSEHOLD	MLM WARD 14 (83002014)	
	PERCENTAGE	NO. OF HOUSEHOLDS
Flat in backyard	0.5%	8
Other	0.4%	7

(Source: StatsSA Census 2011)

The state of most of the municipal roads especially the gravel roads are bad with poor storm water drainage. This situation is exacerbated by heavy trucks transporting coal that are causing a lot of damage to roads.

Basic Service Delivery

Linked to service delivery, the Msukaligwa IDP (2019) indicated that the MLM is currently experiencing a backlog of 1.5% of households without hygienic toilets, 11.1% without electricity and 6.7% without piped water. Further challenges include lack of safe and reliable water supply, inadequate roads and ageing services infrastructure.

The municipality offers free basic water of six kilolitres (6kl) to indigent households only. The provision of free basic electricity remains a challenge to the municipality. Eradication of informal settlements is one of key challenges of the municipality as these impact on community health due to poor sanitation services, refuse removal and inaccessibility to some sections of the settlement as result of poor/none existence of roads (Msukaligwa IDP, 2021).

The tables below provide an overview of service delivery statistics for ward 14. The majority of residents receive their water from formal supply, but some are still reliant on e.g. the river and other sources. The 94.5% of the households that are getting water from a regional or local service provider, is about 25 percent higher than the rate in GSDM and 1.3 times the rate in Mpumalanga.

Table 67: Population by water source

SOURCES OF WATER IN WARD 14		
TYPE OF WATER SOURCE	MLM WARD 14 (83002014)	
	PERCENTAGE	NO. OF HOUSEHOLDS
Service provider	94.5%	5,750
River	1.4%	86
Tanker	1.3%	77
Rainwater tank	1.2%	73
Other	1.7%	101

(Source: StatsSA Census 2011)

Water and Sanitation

The towns and rural settlements in MLM are served by formal water reticulation networks. Just over 93% of households have adequate water supply, with a low backlog of 6.7% remaining. This is an improvement from a backlog of 9.4% in 2001 and 8.3% in 2011.

It is also noted in the IDP that the backlog affects mainly rural communities, where water provision is achieved via boreholes. Such communities do have access to water, but not at RDP standards. Challenges in providing boreholes for water include large distances and resistance from private land owners (MLM SDF, 2019 & MLM IDP, 2020).

Challenges in providing water borne sanitation systems persist in rural areas, due to vast distances and low population density. Water scarcity may also become an increasing challenge in future in view of climate change and alternative systems may have to be considered. In addition, it was noted that the water treatment works were all operating over the design capacity (MLM IDP, 2020).

The table below provides an overview of the sanitation services available in Ward 14.

Table 68: Sanitation facilities Ward 14

SANITATION FACILITIES IN WARD 14		
TYPE OF WATER SOURCE	MLM WARD 14 (83002014)	
	PERCENTAGE	NO. OF HOUSEHOLDS
Flush toilet	92.3%	1,514
Other	2.6%	43
Pit latrine without ventilation	2.3%	37
None	1.7%	28

(Source: StatsSA Census 2011)

The table indicates the following:

93% of households have access to flush or chemical toilets which is about 1.4 times the rate in GSDM (67.08%) and about double the rate in Mpumalanga (45.47%); and

1.7% of households have no access to any toilets which is about one-third of the rate in GSDM (4.99%) and about one-quarter of the rate in Mpumalanga (6.27%).

<u>*Electricity*</u>

Both the municipality and Eskom supply electricity to various parts of MLM. The municipality supplies mostly the towns / nodes, and Eskom mostly the extensive rural areas. Eskom's coal-based Camden Power Station is located south of Ermelo, supplying electricity into the national grid (MLM SDF, 2019).

Areas that are currently not electrified and where backlogs exist are the various informal settlements. The Municipality admits that there is a backlog within MLM's jurisdiction but under Eskom's license areas. The major challenges in these areas affecting farm dwellers are secluded off-grid areas and that of wayleave issues whereby landowners refuse to sign (MLM IDP, 2021).

Waste Management

Waste management is the most challenging in term of basic service provision in MLM, with a remaining refuse removal backlog of 35%.

The municipality only collects domestic waste, building rubble and garden waste. It is the mandate of industries generating hazardous and industrial waste to dispose these types of waste to registered landfills licensed to dispose hazardous waste. There are two waste disposal sites and three waste transfer stations in MLM.

Mining waste should be managed in terms of the conditions of each mine's mining licences (MLM IDP, 2020)

Table 69: Refuse Removal

REFUSE REMOVAL IN WARD 14		
TYPE OF WATER SOURCE	MLM WARD 14 (83002014)	
	PERCENTAGE	NO. OF HOUSEHOLDS
Service provider (regularly)	63.9%	3,893
Own dump	25.4%	1,545
Communal dump	8.2%	499
None	2.2%	131
Other	0.3%	21

(Source: StatsSA Census 2011)

Local Economic Profile

Mpumalanga has five urban centres, namely Mbombela, Secunda, Emalahleni, Ermelo and Middleburg that can be considered as the regional economic engines. Almost 70% of the provinces Gross Value Added (GVA) is generated in or around these towns. The Spatial Development Strategy thus intends to capitalise these towns' economic bases for provincial economic development (Mpumalanga SDF, 2019).

With regards to economic development, the following two key focus areas of the GSDM were identified:

- integrate economic activities to provide local employment and job creation; and
- facilitate economic growth and development in the manufacturing, mining, agriculture and tourism sectors.

It is further proposed to integrate the small towns and deteriorating mining towns with the economic growth centres and tourism nodes by means of physical and economic infrastructure. Town specific urban regeneration strategies must further be developed. These strategies may include proposals linked to the diversification of town economies, mining heritage tourism, SMME development and human capacity building, as well as rehabilitation of the natural environment and mining landscape (Mpumalanga SDF, 2019).

It however, remains important to promote diversification of economic activities by identifying the economic potentials and providing incentives for investment.

The economic growth rate for The MLM was at 3.0% per annum on average, over the period 1996 to 2017. The forecasted average annual Gross Domestic Product (GDP) growth for 2017-2022 was relatively low at 1.3%. The contribution of the MLM to the Mpumalanga economy was around 4.3%, making it the fifth largest local economy in the province. It is the second largest economy in the district, contributing around 15.5% (MLM SDF, 2019).

The main economic sectors in the MLM are agriculture, transport and mining as well as some timber processing. The finance and agriculture sectors achieved the highest (albeit slim) growth in contribution from 2014 to 2017, and the contribution of the utilities, mining and trade sectors declined slightly (MLM SDF, 2019).

In terms of future economic development in MLM, coal mining can be expected to remain an important sector for the short to medium term. This sector, however, can possibly decline in the medium to long term due to limited coal resources, and a move away from a coal-based economy locally and globally in view of climate change mitigation. Alternative development sectors will have to be explored, to ensure a more diversified sustainable local economy. Threats to economic growth such as inadequate infrastructure, skills shortage and distance from markets will however have to be dealt considered (MLM SDF, 2019).

If the average annual growth of the local economy is lower than the population growth rate, poverty levels will deepen if not adequately addressed.

DESKTOP SENSITIVITY VERIFICATION

Based on the outcome of the baseline assessment, social screening and site verification, it was concluded that various socio-economic impacts can occur as a result of the proposed mining activities.

Considering the site sensitivity verification of the site, the dominant agricultural land-use within the project area was identified as having a very high sensitivity from a socio-economic perspective. Loss of the resource use can occur which will result in high negative socio-economic consequences.

Table 70: Desktop Verification Outcome

SOCIO-ECONOMIC THEME	SCREENING TOOL SENSITIVITY	VERIFIED SENSITIVITY
Demographic	None provided	Moderate
Nuisance factors	None provided	Moderate
Safety and security	None provided	Moderate
Public Infrastructure and Services	None provided	Moderate
Local employment and income	None provided	High (+)
Social Funds	None provided	Moderate (+)
External costs	None provided	Moderate
Poverty	None provided	Moderate (+)
Economics	None provided	Moderate (+)
Land-use and impact on sense of place	None provided	High
Impact on Resource Use	None provided	High

PLAN OF STUDY FOR THE EIA

The Social Impact assessment will be conducted by implementing the following measures:

Further Literature Review

Relevant additional literature would be reviewed and incorporated into the report. The review would thus assist the consultants to obtain further demographic and socio-economic information about the receiving environment and to build on the initial profiling of the local population's socio-economic characteristics.

Consultation Sessions and Fieldwork

During the EIA phase, more primary data would also be gathered through consultation with the stakeholders and affected parties, and linkages with the public participation process.

Variables to be assessed

The following variables are typically assessed as part of the SIA:

- Population impacts.
- Community/institutional arrangements.
- Conflicts between local residents and newcomers.
- Individual and Family level impacts.
- Community infrastructure needs.
- Intrusion impacts.

For the purpose of assessing the impacts associated with the proposed project, the above variables will be adapted to allow for the assessment undertaken during the EIA phase. These variables would relate to the construction and operational phases of the proposed project.

Analysis of data compiled from parallel studies

If available, the SIA team will study and analyse the information gathered by the biophysical studies. This information would include technical, environmental, economic and demographic aspects, land-use changes, impact on other facilities, services, and so forth. The SIA will be done in parallel with the public participation process. This would help the social team to assess the impact of the proposed development on the direct (surrounding communities) and indirect (regional) environment.

Additional Data

Additional data as indicated in the main section of the document would be sourced and assessed.

Significance Criteria

As part of the SIA Process, the anticipated social impacts would be rated according to a rating framework specified by the environmental consultants. The impact assessment methodology makes provision for the assessment of impacts against the following criteria:

- Significance;
- Spatial scale;
- Temporal scale (duration);

- Probability; and
- Degree of certainty.

Reporting

The SIA Report will be compiled and generally includes the following:

- A background description of the social environment including demographic and socio-economic characteristics, land-use profile and infrastructure requirements.
- A background description of the local economy.
- Linkages with the integrated development planning processes in the area.
- An assessment of the anticipated social impacts – negative and positive (including core aspects needing attention).
- Rating of impacts.
- Formulation of specific mitigating and management strategies to minimise negative social impacts and increase positive impacts of the proposed development.
- Conclusions and recommendations (also for further studies, if necessary); and
- A Social Management Plan

The mitigation and management measures proposed would culminate in the development of a Social Management Plan (SMP). The aim of the SMP is to provide a plan for the implementation of mitigation and future monitoring and management measures with regards to the possible impacts on the socio-economic environment. This would enable all those responsible for implementation (e.g. the project developer/applicant, communities, government institutions and so forth) to implement their relevant management action plans and processes, as well as establish communication channels to successfully and jointly deal with the project impacts and risks, and to maintain an ongoing role in monitoring these.

KEY ISSUES TO BE ADDRESSED

The following table outlines the potential impacts and possible risks associated with the proposed project. These impacts and risks are based on existing baseline information. There is thus always an uncertainty with regards to the anticipated impact actually occurring, as well as the intensity thereof. Impact predictions have been made as accurately as possible based on the information available at the time of the study. Further studies would be required as part of the detailed phase of the project.

Table 71: Anticipated socio-economic impacts and risks

BASELINE THEME	CHANGE PROCESS AND EXPECTED IMPACTS	IMPACT CATEGORY				STATUS	MITIGATION AND MANAGEMENT	
		CONSTRUCTION	OPERATIONS	CLOSURE	POST CLOSURE		MANAGEMENT OBJECTIVE	MITIGATION EFFECT
Demographic:	Influx of people and households related to those formally employed by the mine: demands on housing and social services	X	X			Negative/Positive	Minimise any possible negative impacts through information sharing processes. Maximise the employment of locals	Can be managed or mitigated to some extent

BASELINE THEME	CHANGE PROCESS AND EXPECTED IMPACTS	IMPACT CATEGORY				STATUS	MITIGATION AND MANAGEMENT	
		CONSTRUCTION	OPERATIONS	CLOSURE	POST CLOSURE		MANAGEMENT OBJECTIVE	MITIGATION EFFECT
							Enhance the local spending patterns	
	Potential informal influx of people in the form of job seekers are anticipated: possible tension between groups and demonstrations	X	X			Negative	Minimise any possible negative impacts related to informal population influx as a direct result of the proposed project in coordination with local authorities e.g. through information sharing processes.	Can be managed or mitigated to some extent
	Change in the social fabric of the community as a result of the proposed project: growth in town, tension between different social groups	X	X			Negative / Positive	Minimise any possible negative impacts through information sharing processes. Maximise the employment of locals	Can be managed or mitigated to some extent
Nuisance factors:	Increase in nuisance factors (noise and dust)	X	X	X		Negative	Limit negative impacts of nuisance factors (intrusions, noise and dust). Pollution prevention of construction site and mining area.	Can be managed or mitigated
	Blasting	X	X			Negative	Limit negative impacts of blasting Pro-active communication regarding blasting schedules	Can be managed or mitigated
Safety and security:	Unfulfilled community expectations in terms of the employment creation and community development funds could increase the potential for civil unrest in the area	X	X			Negative	Avoid creation of unrealistic expectations; Implement transparent communication processes Maximise the employment of locals	Can be avoided, managed or mitigated
	Community safety due to mining and infrastructure development	X	X		X	Negative	Limit safety and health risks through design considerations, location of infrastructure and precautionary construction and operational management principles.	Can be managed or mitigated
	Possible increase in crime due to influx of people	X	X			Negative	Maximise the employment of locals	Can be managed or mitigated to some degree
	Traffic accident risks due to mining related traffic flow	X	X			Negative	Limit safety risks during transportation of personnel and material	Can be managed or mitigated
Public infrastructure and services:	Additional pressure on existing health facilities and infrastructure (e.g. clinics, housing, water, electricity, roads) due to population increase associated with employees and their families, as well as jobseekers.	X	X			Negative	Involve locals in employment opportunities and procurement	Can be managed or mitigated to some degree

BASELINE THEME	CHANGE PROCESS AND EXPECTED IMPACTS	IMPACT CATEGORY				STATUS	MITIGATION AND MANAGEMENT	
		CONSTRUCTION	OPERATIONS	CLOSURE	POST CLOSURE		MANAGEMENT OBJECTIVE	MITIGATION EFFECT
Local income and employment:	Positive impacts on local employment and income due to the operation itself and due to supply-links with local suppliers.	X	X			Positive	Involve locals in employment opportunities and procurement	Can be managed or enhanced
	A decrease/cessation in employment and community funds could negatively impact former beneficiaries			X	X	Negative	Closure Plan to attend to this way in advance	Can be managed or mitigated
	Possible social dissatisfaction with regards to allocation of job opportunities and local procurement associated with the mining activities	X	X			Negative	Source and maximise local skills and local procurement if and where possible	Can be managed or mitigated
	Unfulfilled community expectations in terms of employment creation could result in social conflict	X	X			Negative	Avoid creation of unrealistic expectations; Implement transparent communication processes Maximise the employment of locals	Can be avoided, managed or mitigated
Social funds:	Increased tax income: Due to positive spin-offs on employment and income levels, it is expected that tax revenue to local, provincial and central government will occur	X	X			Positive	Mining activities and employment creation	Can be managed or enhanced
	Social funds for socio-economic development.		X			Positive	Mining activities and distribution of social funds	Can be managed or enhanced
External costs:	Potential negative environmental or social impacts (external costs related to project): This could include negative impacts on land-use, groundwater, air quality, biodiversity, traffic, road infrastructure, health and community safety.	X	X	X	X	Negative	Environmental management of site can limit possible negative impacts	Can be avoided, managed or mitigated
Poverty:	Employment and possible job creation for low-income groups throughout life of mine	X	X			Positive	Avoid creation of unrealistic expectations; Implement transparent communication processes Maximise the employment of locals	Can be managed or enhanced
Economic:	The project can contribute to economic activities in the local economy but if closure occurs the positive inputs on local economy will cease.	X	X	X	X	Positive/Negative	Involve locals in employment opportunities and procurement	Can be managed or enhanced
	Loss of income due to loss of resource use	X	X	X	X	Negative	Implement transparent communication processes Loss of resource use cannot be mitigated	Cannot be mitigated
Land-use and impact on sense of place:	Mining activities will have a negative impact on the current land-use and subsequent impacts on the sense of place	X	X			Negative	Environmental management of site can limit possible negative environmental and visual impacts Land-use impacts are difficult to manage or to mitigate	Difficult to manage and mitigate

BASELINE THEME	CHANGE PROCESS AND EXPECTED IMPACTS	IMPACT CATEGORY				STATUS	MITIGATION AND MANAGEMENT	
		CONSTRUCTION	OPERATIONS	CLOSURE	POST CLOSURE		MANAGEMENT OBJECTIVE	MITIGATION EFFECT
	Possible negative impact on the tourism node of Chrissiesmeer/Kwachibikhulu	X	X	X		Negative	Environmental management of site can limit possible negative environmental and visual impacts Land-use and visual impacts are difficult to manage or to mitigate	Difficult to manage and mitigate
	Attitude formation against and opposition to the project	X	X			Negative	Implement transparent communication processes	Difficult to manage and mitigate
Impact on Resource Use:	Loss of agricultural resource use due to mining activities	X	X			Negative	Implement transparent communication processes Loss of resource use cannot be mitigated	Cannot be mitigated
	The energy and water use needs to be considered.		X			Negative	Environmental management of site can limit possible negative impacts	Can be managed or mitigated

REASONED OPINION REGARDING THE ACCEPTABILITY OF THE PROPOSED DEVELOPMENT

Based on the outcome of the baseline assessment, social screening and site verification, it was concluded that various socio-economic impacts can occur as a result of the proposed mining activities.

Based on the information and the interim conclusions, it is recommended that a detailed SIA be undertaken during the next phase of the Environmental Authorisation process.

Negative Impacts

The socio-economic impacts on the existing landowners will be high (negative), due to the loss in the land- and resource use. This will be difficult to mitigate.

Negative impacts of a more moderate significance refer to demographic changes, nuisance factors, safety and security issues, increased pressure on public infrastructure and services, external costs (e.g. negative impacts on land-use, groundwater, air quality, biodiversity, traffic, road infrastructure, health and community safety) associated with mining, as well as the impact on the sense of place. At this stage, it is concluded that these impacts can be managed and mitigated to some extent.

Positive Impacts

Positive impacts refer to employment and income due to the operation itself and due to supply-links with local suppliers, as well as possible job creation for low-income groups throughout the life of mine, availability of social funds for socio-economic development and subsequent positive impact on poverty levels. The positive impacts can be enhanced.

Attitude Formation

Although attitude formation is not an impact per se, it serves an important indication of community sentiments toward the project. Attitudes can be defined as lasting, general evaluations of people. Attitudes can be formed through the individual's own experience and/or reports in the media. It could provide important information regarding the feelings and potential actions of Interested and Affected Parties (I&APs) that could become evident during the appeal period of the Environmental Impact Assessment process, and/or during the construction and operational phases of the proposed project.

No formal engagements or meetings with stakeholders have been conducted to date. It is anticipated that different responses and opinions regarding the project will be submitted throughout the process. It is highly likely that local unemployed community members in the study area will have a positive attitude towards the project due to the high unemployment figures in the affected ward and in the local municipal area that emphasises the need for employment creation. Other initial responses to the project by the some of the adjacent landowners in the study area indicate that there are some forms of attitude formation. These relate to possible negative impacts on the land- and resource use, intrusions on the rural character of the area and possible devaluation of the property values, together with concerns regarding the possible negative environmental impacts.

Initial issues and opinions already raised should thus be noted. These should further be considered in terms of future community involvement and stakeholder engagement as part of the public participation process to be undertaken and during the detailed impact assessment phase.

(B) DESCRIPTION OF CURRENT LAND USES

Find ***Appendix C – Site Layout Plan, Sensitivities, and Land Use***.

(C) DESCRIPTION OF SPECIFIC ENVIRONMENTAL FEATURES AND INFRASTRUCTURE ON SITE

Apart from the infrastructures associated to the mining development, a number of environmentally and socially sensitive receptors were identified. ***Appendix C – Site Layout Plan, Sensitivities, and Land Use*** provides the proposed site layout plan in relation to the desktop verified sensitivities.

(D) ENVIRONMENTAL AND CURRENT LAND USE MAP

(Show all environmental and current land use features)

Find ***Appendix C – Site Layout Plan, Sensitivities, and Land Use***.

V) IMPACTS IDENTIFIED

(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)

This section summarises the potential impacts associated to all the different phases of the proposed mining activities, i.e. Planning, Construction, Operational and Decommissioning/Closure. 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.

For the purpose of this section, the mitigation measures recommended will only summarise the approach taken to manage each risk. A detailed mitigation plan will form part of the final EIR and EMPr.

Table 74: Explanation of colour indicator

COLOUR	SIGNIFICANCE POINTS	EXPLANATION
	≤ 30	**LOW** environmental significance
	31 - 60	**MODERATE** environmental significance
	> 60	**HIGH** environmental significance

The significance rating represented in this section is from a desktop perspective based on the findings of the various specialists. It also excludes the following considerations:

- Assessment of alternatives, i.e. mining methods, site layout (only the proposed layout as provided by the applicant was considered);
- Mitigation measures; and
- Management measures.

Planning Phase

Agriculture and Soil

Aspect	Soil & Agricultural							
Activities	**Potential Impact/Risk**	**Desktop Significance rating (Pre-mitigation)**					**Mitigation Type**	**Management and/or Mitigation Extend Summary**
Site footprint & location of mining related infrastructure: • Locality selection of contractor's yard, mine offices and ablution facilities; • Locality of workshops, wash bays and hazardous substance stores; • Locality of pollution control facilities; and • Locality of access roads. **Stormwater Infrastructure:** • Stormwater infrastructure design and location. **Fencing and access control:** • Demarcation of mining related areas; • Fencing; and • Access control.	**<u>Loss of agricultural land</u>** _<u>Direct impact:</u>_ • Situating infrastructures associated with the proposed mine within areas identified as high sensitivity related to agricultural use may cause the loss of arable land within the site and adjacent properties. _<u>Indirect impact:</u>_ • Loss of arable land and fertile soil leads to the degradation of the overall agricultural potential for the surrounding community. _<u>Cumulative impact:</u>_ • Food scarcity and reduction in income generated from agricultural activities.	**D** 5	**E** 3	**M** 8	**P** 5	**S** 80	Avoid or Remedy	_Degree to which impact/risk can be reversed_ Due to the ***high sensitivity*** for agricultural productivity, direct loss of agriculturally productive land is likely to occur as a result of the proposed mine. Based on the opinion provided by the appointed specialist (Appendix F.1), from a desktop perspective the mine as a ***high potential*** ("red flag" or "No-Go") ***of not being supported***, especially in light of the Preservation and Development of Agricultural Land Bill (2021) which has been introduced at the National Assembly and which aims to promote the preservation and sustainable development of agricultural land. The Bill seeks to prevent the fragmentation of agricultural land and to minimise the loss of agricultural land by promoting viable farming units and to encourage the optimal use of agricultural land for the promotion of food security, as well as increase the contribution of agriculture to the Gross Domestic Product. Given that the proposed BCR Coal Vlakfontein site is at least 70% agricultural productive and is located within an area dominated by agricultural activities, one must consider the aims of the Bill and minimise the loss of agriculturally viable land. The above ***opinion*** could change ***depending on the outcomes of the EIA phase and site verification*** and does not take into consideration any mitigation measures or alternatives. _Degree to which impact/risk may cause irreplaceable loss of resource_ Following the soil and agricultural desktop assessment of the proposed BCR Coal Vlakfontein Mine, the site has been confirmed as being located within an area that has a ***high sensitivity*** for agricultural productivity (70% of the total extend of the mining right area). _Degree to which impact/risk can be avoided, managed or mitigated_ The potential impacts/risks may potentially be further ***mitigated and or avoided*** by implementing the following measures: • Assessment of alternatives i.e. mining methods, location of infrastructures, and reduction of the mining pit footprint; • Control though soil conservation and management during the entire life cycle of the proposed mine; • Avoid the loss of fertile soil by effectively implementing storm water management and erosion control throughout the entire lifecycle of the proposed mine; • Avoid contamination of soil resources through the development, implementation and review of incident management and emergency preparedness plans; and • Remedy through effectively and concurrently rehabilitating disturbed areas. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.
	<u>Erosion formation and soil pollution</u> _<u>Direct impact:</u>_ • Inadequate planning and assessment of required stormwater management infrastructure associated with the proposed mine has a high potential of exposing soils to environmental factors including rainfall and wind. • Sediment release due to inadequate storm water management infrastructures into the receiving environment causing the degradation of the soil profile. _<u>Indirect impact:</u>_ • Loss of arable land and fertile soil leads to the degradation of the overall agricultural potential for the surrounding community.	**D** 5	**E** 3	**M** 8	**P** 5	**S** 80	Avoid or Remedy	_Degree to which impact/risk can be reversed_ Erosion formation during the entire life cycle of the proposed mine can be effectively avoided or remedies by the development and implementation of a storm water management plan as well as ensuring concurrent rehabilitation of disturbed areas. The placement of mining related infrastructures plays a vital role in the control of exposing environmental factors, i.e placing of infrastructures outside the 1:100-year flood lines or more than 32 meters from a drainage line. The above factors will be ***evaluated*** during the ***EIA phase***. _Degree to which impact/risk may cause irreplaceable loss of resource_ Following the soil and agricultural desktop assessment of the proposed BCR Coal Vlakfontein Mine, the site has been confirmed as being located within an area that has a ***high sensitivity*** for agricultural productivity. _Degree to which impact/risk can be avoided, managed or mitigated_

	• Formation of erosion gullies have an impact on nutrient cycling, with knock on effects on the fertility of the soil. This reduces the viability of the soils for use in the rehabilitation of areas and additional soils will need to be brought in for this purpose. • Pollutants entering the soil profile may have the potential to affect the water quality if stormwater is not treated or managed before release into the natural environment. *Cumulative impact:* • Food scarcity and reduction in income generated from agricultural activities. • Cost implication associated with rehabilitation due to import of soils and increases the likelihood of contaminant introduction within an area with alien invasive species (both floral and faunal). • Change in the baseline soil profile cumulatively effects the micro fauna and flora environment.							The potential impacts/risks may potentially be further ***mitigated and or avoided*** by implementing the following measures: • Development, implementation and constructing infrastructures as per a Storm Water Management Plan as recommended by a suitably qualified engineer; • Control though soil conservation and management during the entire life cycle of the proposed mine; • Avoid the loss of fertile soil by effectively implementing storm water management and erosion control throughout the entire lifecycle of the proposed mine; • Avoid contamination of soil resources through the development, implementation and review of incident management and emergency preparedness plans; and • Remedy through effectively and concurrently rehabilitating disturbed areas. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Landscape and Visual

ASPECT	TOPOGRAPHY AND VISUAL							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED*
Site footprint & location of mining related infrastructure: • Locality selection of contractor's yard, mine offices and ablution facilities; • Locality of workshops, wash bays and hazardous substance stores; • Locality of pollution control facilities; and • Locality of access roads.	**<u>Visual disturbance on sensitive visual receptor</u>** *Direct impact:* • Locating the proposed mine within close proximity to sensitive receptors poses a risk of the overall sense of place to the surrounding community. *Indirect impact:* • Potential increase of community unrest and complaints. *Cumulative impact:* • Loss of production due to community strikes.						Remedy	By implementing an effective rehabilitation plan during decommissioning of the proposed development, visual disturbance on sensitive visual receptors can be remedies to such an extend that the potential impact/risk may be reversed. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Implementing the management measures identified in the EMPr will reduce the visual impact. The level of impact will be assessed during the EIA phase. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Visual disturbances on sensitive visual receptors may potentially be ***managed (remedied)*** through the implementation of the following measures: • Adherence with management measures identified in the EMPr; and • Implementing an effective concurrent rehabilitation plan during the operational phase of the proposed mine. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Archaeology, Cultural, and Palaeontology

ASPECT	ARCHAEOLOGICAL, CULTURAL AND PALAEONTOLOGY							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED*
Site footprint & location of mining related infrastructure:	**<u>Loss of heritage and cultural resources</u>** *Direct impact:*						Avoid	Based on the current information obtained for the area at a desktop level it is anticipated that any heritage resources that occur within the proposed development area will have a Local Significance (LS), Grade 3B or lower field rating and all sites should be mitigatable. Graves are of high social significance (Field rating GP A) and can be expected anywhere on the landscape.

• Locality selection of contractor's yard, mine offices and ablution facilities; • Locality of workshops, wash bays and hazardous substance stores; • Locality of pollution control facilities; and • Locality of access roads. **Stormwater Infrastructure:** • Stormwater infrastructure design and location. **Fencing and access control:** • Demarcation of mining related areas; • Fencing; and • Access control.	• Site selection near or within close proximity to sites of historical and cultural importance leading to the destruction of heritage resources or graves. *Indirect impact:* • Loss of heritage and history for the future generation of the affected community. *Cumulative impact:* • Community unrest. • Permanent loss of sites of historical and cultural significance.							Construction and mining related activities could cause irreversible damage or destroy heritage resources and depletion of the archaeological record of the area. It is recommended that a field based HIA should be conducted to comply with Section 38 (8) of the National Heritage Resources Act. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Significance rating of sites, mitigation measures and magnitude of possible impacts can only be determined after the field based HIA but based on the current information the impact on heritage resources can be mitigated to an acceptable level. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Potential impacts/risk to heritage and cultural resources may potentially be ***mitigated (avoided)*** by implementing the following: • Management actions identified in the EMPr; and • Developing a chance find procedure during all phases of the proposed development. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Terrestrial Biodiversity

ASPECT	TERRESTRIAL BIODIVERSITY							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED*
Site footprint & location of mining related infrastructure: • Locality selection of contractor's yard, mine offices and ablution facilities; • Locality of workshops, wash bays and hazardous substance stores; • Locality of pollution control facilities; and • Locality of access roads. **Stormwater Infrastructure:** • Stormwater infrastructure design and location. **Fencing and access control:** • Demarcation of mining related areas; • Fencing; and • Access control.	**<u>Degradation of terrestrial biodiversity</u>** *Direct impact:* • An increased disturbance of the natural environment associated with the overall footprint of the proposed mine. • Positioning of the proposed mine in a high terrestrial sensitive area, poses a risk of altering the habitat of protected and endangered fauna and flora species. • Positioning the mining pit and corresponding infrastructures in areas classified as a CBA: Irreplicable, will impact the Terrestrial Biodiversity to an irreversible degree. *Indirect impact:* • Intrusion on the surrounding ecological support areas. • Loss of protected and endangered fauna and flora species. • Failing to meet National Biodiversity Targets. *Cumulative impact:* • Loss of vegetation and habitat leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding ecological support and protected areas are affected and may lead to the degradation of the protected area's ecology.	5	4	10	5	95	Avoid/Remedy/Offset	***<u>Vegetation Biodiversity:</u>*** The desktop assessment of the available information indicated that about half of the vegetation that could be impacted on by the proposed mining were ***cultivated or modified***. Such areas are preliminary classified as ***"low sensitivity"*** from a vegetation perspective. However, these areas are likely of ***biodiversity importance to the movement of fauna and pollinators and important to maintain function and ecological processes***. Some ***secondary grasslands*** of ***"medium sensitivity"*** may be present in ***historically cultivated lands***. However, ***large portions*** of seemingly intact natural ***Eastern Highveld Grassland*** are seemingly present within the site, as well as ***moist grasslands***. Remaining patches of this grassland unit is of ***"high conservation value and sensitivity"*** as it is poorly protected and within a vulnerable ecosystem (Skowno, et al., 2019). It is therefore imperative that the site vegetation be assessed for the presence of intact (undisturbed or untransformed) Eastern Highveld Grassland, as remaining portions should be conserved to preserve this vegetation type and protect it from extinction. Importantly, the remaining grassland on the site ***corresponds greatly with*** the ***CBA: Irreplaceable category of the MBSP***, in which ***mining is not an acceptable land use***. Other than the modified areas, the desktop results are in accordance with the screening tool results that the site comprises mostly of ***"high terrestrial biodiversity (vegetation) sensitivity"***. ***<u>Plant Species:</u>*** The site is classified as ***"medium sensitivity for sensitive plant species"***, indicating that the site includes ***suitable habitat for plant species of conservation concern***. The screening tool lists nine (9) species that has a possibility of occurring on the site. The remaining Eastern Highveld Grassland, including the moist grasslands, are ***highly likely to include sensitive and unique habitats***, and ***suitable habitat for several plant species of conservation concern are likely*** to be present concurring with the sensitivity rating of the screening tool.

							Mammal and Invertebrate Species: ***"Highly sensitive"*** areas and areas likely to support higher faunal richness or biodiversity in the project area are directly linked to the ***irreplaceable CBAs*** on site, with the ***eastern CBA the potential primary biodiversity hotspot*** in terms of ***mammals and invertebrates***. In the surrounds, ***"highly sensitive"*** areas incorporate the ***riverine and associated grassland areas north and towards the Vaal and the Vaal Tributary southeast*** of the project area. ***"Moderately sensitive"*** areas currently include the ***on-site non-perennial stream***. Streams and other surface water features are normally considered highly sensitive features due to their legal status under the National Water Act, the fact that they are often form ecological corridors and provide unique habitats within the terrestrial setting (often includes habitat for ecologically significant species). In terms of this specific stream, which does ***not provide a significant ecological corridor and has limited buffer habitat*** within the proposed development site, the sensitivity of the habitat is reduced to moderate. ***Herpetofauna Species:*** The presence of ***CBA – Irreplaceable*** areas within the proposed development footprint, together with the possible ***presence of natural herpetofauna communities contributing to local ecosystems, and potentially including endemic habitat specialists and Near Threatened species***, suggests that impacts may be ***"high and undesirable"*** under the current layout, and require further investigation. ***Avifaunal Species:*** Parts of the proposed study area are considered to have a ***"High and Medium Animal Species Theme Sensitivity"***, as a result of the presence of Southern Bald Ibis Geronticus calvus, African Grass Owl Tyto capensis, Denham's Bustard Neotis denhamii, White-bellied Korhaan Eupodotis senegalensis and Caspian Tern Hydroprogne caspia. Based on the ***low number (n=2) of Southern Bald Ibis recorded*** in the PAOI, this preliminary assessment assigns a ***"medium"*** rating to the PAOI. In addition, it is ***unlikely that African Grass Owl*** will occur within the PAOI, based on previous surveys conducted in the area (pers comms. Christelle Trutter, African Grass Owl Study Group Manager) and ***White-bellied Korhaan and Caspian Tern*** have ***not been recorded*** in the PAOI to date. ***Notable SCC*** that have been ***recorded***, albeit in ***low numbers***, include Secretarybird Sagittarius serpentarius, Deham's Bustard, Grey Crowned Crane Balearica regulorum, Black Harrier Circus maurus, African Marsh Harrier Circus ranivorus, Lanner Falcon Falco biarmicus, Greater Flamingo Phoenicopterus roseus and Lesser Flamingo Phoeniconaias minor in addition to the availability of suitable habitat, thereby confirming the ***"medium sensitivity"*** rating. This rating will be verified further during the EIA phase of the project, following a site verification survey to the proposed development area and broader PAOI.
							DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE
							A significant portion of the proposed site layout (53 % of the proposed layout footprint, see ***Table 7***) is within a CBA: Irreplaceable conservation category of the MBSP. A defined and recommended land use in Irreplaceable CBAs is designated as "Conservation Management". Such natural areas are required for the province to meet its biodiversity targets. ***Mining*** is ***not supported by the MBSP in CBA: Irreplaceable*** and, depending on the outcome of the site verification and impact assessment during the EIA phase, the environmental authorisation application recommendation could ***potentially*** result in a ***"[6]fatal flaw"/" No-Go" alternative***. This will be further supported if any plant or animal species of conservation concern are recorded on the site.
							DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED
							The identified impact/risk may potentially be ***avoided or mitigated (controlled and or remedied)*** through: • The implementation of a species search and rescue prior to the commencement of construction activities; • Appointing a suitably qualified ECO prior to the commencement of any activities monitoring all vegetation clearance activities;

[6] **"Fatal flaw"** means a major defect or deficiency in a project proposal that should result in environmental authorisation being refused, and from a biodiversity perspective, a residual negative impact that would have a Very High significance rating.

							• Obtaining the required permits for the removal of protected species; and • Awareness training of all contractors and permanent employees. In the event of the mitigation measures being implemented still results in a medium to high significance residual negative impact on biodiversity, [7]biodiversity offsetting, as final mitigation measure, may be considered: • Ecological equivalence (like-for-like) as preferred offsetting – when offsets remain the only mechanism to manage residual negative impacts, "like-for-like" offsetting should benefit the same or similar biodiversity components as those components that would be negatively affected. • Trading-up offset types – secures priority areas of greater importance or priority to biodiversity conservation than the area being impacted may only be considered under certain circumstances in order to contribute to conservation objectives. Should there remain residual impacts on irreplaceable biodiversity following all hierarchy of mitigation measures implemented, the following: • Where there are no options left in the landscape to counterbalance a residual impact in accordance with the ecological equivalence (like-for-like) principle (see above), that residual impact cannot be offset. That is, there would be a residual impact on irreplaceable biodiversity, which would prevent national biodiversity targets from being met. In these cases, development would generally not be acceptable, and the impacts should be avoided ("No-Go" or "Fatal-Flaw"). • [8]Ecological compensation – residual impacts which cannot be offset should only be considered in highly exceptional circumstances, when there are imperative reasons for overriding public interest. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

[7] Biodiversity offsets should be distinguished from trade-offs. A trade-off in the biodiversity context involves exchanging a negative outcome for biodiversity with another positive outcome, which does not necessarily benefit biodiversity. Trading off biodiversity for other positive outcomes is not a form of mitigation, like biodiversity offsetting. It falls outside of the scope of the mitigation hierarchy. The following are examples of trade-offs in the biodiversity context:

- Ecological compensation; and
- Financial compensation: a financial contribution to a biodiversity initiative to compensate for a significant residual negative impact on biodiversity.

Trade-offs should only be considered when biodiversity offsetting is not possible and where there are imperative reasons for overriding public interest. They should also be approached with extreme caution in the context of environmental authorisation applications.

[8] **"Ecological Compensation"** means the outcome of measurable actions to protect, restore and manage priority biodiversity, aimed at compensating for residual negative impacts on irreplaceable biodiversity and ecological infrastructure where these impacts cannot be offset and which should, instead and in the first instance, be avoided.

Aquatic Biodiversity

ASPECT	AQUATIC BIODIVERSITY							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED*
Site footprint & location of mining related infrastructure: • Locality selection of contractor's yard, mine offices and ablution facilities; • Locality of workshops, wash bays and hazardous substance stores; • Locality of pollution control facilities; and • Locality of access roads. **Stormwater Infrastructure:** • Stormwater infrastructure design and location. **Fencing and access control:** • Demarcation of mining related areas; • Fencing; and • Access control.	**Loss of aquatic biodiversity/ Direct Loss of Wetland Features** *Direct impact:* • Locating the proposed development within 500m of a wetland, poses a risk in altering the support regions into the wetland. • 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:* • Alteration of wetland support zones poses the risk of alien invasive species the invade, leading to the deterioration of the nearby wetland system. • 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. **Erosion and sedimentation of Wetlands** *Direct impact:* • Locating access roads through drainage lines may cause sedimentation and siltation of watercourses if not managed properly.	5	4	10	5	95	Avoid/Remedy/Offset	The desktop investigation of the study area for the proposed BCR Coal Vlakfontein Mine has confirmed the classification of the study area as being located within an area regarded as being of ***"very high sensitivity"*** from the perspective of the aquatic ecosystem. As such, a detailed aquatic biodiversity specialist assessment as well as a detailed wetland specialist assessment would be required as part of the Environmental Impact Assessment phase of the study. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* As per the MBSP the watercourses/wetlands and wetland clusters associated with the proposed BCR Coal Vlakfontein Mine footprint are classified as ***Ecological Support Areas (ESAs)*** on the basis of wetlands and wetland clusters. ESAs are areas that are ***not essential for meeting biodiversity***, targets, ***but that play an important role in supporting the functioning of protected areas or CBAs*** and for delivering ecosystem services. In the terrestrial assessment they support landscape connectivity and strengthen resilience to climate change. ***ESAs need to be maintained*** in at least a ***functional*** and often ***natural state***, supporting the purpose for which they were identified. They include features such as riparian habitat surrounding rivers or wetlands, migration corridors for over-wintering sites for Blue Cranes, and so on (Mpumalanga Tourism and Parks Agency, 2014). Based on information obtained during the desktop site sensitivity verification assessment, it is concluded that the proposed BCR Coal Vlakfontein Mine is likely to result in a direct loss of wetlands determined to be in a ***largely natural state*** and identified as being ***FEPAs within a designated SWSA and Fish Sanctuary***. the majority (approximately ***84 %***) of the proposed BCR Coal Vlakfontein Mine study area falls within a catchment classified as a FEPA catchment. FEPA catchments achieve biodiversity targets for river ecosystems and threatened/near-threatened fish species and were identified as rivers that are currently in a good condition (***Ecological Category A or B***). The FEPA status is largely as a result of the catchment being classified as a fish sanctuary for ***two fish species***, namely ***Enteromius cf. oraniensis (Chubbyhead Barb; previously Enteromius anoplus s.l.)*** and ***Enteromius sp. pallidus cf. 'north' (Goldie Barb)***, the latter of which is in need of taxonomic revision and both of which are in need of a revised assessment of their threat status. In addition, according to the ***Resource Quality Objectives set for the Upper Vaal*** (Department of Water and Sanitation, 2016), the Recommended Ecological Category (REC) determined for the catchment within which the proposed mine is to be located is set as an ***Ecological Category B***, and is reflected as such within the numerical limits set for instream habitat, aquatic macroinvertebrates, fish, riparian vegetation, hydrology and water quality. In addition, the Resource Quality Objective set for the catchment state that 'salt concentrations must be maintained to meet quality requirements for agriculture and to maintain the ecosystem wellbeing', an ***objective that will be unlikely to be achieved*** should additional mining activities impact the water quality and quantity within the catchment through mining of wetlands and inadvertent or unintentional release of mine-affected water into the catchment. In addition, the reach of the Vaal River downstream of the proposed BCR Coal Vlakfontein Mine is considered to be a ***free-flowing river*** which, according to Driver et al. (2011), are rivers that flow undisturbed from their source to the confluence with a larger river or to the sea without any major dams and are ***a rare feature*** in the South African landscape and part of our natural heritage. Several wetland systems were identified within the project site as well as one FEPA wetland cluster identified in the eastern section. The FEPA wetlands include channelled valley bottom systems and depressions. The wetlands are classified as FEPA wetlands as they are located within a sub quaternary catchment that is often utilised by Wattled Cranes (Bugeranus carunculatus), Grey Crowned Cranes (Balearica regulorum) and/or Blue Cranes (Anthropoides paradiseus). The wetlands furthermore have ***PES*** classifications of ***A/B (unmodified to largely natural)***. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED*

	• 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 and operational 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 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. **Water Quality Deterioration/Contamination of Water Resource** *Direct impact:*							The impact/risk to disturb the aquatic biodiversity may potentially be ***avoided or mitigated (controlled and or remedied)*** by implementing the following measures: • Control through the implementation of storm water management and erosion control; • Avoid impacts through adequately managing effluent and runoff; • Avoid accidental release through the development, implementation, and review of incident management and emergency preparedness plans; • Control through the continuing awareness training of all personal throughout the entire life cycle of the proposed development; and • Remedy through the effective implementation of rehabilitation measures. In the event of the mitigation measures being implemented still results in a medium to high significance residual negative impact on biodiversity, [9]biodiversity offsetting, as final mitigation measure, may be considered: • Ecological equivalence (like-for-like) as preferred offsetting – when offsets remain the only mechanism to manage residual negative impacts, "like-for-like" offsetting should benefit the same or similar biodiversity components as those components that would be negatively affected. • Trading-up offset types – secures priority areas of greater importance or priority to biodiversity conservation than the area being impacted may only be considered under certain circumstances in order to contribute to conservation objectives. Should there remain residual impacts on irreplaceable biodiversity following all hierarchy of mitigation measures implemented, the following: • Where there are no options left in the landscape to counterbalance a residual impact in accordance with the ecological equivalence (like-for-like) principle (see above), that residual impact cannot be offset. That is, there would be a residual impact on irreplaceable biodiversity, which would prevent national biodiversity targets from being met. In these cases, development would generally not be acceptable, and the impacts should be avoided ("No-Go" or "Fatal-Flaw"). • [10]Ecological compensation – residual impacts which cannot be offset should only be considered in highly exceptional circumstances, when there are imperative reasons for overriding public interest. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

[9] Biodiversity offsets should be distinguished from trade-offs. A trade-off in the biodiversity context involves exchanging a negative outcome for biodiversity with another positive outcome, which does not necessarily benefit biodiversity. Trading off biodiversity for other positive outcomes is not a form of mitigation, like biodiversity offsetting. It falls outside of the scope of the mitigation hierarchy. The following are examples of trade-offs in the biodiversity context:

- Ecological compensation; and
- Financial compensation: a financial contribution to a biodiversity initiative to compensate for a significant residual negative impact on biodiversity.

Trade-offs should only be considered when biodiversity offsetting is not possible and where there are imperative reasons for overriding public interest. They should also be approached with extreme caution in the context of environmental authorisation applications.

[10] **"Ecological Compensation"** means the outcome of measurable actions to protect, restore and manage priority biodiversity, aimed at compensating for residual negative impacts on irreplaceable biodiversity and ecological infrastructure where these impacts cannot be offset and which should, instead and in the first instance, be avoided.

- If Pollution Control Dams (PCD's) and Residue Stockpiles 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.

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).
- 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.

Invasive alien plant encroachment

Direct impact:

- Alien invasive trees and shrubs are expected to increase within the area as these species 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.

Indirect impact:

- 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:* • Critical support regions to surrounding ecological support and protected areas are affected and may lead to the degradation of the protected area's ecology.							

Surface and Groundwater Resources

ASPECT	WATER RESOURCES							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		
Site footprint & location of mining related infrastructure: • Locality selection of contractor's yard, mine offices and ablution facilities; • Locality of workshops, wash bays and hazardous substance stores; • Locality of pollution control facilities; and • Locality of access roads. **Stormwater Infrastructure:** • Stormwater infrastructure design and location. **Fencing and access control:** • Demarcation of mining related areas; • Fencing; and • Access control.	**<u>Degradation of natural water resources/Water resource contamination</u>** *Direct impact:* • Lowering of the groundwater levels from dewatering resulting in a cone of depression (or dewatering) which may affect third party groundwater users. • Interception of ambient (and a decrease in) groundwater flow, which would under natural conditions discharge into the surface drainages, provided baseflow to the rivers, or contributed to deeper regional groundwater flow. • Exposure of sulphide bearing minerals (i.e., coal) during mining may negatively affect the ambient groundwater quality in the immediate vicinity of the Mine. Sources of pollution such may include stockpiles, discharges from mine workings and backfilled open pit (post-closure) (decant). Opencast mining involves blasting and removal of the rocks overlying the coal layer, which is removed completely. The fragmented cover rock is then replaced (backfilled) and covered with soil and the terrain is landscaped ('rehabilitated'). Rainwater penetrating through the soil into the backfill becomes acidified by pyrite in the backfill material and can potentially decant to the surface. • As for most coal mines (in the Mpumalanga Highveld) there's a risk for acid rock drainage. • Locating the proposed mine within proximity to a natural drainage line or wetland, poses the risk of associated activities increasing the overall sediment load into the water resource. • Locating 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 and operational footprint will lead to soil compaction, which increases the runoff of water over the topsoil and the reduction in stormwater						Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* The water resources in relation to the proposed activity is considered to be ***"high"*** (classified as an ***Ecological Support Area)***. The proposed mine is situated within the upper reaches of a major catchment system (upper Vaal catchment) with a significant number of water users downstream. The reach of the Vaal River downstream of the proposed BCR Coal Vlakfontein Mine is considered to be a ***free-flowing river*** which, according to Driver et al. (2011), are rivers that flow undisturbed from their source to the confluence with a larger river or to the sea without any major dams and are ***a rare feature*** in the South African landscape and part of our natural heritage. Based on the vulnerability assessment the underlying aquifer is regarded as a ***"low to medium vulnerability"*** aquifer system requiring reasonable groundwater protection measures to ensure that no cumulative pollution affects the aquifer. Impacts/risks discussed associated with the aquatic biodiversity should also be taken into consideration (***FEPAs within a designated SWSA and Fish Sanctuary***). *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Shallow groundwater levels potentially indicate a shallow driven aquifer system that could be acceptable to groundwater contamination from surface related impacts. The effective implementation of a storm water management and erosion control plan may reduce the potential impact/risk to degrade the surface water quality of nearby natural drainage lines. Designing facilities and infrastructures associated with surface and groundwater contamination, such as the Residue Stockpiles, PCD's, storm water management infrastructures etc., in such a manner to prevent the release or seepage of contaminant could manages associated impacts/risks to a sufficient extent. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* The impact/risk to degrade the natural water resources may potentially be ***managed (controlled)*** by implementing the following measures: • Control through the implementation of storm water management and erosion control; • Avoid impacts through adequately managing effluent and runoff; • Avoid accidental release through the development, implementation, and review of incident management and emergency preparedness plans; • Water conservation through monitoring water use and quality throughout the entire life cycle of the proposed development; • Control through the continuing awareness training of all personal throughout the entire life cycle of the proposed development; and • Remedy through the effective implementation of rehabilitation measures.

	infiltration into the soil profile, therefore increasing the likelihood of erosion gully formation and the deposition of sediment within associated watercourses. • If Pollution Control Dams (PCD's) and Residue Stockpiles 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:* • An increased sediment load decreases the overall water quality of surface water resources. • 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. *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). • 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. • Alteration of aquatic ecology of direct affected watercourses as well as downstream watercourses. • Loss of unique biodiversity features. **Water level reduction** *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.							All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

	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. ***All potential impacts/risks identified under the "Aquatic Biodiversity" section directly or indirectly relates to surface and groundwater resources and should also be taken into consideration.***							

Noise

ASPECT	NOISE							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		
Site footprint & location of mining related infrastructure: • Locality selection of contractor's yard, mine offices and ablution facilities; • Locality of workshops, wash bays and hazardous substance stores; • Locality of pollution control facilities; and • Locality of access roads. **Stormwater Infrastructure:** • Stormwater infrastructure design and location. **Fencing and access control:** • Demarcation of mining related areas; • Fencing; and • Access control.	**Noise generation** *Direct impact:* • Increase in noise level at receptors. Disturbing noises. Increased noises or disturbing noises may increase annoyance levels with project. • Locating the proposed development within close proximity to sensitive receptors poses a risk of the overall sense of place to the surrounding community. • Degradation of employees and community hearing health. *Indirect impact:* • Potential increase of community unrest and complaints. • Hearing loss of employees and community members. *Cumulative impact:* • Loss of production due to community strikes.						Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* Considering the project infrastructure layout, there is a potential of a ***"low to high significance"*** of a noise impact during the construction phase, and of a low to high significance during the operational phase. Further study is required, and it is recommended that a full Environmental Noise Impact Assessment (ENIA) study be conducted for the BCR Coal Vlakfontein Mine. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Continuous monitoring as per the recommendation of the specialist and monitoring programme identified during the EIA phase and specified in the EMPr, may allow for the potential impacts/risks to be suitably managed. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Environmental noise levels may potentially be ***managed (controlled)*** by ensuring the following: • Implementation of the monitoring programme as specified in the EMPr; and • Ensuring sufficient noise screening measures should any specific activity exceed the 85 dBA threshold. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Traffic

ASPECT	TRAFFIC MANAGEMENT							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
Site footprint & location of mining related infrastructure: • Locality selection of contractor's yard, mine offices and ablution facilities; • Locality of workshops, wash bays and hazardous substance stores; • Locality of pollution control facilities; and • Locality of access roads. **Fencing and access control:** • Demarcation of mining related areas; • Fencing; and • Access control.	**Increased pressure on local roads/degradation of road infrastructure** *Direct impact:* • Access to and from the proposed development leads to the increased pressure on existing road infrastructure. • Anticipated vehicle traffic to be generated by the Proposed Mining Development, with specific reference to heavy vehicles transporting coal, would have an impact on the existing gravel road, Road D1426. This could contribute to the deteriorating condition of the roadway and could lead to the Proposed Mining Development not being accessible via Road D1426 should the road not be maintained. • 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.	D	E	M	P	S	Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* The main road that is suggested to be used during all phases of the proposed development (Road D1426) is currently in a poor state from the northern boundary of the proposed mine. Depending on where workers will be sourced from, workers using public transport may have difficulties to get to and from site. The relevant existing roads under investigation has a ***"low sensitivity"*** in terms of vehicle traffic volumes and conflicts between vehicles and non-motorized transport. Although the existing intersections currently does not have dedicated right-turn or left-turn deceleration lanes, a low volume of right turning vehicles were observed during the relevant survey conducted. It is therefore rated at a ***"low sensitivity"*** without the Proposed Mining Development. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Anticipated vehicle traffic to be generated by the Proposed Mining Development, with specific reference to heavy vehicles transporting coal, would have an impact on the existing gravel road, Road D1426. This could contribute to the deteriorating condition of the roadway and could lead to the Proposed Mining Development not being accessible via Road D1426 should the road not be maintained. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Potential impacts/risk may potentially be successfully ***managed (control)*** by implementing the following: • Management actions identified in the EMPr; and • Implement the proposed improvements as per Traffic Impact Assessment. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Air Quality and Climate Change

ASPECT	AIR QUALITY & CLIMATE							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		
Site footprint & location of mining related infrastructure: • Locality selection of contractor's yard, mine offices and ablution facilities; • Locality of workshops, wash bays and hazardous substance stores; • Locality of pollution control facilities; and • Locality of access roads. **Fencing and access control:**	**Degradation of air quality** *Direct impact:* • Primary pollutants associated with the with the proposed mine poses a risk to contribute to the overall degradation of air quality. • 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 impact:* • Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities. *Cumulative impact:*						Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* An impact verification statement cannot be determined from the baseline study and can only be determined through dispersion modelling. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Air quality impacts associated with the proposed project can only be determined through dispersion modelling. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Emissions of primary pollutants may potentially be ***mitigated*** (***controlled)*** in the following ways: • Development of a dust fallout monitoring and management plan; • Frequent Inspections; and • Reporting and recording incidents related to air quality. 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.

• Demarcation of mining related areas; • Fencing; and • Access control.	• 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.							All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.
	<u>GHG & CO_2 emissions (direct and indirect)</u>	**D**	**E**	**M**	**P**	**S**	Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* An impact verification statement cannot be determined from the baseline study, as this requires the quantification of GHG emissions and the activity's contribution to the carbon budget of South Africa. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Climate change impacts associated with the proposed project can only be determined through an emissions inventory and GHG calculations. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED*
	<u>Direct Impact:</u> • The usage of diesel operated mobile equipment being used during the construction and operational activities contributes directly to the applicant's 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). *<u>Indirect Impact:</u>* • 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 expects to consume about 180 000 litres of diesel per month. This equates to 38 880 000 litres over the 18-year LoM. 2.5% of the diesel used will be for the generators to generate electricity, while 7.5% will be used for mobile transport. The remaining 90% will be for the mining operations. Based on the use of a diesel combustion generator, GHG emissions can be expected over the duration of the LoM. • 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). *<u>Cumulative Impact:</u>* • Higher minimum, average and maximum temperatures over the next few decades Increased extreme weather events such as drought and floods. • Increased total annual rainfall by between 85 and 303 mm per year. • Increased water demand in Mpumalanga due to rapid industrialisation, mining, urbanization, and population growth will result in the province being unlikely to meet its water demand capacity.							Emissions of primary pollutants may potentially be ***mitigated*** (***controlled)*** in the following ways: • Develop and maintain GHG & CO_2 emissions reporting policy; • Investigate alternative energy efficient measures; and • Monitor the GHG & CO_2 emissions throughout the entire life cycle of the proposed mine. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

<u>Health and Safety</u>

ASPECT	**HEALTH AND SAFETY**							
ACTIVITIES	**POTENTIAL IMPACT/RISK**	**DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)**					**MITIGATION TYPE**	**MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY**
Site footprint & location of mining related infrastructure: • Locality selection of contractor's yard, mine offices and ablution facilities;	**<u>Health effect of pollutants on community/employees</u>** *<u>Direct impact:</u>* • 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. • Exposure of concentrations of $PM_{2.5}$, SO_2, NO_2, and CO over a period of time poses the risk of respiratory and cardiovascular diseases. • It is expected that potential impacts on air quality, and potential resultant impacts on the health of receptor communities, will be of primary interest.	**D**	**E**	**M**	**P**	**S**	Avoid	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* It is expected that potential impacts on air quality, and potential resultant impacts on the health of receptor communities, will be of primary interest. As part of the EIA phase, it has been predetermined that a Rapid Appraisal Health Impact Assessment (RAHIA) will be required. The main focus of the RAHIA is the impact of substances released or dispersed into air on the health of surrounding communities. Due to this focus, air dispersion modelling of the potential impact on air quality will be necessary. This should involve the potentially impacted geographical area, done according to the terms of reference for the Air Quality Impact Assessment (AQIA). *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE*

• Locality of workshops, wash bays and hazardous substance stores; • Locality of pollution control facilities; and • Locality of access roads. **Fencing and access control:** • Demarcation of mining related areas; • Fencing; and • Access control. **Employment of workers and employee management (including contractors and service providers)**	<u>*Indirect impact:*</u> • Increase in injury on duty or disabling injuries of employees. • 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. • Loss of productivity due to investigations into injuries or fatalities. • Influx of local cases of respiratory and cardiovascular diseases in the area. • Increase of cases of lung cancer. <u>*Cumulative impact:*</u> • Loss of human life.							Health impacts associated with the proposed project can only be determined and assessed during the EIA phase by undertaking the required RAHIA and AQIA. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Potential impacts/risk to the health and safety may potentially be ***avoided*** by implementing the following: • Recommendations made by the Air Quality Impact Assessment; and • Develop and implement the Health, Safety, Environment, and Quality (HSEQ) management Plan throughout the entire life cycle of the proposed development. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

<u>*Socio-economic*</u>

ASPECT	**SOCIO-ECONOMIC**							
ACTIVITIES	**POTENTIAL IMPACT/RISK**	**DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)**					**MITIGATION TYPE**	**MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY**
		D	**E**	**M**	**P**	**S**		
Site footprint & location of mining related infrastructure: • Locality selection of contractor's yard, mine offices and ablution facilities; • Locality of workshops, wash bays and hazardous substance stores; • Locality of pollution control facilities; and • Locality of access roads. **Fencing and access control:** • Demarcation of mining related areas; • Fencing; and • Access control. **Employment of workers and employee management (including contractors and service providers)**	**<u>Socio-economic intrusions/Job opportunities and economic impacts/Population change/Sense of place/Community safety risks/Resource efficiency and community health</u>** <u>*Direct impact:*</u> • Influx of people and households related to those formally employed by the mine: demands on housing and social services. • Potential informal influx of people in the form of job seekers are anticipated: possible tension between groups and demonstrations. • Change in the social fabric of the community as a result of the proposed project: growth in town, tension between different social groups. • Increase in nuisance factors (noise and dust). • Community safety due to mining and infrastructure development. • A decrease/cessation in employment and community funds could negatively impact former beneficiaries. • Possible negative socio-economic intrusions. • Impact on localised individuals and groups in terms of employment and local procurement opportunities. • Possible increase in criminal activities due to people movement in the area during construction phase. • Resource efficiency is improved and optimised Health related impacts. <u>*Indirect impact:*</u> • The increasing population will put pressure on the local municipality to provide services such as sewage, drinking water, waste management, electricity etc.						Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* Based on the outcome of the baseline assessment, social screening and site verification it was concluded that various socio-economic impacts can occur as a result of the proposed mining activities. Considering the site sensitivity verification of the site, the dominant agricultural land-use within the project area was identified as having a ***"very high sensitivity"*** from a socio-economic perspective. Loss of the resource use can occur which will result in high negative socio-economic consequences. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* The socio-economic impacts on the existing landowners will be ***"high (negative)"***, due to the loss in the land- and resource use. This will be difficult to mitigate and compensation may likely be the outcome. Negative impacts of a more moderate significance refer to demographic changes, nuisance factors, safety and security issues, increased pressure on public infrastructure and services, external costs (e.g. negative impacts on land-use, groundwater, air quality, biodiversity, traffic, road infrastructure, health and community safety) associated with mining, as well as the impact on the sense of place. At this stage, it is concluded that these impacts can be managed and mitigated to some extent. Positive impacts refer to employment and income due to the operation itself and due to supply-links with local suppliers, as well as possible job creation for low-income groups throughout the life of mine, availability of social funds for socio-economic development and subsequent positive impact on poverty levels. The positive impacts can be enhanced. Although attitude formation is not an impact per se, it serves an important indication of community sentiments toward the project. Attitudes can be defined as lasting, general evaluations of people. Attitudes can be formed through the individual's own experience and/or reports in the media. It could provide important information regarding the feelings and potential actions of Interested and Affected Parties (I&APs) that could become evident during the appeal period of the Environmental Impact Assessment process, and/or during the construction and operational phases of the proposed project.

Relocation of peoples currently occupying properties associated with the proposed mine	• Conflicting cultural and spiritual believes and standards. • Limited opportunities for local participation in labour supply during the construction phase of the project • Limited opportunities for local procurement during construction and operation. • Possible lack of available skills due to implementation of new international technology resulting in continued outsourcing of skills during construction and operational phases. • Possible social dissatisfaction with regards to no or limited job opportunities and local procurement associated with the proposed development. • Unfulfilled community expectations in terms of employment creation could result in social conflict • Possible inflow of jobseekers. • 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. • Movement of people in the area can increase criminal activity or opportunities for criminals. • Traffic accident risks due to mining related traffic flow. • Possible social dissatisfaction with regards to allocation of job opportunities and local procurement associated with the mining activities. • Increased tax income: Due to positive spin-offs on employment and income levels, it is expected that tax revenue to local, provincial and central government will occur. • Social funds for socio-economic development. *Cumulative impact:* • Poor service delivery of municipal infrastructures. • Community unrest. • Job creation for local and district communities. • Local economic development. • Reduced access to livelihood resources. • Change in sense of place.							Initial responses to the project by the landowners in the area indicates that there is already some form of attitude formation against the proposed Vlakfontein project. These relate to opposition to the proposed development, due to the negative impacts on the land- and resource use, intrusions on the rural character of the area and possible devaluation of the property values, together with concerns regarding the possible negative environmental impacts. Issues raised should thus be seen as concerns, but also as inputs with regards to the way forward in terms of community involvement in the project and the detailed impact assessment phase. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* The positive and negative impacts associated to the socio-economic impacts/risks may potentially be ***managed (controlled)*** through the effective planning and management of the following: • Landowner compensation and negotiation where directly effected; • Control through pre-construction planning and development of workers code of conduct, employment procurement policies and a skills development policy; • Ongoing open communication and expectation management of the local communities; • Management of social-economic intrusions; • Control through the management of job opportunities and skills development throughout the life cycle of the proposed development; • Management of population changes; and • Management of community safety. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Waste Management

ASPECT	**WASTE MANAGEMENT**							
ACTIVITIES	**POTENTIAL IMPACT/RISK**	**DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)**					**MITIGATION TYPE**	**MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY**
Site footprint & location of mining related infrastructure: • Locality selection of contractor's yard, mine	**Waste generation/Increased pressure on municipal service delivery/Littering and illegal dumping** *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.	**D**	**E**	**M**	**P**	**S**	Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* Implementation of the national waste management hierarchy (prevention, re-use, recycling, recovery and lastly disposal) will managed the identified protentional waste related impacts/risk associated with the proposed development. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Implementation and aligning management actions with a developed Waste Management Plan will reduce the significant effect of waste on the environment. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED*

offices and ablution facilities; • Locality of workshops, wash bays and hazardous substance stores; • Locality of pollution control facilities; and • Locality of access roads. **Fencing and access control:** • Demarcation of mining related areas; • Fencing; and • Access control.	• An increase in waste generation with disposal as the management measure increases the current strain on the municipal infrastructures. • Accidental spills or incorrect disposal of effluent from the chemical toilets used by the construction employees poses the risk of contaminating the surrounding natural environment. *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. • Due to the lack of capacity within the municipal landfill, the risk of illegally dumping general waste arises. *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 impacts/risks associated with waste generation due to the proposed development may potentially be ***managed (avoided and or controlled)*** through the implementation of the following measures: • Avoid potential impact/risk through effectively implementing the existing Waste Management Plan and monitoring programme; • Avoid incident related to waste management activities by developing. • Implementing, and maintaining incident management and emergency preparedness plan; and • Control waste generation through record keeping. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.
		D	**E**	**M**	**P**	**S**		DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED
	Leachates/ Wastewater effluent *Direct impact:* • Improper management of effluent and leachate from the Residue Stockpiles and RoM stockpiles may lead to the contamination of the surrounding natural environment. *Indirect impact:* • Contaminated effluent causes the degradation of soil and surface water quality. • 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 construction site having consequences on further downstream users.						Avoid	Implementation of the national waste management hierarchy (prevention, re-use, recycling, recovery and lastly disposal) will managed the identified protentional waste related impacts/risk associated with the proposed development. In order to understand the potential impact of leachates from the Residue Stockpiles, a Waste Classification of the waste rock material is required to determine the significant risks associated. This will be undertaken as part of the EIA phase. It is however, from a desktop perspective considered that if the area where the Residue Stockpiles are to be located is not suitably designed to manage the runoff and leachates, that it posed a ***"very high risk"*** of contaminating the surrounding environment. In addition, ***Acid Mine Drainage (AMD)*** is considered to be ***highly likely*** and will to be further assessed as part of the EIA phase. DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE A suitably designed facility or storage area associated with the Residue Stockpiles and RoM has a potential to manage the risks associate with wastewater effluent and leachates to such an extend to prevent environmental contamination. If not managed suitably it is ***highly likely*** that the impacts cause a ***long-term significant impact*** and, in some instance, causes ***irreversible damages***. DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED The impacts/risks associated with waste generation due to the proposed development may potentially be ***managed (avoided and or controlled)*** through the implementation of the following measures: • Waste Classification of waste rock and designing a suitable facility to manage the waste stream; • Developing and suitably designing wastewater facilities to contain and/or prevent spillages or treatment of process water or contaminated water from/before entering the natural environment; • Obtaining the required Waste Management Licence in terms of GN.R 921 (GG 39020 dated 24 July 2015, as amended) and a Water Use Licence (WUL); • Avoid potential impact/risk through effectively implementing the existing Waste Management Plan and monitoring programme; • Avoid incident related to waste management activities by developing. • Implementing, and maintaining incident management and emergency preparedness plan; and • Control waste generation through record keeping.

								All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

CONSTRUCTION PHASE

Agriculture and Soil

ASPECT	SOIL & AGRICULTURAL							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
	Degradation of soil resources and loss of agricultural land	D	E	M	P	S		*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED*
Clearing of development footprint: • Clearing and grubbing; • Topsoil and subsoil stripping; and • Excavations associated with infrastructure. **Site establishment:** • Laydown areas; • Temporary offices including the contractors yard; and • Ablution facilities **Access roads, access control and traffic:** • Hauling of construction material to and from site; • Increase in traffic from heavy vehicles; • Movement of construction plant and equipment; • River and or drainage line crossings; and • Storm water from access roads. **Temporary hazardous substances stores**	*Direct Impact:* • As part of the construction activities related to roads and earthworks associated to the construction of mining related infrastructure, 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. • Improper backfilling of topsoil during shaping activities may lead to further loss of valuable topsoil's. • Impacts during the construction phase for the associated are associated with excessive dust, noise pollution and the pollution and sedimentation of wetlands and dams that may be utilised by adjacent agricultural activities. • The use of heavy machinery or vehicles as well as daily traffic on the haul roads will lead to the compaction of disturbed soils. This will increase the soil bulk density, reduce the porosity and the hydraulic conductivity, leading to a greater potential for the formation of erosion gullies. • Increase in the volume of traffic to the site increases the potential for additional sources of pollutants. Stormwater runoff from any parking lot and internal roads may potentially be contaminated with pollutants including petroleum residues, metals from brake linings, rubber particles from tires, nitrous oxide from car exhausts, and grease. These pollutants enter the soil profile and affect water quality if the stormwater is not treated before it is released. *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. • Continuous exposure to hydrocarbon leaks poses a risk to the degradation of the surrounding soil resources. • Soil compaction and the formation of erosion gullies have an impact on nutrient cycling, with knock on effects on the fertility of the soil. • 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.	5	3	8	5	80	Avoid	Due to the ***high sensitivity*** for agricultural productivity, direct loss of agriculturally productive land is likely to occur as a result of the proposed mine. Based on the opinion provided by the appointed specialist (Appendix F.1), from a desktop perspective the mine as a ***high potential*** ("red flag" or "No-Go") ***of not being supported***, especially in light of the Preservation and Development of Agricultural Land Bill (2021) which has been introduced at the National Assembly and which aims to promote the preservation and sustainable development of agricultural land. The Bill seeks to prevent the fragmentation of agricultural land and to minimise the loss of agricultural land by promoting viable farming units and to encourage the optimal use of agricultural land for the promotion of food security, as well as increase the contribution of agriculture to the Gross Domestic Product. Given that the proposed BCR Coal Vlakfontein site is at least 70% agricultural productive and is located within an area dominated by agricultural activities, one must consider the aims of the Bill and minimise the loss of agriculturally viable land. The above ***opinion*** could change ***depending on the outcomes of the EIA phase and site verification*** and does not take into consideration any mitigation measures or alternatives. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Following the soil and agricultural desktop assessment of the proposed BCR Coal Vlakfontein Mine, the site has been confirmed as being located within an area that has a ***high sensitivity*** for agricultural productivity (70% of the total extend of the mining right area). *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* The potential impacts/risks may potentially be further ***mitigated and or avoided*** by implementing the following measures: • Control though soil conservation and management during the constructional and decommissioning phase of the proposed development; • Avoid the loss of fertile soil by effectively implementing storm water management and erosion control throughout the entire lifecycle of the proposed development; • Avoid contamination of soil resources through the development, implementation and review of incident management and emergency preparedness plans; and • Remedy through effectively rehabilitating disturbed areas. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

	• Cost implication associated with rehabilitation due to import of soils and increases the likelihood of contaminant introduction within an area with alien invasive species (both floral and faunal).							
	Hydrocarbon/soil contamination *Direct impact:* • 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. • 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.	**D**	**E**	**M**	**P**	**S**	Avoid	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* By avoiding incidents related to spilling of hydrocarbons and concrete during the construction phase, the potential of contamination can be effectively managed. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* The implementation of management actions identified in the EMPr will avoid the loss of fertile soil due to contamination related to incidents. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* The potential impacts/risks may potentially be further ***mitigated and or avoided*** by implementing the following measures: • Avoid contamination of soil resources through the development, implementation and review of incident management and emergency preparedness plans; and • Remedy through effectively rehabilitating disturbed areas. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Landscape and Visual

ASPECT	TOPOGRAPHY AND VISUAL							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
Clearing of development footprint: • Clearing and grubbing; • Topsoil and subsoil stripping; and	**Visual disturbance on sensitive visual receptor/ 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.	**D**	**E**	**M**	**P**	**S**	Remedy	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* By implementing an effective rehabilitation plan during decommissioning of the proposed development, visual disturbance on sensitive visual receptors can be remedies to such an extent that the potential impact/risk may be reversed. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Implementing the management measures identified in the EMPr will reduce the visual impact. The level of impact will be assessed during the EIA phase. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED*

• Excavations associated with infrastructure. **Site establishment:** • Laydown areas; • Temporary offices including the contractors yard; and • Ablution facilities **Access roads, access control and traffic:** • Hauling of construction material to and from site; • Increase in traffic from heavy vehicles; • Movement of construction plant and equipment; • River and or drainage line crossings; and • Storm water from access roads.	• Visual impact on observers and residents at homesteads within a 2 - 3km radius of the proposed 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.							Visual disturbances on sensitive visual receptors may potentially be ***managed (remedied)*** through the implementation of the following measures: • Adherence with management measures identified in the EMPr; and • Implementing an effective concurrent rehabilitation plan during the operational phase of the proposed mine. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Archaeology, Cultural, and Palaeontology

ASPECT	ARCHAEOLOGICAL, CULTURAL AND PALAEONTOLOGY							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED*
Clearing of development footprint: • Clearing and grubbing; • Topsoil and subsoil stripping; and • Excavations associated with infrastructure. **Site establishment:** • Laydown areas; • Temporary offices including the contractors yard; and • Ablution facilities **Access roads, access control and traffic:** • Hauling of construction material to and from site;	**Loss of heritage and cultural resources** *Direct impact:* • Construction activities may potentially disturb sites of historical and cultural sites or graves. *Indirect impact:* • Loss of heritage and history for the future generation of the affected community. *Cumulative impact:* • 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.						Avoid	Based on the current information obtained for the area at a desktop level it is anticipated that any heritage resources that occur within the proposed development area will have a Local Significance (LS), Grade 3B or lower field rating and all sites should be mitigatable. Graves are of high social significance (Field rating GP A) and can be expected anywhere on the landscape. Construction and mining related activities could cause irreversible damage or destroy heritage resources and depletion of the archaeological record of the area. It is recommended that a field based HIA should be conducted to comply with Section 38 (8) of the National Heritage Resources Act. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Significance rating of sites, mitigation measures and magnitude of possible impacts can only be determined after the field based HIA but based on the current information the impact on heritage resources can be mitigated to an acceptable level. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Potential impacts/risk to heritage and cultural resources may potentially be successfully ***mitigated (avoided)*** by implementing the following: • Management actions identified in the EMPr; and • Developing a chance find procedure during all phases of the proposed development. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

• Increase in traffic from heavy vehicles; • Movement of construction plant and equipment; • River and or drainage line crossings; and • Storm water from access roads.								

Terrestrial Biodiversity

Aspect	Terrestrial Biodiversity							
Activities	**Potential Impact/Risk**	**Desktop Significance rating (Pre-mitigation)**					**Mitigation Type**	**Management and/or Mitigation Extend Summary**
		D	**E**	**M**	**P**	**S**		*Degree to which impact/risk can be reversed*
Clearing of development footprint: • Clearing and grubbing; • Topsoil and subsoil stripping; and • Excavations associated with infrastructure. **Site establishment:** • Laydown areas; • Temporary offices including the contractors yard; and • Ablution facilities **Access roads, access control and traffic:**	**Disturbance to terrestrial biodiversity** *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 cleared areas are not rehabilitated properly or storm water control features installed are not constructed according to a designed 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.	5	4	10	5	95	Avoid/Remedy/Offset	***Vegetation Biodiversity:*** The desktop assessment of the available information indicated that about half of the vegetation that could be impacted on by the proposed mining were ***cultivated or modified***. Such areas are preliminary classified as ***"low sensitivity"*** from a vegetation perspective. However, these areas are likely of ***biodiversity importance to the movement of fauna and pollinators and important to maintain function and ecological processes***. Some ***secondary grasslands*** of ***"medium sensitivity"*** may be present in ***historically cultivated lands***. However, ***large portions*** of seemingly intact natural ***Eastern Highveld Grassland*** are seemingly present within the site, as well as ***moist grasslands***. Remaining patches of this grassland unit is of ***"high conservation value and sensitivity"*** as it is poorly protected and within a vulnerable ecosystem (Skowno, et al., 2019). It is therefore imperative that the site vegetation be assessed for the presence of intact (undisturbed or untransformed) Eastern Highveld Grassland, as remaining portions should be conserved to preserve this vegetation type and protect it from extinction. Importantly, the remaining grassland on the site ***corresponds greatly with*** the ***CBA: Irreplaceable category of the MBSP***, in which ***mining is not an acceptable land use***.

• Hauling of construction material to and from site; • Increase in traffic from heavy vehicles; • Movement of construction plant and equipment; • River and or drainage line crossings; and • Storm water from access roads. **Temporary hazardous substances stores**	<u>**Influx of alien and invasive species**</u> *<u>Direct Impact:</u>* • 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. *<u>Indirect Impact:</u>* • Disturbed areas are likely to act as seed areas that will ultimately facilitate the invasion of nearby 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. *<u>Cumulative Impact:</u>* • Loss of vegetation and habitat leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding ecological support and protected areas are affected and may lead to the degradation of the protected area's ecology.							Other than the modified areas, the desktop results are in accordance with the screening tool results that the site comprises mostly of ***"high terrestrial biodiversity (vegetation) sensitivity"***. ***<u>Plant Species:</u>*** The site is classified as ***"medium sensitivity for sensitive plant species"***, indicating that the site includes ***suitable habitat for plant species of conservation concern***. The screening tool lists nine (9) species that has a possibility of occurring on the site. The remaining Eastern Highveld Grassland, including the moist grasslands, are ***highly likely to include sensitive and unique habitats***, and ***suitable habitat for several plant species of conservation concern are likely*** to be present concurring with the sensitivity rating of the screening tool. ***<u>Mammal and Invertebrate Species:</u>*** ***"Highly sensitive"*** areas and areas likely to support higher faunal richness or biodiversity in the project area are directly linked to the ***irreplaceable CBAs*** on site, with the ***eastern CBA the potential primary biodiversity hotspot*** in terms of ***mammals and invertebrates***. In the surrounds, ***"highly sensitive"*** areas incorporate the ***riverine and associated grassland areas north and towards the Vaal and the Vaal Tributary southeast*** of the project area. ***"Moderately sensitive"*** areas currently include the ***on-site non-perennial stream***. Streams and other surface water features are normally considered highly sensitive features due to their legal status under the National Water Act, the fact that they are often form ecological corridors and provide unique habitats within the terrestrial setting (often includes habitat for ecologically significant species). In terms of this specific stream, which does ***not provide a significant ecological corridor and has limited buffer habitat*** within the proposed development site, the sensitivity of the habitat is reduced to moderate. ***<u>Herpetofauna Species:</u>*** The presence of ***CBA – Irreplaceable*** areas within the proposed development footprint, together with the possible ***presence of natural herpetofauna communities contributing to local ecosystems, and potentially including endemic habitat specialists and Near Threatened species***, suggests that impacts may be ***"high and undesirable"*** under the current layout, and require further investigation. ***<u>Avifaunal Species:</u>*** Parts of the proposed study area are considered to have a ***"High and Medium Animal Species Theme Sensitivity"***, as a result of the presence of Southern Bald Ibis Geronticus calvus, African Grass Owl Tyto capensis, Denham's Bustard Neotis denhamii, White-bellied Korhaan Eupodotis senegalensis and Caspian Tern Hydroprogne caspia. Based on the ***low number (n=2) of Southern Bald Ibis recorded*** in the PAOI, this preliminary assessment assigns a ***"medium"*** rating to the PAOI. In addition, it is ***unlikely that African Grass Owl*** will occur within the PAOI, based on previous surveys conducted in the area (pers comms. Christelle Trutter, African Grass Owl Study Group Manager) and ***White-bellied Korhaan and Caspian Tern*** have ***not been recorded*** in the PAOI to date. ***Notable SCC*** that have been ***recorded***, albeit in ***low numbers***, include Secretarybird Sagittarius serpentarius, Deham's Bustard, Grey Crowned Crane Balearica regulorum, Black Harrier Circus maurus, African Marsh Harrier Circus ranivorus, Lanner Falcon Falco biarmicus, Greater Flamingo Phoenicopterus roseus and Lesser Flamingo Phoeniconaias minor in addition to the availability of suitable habitat, thereby confirming the ***"medium sensitivity"*** rating. This rating will be verified further during the EIA phase of the project, following a site verification survey to the proposed development area and broader PAOI. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* A significant portion of the proposed site layout (53 % of the proposed layout footprint, see ***Table 8)*** is within a CBA: Irreplaceable conservation category of the MBSP. A defined and recommended land use in Irreplaceable CBAs is designated as "Conservation Management". Such natural areas are required for the province to meet its biodiversity targets. ***Mining*** is ***not supported by the MBSP in CBA: Irreplaceable*** and, depending on the outcome of the site verification and impact assessment during the EIA phase, the environmental authorisation application recommendation could ***<u>potentially</u>***
	<u>**Increased fire risk**</u> *<u>Direct Impact:</u>* • 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. *<u>Indirect Impact:</u>* • 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. *<u>Cumulative Impact:</u>* • Loss of vegetation and habitat leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding ecological support and protected areas are affected and may lead to the degradation of the protected area's ecology.							

							result in a ***“[11]fatal flaw”/” No-Go” alternative***. This will be further supported if any plant or animal species of conservation concern are recorded on the site.
							DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED
							The identified impact/risk may potentially be ***avoided or mitigated (controlled and or remedied)*** through: • The implementation of a species search and rescue prior to the commencement of construction activities; • Appointing a suitably qualified ECO prior to the commencement of any activities monitoring all vegetation clearance activities; • Obtaining the required permits for the removal of protected species; and • Awareness training of all contractors and permanent employees. In the event of the mitigation measures being implemented still results in a medium to high significance residual negative impact on biodiversity, [12]biodiversity offsetting, as final mitigation measure, may be considered: • Ecological equivalence (like-for-like) as preferred offsetting – when offsets remain the only mechanism to manage residual negative impacts, “like-for-like” offsetting should benefit the same or similar biodiversity components as those components that would be negatively affected. • Trading-up offset types – secures priority areas of greater importance or priority to biodiversity conservation than the area being impacted may only be considered under certain circumstances in order to contribute to conservation objectives. Should there remain residual impacts on irreplaceable biodiversity following all hierarchy of mitigation measures implemented, the following: • Where there are no options left in the landscape to counterbalance a residual impact in accordance with the ecological equivalence (like-for-like) principle (see above), that residual impact cannot be offset. That is, there would be a residual impact on irreplaceable biodiversity, which would prevent national biodiversity targets from being met. In these cases, development would generally not be acceptable, and the impacts should be avoided (“No-Go” or “Fatal-Flaw”). • [13]Ecological compensation – residual impacts which cannot be offset should only be considered in highly exceptional circumstances, when there are imperative reasons for overriding public interest. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

[11] **“Fatal flaw”** means a major defect or deficiency in a project proposal that should result in environmental authorisation being refused, and from a biodiversity perspective, a residual negative impact that would have a Very High significance rating.

[12] Biodiversity offsets should be distinguished from trade-offs. A trade-off in the biodiversity context involves exchanging a negative outcome for biodiversity with another positive outcome, which does not necessarily benefit biodiversity. Trading off biodiversity for other positive outcomes is not a form of mitigation, like biodiversity offsetting. It falls outside of the scope of the mitigation hierarchy. The following are examples of trade-offs in the biodiversity context:

- Ecological compensation; and
- Financial compensation: a financial contribution to a biodiversity initiative to compensate for a significant residual negative impact on biodiversity.

Trade-offs should only be considered when biodiversity offsetting is not possible and where there are imperative reasons for overriding public interest. They should also be approached with extreme caution in the context of environmental authorisation applications.

[13] **“Ecological Compensation”** means the outcome of measurable actions to protect, restore and manage priority biodiversity, aimed at compensating for residual negative impacts on irreplaceable biodiversity and ecological infrastructure where these impacts cannot be offset and which should, instead and in the first instance, be avoided.

Aquatic Biodiversity

ASPECT	AQUATIC BIODIVERSITY							
ACTIVITIES	**POTENTIAL IMPACT/RISK**	**DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)**					**MITIGATION TYPE**	**MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY**
		D	**E**	**M**	**P**	**S**		
Clearing of development footprint: • Clearing and grubbing; • Topsoil and subsoil stripping; and • Excavations associated with infrastructure. **Site establishment:** • Laydown areas; • Temporary offices including the contractors yard; and • Ablution facilities **Access roads, access control and traffic:** • Hauling of construction material to and from site; • Increase in traffic from heavy vehicles; • Movement of construction plant and equipment; • River and or drainage line crossings; and • Storm water from access roads. **Temporary hazardous substances stores**	**Loss of aquatic biodiversity/ Direct Loss of Wetland Features** *Direct impact:* • Locating the proposed development within 500m of a wetland, poses a risk in altering the support regions into the wetland. • 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:* • Alteration of wetland support zones poses the risk of alien invasive species the invade, leading to the deterioration of the nearby wetland system. • 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. **Erosion and sedimentation of Wetlands** *Direct impact:* • Locating 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.	5	4	10	5	95	Avoid/Remedy/Offset	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* The desktop investigation of the study area for the proposed BCR Coal Vlakfontein Mine has confirmed the classification of the study area as being located within an area regarded as being of ***"very high sensitivity"*** from the perspective of the aquatic ecosystem. As such, a detailed aquatic biodiversity specialist assessment as well as a detailed wetland specialist assessment would be required as part of the Environmental Impact Assessment phase of the study. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* As per the MBSP the watercourses/wetlands and wetland clusters associated with the proposed BCR Coal Vlakfontein Mine footprint are classified as ***Ecological Support Areas (ESAs)*** on the basis of wetlands and wetland clusters. ESAs are areas that are ***not essential for meeting biodiversity***, targets, ***but that play an important role in supporting the functioning of protected areas or CBAs*** and for delivering ecosystem services. In the terrestrial assessment they support landscape connectivity and strengthen resilience to climate change. ***ESAs need to be maintained*** in at least a ***functional*** and often ***natural state***, supporting the purpose for which they were identified. They include features such as riparian habitat surrounding rivers or wetlands, migration corridors for over-wintering sites for Blue Cranes, and so on (Mpumalanga Tourism and Parks Agency, 2014). Based on information obtained during the desktop site sensitivity verification assessment, it is concluded that the proposed BCR Coal Vlakfontein Mine is likely to result in a direct loss of wetlands determined to be in a ***largely natural state*** and identified as being ***FEPAs within a designated SWSA and Fish Sanctuary***. the majority (approximately ***84 %***) of the proposed BCR Coal Vlakfontein Mine study area falls within a catchment classified as a FEPA catchment. FEPA catchments achieve biodiversity targets for river ecosystems and threatened/near-threatened fish species and were identified as rivers that are currently in a good condition (***Ecological Category A or B***). The FEPA status is largely as a result of the catchment being classified as a fish sanctuary for ***two fish species***, namely ***Enteromius cf. oraniensis (Chubbyhead Barb; previously Enteromius anoplus s.l.)*** and ***Enteromius sp. pallidus cf. 'north' (Goldie Barb)***, the latter of which is in need of taxonomic revision and both of which are in need of a revised assessment of their threat status. In addition, according to the ***Resource Quality Objectives set for the Upper Vaal*** (Department of Water and Sanitation, 2016), the Recommended Ecological Category (REC) determined for the catchment within which the proposed mine is to be located is set as an ***Ecological Category B***, and is reflected as such within the numerical limits set for instream habitat, aquatic macroinvertebrates, fish, riparian vegetation, hydrology and water quality. In addition, the Resource Quality Objective set for the catchment state that 'salt concentrations must be maintained to meet quality requirements for agriculture and to maintain the ecosystem wellbeing', an ***objective that will be unlikely to be achieved*** should additional mining activities impact the water quality and quantity within the catchment through mining of wetlands and inadvertent or unintentional release of mine-affected water into the catchment. In addition, the reach of the Vaal River downstream of the proposed BCR Coal Vlakfontein Mine is considered to be a ***free-flowing river*** which, according to Driver et al. (2011), are rivers that flow undisturbed from their source to the confluence with a larger river or to the sea without any major dams and are ***a rare feature*** in the South African landscape and part of our natural heritage. Several wetland systems were identified within the project site as well as one FEPA wetland cluster identified in the eastern section. The FEPA wetlands include channelled valley bottom systems and depressions. The wetlands are classified as FEPA wetlands as they are located within a sub quaternary catchment that is often utilised by Wattled Cranes (Bugeranus carunculatus), Grey Crowned Cranes (Balearica regulorum) and/or Blue Cranes (Anthropoides paradiseus). The wetlands furthermore have ***PES*** classifications of ***A/B (unmodified to largely natural)***.

								DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED
	• The use of heavy machinery within the construction and operational 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 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. **Water Quality Deterioration/Contamination of Water Resource** *Direct impact:*							The impact/risk to disturb the aquatic biodiversity may potentially be ***avoided or mitigated (controlled and or remedied)*** by implementing the following measures: • Control through the implementation of storm water management and erosion control; • Avoid impacts through adequately managing effluent and runoff; • Avoid accidental release through the development, implementation, and review of incident management and emergency preparedness plans; • Control through the continuing awareness training of all personal throughout the entire life cycle of the proposed development; and • Remedy through the effective implementation of rehabilitation measures. In the event of the mitigation measures being implemented still results in a medium to high significance residual negative impact on biodiversity, [14]biodiversity offsetting, as final mitigation measure, may be considered: • Ecological equivalence (like-for-like) as preferred offsetting – when offsets remain the only mechanism to manage residual negative impacts, "like-for-like" offsetting should benefit the same or similar biodiversity components as those components that would be negatively affected. • Trading-up offset types – secures priority areas of greater importance or priority to biodiversity conservation than the area being impacted may only be considered under certain circumstances in order to contribute to conservation objectives. Should there remain residual impacts on irreplaceable biodiversity following all hierarchy of mitigation measures implemented, the following: • Where there are no options left in the landscape to counterbalance a residual impact in accordance with the ecological equivalence (like-for-like) principle (see above), that residual impact cannot be offset. That is, there would be a residual impact on irreplaceable biodiversity, which would prevent national biodiversity targets from being met. In these cases, development would generally not be acceptable, and the impacts should be avoided ("No-Go" or "Fatal-Flaw"). • [15]Ecological compensation – residual impacts which cannot be offset should only be considered in highly exceptional circumstances, when there are imperative reasons for overriding public interest. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

[14] Biodiversity offsets should be distinguished from trade-offs. A trade-off in the biodiversity context involves exchanging a negative outcome for biodiversity with another positive outcome, which does not necessarily benefit biodiversity. Trading off biodiversity for other positive outcomes is not a form of mitigation, like biodiversity offsetting. It falls outside of the scope of the mitigation hierarchy. The following are examples of trade-offs in the biodiversity context:

- Ecological compensation; and
- Financial compensation: a financial contribution to a biodiversity initiative to compensate for a significant residual negative impact on biodiversity.

Trade-offs should only be considered when biodiversity offsetting is not possible and where there are imperative reasons for overriding public interest. They should also be approached with extreme caution in the context of environmental authorisation applications.

[15] **"Ecological Compensation"** means the outcome of measurable actions to protect, restore and manage priority biodiversity, aimed at compensating for residual negative impacts on irreplaceable biodiversity and ecological infrastructure where these impacts cannot be offset and which should, instead and in the first instance, be avoided.

	• If Pollution Control Dams (PCD's) and Residue Stockpiles 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. *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). • 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. **Invasive alien plant encroachment** *Direct impact:* • Alien invasive trees and shrubs are expected to increase within the area as these species 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. *Indirect impact:* • 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:* • Critical support regions to surrounding ecological support and protected areas are affected and may lead to the degradation of the protected area's ecology.							

Surface and Groundwater Resources

ASPECT	WATER RESOURCES							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
Clearing of development footprint: • Clearing and grubbing; • Topsoil and subsoil stripping; and • Excavations associated with infrastructure. **Site establishment:** • Laydown areas; • Temporary offices including the contractors yard; and • Ablution facilities **Access roads, access control and traffic:** • Hauling of construction material to and from site; • Increase in traffic from heavy vehicles; • Movement of construction plant and equipment;	**Degradation of natural water resources/Water resource contamination** *Direct impact:* • Locating the proposed mine within proximity to a natural drainage line or wetland, poses the risk of associated activities increasing the overall sediment load into the water resource. • Locating 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 and operational 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. • If Pollution Control Dams (PCD's) and Residue Stockpiles 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.	D	E	M	P	S	Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* The water resources in relation to the proposed activity is considered to be ***"high"*** (classified as an ***Ecological Support Area)***. The proposed mine is situated within the upper reaches of a major catchment system (upper Vaal catchment) with a significant number of water users downstream. The reach of the Vaal River downstream of the proposed BCR Coal Vlakfontein Mine is considered to be a ***free-flowing river*** which, according to Driver et al. (2011), are rivers that flow undisturbed from their source to the confluence with a larger river or to the sea without any major dams and are ***a rare feature*** in the South African landscape and part of our natural heritage. Based on the vulnerability assessment the underlying aquifer is regarded as a ***"low to medium vulnerability"*** aquifer system requiring reasonable groundwater protection measures to ensure that no cumulative pollution affects the aquifer. Impacts/risks discussed associated with the aquatic biodiversity should also be taken into consideration (***FEPAs within a designated SWSA and Fish Sanctuary***). *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Shallow groundwater levels potentially indicate a shallow driven aquifer system that could be acceptable to groundwater contamination from surface related impacts. The effective implementation of a storm water management and erosion control plan may reduce the potential impact/risk to degrade the surface water quality of nearby natural drainage lines. Designing facilities and infrastructures associated with surface and groundwater contamination, such as the Residue Stockpiles, PCD's, storm water management infrastructures etc., in such a manner to prevent the release or seepage of contaminant could manages associated impacts/risks to a sufficient extent. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* The impact/risk to degrade the natural water resources may potentially be ***managed (controlled)*** by implementing the following measures: • Control through the implementation of storm water management and erosion control; • Avoid impacts through adequately managing effluent and runoff;

• River and or drainage line crossings; and • Storm water from access roads. **Temporary hazardous substances stores**	Accordingly, aquatic assemblages are likely to be negatively affected, with a decrease in diversity expected. *Indirect impact:* • An increased sediment load decreases the overall water quality of surface water resources. • 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. *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). • 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. • • Alteration of aquatic ecology of direct affected watercourses as well as downstream watercourses. • Loss of unique biodiversity features. **Water level reduction** *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. ***All potential impacts/risks identified under the "Aquatic Biodiversity" section directly or indirectly relates to surface and groundwater resources and should also be taken into consideration.***							• Avoid accidental release through the development, implementation, and review of incident management and emergency preparedness plans; • Water conservation through monitoring water use and quality throughout the entire life cycle of the proposed development; • Control through the continuing awareness training of all personal throughout the entire life cycle of the proposed development; and • Remedy through the effective implementation of rehabilitation measures. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Noise

ASPECT	NOISE							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED*
Clearing of development footprint: • Clearing and grubbing; • Topsoil and subsoil stripping; and • Excavations associated with infrastructure. **Site establishment:** • Laydown areas; • Temporary offices including the contractors yard; and • Ablution facilities **Access roads, access control and traffic:** • Hauling of construction material to and from site; • Increase in traffic from heavy vehicles; • Movement of construction plant and equipment; • River and or drainage line crossings; and • Storm water from access roads. **Temporary hazardous substances stores**	**Noise generation** *Direct impact:* • Increase in noise level at receptors. Increased noises or disturbing noises may increase annoyance levels with project. Noise levels could exceed 45 dBA during construction. (temporary construction of access roads, construction of infrastructure as well as construction traffic passing close to NSR). • Locating the proposed development within close proximity to sensitive receptors poses a risk of the overall sense of place to the surrounding community. • Degradation of employees and community hearing health. *Indirect impact:* • Potential increase of community unrest and complaints. • Hearing loss of employees and community members. *Cumulative impact:* • Loss of production due to community strikes.						Control	Considering the project infrastructure layout, there is a potential of a ***"low to high significance"*** of a noise impact during the construction phase, and of a low to high significance during the operational phase. Further study is required, and it is recommended that a full Environmental Noise Impact Assessment (ENIA) study be conducted for the BCR Coal Vlakfontein Mine. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Without noise propagation modelling where cumulative effects are included, it is difficult to assess the potential significance of the noise impact, though considering the projected noise levels, the significance may be ***very "low"*** to ***"high"*** at the different Noise Sensitive Receptor (NSR). Construction noise impacts however: • Are highly reversible; • Will not result in the irreplaceable loss of resources; and • Potential noise impacts can be managed, mitigated or even avoided. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Environmental noise levels may potentially be ***managed (controlled)*** by ensuring the following: • Implementation of the monitoring programme as specified in the EMPr; and • Ensuring sufficient noise screening measures should any specific activity exceed the 85 dBA threshold. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Traffic

ASPECT	TRAFFIC MANAGEMENT							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
Clearing of development footprint: • Clearing and grubbing; • Topsoil and subsoil stripping; and • Excavations associated with infrastructure. **Site establishment:** • Laydown areas; • Temporary offices including the contractors yard; and • Ablution facilities **Access roads, access control and traffic:** • Hauling of construction material to and from site; • Increase in traffic from heavy vehicles; • Movement of construction plant and equipment; • River and or drainage line crossings; and • Storm water from access roads. **Temporary hazardous substances stores**	**<u>Increased pressure on local roads/degradation of road infrastructure</u>** *<u>Direct impact:</u>* • Access to and from the proposed development leads to the increased pressure on existing road infrastructure. • Anticipated vehicle traffic to be generated by the Proposed Mining Development, with specific reference to heavy vehicles transporting coal, would have an impact on the existing gravel road, Road D1426. This could contribute to the deteriorating condition of the roadway and could lead to the Proposed Mining Development not being accessible via Road D1426 should the road not be maintained. • 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. *<u>Indirect impact:</u>* • Increased pressure on existing road infrastructures and municipalities to maintain infrastructures. *<u>Cumulative impact:</u>* • Degradation of public transport infrastructure. • Increased risks of accidents on the public road.	D	E	M	P	S	Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* The main road that is suggested to be used during all phases of the proposed development (Road D1426) is currently in a poor state from the northern boundary of the proposed mine. Depending on where workers will be sourced from, workers using public transport may have difficulties to get to and from site. The relevant existing roads under investigation has a ***"low sensitivity"*** in terms of vehicle traffic volumes and conflicts between vehicles and non-motorized transport. Although the existing intersections currently does not have dedicated right-turn or left-turn deceleration lanes, a low volume of right turning vehicles were observed during the relevant survey conducted. It is therefore rated at a ***"low sensitivity"*** without the Proposed Mining Development. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Anticipated vehicle traffic to be generated by the Proposed Mining Development, with specific reference to heavy vehicles transporting coal, would have an impact on the existing gravel road, Road D1426. This could contribute to the deteriorating condition of the roadway and could lead to the Proposed Mining Development not being accessible via Road D1426 should the road not be maintained. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Potential impacts/risk may potentially be successfully ***managed (control)*** by implementing the following: • Management actions identified in the EMPr; and • Implement the proposed improvements as per Traffic Impact Assessment. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Air Quality and Climate Change

ASPECT	AIR QUALITY & CLIMATE							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		
Clearing of development footprint: • Clearing and grubbing; • Topsoil and subsoil stripping; and • Excavations associated with infrastructure.	**<u>Degradation of air quality</u>** *<u>Direct impact:</u>* • Primary pollutants associated with the with the proposed mine poses a risk to contribute to the overall degradation of air quality. • Road construction, preparation of laydown areas and the construction of infrastructures involves the removal of rock and earth by grading or digging during construction.						Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* An impact verification statement cannot be determined from the baseline study and can only be determined through dispersion modelling. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Air quality impacts associated with the proposed project can only be determined through dispersion modelling. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Emissions of primary pollutants may potentially be ***mitigated*** (***controlled)*** in the following ways: • Development of a dust fallout monitoring and management plan;

Site establishment: • Laydown areas; • Temporary offices including the contractors yard; and • Ablution facilities **Access roads, access control and traffic:** • Hauling of construction material to and from site; • Increase in traffic from heavy vehicles; • Movement of construction plant and equipment; • River and or drainage line crossings; and • Storm water from access roads. **Temporary hazardous substances stores**	• 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 impact:* • Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities. *Cumulative impact:* • 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.							• Frequent Inspections; and • Reporting and recording incidents related to air quality. 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. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.
	GHG & CO_2 emissions (direct and indirect)	**D**	**E**	**M**	**P**	**S**	Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* An impact verification statement cannot be determined from the baseline study, as this requires the quantification of GHG emissions and the activity's contribution to the carbon budget of South Africa. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Climate change impacts associated with the proposed project can only be determined through an emissions inventory and GHG calculations. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED*
	Direct Impact: • The usage of diesel operated mobile equipment being used during the construction and operational activities contributes directly to the applicant's 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 expects to consume about 180 000 litres of diesel per month. This equates to 38 880 000 litres over the 18-year LoM. 2.5% of the diesel used will be for the generators to generate electricity, while 7.5% will be used for mobile transport. The remaining 90% will be for the mining operations. Based on the use of a diesel combustion generator, GHG emissions can be expected over the duration of the LoM. • 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:* • Higher minimum, average and maximum temperatures over the next few decades Increased extreme weather events such as drought and floods. • Increased total annual rainfall by between 85 and 303 mm per year. • Increased water demand in Mpumalanga due to rapid industrialisation, mining, urbanization, and population growth will result in the province being unlikely to meet its water demand capacity.							Emissions of primary pollutants may potentially be ***mitigated*** (***controlled)*** in the following ways: • Develop and maintain GHG & CO_2 emissions reporting policy; • Investigate alternative energy efficient measures; and • Monitor the GHG & CO_2 emissions throughout the entire life cycle of the proposed mine. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Health and Safety

ASPECT	HEALTH AND SAFETY							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
	Health effect of pollutants on community/employees	**D**	**E**	**M**	**P**	**S**		*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED*

Clearing of development footprint: • Clearing and grubbing; • Topsoil and subsoil stripping; and • Excavations associated with infrastructure. **Site establishment:** • Laydown areas; • Temporary offices including the contractors yard; and • Ablution facilities **Access roads, access control and traffic:** • Hauling of construction material to and from site; • Increase in traffic from heavy vehicles; • Movement of construction plant and equipment; • River and or drainage line crossings; and • Storm water from access roads. **Temporary hazardous substances stores** **Employment of workers and employee management (including contractors and service providers)**	*Direct impact:* • 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. • Exposure of concentrations of $PM_{2.5}$, SO_2, NO_2, and CO over a period of time poses the risk of respiratory and cardiovascular diseases. • It is expected that potential impacts on air quality, and potential resultant impacts on the health of receptor communities, will be of primary interest. *Indirect impact:* • Increase in injury on duty or disabling injuries of employees. • 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. • Loss of productivity due to investigations into injuries or fatalities. • Influx of local cases of respiratory and cardiovascular diseases in the area. • Increase of cases of lung cancer. *Cumulative impact:* • Loss of human life.							It is expected that potential impacts on air quality, and potential resultant impacts on the health of receptor communities, will be of primary interest. As part of the EIA phase, it has been predetermined that a Rapid Appraisal Health Impact Assessment (RAHIA) will be required. The main focus of the RAHIA is the impact of substances released or dispersed into air on the health of surrounding communities. Due to this focus, air dispersion modelling of the potential impact on air quality will be necessary. This should involve the potentially impacted geographical area, done according to the terms of reference for the Air Quality Impact Assessment (AQIA). *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Health impacts associated with the proposed project can only be determined and assessed during the EIA phase by undertaking the required RAHIA and AQIA. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Potential impacts/risk to the health and safety may potentially be ***avoided*** by implementing the following: • Recommendations made by the Air Quality Impact Assessment; and • Develop and implement the Health, Safety, Environment, and Quality (HSEQ) management Plan throughout the entire life cycle of the proposed development. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Socio-economic

ASPECT	SOCIO-ECONOMIC							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		
Clearing of development footprint: • Clearing and grubbing; • Topsoil and subsoil stripping; and	**<u>Socio-economic intrusions/Job opportunities and economic impacts/Population change/Sense of place/Community safety risks/Resource efficiency and community health</u>** *Direct impact:* • Influx of people and households related to those formally employed by the mine: demands on housing and social services.						Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* Based on the outcome of the baseline assessment, social screening and site verification it was concluded that various socio-economic impacts can occur as a result of the proposed mining activities. Considering the site sensitivity verification of the site, the dominant agricultural land-use within the project area was identified as having a ***"very high sensitivity"*** from a socio-economic perspective. Loss of the resource use can occur which will result in high negative socio-economic consequences. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE*

• Excavations associated with infrastructure. **Site establishment:** • Laydown areas; • Temporary offices including the contractors yard; and • Ablution facilities **Access roads, access control and traffic:** • Hauling of construction material to and from site; • Increase in traffic from heavy vehicles; • Movement of construction plant and equipment; • River and or drainage line crossings; and • Storm water from access roads. **Temporary hazardous substances stores** **Employment of workers and employee management (including contractors and service providers)** **Relocation of peoples currently occupying properties associated with the proposed mine**	• Potential informal influx of people in the form of job seekers are anticipated: possible tension between groups and demonstrations. • Change in the social fabric of the community as a result of the proposed project: growth in town, tension between different social groups. • Increase in nuisance factors (noise and dust). • Community safety due to mining and infrastructure development. • A decrease/cessation in employment and community funds could negatively impact former beneficiaries. • Possible negative socio-economic intrusions. • Impact on localised individuals and groups in terms of employment and local procurement opportunities. • Possible increase in criminal activities due to people movement in the area during construction phase. • Resource efficiency is improved and optimised Health related impacts. _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. • Limited opportunities for local participation in labour supply during the construction phase of the project • Limited opportunities for local procurement during construction and operation. • Possible lack of available skills due to implementation of new international technology resulting in continued outsourcing of skills during construction and operational phases. • Possible social dissatisfaction with regards to no or limited job opportunities and local procurement associated with the proposed development. • Unfulfilled community expectations in terms of employment creation could result in social conflict • Possible inflow of jobseekers. • 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. • Movement of people in the area can increase criminal activity or opportunities for criminals. • Traffic accident risks due to mining related traffic flow. • Possible social dissatisfaction with regards to allocation of job opportunities and local procurement associated with the mining activities. • Increased tax income: Due to positive spin-offs on employment and income levels, it is expected that tax revenue to local, provincial and central government will occur. • Social funds for socio-economic development. _Cumulative impact:_ • Poor service delivery of municipal infrastructures. • Community unrest. • Job creation for local and district communities. • Local economic development. • Reduced access to livelihood resources. • Change in sense of place.						The socio-economic impacts on the existing landowners will be ***"high (negative)"***, due to the loss in the land- and resource use. This will be difficult to mitigate and compensation may likely be the outcome. Negative impacts of a more moderate significance refer to demographic changes, nuisance factors, safety and security issues, increased pressure on public infrastructure and services, external costs (e.g. negative impacts on land-use, groundwater, air quality, biodiversity, traffic, road infrastructure, health and community safety) associated with mining, as well as the impact on the sense of place. At this stage, it is concluded that these impacts can be managed and mitigated to some extent. Positive impacts refer to employment and income due to the operation itself and due to supply-links with local suppliers, as well as possible job creation for low-income groups throughout the life of mine, availability of social funds for socio-economic development and subsequent positive impact on poverty levels. The positive impacts can be enhanced. Although attitude formation is not an impact per se, it serves an important indication of community sentiments toward the project. Attitudes can be defined as lasting, general evaluations of people. Attitudes can be formed through the individual's own experience and/or reports in the media. It could provide important information regarding the feelings and potential actions of Interested and Affected Parties (I&APs) that could become evident during the appeal period of the Environmental Impact Assessment process, and/or during the construction and operational phases of the proposed project. Initial responses to the project by the landowners in the area indicates that there is already some form of attitude formation against the proposed Vlakfontein project. These relate to opposition to the proposed development, due to the negative impacts on the land- and resource use, intrusions on the rural character of the area and possible devaluation of the property values, together with concerns regarding the possible negative environmental impacts. Issues raised should thus be seen as concerns, but also as inputs with regards to the way forward in terms of community involvement in the project and the detailed impact assessment phase. _DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED_ The positive and negative impacts associated to the socio-economic impacts/risks may potentially be ***managed (controlled)*** through the effective planning and management of the following: • Landowner compensation and negotiation where directly effected; • Control through pre-construction planning and development of workers code of conduct, employment procurement policies and a skills development policy; • Ongoing open communication and expectation management of the local communities; • Management of social-economic intrusions; • Control through the management of job opportunities and skills development throughout the life cycle of the proposed development; • Management of population changes; and • Management of community safety. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Waste Management

ASPECT	WASTE MANAGEMENT						
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)				MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY

		D	E	M	P	S		
Clearing of development footprint: • Clearing and grubbing; • Topsoil and subsoil stripping; and • Excavations associated with infrastructure. **Site establishment:** • Laydown areas; • Temporary offices including the contractors yard; and • Ablution facilities **Access roads, access control and traffic:** • Hauling of construction material to and from site; • Increase in traffic from heavy vehicles; • Movement of construction plant and equipment; • River and or drainage line crossings; and • Storm water from access roads. **Temporary hazardous substances stores**	**<u>Waste generation/Increased pressure on municipal service delivery/Littering and illegal dumping</u>** *<u>Direct impact:</u>* • 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. • An increase in waste generation with disposal as the management measure increases the current strain on the municipal infrastructures. • Accidental spills or incorrect disposal of effluent from the chemical toilets used by the construction employees poses the risk of contaminating the surrounding natural environment. *<u>Indirect impact:</u>* • Exposure of leachate to the natural environment poses a health risk to the surrounding fauna and flora habitats as well as human health. • Due to the lack of capacity within the municipal landfill, the risk of illegally dumping general waste arises. *<u>Cumulative impact:</u>* • 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.						Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* Implementation of the national waste management hierarchy (prevention, re-use, recycling, recovery and lastly disposal) will managed the identified protentional waste related impacts/risk associated with the proposed development. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Implementation and aligning management actions with a developed Waste Management Plan will reduce the significant effect of waste on the environment. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* The impacts/risks associated with waste generation due to the proposed development may potentially be ***managed (avoided and or controlled)*** through the implementation of the following measures: • Avoid potential impact/risk through effectively implementing the existing Waste Management Plan and monitoring programme; • Avoid incident related to waste management activities by developing. • Implementing, and maintaining incident management and emergency preparedness plan; and • Control waste generation through record keeping. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.
		D	**E**	**M**	**P**	**S**		
	<u>Leachates/ Wastewater effluent</u> *<u>Direct impact:</u>* • Improper management of effluent and leachate from the Residue Stockpiles and RoM stockpiles may lead to the contamination of the surrounding natural environment. *<u>Indirect impact:</u>* • Contaminated effluent causes the degradation of soil and surface water quality. • 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. *<u>Cumulative impact:</u>* • The linked nature of the wetland systems to downstream water resources will result in pollutants being carried downstream from the construction site having consequences on further downstream users.						Avoid	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* Implementation of the national waste management hierarchy (prevention, re-use, recycling, recovery and lastly disposal) will managed the identified protentional waste related impacts/risk associated with the proposed development. In order to understand the potential impact of leachates from the Residue Stockpiles, a Waste Classification of the waste rock material is required to determine the significant risks associated. This will be undertaken as part of the EIA phase. It is however, from a desktop perspective considered that if the area where the Residue Stockpiles are to be located is not suitably designed to manage the runoff and leachates, that it posed a ***"very high risk"*** of contaminating the surrounding environment. In addition, ***Acid Mine Drainage (AMD)*** is considered to be ***highly likely*** and will to be further assessed as part of the EIA phase. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* A suitably designed facility or storage area associated with the Residue Stockpiles and RoM has a potential to manage the risks associate with wastewater effluent and leachates to such an extend to prevent environmental contamination. If not managed suitably it is ***highly likely*** that the impacts cause a ***long-term significant impact*** and, in some instance, causes ***irreversible damages***. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* The impacts/risks associated with waste generation due to the proposed development may potentially be ***managed (avoided and or controlled)*** through the implementation of the following measures: • Waste Classification of waste rock and designing a suitable facility to manage the waste stream; • Developing and suitably designing wastewater facilities to contain and/or prevent spillages or treatment of process water or contaminated water from/before entering the natural environment;

								• Obtaining the required Waste Management Licence in terms of GN.R 921 (GG 39020 dated 24 July 2015, as amended) and a Water Use Licence (WUL); • Avoid potential impact/risk through effectively implementing the existing Waste Management Plan and monitoring programme; • Avoid incident related to waste management activities by developing. • Implementing, and maintaining incident management and emergency preparedness plan; and • Control waste generation through record keeping. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

OPERATIONAL PHASE

Agriculture and Soil

ASPECT	SOIL & AGRICULTURAL							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		
Blasting and opencast excavations: • Topsoil and subsoil stripping; • Blasting and removal of overburden; • Trucking and shovelling raw materials; and • Safety benching construction. **Residue, RoM and Product, and Topsoil Stockpiles:** • Surface and wastewater management; and • Importing and exporting material from stockpiles. **Access roads, access control, weighbridge, and traffic:** • Importing and exporting RoM and product from operational areas; • Increase in traffic from heavy vehicles; • Traffic management at weighbridge; • Movement of operational plant and equipment;	**Degradation of soil resources and loss of agricultural land** *Direct Impact:* • As part of the construction activities related to roads and earthworks associated to the construction of mining related infrastructure, 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. • Improper backfilling of topsoil during shaping activities may lead to further loss of valuable topsoil's. • Impacts during the construction phase for the associated are associated with excessive dust, noise pollution and the pollution and sedimentation of wetlands and dams that may be utilised by adjacent agricultural activities. • The use of heavy machinery or vehicles as well as daily traffic on the haul roads will lead to the compaction of disturbed soils. This will increase the soil bulk density, reduce the porosity and the hydraulic conductivity, leading to a greater potential for the formation of erosion gullies. • Increase in the volume of traffic to the site increases the potential for additional sources of pollutants. Stormwater runoff from any parking lot and internal roads may potentially be contaminated with pollutants including petroleum residues, metals from brake linings, rubber particles from tires, nitrous oxide from car exhausts, and grease. These pollutants enter the soil profile and affect water quality if the stormwater is not treated before it is released. *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. • Continuous exposure to hydrocarbon leaks poses a risk to the degradation of the surrounding soil resources. • Soil compaction and the formation of erosion gullies have an impact on nutrient cycling, with knock on effects on the fertility of the soil. • Unvegetated areas are prone to erosion formation. *Cumulative Impact:*	5	3	8	5	80	Avoid/Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* Due to the ***high sensitivity*** for agricultural productivity, direct loss of agriculturally productive land is likely to occur as a result of the proposed mine. Based on the opinion provided by the appointed specialist (Appendix F.1), from a desktop perspective the mine as a ***high potential*** ("red flag" or "No-Go") ***of not being supported***, especially in light of the Preservation and Development of Agricultural Land Bill (2021) which has been introduced at the National Assembly and which aims to promote the preservation and sustainable development of agricultural land. The Bill seeks to prevent the fragmentation of agricultural land and to minimise the loss of agricultural land by promoting viable farming units and to encourage the optimal use of agricultural land for the promotion of food security, as well as increase the contribution of agriculture to the Gross Domestic Product. Given that the proposed BCR Coal Vlakfontein site is at least 70% agricultural productive and is located within an area dominated by agricultural activities, one must consider the aims of the Bill and minimise the loss of agriculturally viable land. The above ***opinion*** could change ***depending on the outcomes of the EIA phase and site verification*** and does not take into consideration any mitigation measures or alternatives. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Following the soil and agricultural desktop assessment of the proposed BCR Coal Vlakfontein Mine, the site has been confirmed as being located within an area that has a ***high sensitivity*** for agricultural productivity (70% of the total extend of the mining right area). *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* The potential impacts/risks may potentially be further ***mitigated and or avoided*** by implementing the following measures: • Control though soil conservation and management during the constructional and decommissioning phase of the proposed development; • Avoid the loss of fertile soil by effectively implementing storm water management and erosion control throughout the entire lifecycle of the proposed development; • Avoid contamination of soil resources through the development, implementation and review of incident management and emergency preparedness plans; and • Remedy through effectively rehabilitating disturbed areas. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

• River and or drainage line crossings; and • Storm water from access roads. **Workshops, wash bays, fuel storage, generator and hazardous substance stores:**	• 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. • Cost implication associated with rehabilitation due to import of soils and increases the likelihood of contaminant introduction within an area with alien invasive species (both floral and faunal).							
• Mine vehicle and equipment servicing; • Washing of mine equipment and vehicles; • Storing, decanting and fuel use; • Electricity generation using the generator; and • Storing, handling and transport of hazardous substances. **Crushing and screening of raw materials:** • Storm water management within the laydown area; • Access and layout control; and • Servicing of crushing and screening equipment. **Water supply and storage and power supply:** • Borehole abstraction for office use; • Re-use of process water for dust suppression; • Storage of water in conservancy tanks for domestic use; and • Overhead transmission lines to supply electricity to mine offices and laydown areas. **Backfilling and concurrent rehabilitation of the mining pits:**	**<u>Soil contamination</u>** *<u>Direct impact:</u>* • Throughout the operational phase hazardous substances 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. • 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. • Storm water from dirty areas and mining pits, 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 reuse of process water for dust suppression on the access roads poses a risk of distributing contaminants. *<u>Indirect impact:</u>* • 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. • Continuous exposure to hydrocarbon leaks poses a risk to the degradation of the surrounding soil resources. • Unvegetated areas are prone to erosion formation. *<u>Cumulative impact:</u>* • 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**	Avoid	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* Continuous management and monitoring of potential contaminants associated to all activities of the proposed mine can sufficiently address the identified impacts and risks. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* The implementation of management actions identified in the EMPr will avoid the loss of fertile soil due to contamination related to incidents. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* The potential impacts/risks may potentially be further ***mitigated and or avoided*** by implementing the following measures: • Implementation of continuous monitoring programme with the focus on surface water and ground water quality; • Avoid contamination of soil resources through the development, implementation and review of incident management and emergency preparedness plans; and • Remedy through effectively rehabilitating disturbed areas. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

• Backfilling, levelling and rehabilitation of mining pits; and • Importing of material to fill mining pit voids.								

Landscape and Visual

ASPECT	TOPOGRAPHY AND VISUAL							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		
Blasting and opencast excavations: • Topsoil and subsoil stripping; • Blasting and removal of overburden; • Trucking and shovelling raw materials; and • Safety benching construction. **Residue, RoM and Product, and Topsoil Stockpiles:** • Surface and wastewater management; and • Importing and exporting material from stockpiles. **Access roads, access control, weighbridge, and traffic:** • Importing and exporting RoM and product from operational areas; • Increase in traffic from heavy vehicles; • Traffic management at weighbridge; • Movement of operational plant and equipment; • River and or drainage line crossings; and • Storm water from access roads. **Workshops, wash bays, fuel storage, generator and hazardous substance stores:** • Mine vehicle and equipment servicing; • Washing of mine equipment and vehicles; • Storing, decanting and fuel use; • Electricity generation using the generator; and • Storing, handling and transport of hazardous substances. **Crushing and screening of raw materials:**	**<u>Visual disturbance on sensitive visual receptors/Lighting impacts/Topography and visual alterations</u>** *<u>Direct impact:</u>* • Visual impact on observers travelling along the N17 main road within a 0.5km radius of the proposed mining infrastructures. • Visual impact on observers within a 0.5 – 1.5km radius of the mine structures. • Lighting impacts relate to the effects of glare and sky glow. The source of glare light is unshielded luminaries which emit light in all directions, and which are visible over long distances. • Sky glow is the condition where the night sky is illuminated when light reflects off particles in the atmosphere such as moisture, dust or smog. The sky glow intensifies with the increase in the number of light sources. Each new light source, especially upwardly directed lighting, contribute to the increase in sky glow. • Excessive dust and noise generation from the blasting and excavation associated with the mine. *<u>Indirect impact:</u>* • 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. *<u>Cumulative impact:</u>* • 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.						Remedy	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* By implementing an effective rehabilitation plan during decommissioning of the proposed development, visual disturbance on sensitive visual receptors can be remedies to such an extent that the potential impact/risk may be reversed. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Implementing the management measures identified in the EMPr will reduce the visual impact. The level of impact will be assessed during the EIA phase. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Visual disturbances on sensitive visual receptors may potentially be ***managed (remedied)*** through the implementation of the following measures: • Adherence with management measures identified in the EMPr; and • Implementing an effective concurrent rehabilitation plan during the operational phase of the proposed mine. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

• Storm water management within the laydown area; • Access and layout control; and • Servicing of crushing and screening equipment. **Water supply and storage and power supply:** • Borehole abstraction for office use; • Re-use of process water for dust suppression; • Storage of water in conservancy tanks for domestic use; and • Overhead transmission lines to supply electricity to mine offices and laydown areas. **Backfilling and concurrent rehabilitation of the mining pits:** • Backfilling, levelling and rehabilitation of mining pits; and • Importing of material to fill mining pit voids.								

Archaeology, Cultural, and Palaeontology

ASPECT	ARCHAEOLOGICAL, CULTURAL AND PALAEONTOLOGY							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED*
Blasting and opencast excavations: • Topsoil and subsoil stripping; • Blasting and removal of overburden; • Trucking and shovelling raw materials; and • Safety benching construction.	**Loss of heritage and cultural resources** *Direct impact:* • Operational activities such as blasting, and mining pit excavations may potentially disturb sites of historical and cultural sites or graves. *Indirect impact:* • Loss of heritage and history for the future generation of the affected community. *Cumulative impact:* • 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.						Avoid	Based on the current information obtained for the area at a desktop level it is anticipated that any heritage resources that occur within the proposed development area will have a Local Significance (LS), Grade 3B or lower field rating and all sites should be mitigatable. Graves are of high social significance (Field rating GP A) and can be expected anywhere on the landscape. Construction and mining related activities could cause irreversible damage or destroy heritage resources and depletion of the archaeological record of the area. It is recommended that a field based HIA should be conducted to comply with Section 38 (8) of the National Heritage Resources Act. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Significance rating of sites, mitigation measures and magnitude of possible impacts can only be determined after the field based HIA but based on the current information the impact on heritage resources can be mitigated to an acceptable level. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Potential impacts/risk to heritage and cultural resources may potentially be successfully ***mitigated (avoided)*** by implementing the following: • Management actions identified in the EMPr; and • Developing a chance find procedure during all phases of the proposed development. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Terrestrial Biodiversity

ASPECT	TERRESTRIAL BIODIVERSITY							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED*
Blasting and opencast excavations: • Topsoil and subsoil stripping; • Blasting and removal of overburden; • Trucking and shovelling raw materials; and • Safety benching construction. **Residue, RoM and Product, and Topsoil Stockpiles:** • Surface and wastewater management; and • Importing and exporting material from stockpiles.	**Disturbance to terrestrial biodiversity** *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 cleared areas are not rehabilitated properly or storm water control features installed are not constructed according to a designed storm water management model, these areas are prone to erosion. *Cumulative Impact:*	5	4	10	5	95	Avoid/Remedy/Offset	***Vegetation Biodiversity:*** The desktop assessment of the available information indicated that about half of the vegetation that could be impacted on by the proposed mining were ***cultivated or modified***. Such areas are preliminary classified as ***"low sensitivity"*** from a vegetation perspective. However, these areas are likely of ***biodiversity importance to the movement of fauna and pollinators and important to maintain function and ecological processes***. Some ***secondary grasslands*** of ***"medium sensitivity"*** may be present in ***historically cultivated lands***. However, ***large portions*** of seemingly intact natural ***Eastern Highveld Grassland*** are seemingly present within the site, as well as ***moist grasslands***. Remaining patches of this grassland unit is of ***"high conservation value and sensitivity"*** as it is poorly protected and within a vulnerable ecosystem (Skowno, et al., 2019). It is therefore imperative that the site vegetation be assessed for the presence of intact (undisturbed or untransformed) Eastern Highveld Grassland, as remaining portions should be conserved to preserve this vegetation type and protect it from extinction. Importantly, the remaining grassland on the site ***corresponds greatly with*** the ***CBA: Irreplaceable category of the MBSP***, in which ***mining is not an acceptable land use***. Other than the modified areas, the desktop results are in accordance with the screening tool results that the site comprises mostly of ***"high terrestrial biodiversity (vegetation) sensitivity"***.

Access roads, access control, weighbridge, and traffic: • Importing and exporting RoM and product from operational areas; • Increase in traffic from heavy vehicles; • Traffic management at weighbridge; • Movement of operational plant and equipment; • River and or drainage line crossings; and • Storm water from access roads.	• 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.							***Plant Species:*** The site is classified as ***"medium sensitivity for sensitive plant species"***, indicating that the site includes ***suitable habitat for plant species of conservation concern***. The screening tool lists nine (9) species that has a possibility of occurring on the site. The remaining Eastern Highveld Grassland, including the moist grasslands, are ***highly likely to include sensitive and unique habitats***, and ***suitable habitat for several plant species of conservation concern are likely*** to be present concurring with the sensitivity rating of the screening tool. ***Mammal and Invertebrate Species:*** ***"Highly sensitive"*** areas and areas likely to support higher faunal richness or biodiversity in the project area are directly linked to the ***irreplaceable CBAs*** on site, with the ***eastern CBA the potential primary biodiversity hotspot*** in terms of ***mammals and invertebrates***. In the surrounds, ***"highly sensitive"*** areas incorporate the ***riverine and associated grassland areas north and towards the Vaal and the Vaal Tributary southeast*** of the project area. ***"Moderately sensitive"*** areas currently include the ***on-site non-perennial stream***. Streams and other surface water features are normally considered highly sensitive features due to their legal status under the National Water Act, the fact that they are often form ecological corridors and provide unique habitats within the terrestrial setting (often includes habitat for ecologically significant species). In terms of this specific stream, which does ***not provide a significant ecological corridor and has limited buffer habitat*** within the proposed development site, the sensitivity of the habitat is reduced to moderate. ***Herpetofauna Species:*** The presence of ***CBA – Irreplaceable*** areas within the proposed development footprint, together with the possible ***presence of natural herpetofauna communities contributing to local ecosystems, and potentially including endemic habitat specialists and Near Threatened species***, suggests that impacts may be ***"high and undesirable"*** under the current layout, and require further investigation. ***Avifaunal Species:*** Parts of the proposed study area are considered to have a ***"High and Medium Animal Species Theme Sensitivity"***, as a result of the presence of Southern Bald Ibis Geronticus calvus, African Grass Owl Tyto capensis, Denham's Bustard Neotis denhamii, White-bellied Korhaan Eupodotis senegalensis and Caspian Tern Hydroprogne caspia. Based on the ***low number (n=2) of Southern Bald Ibis recorded*** in the PAOI, this preliminary assessment assigns a ***"medium"*** rating to the PAOI. In addition, it is ***unlikely that African Grass Owl*** will occur within the PAOI, based on previous surveys conducted in the area (pers comms. Christelle Trutter, African Grass Owl Study Group Manager) and ***White-bellied Korhaan and Caspian Tern*** have ***not been recorded*** in the PAOI to date. ***Notable SCC*** that have been ***recorded***, albeit in ***low numbers***, include Secretarybird Sagittarius serpentarius, Deham's Bustard, Grey Crowned Crane Balearica regulorum, Black Harrier Circus maurus, African Marsh Harrier Circus ranivorus, Lanner Falcon Falco biarmicus, Greater Flamingo Phoenicopterus roseus and Lesser Flamingo Phoeniconaias minor in addition to the availability of suitable habitat, thereby confirming the ***"medium sensitivity"*** rating. This rating will be verified further during the EIA phase of the project, following a site verification survey to the proposed development area and broader PAOI.
Workshops, wash bays, fuel storage, generator and hazardous substance stores: • Mine vehicle and equipment servicing; • Washing of mine equipment and vehicles; • Storing, decanting and fuel use; • Electricity generation using the generator; and • Storing, handling and transport of hazardous substances. **Crushing and screening of raw materials:** • Storm water management within the laydown area; • Access and layout control; and • Servicing of crushing and screening equipment. **Water supply and storage and power supply:** • Borehole abstraction for office use;	**Influx of alien and invasive species** *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 nearby 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 ecological support and 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.							

• Re-use of process water for dust suppression; • Storage of water in conservancy tanks for domestic use; and • Overhead transmission lines to supply electricity to mine offices and laydown areas. **Backfilling and concurrent rehabilitation of the mining pits:** • Backfilling, levelling and rehabilitation of mining pits; and • Importing of material to fill mining pit voids.	**<u>Increased fire risk/veldt fires</u>** *<u>Direct Impact:</u>* • 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. *<u>Indirect Impact:</u>* • 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. *<u>Cumulative Impact:</u>* • Loss of vegetation and habitat leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding ecological support and protected areas are affected and may lead to the degradation of the protected area's ecology.							
	<u>Limiting faunal movement</u> *<u>Direct impact:</u>* • Fencing of the proposed mine will alter the existing faunal movement patterns. • Most of the ecological services provided by fauna will cease in the mine area. Tolerant generalist fauna will persist in open spaces and continue to provide some services and a complete loss is not expected. *<u>Indirect impact:</u>* • Alteration to the existing faunal patterns associated with for example breeding, nesting, and grazing or hunting. *<u>Cumulative impact:</u>* • Alteration of faunal movement of surrounding areas, i.e. additional predators within nearby ecological support areas, pressure on the carrying capacity of the surrounding areas etc.							*DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* A significant portion of the proposed site layout (53 % of the proposed layout footprint, see Table 6) is within a CBA: Irreplaceable conservation category of the MBSP. A defined and recommended land use in Irreplaceable CBAs is designated as "Conservation Management". Such natural areas are required for the province to meet its biodiversity targets. ***Mining* is *not supported by the MBSP in CBA: Irreplaceable*** and, depending on the outcome of the site verification and impact assessment during the EIA phase, the environmental authorisation application recommendation could ***<u>potentially</u>*** result in a ***"[16]fatal flaw"/" No-Go" alternative***. This will be further supported if any plant or animal species of conservation concern are recorded on the site. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* The identified impact/risk may potentially be ***avoided or mitigated (controlled and or remedied)*** through: • The implementation of a species search and rescue prior to the commencement of construction activities; • Appointing a suitably qualified ECO prior to the commencement of any activities monitoring all vegetation clearance activities; • Obtaining the required permits for the removal of protected species; and • Awareness training of all contractors and permanent employees.

[16] **"Fatal flaw"** means a major defect or deficiency in a project proposal that should result in environmental authorisation being refused, and from a biodiversity perspective, a residual negative impact that would have a Very High significance rating.

							In the event of the mitigation measures being implemented still results in a medium to high significance residual negative impact on biodiversity, [17]biodiversity offsetting, as final mitigation measure, may be considered: • Ecological equivalence (like-for-like) as preferred offsetting – when offsets remain the only mechanism to manage residual negative impacts, "like-for-like" offsetting should benefit the same or similar biodiversity components as those components that would be negatively affected. • Trading-up offset types – secures priority areas of greater importance or priority to biodiversity conservation than the area being impacted may only be considered under certain circumstances in order to contribute to conservation objectives. Should there remain residual impacts on irreplaceable biodiversity following all hierarchy of mitigation measures implemented, the following: • Where there are no options left in the landscape to counterbalance a residual impact in accordance with the ecological equivalence (like-for-like) principle (see above), that residual impact cannot be offset. That is, there would be a residual impact on irreplaceable biodiversity, which would prevent national biodiversity targets from being met. In these cases, development would generally not be acceptable, and the impacts should be avoided ("No-Go" or "Fatal-Flaw"). • [18]Ecological compensation – residual impacts which cannot be offset should only be considered in highly exceptional circumstances, when there are imperative reasons for overriding public interest. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

[17] Biodiversity offsets should be distinguished from trade-offs. A trade-off in the biodiversity context involves exchanging a negative outcome for biodiversity with another positive outcome, which does not necessarily benefit biodiversity. Trading off biodiversity for other positive outcomes is not a form of mitigation, like biodiversity offsetting. It falls outside of the scope of the mitigation hierarchy. The following are examples of trade-offs in the biodiversity context:

- Ecological compensation; and
- Financial compensation: a financial contribution to a biodiversity initiative to compensate for a significant residual negative impact on biodiversity.

Trade-offs should only be considered when biodiversity offsetting is not possible and where there are imperative reasons for overriding public interest. They should also be approached with extreme caution in the context of environmental authorisation applications.

[18] **"Ecological Compensation"** means the outcome of measurable actions to protect, restore and manage priority biodiversity, aimed at compensating for residual negative impacts on irreplaceable biodiversity and ecological infrastructure where these impacts cannot be offset and which should, instead and in the first instance, be avoided.

Aquatic Biodiversity

ASPECT	AQUATIC BIODIVERSITY							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		
Blasting and opencast excavations: • Topsoil and subsoil stripping; • Blasting and removal of overburden; • Trucking and shovelling raw materials; and • Safety benching construction. **Residue, RoM and Product, and Topsoil Stockpiles:** • Surface and wastewater management; and • Importing and exporting material from stockpiles. **Access roads, access control, weighbridge, and traffic:** • Importing and exporting RoM and product from operational areas; • Increase in traffic from heavy vehicles; • Traffic management at weighbridge; • Movement of operational plant and equipment; • River and or drainage line crossings; and • Storm water from access roads. **Workshops, wash bays, fuel storage, generator and hazardous substance stores:** • Mine vehicle and equipment servicing;	**<u>Loss of aquatic biodiversity/ Direct Loss of Wetland Features</u>** <u>*Direct impact:*</u> • Locating the proposed development within 500m of a wetland, poses a risk in altering the support regions into the wetland. • 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. <u>*Indirect impact:*</u> • Alteration of wetland support zones poses the risk of alien invasive species the invade, leading to the deterioration of the nearby wetland system. • 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). <u>*Cumulative impact:*</u> • 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. **<u>Erosion and sedimentation of Wetlands</u>** <u>*Direct impact:*</u> • Locating access roads through drainage lines may cause sedimentation and siltation of watercourses if not managed properly.	5	4	10	5	**95**	Avoid/Remedy/Offset	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* The desktop investigation of the study area for the proposed BCR Coal Vlakfontein Mine has confirmed the classification of the study area as being located within an area regarded as being of ***"very high sensitivity"*** from the perspective of the aquatic ecosystem. As such, a detailed aquatic biodiversity specialist assessment as well as a detailed wetland specialist assessment would be required as part of the Environmental Impact Assessment phase of the study. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* As per the MBSP the watercourses/wetlands and wetland clusters associated with the proposed BCR Coal Vlakfontein Mine footprint are classified as ***Ecological Support Areas (ESAs)*** on the basis of wetlands and wetland clusters. ESAs are areas that are ***not essential for meeting biodiversity***, targets, ***but that play an important role in supporting the functioning of protected areas or CBAs*** and for delivering ecosystem services. In the terrestrial assessment they support landscape connectivity and strengthen resilience to climate change. ***ESAs need to be maintained*** in at least a ***functional*** and often ***natural state***, supporting the purpose for which they were identified. They include features such as riparian habitat surrounding rivers or wetlands, migration corridors for over-wintering sites for Blue Cranes, and so on (Mpumalanga Tourism and Parks Agency, 2014). Based on information obtained during the desktop site sensitivity verification assessment, it is concluded that the proposed BCR Coal Vlakfontein Mine is likely to result in a direct loss of wetlands determined to be in a ***largely natural state*** and identified as being ***FEPAs within a designated SWSA and Fish Sanctuary***. the majority (approximately ***84 %***) of the proposed BCR Coal Vlakfontein Mine study area falls within a catchment classified as a FEPA catchment. FEPA catchments achieve biodiversity targets for river ecosystems and threatened/near-threatened fish species and were identified as rivers that are currently in a good condition (***Ecological Category A or B***). The FEPA status is largely as a result of the catchment being classified as a fish sanctuary for ***two fish species***, namely ***Enteromius cf. oraniensis (Chubbyhead Barb; previously Enteromius anoplus s.l.)*** and ***Enteromius sp. pallidus cf. 'north' (Goldie Barb)***, the latter of which is in need of taxonomic revision and both of which are in need of a revised assessment of their threat status. In addition, according to the ***Resource Quality Objectives set for the Upper Vaal*** (Department of Water and Sanitation, 2016), the Recommended Ecological Category (REC) determined for the catchment within which the proposed mine is to be located is set as an ***Ecological Category B***, and is reflected as such within the numerical limits set for instream habitat, aquatic macroinvertebrates, fish, riparian vegetation, hydrology and water quality. In addition, the Resource Quality Objective set for the catchment state that 'salt concentrations must be maintained to meet quality requirements for agriculture and to maintain the ecosystem wellbeing', an ***objective that will be unlikely to be achieved*** should additional mining activities impact the water quality and quantity within the catchment through mining of wetlands and inadvertent or unintentional release of mine-affected water into the catchment. In addition, the reach of the Vaal River downstream of the proposed BCR Coal Vlakfontein Mine is considered to be a ***free-flowing river*** which, according to Driver et al. (2011), are rivers that flow undisturbed from their source to the confluence with a larger river or to the sea without any major dams and are ***a rare feature*** in the South African landscape and part of our natural heritage. Several wetland systems were identified within the project site as well as one FEPA wetland cluster identified in the eastern section. The FEPA wetlands include channelled valley bottom systems and depressions. The wetlands are classified as FEPA wetlands as they are located within a sub quaternary catchment that is often utilised by Wattled Cranes (Bugeranus carunculatus), Grey Crowned Cranes (Balearica regulorum) and/or Blue Cranes (Anthropoides paradiseus). The wetlands furthermore have ***PES*** classifications of ***A/B (unmodified to largely natural)***. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED*

• Washing of mine equipment and vehicles; • Storing, decanting and fuel use; • Electricity generation using the generator; and • Storing, handling and transport of hazardous substances. **Crushing and screening of raw materials:** • Storm water management within the laydown area; • Access and layout control; and • Servicing of crushing and screening equipment. **Water supply and storage and power supply:** • Borehole abstraction for office use; • Re-use of process water for dust suppression; • Storage of water in conservancy tanks for domestic use; and • Overhead transmission lines to supply electricity to mine offices and laydown areas. **Backfilling and concurrent rehabilitation of the mining pits:** • Backfilling, levelling and rehabilitation of mining pits; and	• 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 and operational 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 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. **Water Quality Deterioration/Contamination of Water Resource** _Direct impact:_							The impact/risk to disturb the aquatic biodiversity may potentially be ***avoided or mitigated (controlled and or remedied)*** by implementing the following measures: • Control through the implementation of storm water management and erosion control; • Avoid impacts through adequately managing effluent and runoff; • Avoid accidental release through the development, implementation, and review of incident management and emergency preparedness plans; • Control through the continuing awareness training of all personal throughout the entire life cycle of the proposed development; and • Remedy through the effective implementation of rehabilitation measures. In the event of the mitigation measures being implemented still results in a medium to high significance residual negative impact on biodiversity, [19]biodiversity offsetting, as final mitigation measure, may be considered: • Ecological equivalence (like-for-like) as preferred offsetting – when offsets remain the only mechanism to manage residual negative impacts, "like-for-like" offsetting should benefit the same or similar biodiversity components as those components that would be negatively affected. • Trading-up offset types – secures priority areas of greater importance or priority to biodiversity conservation than the area being impacted may only be considered under certain circumstances in order to contribute to conservation objectives. Should there remain residual impacts on irreplaceable biodiversity following all hierarchy of mitigation measures implemented, the following: • Where there are no options left in the landscape to counterbalance a residual impact in accordance with the ecological equivalence (like-for-like) principle (see above), that residual impact cannot be offset. That is, there would be a residual impact on irreplaceable biodiversity, which would prevent national biodiversity targets from being met. In these cases, development would generally not be acceptable, and the impacts should be avoided ("No-Go" or "Fatal-Flaw"). • [20]Ecological compensation – residual impacts which cannot be offset should only be considered in highly exceptional circumstances, when there are imperative reasons for overriding public interest. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

[19] Biodiversity offsets should be distinguished from trade-offs. A trade-off in the biodiversity context involves exchanging a negative outcome for biodiversity with another positive outcome, which does not necessarily benefit biodiversity. Trading off biodiversity for other positive outcomes is not a form of mitigation, like biodiversity offsetting. It falls outside of the scope of the mitigation hierarchy. The following are examples of trade-offs in the biodiversity context:

- Ecological compensation; and
- Financial compensation: a financial contribution to a biodiversity initiative to compensate for a significant residual negative impact on biodiversity.

Trade-offs should only be considered when biodiversity offsetting is not possible and where there are imperative reasons for overriding public interest. They should also be approached with extreme caution in the context of environmental authorisation applications.

[20] **"Ecological Compensation"** means the outcome of measurable actions to protect, restore and manage priority biodiversity, aimed at compensating for residual negative impacts on irreplaceable biodiversity and ecological infrastructure where these impacts cannot be offset and which should, instead and in the first instance, be avoided.

• Importing of material to fill mining pit voids.	• If Pollution Control Dams (PCD's) and Residue Stockpiles 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. *<u>Indirect impact:</u>* • 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. *<u>Cumulative impact:</u>* • 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). • 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. **<u>Invasive alien plant encroachment</u>** *<u>Direct impact:</u>* • Alien invasive trees and shrubs are expected to increase within the area as these species 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. *<u>Indirect impact:</u>* • 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:* • Critical support regions to surrounding ecological support and protected areas are affected and may lead to the degradation of the protected area's ecology. **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. **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:* • 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.						

Surface and Groundwater Resources

ASPECT	WATER RESOURCES						
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)				MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S	
Blasting and opencast excavations: • Topsoil and subsoil stripping; • Blasting and removal of overburden; • Trucking and shovelling raw materials; and • Safety benching construction. **Residue, RoM and Product, and Topsoil Stockpiles:** • Surface and wastewater management; and • Importing and exporting material from stockpiles. **Access roads, access control, weighbridge, and traffic:** • Importing and exporting RoM and product from operational areas;	**Degradation of natural water resources/Water resource contamination** *Direct impact:* • Lowering of the groundwater levels from dewatering resulting in a cone of depression (or dewatering) which may affect third party groundwater users. • Interception of ambient (and a decrease in) groundwater flow, which would under natural conditions discharge into the surface drainages, provided baseflow to the rivers, or contributed to deeper regional groundwater flow. • Exposure of sulphide bearing minerals (i.e., coal) during mining may negatively affect the ambient groundwater quality in the immediate vicinity of the Mine. Sources of pollution such may include stockpiles, discharges from mine workings and backfilled open pit (post-closure) (decant). Opencast mining involves blasting and removal of the rocks overlying the coal layer, which is removed completely. The fragmented cover rock is then replaced (backfilled) and covered with soil and the terrain is landscaped ('rehabilitated'). Rainwater penetrating through the soil into the backfill becomes acidified by pyrite in the backfill material and can potentially decant to the surface. • As for most coal mines (in the Mpumalanga Highveld) there's a risk for acid rock drainage. • Locating the proposed mine within proximity to a natural drainage line or wetland, poses the risk of associated activities increasing the overall sediment load into the water resource. • Locating 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 and operational footprint will lead to soil compaction, which increases the runoff of water over the topsoil and the reduction in stormwater						Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* The water resources in relation to the proposed activity is considered to be ***"high"*** (classified as an ***Ecological Support Area)***. The proposed mine is situated within the upper reaches of a major catchment system (upper Vaal catchment) with a significant number of water users downstream. The reach of the Vaal River downstream of the proposed BCR Coal Vlakfontein Mine is considered to be a ***free-flowing river*** which, according to Driver et al. (2011), are rivers that flow undisturbed from their source to the confluence with a larger river or to the sea without any major dams and are ***a rare feature*** in the South African landscape and part of our natural heritage. Based on the vulnerability assessment the underlying aquifer is regarded as a ***"low to medium vulnerability"*** aquifer system requiring reasonable groundwater protection measures to ensure that no cumulative pollution affects the aquifer. Impacts/risks discussed associated with the aquatic biodiversity should also be taken into consideration (***FEPAs within a designated SWSA and Fish Sanctuary***). *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Shallow groundwater levels potentially indicate a shallow driven aquifer system that could be acceptable to groundwater contamination from surface related impacts. The effective implementation of a storm water management and erosion control plan may reduce the potential impact/risk to degrade the surface water quality of nearby natural drainage lines. Designing facilities and infrastructures associated with surface and groundwater contamination, such as the Residue Stockpiles, PCD's, storm water management infrastructures etc., in such a manner to prevent the release or seepage of contaminant could manages associated impacts/risks to a sufficient extent. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* The impact/risk to degrade the natural water resources may potentially be ***managed (controlled)*** by implementing the following measures: • Control through the implementation of storm water management and erosion control; • Avoid impacts through adequately managing effluent and runoff;

• Increase in traffic from heavy vehicles; • Traffic management at weighbridge; • Movement of operational plant and equipment; • River and or drainage line crossings; and • Storm water from access roads. **Workshops, wash bays, fuel storage, generator and hazardous substance stores:** • Mine vehicle and equipment servicing; • Washing of mine equipment and vehicles; • Storing, decanting and fuel use; • Electricity generation using the generator; and • Storing, handling and transport of hazardous substances. **Crushing and screening of raw materials:** • Storm water management within the laydown area; • Access and layout control; and • Servicing of crushing and screening equipment. **Water supply and storage and power supply:** • Borehole abstraction for office use; • Re-use of process water for dust suppression; • Storage of water in conservancy tanks for domestic use; and • Overhead transmission lines to supply electricity to mine offices and laydown areas.	infiltration into the soil profile, therefore increasing the likelihood of erosion gully formation and the deposition of sediment within associated watercourses. • If Pollution Control Dams (PCD's) and Residue Stockpiles 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:* • An increased sediment load decreases the overall water quality of surface water resources. • 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. *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). • 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. • Alteration of aquatic ecology of direct affected watercourses as well as downstream watercourses. • Loss of unique biodiversity features. **Water level reduction** *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.							• Avoid accidental release through the development, implementation, and review of incident management and emergency preparedness plans; • Water conservation through monitoring water use and quality throughout the entire life cycle of the proposed development; • Control through the continuing awareness training of all personal throughout the entire life cycle of the proposed development; and • Remedy through the effective implementation of rehabilitation measures. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Backfilling and concurrent rehabilitation of the mining pits: • Backfilling, levelling and rehabilitation of mining pits; and • Importing of material to fill mining pit voids.	*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. ***All potential impacts/risks identified under the "Aquatic Biodiversity" section directly or indirectly relates to surface and groundwater resources and should also be taken into consideration.***							

Noise

ASPECT	NOISE							
ACTIVITIES	**POTENTIAL IMPACT/RISK**	**DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)**					**MITIGATION TYPE**	**MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY**
		D	**E**	**M**	**P**	**S**		
Blasting and opencast excavations: • Topsoil and subsoil stripping; • Blasting and removal of overburden; • Trucking and shovelling raw materials; and • Safety benching construction. **Residue, RoM and Product, and Topsoil Stockpiles:** • Surface and wastewater management; and • Importing and exporting material from stockpiles. **Access roads, access control, weighbridge, and traffic:** • Importing and exporting RoM and product from operational areas; • Increase in traffic from heavy vehicles; • Traffic management at weighbridge; • Movement of operational plant and equipment; • River and or drainage line crossings; and	**<u>Noise generation</u>** *Direct impact:* • Increase in noise level at receptors. Increased noises or disturbing noises may increase annoyance levels with project. • Noise levels exceeding the SANS 10103 rating level. • Locating the proposed development within close proximity to sensitive receptors poses a risk of the overall sense of place to the surrounding community. • Degradation of employees and community hearing health. *Indirect impact:* • Potential increase of community unrest and complaints. • Hearing loss of employees and community members. *Cumulative impact:* • Loss of production due to community strikes.						Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* Considering the project infrastructure layout, there is a potential of a ***"low to high significance"*** of a noise impact during the construction phase, and of a low to high significance during the operational phase. Further study is required, and it is recommended that a full Environmental Noise Impact Assessment (ENIA) study be conducted for the BCR Coal Vlakfontein Mine. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Without noise propagation modelling where cumulative effects are included, it is difficult to assess the potential significance of the noise impact, though considering the projected noise levels, the significance may be very ***"low"*** to ***"high"*** at the different Noise Sensitive Receptor (NSR). Mining activities may take place very close to NSR, and noise levels would be higher than the preliminary upper noise limit of 52 dBA. This is considering the output of a basic noise model, not considering the cumulative effect. The potential significance of the noise impact will be assessed in more detail in EIA phase using a more detailed noise model. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Environmental noise levels may potentially be ***managed (controlled)*** by ensuring the following: • Implementation of the monitoring programme as specified in the EMPr; and • Ensuring sufficient noise screening measures should any specific activity exceed the 85 dBA threshold. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

• Storm water from access roads. **Workshops, wash bays, fuel storage, generator and hazardous substance stores:** • Mine vehicle and equipment servicing; • Washing of mine equipment and vehicles; • Storing, decanting and fuel use; • Electricity generation using the generator; and • Storing, handling and transport of hazardous substances. **Crushing and screening of raw materials:** • Storm water management within the laydown area; • Access and layout control; and • Servicing of crushing and screening equipment. **Water supply and storage and power supply:** • Borehole abstraction for office use; • Re-use of process water for dust suppression; • Storage of water in conservancy tanks for domestic use; and • Overhead transmission lines to supply electricity to mine offices and laydown areas. **Backfilling and concurrent rehabilitation of the mining pits:** • Backfilling, levelling and rehabilitation of mining pits; and								

• Importing of material to fill mining pit voids.								

Traffic

ASPECT	TRAFFIC MANAGEMENT							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		
Blasting and opencast excavations: • Topsoil and subsoil stripping; • Blasting and removal of overburden; • Trucking and shovelling raw materials; and • Safety benching construction. **Residue, RoM and Product, and Topsoil Stockpiles:** • Surface and wastewater management; and • Importing and exporting material from stockpiles. **Access roads, access control, weighbridge, and traffic:** • Importing and exporting RoM and product from operational areas; • Increase in traffic from heavy vehicles; • Traffic management at weighbridge; • Movement of operational plant and equipment; • River and or drainage line crossings; and • Storm water from access roads. **Workshops, wash bays, fuel storage, generator and hazardous substance stores:** • Mine vehicle and equipment servicing;	**<u>Increased pressure on local roads/degradation of road infrastructure</u>** *<u>Direct impact:</u>* • Access to and from the proposed development leads to the increased pressure on existing road infrastructure. • Anticipated vehicle traffic to be generated by the Proposed Mining Development, with specific reference to heavy vehicles transporting coal, would have an impact on the existing gravel road, Road D1426. This could contribute to the deteriorating condition of the roadway and could lead to the Proposed Mining Development not being accessible via Road D1426 should the road not be maintained. • 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. *<u>Indirect impact:</u>* • Increased pressure on existing road infrastructures and municipalities to maintain infrastructures. *<u>Cumulative impact:</u>* • Degradation of public transport infrastructure. • Increased risks of accidents on the public road.						Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* The main road that is suggested to be used during all phases of the proposed development (Road D1426) is currently in a poor state from the northern boundary of the proposed mine. Depending on where workers will be sourced from, workers using public transport may have difficulties to get to and from site. The relevant existing roads under investigation has a ***"low sensitivity"*** in terms of vehicle traffic volumes and conflicts between vehicles and non-motorized transport. Although the existing intersections currently does not have dedicated right-turn or left-turn deceleration lanes, a low volume of right turning vehicles were observed during the relevant survey conducted. It is therefore rated at a ***"low sensitivity"*** without the Proposed Mining Development. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Anticipated vehicle traffic to be generated by the Proposed Mining Development, with specific reference to heavy vehicles transporting coal, would have an impact on the existing gravel road, Road D1426. This could contribute to the deteriorating condition of the roadway and could lead to the Proposed Mining Development not being accessible via Road D1426 should the road not be maintained. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Potential impacts/risk may potentially be successfully ***managed (control)*** by implementing the following: • Management actions identified in the EMPr; and • Implement the proposed improvements as per Traffic Impact Assessment. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

• Washing of mine equipment and vehicles; • Storing, decanting and fuel use; • Electricity generation using the generator; and • Storing, handling and transport of hazardous substances. **Crushing and screening of raw materials:** • Storm water management within the laydown area; • Access and layout control; and • Servicing of crushing and screening equipment. **Water supply and storage and power supply:** • Borehole abstraction for office use; • Re-use of process water for dust suppression; • Storage of water in conservancy tanks for domestic use; and • Overhead transmission lines to supply electricity to mine offices and laydown areas. **Backfilling and concurrent rehabilitation of the mining pits:** • Backfilling, levelling and rehabilitation of mining pits; and • Importing of material to fill mining pit voids.								

Air Quality and Climate Change

ASPECT	AIR QUALITY & CLIMATE						
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)				MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
Blasting and opencast excavations:	**Degradation of air quality** *Direct impact:*	D	E	M	P	S	Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* An impact verification statement cannot be determined from the baseline study and can only be determined through dispersion modelling.

• Topsoil and subsoil stripping; • Blasting and removal of overburden; • Trucking and shovelling raw materials; and • Safety benching construction. **Residue, RoM and Product, and Topsoil Stockpiles:** • Surface and wastewater management; and • Importing and exporting material from stockpiles.	• Primary pollutants associated with the with the proposed mine poses a risk to contribute to the overall degradation of air quality. • 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 impact:* • Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities. *Cumulative impact:* • 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.							*DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Air quality impacts associated with the proposed project can only be determined through dispersion modelling. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Emissions of primary pollutants may potentially be ***mitigated*** (***controlled***) in the following ways: • Development of a dust fallout monitoring and management plan; • Frequent Inspections; and • Reporting and recording incidents related to air quality. 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. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.
Access roads, access control, weighbridge, and traffic: • Importing and exporting RoM and product from operational areas; • Increase in traffic from heavy vehicles; • Traffic management at weighbridge; • Movement of operational plant and equipment; • River and or drainage line crossings; and • Storm water from access roads. **Workshops, wash bays, fuel storage, generator and hazardous substance stores:** • Mine vehicle and equipment servicing; • Washing of mine equipment and vehicles; • Storing, decanting and fuel use; • Electricity generation using the generator; and • Storing, handling and transport of hazardous substances.	**<u>GHG & CO_2 emissions (direct and indirect)</u>** *Direct Impact:* • The usage of diesel operated mobile equipment being used during the construction and operational activities contributes directly to the applicant's 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). • BCR Coal expects to use explosives to break through the hard overburden, as well as blasting of the coal seams. Explosives will not be used on topsoil and soft overburden. Waste volumes including topsoil, soft and hard overburden over the 18-year LoM is expected to be 52 792 258 m3, of which 85% will be overburden. To determine the potential contribution of this blasting (in terms of GHG emissions) to climate change, one would need to calculate the GHG emissions thereof. *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 expects to consume about 180 000 litres of diesel per month. This equates to 38 880 000 litres over the 18-year LoM. 2.5% of the diesel used will be for the generators to generate electricity, while 7.5% will be used for mobile transport. The remaining 90% will be for the mining operations. Based on the use of a diesel combustion generator, GHG emissions can be expected over the duration of the LoM. • 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:* • Higher minimum, average and maximum temperatures over the next few decades Increased extreme weather events such as drought and floods. • Increased total annual rainfall by between 85 and 303 mm per year.	**D**	**E**	**M**	**P**	**S**	Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* An impact verification statement cannot be determined from the baseline study, as this requires the quantification of GHG emissions and the activity's contribution to the carbon budget of South Africa. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Climate change impacts associated with the proposed project can only be determined through an emissions inventory and GHG calculations. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Emissions of primary pollutants may potentially be ***mitigated*** (***controlled***) in the following ways: • Develop and maintain GHG & CO_2 emissions reporting policy; • Investigate alternative energy efficient measures; and • Monitor the GHG & CO_2 emissions throughout the entire life cycle of the proposed mine. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Crushing and screening of raw materials: • Storm water management within the laydown area; • Access and layout control; and • Servicing of crushing and screening equipment. **Water supply and storage and power supply:** • Borehole abstraction for office use; • Re-use of process water for dust suppression; • Storage of water in conservancy tanks for domestic use; and • Overhead transmission lines to supply electricity to mine offices and laydown areas. **Backfilling and concurrent rehabilitation of the mining pits:** • Backfilling, levelling and rehabilitation of mining pits; and • Importing of material to fill mining pit voids.	• Increased water demand in Mpumalanga due to rapid industrialisation, mining, urbanization, and population growth will result in the province being unlikely to meet its water demand capacity.							

Health and Safety

ASPECT	HEALTH AND SAFETY							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
Blasting and opencast excavations: • Topsoil and subsoil stripping; • Blasting and removal of overburden; • Trucking and shovelling raw materials; and • Safety benching construction.	**<u>Health effect of pollutants on community/employees</u>** *<u>Direct impact:</u>* • 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. • Exposure of concentrations of $PM_{2.5}$, SO_2, NO_2, and CO over a period of time poses the risk of respiratory and cardiovascular diseases. • It is expected that potential impacts on air quality, and potential resultant impacts on the health of receptor communities, will be of primary interest. *<u>Indirect impact:</u>*	D	E	M	P	S	Avoid	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* It is expected that potential impacts on air quality, and potential resultant impacts on the health of receptor communities, will be of primary interest. As part of the EIA phase, it has been predetermined that a Rapid Appraisal Health Impact Assessment (RAHIA) will be required. The main focus of the RAHIA is the impact of substances released or dispersed into air on the health of surrounding communities. Due to this focus, air dispersion modelling of the potential impact on air quality will be necessary. This should involve the potentially impacted geographical area, done according to the terms of reference for the Air Quality Impact Assessment (AQIA). *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Health impacts associated with the proposed project can only be determined and assessed during the EIA phase by undertaking the required RAHIA and AQIA.

								DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED
Residue, RoM and Product, and Topsoil Stockpiles: • Surface and wastewater management; and • Importing and exporting material from stockpiles. **Access roads, access control, weighbridge, and traffic:** • Importing and exporting RoM and product from operational areas; • Increase in traffic from heavy vehicles; • Traffic management at weighbridge; • Movement of operational plant and equipment; • River and or drainage line crossings; and • Storm water from access roads. **Workshops, wash bays, fuel storage, generator and hazardous substance stores:** • Mine vehicle and equipment servicing; • Washing of mine equipment and vehicles; • Storing, decanting and fuel use; • Electricity generation using the generator; and • Storing, handling and transport of hazardous substances. **Crushing and screening of raw materials:** • Storm water management within the laydown area; • Access and layout control; and • Servicing of crushing and screening equipment.	• Increase in injury on duty or disabling injuries of employees. • 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. • Loss of productivity due to investigations into injuries or fatalities. • Influx of local cases of respiratory and cardiovascular diseases in the area. • Increase of cases of lung cancer. *Cumulative impact:* • Loss of human life.							Potential impacts/risk to the health and safety may potentially be ***avoided*** by implementing the following: • Recommendations made by the Air Quality Impact Assessment; and • Develop and implement the Health, Safety, Environment, and Quality (HSEQ) management Plan throughout the entire life cycle of the proposed development. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Water supply and storage and power supply: • Borehole abstraction for office use; • Re-use of process water for dust suppression; • Storage of water in conservancy tanks for domestic use; and • Overhead transmission lines to supply electricity to mine offices and laydown areas. **Backfilling and concurrent rehabilitation of the mining pits:** • Backfilling, levelling and rehabilitation of mining pits; and • Importing of material to fill mining pit voids. **Employment of workers and employee management (including contractors and service providers)**								

Socio-economic

ASPECT	SOCIO-ECONOMIC						
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		
Blasting and opencast excavations: • Topsoil and subsoil stripping; • Blasting and removal of overburden; • Trucking and shovelling raw materials; and • Safety benching construction. **Residue, RoM and Product, and Topsoil Stockpiles:**	**Socio-economic intrusions/Job opportunities and economic impacts/Population change/Sense of place/Community safety risks/Resource efficiency and community health** *Direct impact:* • Influx of people and households related to those formally employed by the mine: demands on housing and social services. • Potential informal influx of people in the form of job seekers are anticipated: possible tension between groups and demonstrations. • Change in the social fabric of the community as a result of the proposed project: growth in town, tension between different social groups. • Increase in nuisance factors (noise and dust). • Community safety due to mining and infrastructure development. • A decrease/cessation in employment and community funds could negatively impact former beneficiaries.						Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* Based on the outcome of the baseline assessment, social screening and site verification it was concluded that various socio-economic impacts can occur as a result of the proposed mining activities. Considering the site sensitivity verification of the site, the dominant agricultural land-use within the project area was identified as having a ***"very high sensitivity"*** from a socio-economic perspective. Loss of the resource use can occur which will result in high negative socio-economic consequences. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* The socio-economic impacts on the existing landowners will be ***"high (negative)"***, due to the loss in the land- and resource use. This will be difficult to mitigate and compensation may likely be the outcome. Negative impacts of a more moderate significance refer to demographic changes, nuisance factors, safety and security issues, increased pressure on public infrastructure and services, external costs (e.g. negative impacts on land-use, groundwater, air quality, biodiversity, traffic, road infrastructure, health and community safety) associated with mining, as well as the impact on the sense of place. At this stage, it is concluded that these impacts can be managed and mitigated to some extent.

• Surface and wastewater management; and • Importing and exporting material from stockpiles. **Access roads, access control, weighbridge, and traffic:** • Importing and exporting RoM and product from operational areas; • Increase in traffic from heavy vehicles; • Traffic management at weighbridge; • Movement of operational plant and equipment; • River and or drainage line crossings; and • Storm water from access roads. **Workshops, wash bays, fuel storage, generator and hazardous substance stores:** • Mine vehicle and equipment servicing; • Washing of mine equipment and vehicles; • Storing, decanting and fuel use; • Electricity generation using the generator; and • Storing, handling and transport of hazardous substances. **Crushing and screening of raw materials:** • Storm water management within the laydown area; • Access and layout control; and • Servicing of crushing and screening equipment. **Water supply and storage and power supply:**	• Possible negative socio-economic intrusions. • Impact on localised individuals and groups in terms of employment and local procurement opportunities. • Possible increase in criminal activities due to people movement in the area during construction phase. • Resource efficiency is improved and optimised Health related impacts. _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. • Limited opportunities for local participation in labour supply during the construction phase of the project • Limited opportunities for local procurement during construction and operation. • Possible lack of available skills due to implementation of new international technology resulting in continued outsourcing of skills during construction and operational phases. • Possible social dissatisfaction with regards to no or limited job opportunities and local procurement associated with the proposed development. • Unfulfilled community expectations in terms of employment creation could result in social conflict • Possible inflow of jobseekers. • 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. • Movement of people in the area can increase criminal activity or opportunities for criminals. • Traffic accident risks due to mining related traffic flow. • Possible social dissatisfaction with regards to allocation of job opportunities and local procurement associated with the mining activities. • Increased tax income: Due to positive spin-offs on employment and income levels, it is expected that tax revenue to local, provincial and central government will occur. • Social funds for socio-economic development. _Cumulative impact:_ • Poor service delivery of municipal infrastructures. • Community unrest. • Job creation for local and district communities. • Local economic development. • Reduced access to livelihood resources. • Change in sense of place.							Positive impacts refer to employment and income due to the operation itself and due to supply-links with local suppliers, as well as possible job creation for low-income groups throughout the life of mine, availability of social funds for socio-economic development and subsequent positive impact on poverty levels. The positive impacts can be enhanced. Although attitude formation is not an impact per se, it serves an important indication of community sentiments toward the project. Attitudes can be defined as lasting, general evaluations of people. Attitudes can be formed through the individual's own experience and/or reports in the media. It could provide important information regarding the feelings and potential actions of Interested and Affected Parties (I&APs) that could become evident during the appeal period of the Environmental Impact Assessment process, and/or during the construction and operational phases of the proposed project. Initial responses to the project by the landowners in the area indicates that there is already some form of attitude formation against the proposed Vlakfontein project. These relate to opposition to the proposed development, due to the negative impacts on the land- and resource use, intrusions on the rural character of the area and possible devaluation of the property values, together with concerns regarding the possible negative environmental impacts. Issues raised should thus be seen as concerns, but also as inputs with regards to the way forward in terms of community involvement in the project and the detailed impact assessment phase. _DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED_ The positive and negative impacts associated to the socio-economic impacts/risks may potentially be ***managed (controlled)*** through the effective planning and management of the following: • Landowner compensation and negotiation where directly effected; • Control through pre-construction planning and development of workers code of conduct, employment procurement policies and a skills development policy; • Ongoing open communication and expectation management of the local communities; • Management of social-economic intrusions; • Control through the management of job opportunities and skills development throughout the life cycle of the proposed development; • Management of population changes; and • Management of community safety. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

• Borehole abstraction for office use; • Re-use of process water for dust suppression; • Storage of water in conservancy tanks for domestic use; and • Overhead transmission lines to supply electricity to mine offices and laydown areas. **Backfilling and concurrent rehabilitation of the mining pits:** • Backfilling, levelling and rehabilitation of mining pits; and • Importing of material to fill mining pit voids. **Employment of workers and employee management (including contractors and service providers)** **Relocation of peoples currently occupying properties associated with the proposed mine**								

Waste Management

ASPECT	WASTE MANAGEMENT							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
Blasting and opencast excavations: • Topsoil and subsoil stripping; • Blasting and removal of overburden;	**Waste generation/Increased pressure on municipal service delivery/Littering and illegal dumping** *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.	D	E	M	P	S	Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* Implementation of the national waste management hierarchy (prevention, re-use, recycling, recovery and lastly disposal) will managed the identified protentional waste related impacts/risk associated with the proposed development. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Implementation and aligning management actions with a developed Waste Management Plan will reduce the significant effect of waste on the environment. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED*

• Trucking and shovelling raw materials; and • Safety benching construction. **Residue, RoM and Product, and Topsoil Stockpiles:** • Surface and wastewater management; and • Importing and exporting material from stockpiles. **Access roads, access control, weighbridge, and traffic:** • Importing and exporting RoM and product from operational areas;	• An increase in waste generation with disposal as the management measure increases the current strain on the municipal infrastructures. • Accidental spills or incorrect disposal of effluent from the chemical toilets used by the construction employees poses the risk of contaminating the surrounding natural environment. *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. • Due to the lack of capacity within the municipal landfill, the risk of illegally dumping general waste arises. *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 impacts/risks associated with waste generation due to the proposed development may potentially be ***managed (avoided and or controlled)*** through the implementation of the following measures: • Avoid potential impact/risk through effectively implementing the existing Waste Management Plan and monitoring programme; • Avoid incident related to waste management activities by developing. • Implementing, and maintaining incident management and emergency preparedness plan; and • Control waste generation through record keeping. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.
• Increase in traffic from heavy vehicles; • Traffic management at weighbridge; • Movement of operational plant and equipment; • River and or drainage line crossings; and • Storm water from access roads. **Workshops, wash bays, fuel storage, generator and hazardous substance stores:** • Mine vehicle and equipment servicing; • Washing of mine equipment and vehicles; • Storing, decanting and fuel use; • Electricity generation using the generator; and • Storing, handling and transport of hazardous substances. **Crushing and screening of raw materials:** • Storm water management within the laydown area;	**Leachates/ Wastewater effluent** *Direct impact:* • Improper management of effluent and leachate from the Residue Stockpiles and RoM stockpiles may lead to the contamination of the surrounding natural environment. *Indirect impact:* • Contaminated effluent causes the degradation of soil and surface water quality. • 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 construction site having consequences on further downstream users.	**D**	**E**	**M**	**P**	**S**	Avoid	DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED
								Implementation of the national waste management hierarchy (prevention, re-use, recycling, recovery and lastly disposal) will managed the identified protentional waste related impacts/risk associated with the proposed development. In order to understand the potential impact of leachates from the Residue Stockpiles, a Waste Classification of the waste rock material is required to determine the significant risks associated. This will be undertaken as part of the EIA phase. It is however, from a desktop perspective considered that if the area where the Residue Stockpiles are to be located is not suitably designed to manage the runoff and leachates, that it posed a ***"very high risk"*** of contaminating the surrounding environment. In addition, ***Acid Mine Drainage (AMD)*** is considered to be ***highly likely*** and will to be further assessed as part of the EIA phase.
								DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE
								A suitably designed facility or storage area associated with the Residue Stockpiles and RoM has a potential to manage the risks associate with wastewater effluent and leachates to such an extend to prevent environmental contamination. If not managed suitably it is ***highly likely*** that the impacts cause a ***long-term significant impact*** and, in some instance, causes ***irreversible damages***.
								DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED
								The impacts/risks associated with waste generation due to the proposed development may potentially be ***managed (avoided and or controlled)*** through the implementation of the following measures: • Waste Classification of waste rock and designing a suitable facility to manage the waste stream; • Developing and suitably designing wastewater facilities to contain and/or prevent spillages or treatment of process water or contaminated water from/before entering the natural environment; • Obtaining the required Waste Management Licence in terms of GN.R 921 (GG 39020 dated 24 July 2015, as amended) and a Water Use Licence (WUL); • Avoid potential impact/risk through effectively implementing the existing Waste Management Plan and monitoring programme; • Avoid incident related to waste management activities by developing. • Implementing, and maintaining incident management and emergency preparedness plan; and • Control waste generation through record keeping.

• Access and layout control; and • Servicing of crushing and screening equipment. **Water supply and storage and power supply:** • Borehole abstraction for office use; • Re-use of process water for dust suppression; • Storage of water in conservancy tanks for domestic use; and • Overhead transmission lines to supply electricity to mine offices and laydown areas. **Backfilling and concurrent rehabilitation of the mining pits:** • Backfilling, levelling and rehabilitation of mining pits; and • Importing of material to fill mining pit voids.								All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

DECOMMISSIONING/CLOSURE

Agriculture and Soil

ASPECT	SOIL & AGRICULTURAL							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
	Degradation of soil resources and loss of agricultural land	D	E	M	P	S		*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED*
Demolition of mine related infrastructures: • Demolishing of mine offices, ablution facilities and medical station; • Demolishing of workshops, wash bays, fuel storage facilities and hazardous substance stores; • Demolishing of storm water infrastructures; and • Importing and topsoil placement.	*Direct impact:* • Placement of infertile topsoil's poses a risk of vegetation not being able to re-establish. • Exposed unvegetated soils causes further loss of fertile soils. *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. • Continuous exposure to hydrocarbon leaks poses a risk to the degradation of the surrounding soil resources. • Unvegetated areas are prone to erosion formation.	5	3	8	5	80	Control	Due to the ***high sensitivity*** for agricultural productivity, direct loss of agriculturally productive land is likely to occur as a result of the proposed mine. Based on the opinion provided by the appointed specialist (Appendix F.1), from a desktop perspective the mine as a ***high potential*** ("red flag" or "No-Go") ***of not being supported***, especially in light of the Preservation and Development of Agricultural Land Bill (2021) which has been introduced at the National Assembly and which aims to promote the preservation and sustainable development of agricultural land. The Bill seeks to prevent the fragmentation of agricultural land and to minimise the loss of agricultural land by promoting viable farming units and to encourage the optimal use of agricultural land for the promotion of food security, as well as increase the contribution of agriculture to the Gross Domestic Product. Given that the proposed BCR Coal Vlakfontein site is at least 70% agricultural productive and is located within an area dominated by agricultural activities, one must consider the aims of the Bill and minimise the loss of agriculturally viable land. The above ***opinion*** could change ***depending on the outcomes of the EIA phase and site verification*** and does not take into consideration any mitigation measures or alternatives.

Dismantling of crushing and screening plant: • Removal of temporary offices, ablution facilities and waste water management infrastructures; and • Removal of crushing and screening material; • Rehabilitation of laydown area; and • Importing and topsoil placement.	*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.							*DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Following the soil and agricultural desktop assessment of the proposed BCR Coal Vlakfontein Mine, the site has been confirmed as being located within an area that has a ***high sensitivity*** for agricultural productivity (70% of the total extend of the mining right area). *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* The potential impacts/risks may potentially be further ***mitigated and or avoided*** by implementing the following measures: • Control though soil conservation and management during the constructional and decommissioning phase of the proposed development; • Avoid the loss of fertile soil by effectively implementing storm water management and erosion control throughout the entire lifecycle of the proposed development; • Avoid contamination of soil resources through the development, implementation and review of incident management and emergency preparedness plans; and • Remedy through effectively rehabilitating disturbed areas. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.
Rehabilitation of access roads, access control, demolishing weighbridge, and traffic: • Increase in traffic from heavy vehicles during demolition activities; • Demolition of the weighbridge; • Movement of decommissioning plant and equipment; • River and or drainage line crossings infrastructure removal or maintenance; • Storm water from access roads and erosion prevention; • Removal of contaminants from access roads; • Ripping, shaping and rehabilitation of access roads. **Final closure of mining pits:** • Monitoring of rehabilitated areas; • Final shaping, levelling, benching and stabilisation of mining pits; and • Importing and topsoil placement.	**<u>Soil contamination/Hydrocarbon/soil contamination</u>** *Direct impact:* • 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. • 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.	**D**	**E**	**M**	**P**	**S**	Avoid	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* Continuous management and monitoring of potential contaminants associated to all activities of the proposed mine can sufficiently address the identified impacts and risks. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* The implementation of management actions identified in the EMPr will avoid the loss of fertile soil due to contamination related to incidents. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* The potential impacts/risks can be further ***mitigated and or avoided*** by implementing the following measures: • Implementation of continuous monitoring programme with the focus on surface water and ground water quality; • Avoid contamination of soil resources through the development, implementation and review of incident management and emergency preparedness plans; and • Remedy through effectively rehabilitating disturbed areas. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Decommissioning of Residue Stockpiles: • Shaping, levelling, stabilising and capping of Residue Stockpiles; • Importing and topsoil placement; and • Active post decommissioning monitoring.								

Landscape and Visual

ASPECT	TOPOGRAPHY AND VISUAL							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		
Demolition of mine related infrastructures: • Demolishing of mine offices, ablution facilities and medical station; • Demolishing of workshops, wash bays, fuel storage facilities and hazardous substance stores; • Demolishing of storm water infrastructures; and • Importing and topsoil placement. **Dismantling of crushing and screening plant:** • Removal of temporary offices, ablution facilities and waste water management infrastructures; and • Removal of crushing and screening material; • Rehabilitation of laydown area; and • Importing and topsoil placement. **Rehabilitation of access roads, access control, demolishing weighbridge, and traffic:**	**Visual disturbance on sensitive visual receptors/Lighting impacts/Topography and visual alterations** *Direct impact:* • Unnatural shaping of the landscape following demolishing of infrastructure altering the topography and visual environment. • Visual impact of decommissioning activities on sensitive visual receptors near the proposed mine. • Visual impact on observers and residents at homesteads within a 2 - 3km radius of the proposed mine. • Visual impact on observers travelling along the roads and residents at homesteads within a 3 – 6km radius of the proposed mine. *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.						Remedy	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* By implementing an effective rehabilitation plan during decommissioning of the proposed development, visual disturbance on sensitive visual receptors can be remedies to such an extent that the potential impact/risk may be reversed. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Implementing the management measures identified in the EMPr will reduce the visual impact. The level of impact will be assessed during the EIA phase. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Visual disturbances on sensitive visual receptors may potentially be ***managed (remedied)*** through the implementation of the following measures: • Adherence with management measures identified in the EMPr; and • Implementing an effective concurrent rehabilitation plan during the operational phase of the proposed mine. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

• Increase in traffic from heavy vehicles during demolition activities; • Demolition of the weighbridge; • Movement of decommissioning plant and equipment; • River and or drainage line crossings infrastructure removal or maintenance; • Storm water from access roads and erosion prevention; • Removal of contaminants from access roads; • Ripping, shaping and rehabilitation of access roads. **Final closure of mining pits:** • Monitoring of rehabilitated areas; • Final shaping, levelling, benching and stabilisation of mining pits; and • Importing and topsoil placement. **Decommissioning of Residue Stockpiles:** • Shaping, levelling, stabilising and capping of Residue Stockpiles; • Importing and topsoil placement; and • Active post decommissioning monitoring.								

Archaeology, Cultural, and Palaeontology

ASPECT	ARCHAEOLOGICAL, CULTURAL AND PALAEONTOLOGY							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED*
Final closure of mining pits: • Monitoring of rehabilitated areas; • Final shaping, levelling, benching and stabilisation of mining pits; and • Importing and topsoil placement.	**Loss of heritage and cultural resources** *Direct impact:* • Activities associated to final closure of the mining pits may potentially disturb sites of historical and cultural sites or graves that was not identified during the planning, construction or operational phase. *Indirect impact:* • Loss of heritage and history for the future generation of the affected community. *Cumulative impact:* • 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.						Avoid	Based on the current information obtained for the area at a desktop level it is anticipated that any heritage resources that occur within the proposed development area will have a Local Significance (LS), Grade 3B or lower field rating and all sites should be mitigatable. Graves are of high social significance (Field rating GP A) and can be expected anywhere on the landscape. Construction and mining related activities could cause irreversible damage or destroy heritage resources and depletion of the archaeological record of the area. It is recommended that a field based HIA should be conducted to comply with Section 38 (8) of the National Heritage Resources Act. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Significance rating of sites, mitigation measures and magnitude of possible impacts can only be determined after the field based HIA but based on the current information the impact on heritage resources can be mitigated to an acceptable level. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Potential impacts/risk to heritage and cultural resources may potentially be successfully ***mitigated (avoided)*** by implementing the following: • Management actions identified in the EMPr; and • Developing a chance find procedure during all phases of the proposed development. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Terrestrial Biodiversity

ASPECT	TERRESTRIAL BIODIVERSITY							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED*
Demolition of mine related infrastructures: • Demolishing of mine offices, ablution facilities and medical station; • Demolishing of workshops, wash bays, fuel storage facilities and hazardous substance stores; • Demolishing of storm water infrastructures; and • Importing and topsoil placement. **Dismantling of crushing and screening plant:** • Removal of temporary offices, ablution facilities and waste water	**Disturbance to terrestrial biodiversity** *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 cleared areas are not rehabilitated properly or storm water control features installed are not constructed according to a designed 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.	5	4	10	5	95	Avoid/Remedy/Offset	***Vegetation Biodiversity:*** The desktop assessment of the available information indicated that about half of the vegetation that could be impacted on by the proposed mining were ***cultivated or modified***. Such areas are preliminary classified as ***"low sensitivity"*** from a vegetation perspective. However, these areas are likely of ***biodiversity importance to the movement of fauna and pollinators and important to maintain function and ecological processes***. Some ***secondary grasslands*** of ***"medium sensitivity"*** may be present in ***historically cultivated lands***. However, ***large portions*** of seemingly intact natural ***Eastern Highveld Grassland*** are seemingly present within the site, as well as ***moist grasslands***. Remaining patches of this grassland unit is of ***"high conservation value and sensitivity"*** as it is poorly protected and within a vulnerable ecosystem (Skowno, et al., 2019). It is therefore imperative that the site vegetation be assessed for the presence of intact (undisturbed or untransformed) Eastern Highveld Grassland, as remaining portions should be conserved to preserve this vegetation type and protect it from extinction. Importantly, the remaining grassland on the site ***corresponds greatly with*** the ***CBA: Irreplaceable category of the MBSP***, in which ***mining is not an acceptable land use***. Other than the modified areas, the desktop results are in accordance with the screening tool results that the site comprises mostly of ***"high terrestrial biodiversity (vegetation) sensitivity"***.

management infrastructures; and • Removal of crushing and screening material; • Rehabilitation of laydown area; and • Importing and topsoil placement. **Rehabilitation of access roads, access control, demolishing weighbridge, and traffic:** • Increase in traffic from heavy vehicles during demolition activities; • Demolition of the weighbridge; • Movement of decommissioning plant and equipment; • River and or drainage line crossings infrastructure removal or maintenance; • Storm water from access roads and erosion prevention; • Removal of contaminants from access roads; • Ripping, shaping and rehabilitation of access roads. **Final closure of mining pits:** • Monitoring of rehabilitated areas; • Final shaping, levelling, benching and stabilisation of mining pits; and • Importing and topsoil placement. **Decommissioning of Residue Stockpiles:** • Shaping, levelling, stabilising and capping of Residue Stockpiles; • Importing and topsoil placement; and • Active post decommissioning monitoring. • Importing of material to fill mining pit voids.	• 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. **<u>Influx of alien and invasive species</u>** *<u>Direct Impact:</u>* • 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. *<u>Indirect Impact:</u>* • Disturbed areas are likely to act as seed areas that will ultimately facilitate the invasion of nearby 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. *<u>Cumulative Impact:</u>* • Loss of vegetation and habitat leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding ecological support and 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.							***<u>Plant Species:</u>*** The site is classified as ***"medium sensitivity for sensitive plant species"***, indicating that the site includes ***suitable habitat for plant species of conservation concern***. The screening tool lists nine (9) species that has a possibility of occurring on the site. The remaining Eastern Highveld Grassland, including the moist grasslands, are ***highly likely to include sensitive and unique habitats***, and ***suitable habitat for several plant species of conservation concern are likely*** to be present concurring with the sensitivity rating of the screening tool. ***<u>Mammal and Invertebrate Species:</u>*** ***"Highly sensitive"*** areas and areas likely to support higher faunal richness or biodiversity in the project area are directly linked to the ***irreplaceable CBAs*** on site, with the ***eastern CBA the potential primary biodiversity hotspot*** in terms of ***mammals and invertebrates***. In the surrounds, ***"highly sensitive"*** areas incorporate the ***riverine and associated grassland areas north and towards the Vaal and the Vaal Tributary southeast*** of the project area. ***"Moderately sensitive"*** areas currently include the ***on-site non-perennial stream***. Streams and other surface water features are normally considered highly sensitive features due to their legal status under the National Water Act, the fact that they are often form ecological corridors and provide unique habitats within the terrestrial setting (often includes habitat for ecologically significant species). In terms of this specific stream, which does ***not provide a significant ecological corridor and has limited buffer habitat*** within the proposed development site, the sensitivity of the habitat is reduced to moderate. ***<u>Herpetofauna Species:</u>*** The presence of ***CBA – Irreplaceable*** areas within the proposed development footprint, together with the ***possible presence of natural herpetofauna communities contributing to local ecosystems, and potentially including endemic habitat specialists and Near Threatened species***, suggests that impacts may be ***"high and undesirable"*** under the current layout, and require further investigation. ***<u>Avifaunal Species:</u>*** Parts of the proposed study area are considered to have a ***"High and Medium Animal Species Theme Sensitivity"***, as a result of the presence of Southern Bald Ibis Geronticus calvus, African Grass Owl Tyto capensis, Denham's Bustard Neotis denhamii, White-bellied Korhaan Eupodotis senegalensis and Caspian Tern Hydroprogne caspia. Based on the ***low number (n=2) of Southern Bald Ibis recorded*** in the PAOI, this preliminary assessment assigns a ***"medium"*** rating to the PAOI. In addition, it is ***unlikely that African Grass Owl*** will occur within the PAOI, based on previous surveys conducted in the area (pers comms. Christelle Trutter, African Grass Owl Study Group Manager) and ***White-bellied Korhaan and Caspian Tern*** have ***not been recorded*** in the PAOI to date. ***Notable SCC*** that have been ***recorded***, albeit in ***low numbers***, include Secretarybird Sagittarius serpentarius, Deham's Bustard, Grey Crowned Crane Balearica regulorum, Black Harrier Circus maurus, African Marsh Harrier Circus ranivorus, Lanner Falcon Falco biarmicus, Greater Flamingo Phoenicopterus roseus and Lesser Flamingo Phoeniconaias minor in addition to the availability of suitable habitat, thereby confirming the ***"medium sensitivity"*** rating. This rating will be verified further during the EIA phase of the project, following a site verification survey to the proposed development area and broader PAOI.

	<u>Increased fire risk/veldt fires</u> *<u>Direct Impact:</u>* • 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. *<u>Indirect Impact:</u>* • 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. *<u>Cumulative Impact:</u>* • Loss of vegetation and habitat leads to the overall degradation of the terrestrial ecology. • Critical support regions to surrounding ecological support and protected areas are affected and may lead to the degradation of the protected area's ecology.							*DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* A significant portion of the proposed site layout (53 % of the proposed layout footprint, see ***Table 8***) is within a CBA: Irreplaceable conservation category of the MBSP. A defined and recommended land use in Irreplaceable CBAs is designated as "Conservation Management". Such natural areas are required for the province to meet its biodiversity targets. ***Mining* is *not supported by the MBSP in CBA: Irreplaceable*** and, depending on the outcome of the site verification and impact assessment during the EIA phase, the environmental authorisation application recommendation could ***<u>potentially</u>*** result in a ***"[21]fatal flaw"/" No-Go" alternative***. This will be further supported if any plant or animal species of conservation concern are recorded on the site. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* The identified impact/risk may potentially be ***avoided or mitigated (controlled and or remedied)*** through: • The implementation of a species search and rescue prior to the commencement of construction activities; • Appointing a suitably qualified ECO prior to the commencement of any activities monitoring all vegetation clearance activities; • Obtaining the required permits for the removal of protected species; and • Awareness training of all contractors and permanent employees.

[21] **"Fatal flaw"** means a major defect or deficiency in a project proposal that should result in environmental authorisation being refused, and from a biodiversity perspective, a residual negative impact that would have a Very High significance rating.

								In the event of the mitigation measures being implemented still results in a medium to high significance residual negative impact on biodiversity, [22]biodiversity offsetting, as final mitigation measure, may be considered: • Ecological equivalence (like-for-like) as preferred offsetting – when offsets remain the only mechanism to manage residual negative impacts, "like-for-like" offsetting should benefit the same or similar biodiversity components as those components that would be negatively affected. • Trading-up offset types – secures priority areas of greater importance or priority to biodiversity conservation than the area being impacted may only be considered under certain circumstances in order to contribute to conservation objectives. Should there remain residual impacts on irreplaceable biodiversity following all hierarchy of mitigation measures implemented, the following: • Where there are no options left in the landscape to counterbalance a residual impact in accordance with the ecological equivalence (like-for-like) principle (see above), that residual impact cannot be offset. That is, there would be a residual impact on irreplaceable biodiversity, which would prevent national biodiversity targets from being met. In these cases, development would generally not be acceptable, and the impacts should be avoided ("No-Go" or "Fatal-Flaw"). • [23]Ecological compensation – residual impacts which cannot be offset should only be considered in highly exceptional circumstances, when there are imperative reasons for overriding public interest. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Aquatic Biodiversity

ASPECT	AQUATIC BIODIVERSITY							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED*
Demolition of mine related infrastructures: • Demolishing of mine offices, ablution facilities and medical station; • Demolishing of workshops, wash bays, fuel storage facilities and hazardous substance stores; • Demolishing of storm water infrastructures; and • Importing and topsoil placement.	**Loss of aquatic biodiversity** *Direct impact:* • Locating the proposed development within 500m of a wetland, poses a risk in altering the support regions into the wetland. *Indirect impact:* • Alteration of wetland support zones poses the risk of alien invasive species the invade, leading to the deterioration of the nearby wetland system. *Cumulative impact:*	5	4	10	5	95	Avoid/Remedy/Offset	The desktop investigation of the study area for the proposed BCR Coal Vlakfontein Mine has confirmed the classification of the study area as being located within an area regarded as being of ***"very high sensitivity"*** from the perspective of the aquatic ecosystem. As such, a detailed aquatic biodiversity specialist assessment as well as a detailed wetland specialist assessment would be required as part of the Environmental Impact Assessment phase of the study. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* As per the MBSP the watercourses/wetlands and wetland clusters associated with the proposed BCR Coal Vlakfontein Mine footprint are classified as ***Ecological Support Areas (ESAs)*** on the basis of wetlands and wetland clusters. ESAs are areas that are ***not essential for meeting biodiversity***, targets, ***but that play an important role in supporting the functioning of protected areas or CBAs*** and for delivering ecosystem services. In the terrestrial assessment they support landscape connectivity and strengthen resilience to climate change. ***ESAs need to be maintained*** in at least a ***functional*** and often ***natural state***, supporting the purpose for which they were identified. They include features such as riparian habitat surrounding rivers or wetlands, migration corridors for over-wintering sites for Blue Cranes, and so on (Mpumalanga Tourism and Parks Agency, 2014).

[22] Biodiversity offsets should be distinguished from trade-offs. A trade-off in the biodiversity context involves exchanging a negative outcome for biodiversity with another positive outcome, which does not necessarily benefit biodiversity. Trading off biodiversity for other positive outcomes is not a form of mitigation, like biodiversity offsetting. It falls outside of the scope of the mitigation hierarchy. The following are examples of trade-offs in the biodiversity context:
- Ecological compensation; and
- Financial compensation: a financial contribution to a biodiversity initiative to compensate for a significant residual negative impact on biodiversity.

Trade-offs should only be considered when biodiversity offsetting is not possible and where there are imperative reasons for overriding public interest. They should also be approached with extreme caution in the context of environmental authorisation applications.
[23] **"Ecological Compensation"** means the outcome of measurable actions to protect, restore and manage priority biodiversity, aimed at compensating for residual negative impacts on irreplaceable biodiversity and ecological infrastructure where these impacts cannot be offset and which should, instead and in the first instance, be avoided.

Dismantling of crushing and screening plant: • Removal of temporary offices, ablution facilities and waste water management infrastructures; and • Removal of crushing and screening material; • Rehabilitation of laydown area; and • Importing and topsoil placement. **Rehabilitation of access roads, access control, demolishing weighbridge, and traffic:** • Increase in traffic from heavy vehicles during demolition activities; • Demolition of the weighbridge; • Movement of decommissioning plant and equipment; • River and or drainage line crossings infrastructure removal or maintenance; • Storm water from access roads and erosion prevention; • Removal of contaminants from access roads; • Ripping, shaping and rehabilitation of access roads. **Final closure of mining pits:** • Monitoring of rehabilitated areas; • Final shaping, levelling, benching and stabilisation of mining pits; and • Importing and topsoil placement.	• Alteration of aquatic ecology of direct affected watercourses as well as downstream watercourses. **<u>Erosion, sedimentation, and siltation of watercourses/wetlands</u>** <u>*Direct Impact:*</u> • Runoff from exposed un-vegetated areas poses a risk in contaminating nearby streams, rivers, and drainage lines. <u>*Indirect Impact:*</u> • 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. <u>*Cumulative Impact:*</u> • Alteration of aquatic ecology of direct affected watercourses as well as downstream watercourses. **<u>Contamination of water resources</u>** <u>*Direct Impact:*</u> • Discharge, spills, and leakage of effluent containing pollutants poses a risk of contaminating water resources within close proximity. <u>*Indirect Impact:*</u> • 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. <u>*Cumulative Impact:*</u> • 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. **<u>Invasive alien plant encroachment</u>**							Based on information obtained during the desktop site sensitivity verification assessment, it is concluded that the proposed BCR Coal Vlakfontein Mine is likely to result in a direct loss of wetlands determined to be in a ***largely natural state*** and identified as being ***FEPAs within a designated SWSA and Fish Sanctuary***. the majority (approximately ***84 %***) of the proposed BCR Coal Vlakfontein Mine study area falls within a catchment classified as a FEPA catchment. FEPA catchments achieve biodiversity targets for river ecosystems and threatened/near-threatened fish species and were identified as rivers that are currently in a good condition (***Ecological Category A or B***). The FEPA status is largely as a result of the catchment being classified as a fish sanctuary for ***two fish species***, namely ***Enteromius cf. oraniensis (Chubbyhead Barb; previously Enteromius anoplus s.l.)*** and ***Enteromius sp. pallidus cf. 'north' (Goldie Barb)***, the latter of which is in need of taxonomic revision and both of which are in need of a revised assessment of their threat status. In addition, according to the ***Resource Quality Objectives set for the Upper Vaal*** (Department of Water and Sanitation, 2016), the Recommended Ecological Category (REC) determined for the catchment within which the proposed mine is to be located is set as an ***Ecological Category B***, and is reflected as such within the numerical limits set for instream habitat, aquatic macroinvertebrates, fish, riparian vegetation, hydrology and water quality. In addition, the Resource Quality Objective set for the catchment state that 'salt concentrations must be maintained to meet quality requirements for agriculture and to maintain the ecosystem wellbeing', an ***objective that will be unlikely to be achieved*** should additional mining activities impact the water quality and quantity within the catchment through mining of wetlands and inadvertent or unintentional release of mine-affected water into the catchment. In addition, the reach of the Vaal River downstream of the proposed BCR Coal Vlakfontein Mine is considered to be a ***free-flowing river*** which, according to Driver et al. (2011), are rivers that flow undisturbed from their source to the confluence with a larger river or to the sea without any major dams and are ***a rare feature*** in the South African landscape and part of our natural heritage. Several wetland systems were identified within the project site as well as one FEPA wetland cluster identified in the eastern section. The FEPA wetlands include channelled valley bottom systems and depressions. The wetlands are classified as FEPA wetlands as they are located within a sub quaternary catchment that is often utilised by Wattled Cranes (Bugeranus carunculatus), Grey Crowned Cranes (Balearica regulorum) and/or Blue Cranes (Anthropoides paradiseus). The wetlands furthermore have ***PES*** classifications of ***A/B (unmodified to largely natural)***. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* The impact/risk to disturb the aquatic biodiversity may potentially be ***avoided or mitigated (controlled and or remedied)*** by implementing the following measures: • Control through the implementation of storm water management and erosion control; • Avoid impacts through adequately managing effluent and runoff; • Avoid accidental release through the development, implementation, and review of incident management and emergency preparedness plans; • Control through the continuing awareness training of all personal throughout the entire life cycle of the proposed development; and • Remedy through the effective implementation of rehabilitation measures.

Decommissioning of Residue Stockpiles: • Shaping, levelling, stabilising and capping of Residue Stockpiles; • Importing and topsoil placement; and • Active post decommissioning monitoring. • Importing of material to fill mining pit voids.	*Direct impact:* • Alien invasive trees and shrubs are expected to increase within the area as these species 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. *Indirect impact:* • 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:* • Critical support regions to surrounding ecological support and protected areas are affected and may lead to the degradation of the protected area's ecology.							In the event of the mitigation measures being implemented still results in a medium to high significance residual negative impact on biodiversity, [24]biodiversity offsetting, as final mitigation measure, may be considered: • Ecological equivalence (like-for-like) as preferred offsetting – when offsets remain the only mechanism to manage residual negative impacts, "like-for-like" offsetting should benefit the same or similar biodiversity components as those components that would be negatively affected. • Trading-up offset types – secures priority areas of greater importance or priority to biodiversity conservation than the area being impacted may only be considered under certain circumstances in order to contribute to conservation objectives. Should there remain residual impacts on irreplaceable biodiversity following all hierarchy of mitigation measures implemented, the following: • Where there are no options left in the landscape to counterbalance a residual impact in accordance with the ecological equivalence (like-for-like) principle (see above), that residual impact cannot be offset. That is, there would be a residual impact on irreplaceable biodiversity, which would prevent national biodiversity targets from being met. In these cases, development would generally not be acceptable, and the impacts should be avoided ("No-Go" or "Fatal-Flaw"). • [25]Ecological compensation – residual impacts which cannot be offset should only be considered in highly exceptional circumstances, when there are imperative reasons for overriding public interest. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Surface and Groundwater Resources

ASPECT	WATER RESOURCES							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
Demolition of mine related infrastructures: • Demolishing of mine offices, ablution facilities and medical station; • Demolishing of workshops, wash bays, fuel storage facilities and hazardous substance stores; • Demolishing of storm water infrastructures; and	**Degradation of natural water resources/Water resource contamination** *Direct impact:* • Lowering of the groundwater levels from dewatering resulting in a cone of depression (or dewatering) which may affect third party groundwater users. • Interception of ambient (and a decrease in) groundwater flow, which would under natural conditions discharge into the surface drainages, provided baseflow to the rivers, or contributed to deeper regional groundwater flow. • Exposure of sulphide bearing minerals (i.e., coal) during mining may negatively affect the ambient groundwater quality in the immediate vicinity of the Mine. The fragmented cover rock is then replaced (backfilled) and covered with soil and the terrain is landscaped ('rehabilitated'). Rainwater penetrating through the soil into the backfill becomes acidified by pyrite in the backfill material and can potentially decant to the surface.	**D**	**E**	**M**	**P**	**S**	Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* The water resources in relation to the proposed activity is considered to be ***"high"*** (classified as an ***Ecological Support Area)***. The proposed mine is situated within the upper reaches of a major catchment system (upper Vaal catchment) with a significant number of water users downstream. The reach of the Vaal River downstream of the proposed BCR Coal Vlakfontein Mine is considered to be a ***free-flowing river*** which, according to Driver et al. (2011), are rivers that flow undisturbed from their source to the confluence with a larger river or to the sea without any major dams and are ***a rare feature*** in the South African landscape and part of our natural heritage. Based on the vulnerability assessment the underlying aquifer is regarded as a ***"low to medium vulnerability"*** aquifer system requiring reasonable groundwater protection measures to ensure that no cumulative pollution affects the aquifer. Impacts/risks discussed associated with the aquatic biodiversity should also be taken into consideration (***FEPAs within a designated SWSA and Fish Sanctuary***). *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE*

[24] Biodiversity offsets should be distinguished from trade-offs. A trade-off in the biodiversity context involves exchanging a negative outcome for biodiversity with another positive outcome, which does not necessarily benefit biodiversity. Trading off biodiversity for other positive outcomes is not a form of mitigation, like biodiversity offsetting. It falls outside of the scope of the mitigation hierarchy. The following are examples of trade-offs in the biodiversity context:
- Ecological compensation; and
- Financial compensation: a financial contribution to a biodiversity initiative to compensate for a significant residual negative impact on biodiversity.

Trade-offs should only be considered when biodiversity offsetting is not possible and where there are imperative reasons for overriding public interest. They should also be approached with extreme caution in the context of environmental authorisation applications.
[25] **"Ecological Compensation"** means the outcome of measurable actions to protect, restore and manage priority biodiversity, aimed at compensating for residual negative impacts on irreplaceable biodiversity and ecological infrastructure where these impacts cannot be offset and which should, instead and in the first instance, be avoided.

• Importing and topsoil placement. **Dismantling of crushing and screening plant:** • Removal of temporary offices, ablution facilities and waste water management infrastructures; and • Removal of crushing and screening material; • Rehabilitation of laydown area; and • Importing and topsoil placement. **Rehabilitation of access roads, access control, demolishing weighbridge, and traffic:** • Increase in traffic from heavy vehicles during demolition activities; • Demolition of the weighbridge; • Movement of decommissioning plant and equipment; • River and or drainage line crossings infrastructure removal or maintenance; • Storm water from access roads and erosion prevention; • Removal of contaminants from access roads; • Ripping, shaping and rehabilitation of access roads. **Final closure of mining pits:** • Monitoring of rehabilitated areas; • Final shaping, levelling, benching and stabilisation of mining pits; and • Importing and topsoil placement.	• Locating the proposed mine within proximity to a natural drainage line or wetland, poses the risk of associated activities increasing the overall sediment load into the water resource. • Locating 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 and operational 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. • If Pollution Control Dams (PCD's) and Residue Stockpiles 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. *<u>Indirect impact:</u>* • An increased sediment load decreases the overall water quality of surface water resources. • 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. *<u>Cumulative impact:</u>* • 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). • 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. • Alteration of aquatic ecology of direct affected watercourses as well as downstream watercourses. • Loss of unique biodiversity features. **<u>Water level reduction</u>**							Shallow groundwater levels potentially indicate a shallow driven aquifer system that could be acceptable to groundwater contamination from surface related impacts. The effective implementation of a storm water management and erosion control plan may reduce the potential impact/risk to degrade the surface water quality of nearby natural drainage lines. Designing facilities and infrastructures associated with surface and groundwater contamination, such as the Residue Stockpiles, PCD's, storm water management infrastructures etc., in such a manner to prevent the release or seepage of contaminant could manages associated impacts/risks to a sufficient extent. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* The impact/risk to degrade the natural water resources may potentially be ***managed (controlled)*** by implementing the following measures: • Control through the implementation of storm water management and erosion control; • Avoid impacts through adequately managing effluent and runoff; • Avoid accidental release through the development, implementation, and review of incident management and emergency preparedness plans; • Water conservation through monitoring water use and quality throughout the entire life cycle of the proposed development; • Control through the continuing awareness training of all personal throughout the entire life cycle of the proposed development; and • Remedy through the effective implementation of rehabilitation measures. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Decommissioning of Residue Stockpiles: • Shaping, levelling, stabilising and capping of Residue Stockpiles; • Importing and topsoil placement; and • Active post decommissioning monitoring. • Importing of material to fill mining pit voids.	*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. ***All potential impacts/risks identified under the "Aquatic Biodiversity" section directly or indirectly relates to surface and groundwater resources and should also be taken into consideration.***							

Noise

ASPECT	NOISE							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		
Demolition of mine related infrastructures: • Demolishing of mine offices, ablution facilities and medical station; • Demolishing of workshops, wash bays, fuel storage facilities and hazardous substance stores; • Demolishing of storm water infrastructures; and • Importing and topsoil placement. **Dismantling of crushing and screening plant:** • Removal of temporary offices, ablution facilities and waste water management infrastructures; and • Removal of crushing and screening material;	**Noise generation** *Direct impact:* • Increase in noise level at receptors. Increased noises or disturbing noises may increase annoyance levels with project. Noise levels could exceed 45 dBA during construction. (temporary construction of access roads, construction of infrastructure as well as construction traffic passing close to NSR). • Locating the proposed development within close proximity to sensitive receptors poses a risk of the overall sense of place to the surrounding community. • Degradation of employees and community hearing health. *Indirect impact:* • Potential increase of community unrest and complaints. • Hearing loss of employees and community members. *Cumulative impact:* • Loss of production due to community strikes.						Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* Considering the project infrastructure layout, there is a potential of a ***"low to high significance"*** of a noise impact during the construction phase, and of a low to high significance during the operational phase. Further study is required, and it is recommended that a full Environmental Noise Impact Assessment (ENIA) study be conducted for the BCR Coal Vlakfontein Mine. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Without noise propagation modelling where cumulative effects are included, it is difficult to assess the potential significance of the noise impact, though considering the projected noise levels, the significance may be ***very "low"*** to ***"high"*** at the different Noise Sensitive Receptor (NSR). Construction noise related with demolishing activities impacts however: • Are highly reversible; • Will not result in the irreplaceable loss of resources; and • Potential noise impacts can be managed, mitigated or even avoided. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Environmental noise levels may potentially be ***managed (controlled)*** by ensuring the following: • Implementation of the monitoring programme as specified in the EMPr; and • Ensuring sufficient noise screening measures should any specific activity exceed the 85 dBA threshold. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

• Rehabilitation of laydown area; and • Importing and topsoil placement. **Rehabilitation of access roads, access control, demolishing weighbridge, and traffic:** • Increase in traffic from heavy vehicles during demolition activities; • Demolition of the weighbridge; • Movement of decommissioning plant and equipment; • River and or drainage line crossings infrastructure removal or maintenance; • Storm water from access roads and erosion prevention; • Removal of contaminants from access roads; • Ripping, shaping and rehabilitation of access roads. **Final closure of mining pits:** • Monitoring of rehabilitated areas; • Final shaping, levelling, benching and stabilisation of mining pits; and • Importing and topsoil placement. **Decommissioning of Residue Stockpiles:** • Shaping, levelling, stabilising and capping of Residue Stockpiles; • Importing and topsoil placement; and • Active post decommissioning monitoring.								

• Importing of material to fill mining pit voids.								

Traffic

ASPECT	TRAFFIC MANAGEMENT							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
Demolition of mine related infrastructures: • Demolishing of mine offices, ablution facilities and medical station; • Demolishing of workshops, wash bays, fuel storage facilities and hazardous substance stores; • Demolishing of storm water infrastructures; and • Importing and topsoil placement. **Dismantling of crushing and screening plant:** • Removal of temporary offices, ablution facilities and waste water management infrastructures; and • Removal of crushing and screening material; • Rehabilitation of laydown area; and • Importing and topsoil placement. **Rehabilitation of access roads, access control, demolishing weighbridge, and traffic:** • Increase in traffic from heavy vehicles during demolition activities; • Demolition of the weighbridge; • Movement of decommissioning plant and equipment;	**<u>Increased pressure on local roads/degradation of road infrastructure</u>** *<u>Direct impact:</u>* • Access to and from the proposed development leads to the increased pressure on existing road infrastructure. • Anticipated vehicle traffic to be generated by the Proposed Mining Development, with specific reference to heavy vehicles transporting coal, would have an impact on the existing gravel road, Road D1426. This could contribute to the deteriorating condition of the roadway and could lead to the Proposed Mining Development not being accessible via Road D1426 should the road not be maintained. • Increase of heavy vehicles on public roads transporting coal. *<u>Indirect impact:</u>* • Increased pressure on existing road infrastructures and municipalities to maintain infrastructures. *<u>Cumulative impact:</u>* • Degradation of public transport infrastructure. • Increased risks of accidents on the public road.	D	E	M	P	S	Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* The main road that is suggested to be used during all phases of the proposed development (Road D1426) is currently in a poor state from the northern boundary of the proposed mine. Depending on where workers will be sourced from, workers using public transport may have difficulties to get to and from site. The relevant existing roads under investigation has a ***"low sensitivity"*** in terms of vehicle traffic volumes and conflicts between vehicles and non-motorized transport. Although the existing intersections currently does not have dedicated right-turn or left-turn deceleration lanes, a low volume of right turning vehicles were observed during the relevant survey conducted. It is therefore rated at a ***"low sensitivity"*** without the Proposed Mining Development. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Anticipated vehicle traffic to be generated by the Proposed Mining Development, with specific reference to heavy vehicles transporting coal, would have an impact on the existing gravel road, Road D1426. This could contribute to the deteriorating condition of the roadway and could lead to the Proposed Mining Development not being accessible via Road D1426 should the road not be maintained. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Potential impacts/risk may potentially be successfully ***managed (control)*** by implementing the following: • Management actions identified in the EMPr; and • Implement the proposed improvements as per Traffic Impact Assessment. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

• River and or drainage line crossings infrastructure removal or maintenance; • Storm water from access roads and erosion prevention; • Removal of contaminants from access roads; • Ripping, shaping and rehabilitation of access roads. **Final closure of mining pits:** • Monitoring of rehabilitated areas; • Final shaping, levelling, benching and stabilisation of mining pits; and • Importing and topsoil placement. **Decommissioning of Residue Stockpiles:** • Shaping, levelling, stabilising and capping of Residue Stockpiles; • Importing and topsoil placement; and • Active post decommissioning monitoring. • Importing of material to fill mining pit voids.								

Air Quality and Climate Change

ASPECT	AIR QUALITY & CLIMATE							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		
Demolition of mine related infrastructures: • Demolishing of mine offices, ablution facilities and medical station; • Demolishing of workshops, wash bays, fuel storage facilities and hazardous substance stores;	**Degradation of air quality** *Direct impact:* • Primary pollutants associated with the with the proposed mine poses a risk to contribute to the overall degradation of air quality. • 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.						Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* An impact verification statement cannot be determined from the baseline study and can only be determined through dispersion modelling. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Air quality impacts associated with the proposed project can only be determined through dispersion modelling. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Emissions of primary pollutants may potentially be ***mitigated*** (***controlled)*** in the following ways: • Development of a dust fallout monitoring and management plan; • Frequent Inspections; and

• Demolishing of storm water infrastructures; and • Importing and topsoil placement. **Dismantling of crushing and screening plant:** • Removal of temporary offices, ablution facilities and waste water management infrastructures; and • Removal of crushing and screening material; • Rehabilitation of laydown area; and • Importing and topsoil placement. **Rehabilitation of access roads, access control, demolishing weighbridge, and traffic:** • Increase in traffic from heavy vehicles during demolition activities; • Demolition of the weighbridge; • Movement of decommissioning plant and equipment; • River and or drainage line crossings infrastructure removal or maintenance; • Storm water from access roads and erosion prevention; • Removal of contaminants from access roads; • Ripping, shaping and rehabilitation of access roads. **Final closure of mining pits:** • Monitoring of rehabilitated areas; • Final shaping, levelling, benching and stabilisation of mining pits; and	<u>*Indirect impact:*</u> • Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities. <u>*Cumulative impact:*</u> • 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.							• Reporting and recording incidents related to air quality. 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. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.
		D	**E**	**M**	**P**	**S**		*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED*
								An impact verification statement cannot be determined from the baseline study, as this requires the quantification of GHG emissions and the activity's contribution to the carbon budget of South Africa.
								DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE
								Climate change impacts associated with the proposed project can only be determined through an emissions inventory and GHG calculations.
								DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED
	<u>**GHG & CO_2 emissions (direct and indirect)**</u> <u>*Direct Impact:*</u> • The usage of diesel operated mobile equipment being used during the construction and operational activities contributes directly to the applicant's 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). <u>*Indirect Impact:*</u> • 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 expects to consume about 180 000 litres of diesel per month. This equates to 38 880 000 litres over the 18-year LoM. 2.5% of the diesel used will be for the generators to generate electricity, while 7.5% will be used for mobile transport. The remaining 90% will be for the mining operations. Based on the use of a diesel combustion generator, GHG emissions can be expected over the duration of the LoM. • 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). <u>*Cumulative Impact:*</u> • Higher minimum, average and maximum temperatures over the next few decades Increased extreme weather events such as drought and floods. • Increased total annual rainfall by between 85 and 303 mm per year. • Increased water demand in Mpumalanga due to rapid industrialisation, mining, urbanization, and population growth will result in the province being unlikely to meet its water demand capacity.						Control	Emissions of primary pollutants may potentially be ***mitigated*** (***controlled)*** in the following ways: • Develop and maintain GHG & CO_2 emissions reporting policy; • Investigate alternative energy efficient measures; and • Monitor the GHG & CO_2 emissions throughout the entire life cycle of the proposed mine. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

• Importing and topsoil placement. **Decommissioning of Residue Stockpiles:** • Shaping, levelling, stabilising and capping of Residue Stockpiles; • Importing and topsoil placement; and • Active post decommissioning monitoring. • Importing of material to fill mining pit voids.								

Health and Safety

ASPECT	HEALTH AND SAFETY							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
Demolition of mine related infrastructures: • Demolishing of mine offices, ablution facilities and medical station; • Demolishing of workshops, wash bays, fuel storage facilities and hazardous substance stores; • Demolishing of storm water infrastructures; and • Importing and topsoil placement. **Dismantling of crushing and screening plant:** • Removal of temporary offices, ablution facilities and waste water management infrastructures; and • Removal of crushing and screening material; • Rehabilitation of laydown area; and • Importing and topsoil placement.	**Health effect of pollutants on community/employees** *Direct impact:* • 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. • Exposure of concentrations of $PM_{2.5}$, SO_2, NO_2, and CO over a period of time poses the risk of respiratory and cardiovascular diseases. • It is expected that potential impacts on air quality, and potential resultant impacts on the health of receptor communities, will be of primary interest. *Indirect impact:* • Increase in injury on duty or disabling injuries of employees. • 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. • Loss of productivity due to investigations into injuries or fatalities. • Influx of local cases of respiratory and cardiovascular diseases in the area. • Increase of cases of lung cancer. *Cumulative impact:* • Loss of human life.	D	E	M	P	S	Avoid	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* It is expected that potential impacts on air quality, and potential resultant impacts on the health of receptor communities, will be of primary interest. As part of the EIA phase, it has been predetermined that a Rapid Appraisal Health Impact Assessment (RAHIA) will be required. The main focus of the RAHIA is the impact of substances released or dispersed into air on the health of surrounding communities. Due to this focus, air dispersion modelling of the potential impact on air quality will be necessary. This should involve the potentially impacted geographical area, done according to the terms of reference for the Air Quality Impact Assessment (AQIA). *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Health impacts associated with the proposed project can only be determined and assessed during the EIA phase by undertaking the required RAHIA and AQIA. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* Potential impacts/risk to the health and safety may potentially be ***avoided*** by implementing the following: • Recommendations made by the Air Quality Impact Assessment; and • Develop and implement the Health, Safety, Environment, and Quality (HSEQ) management Plan throughout the entire life cycle of the proposed development. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

Rehabilitation of access roads, access control, demolishing weighbridge, and traffic: • Increase in traffic from heavy vehicles during demolition activities; • Demolition of the weighbridge; • Movement of decommissioning plant and equipment; • River and or drainage line crossings infrastructure removal or maintenance; • Storm water from access roads and erosion prevention; • Removal of contaminants from access roads; • Ripping, shaping and rehabilitation of access roads. **Final closure of mining pits:** • Monitoring of rehabilitated areas; • Final shaping, levelling, benching and stabilisation of mining pits; and • Importing and topsoil placement. **Decommissioning of Residue Stockpiles:** • Shaping, levelling, stabilising and capping of Residue Stockpiles; • Importing and topsoil placement; and • Active post decommissioning monitoring. • Importing of material to fill mining pit voids. **Employment of workers and employee management**								

(including contractors and service providers)								

Socio-economic

ASPECT	SOCIO-ECONOMIC							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
		D	E	M	P	S		
Demolition of mine related infrastructures: • Demolishing of mine offices, ablution facilities and medical station; • Demolishing of workshops, wash bays, fuel storage facilities and hazardous substance stores; • Demolishing of storm water infrastructures; and • Importing and topsoil placement. **Dismantling of crushing and screening plant:** • Removal of temporary offices, ablution facilities and waste water management infrastructures; and • Removal of crushing and screening material; • Rehabilitation of laydown area; and • Importing and topsoil placement. **Rehabilitation of access roads, access control, demolishing weighbridge, and traffic:** • Increase in traffic from heavy vehicles during demolition activities; • Demolition of the weighbridge; • Movement of decommissioning plant and equipment;	**<u>Socio-economic intrusions/Job opportunities and economic impacts/Population change/Sense of place/Community safety risks/Resource efficiency and community health</u>** <u>*Direct impact:*</u> • Influx of people and households related to those formally employed by the mine: demands on housing and social services. • Potential informal influx of people in the form of job seekers are anticipated: possible tension between groups and demonstrations. • Change in the social fabric of the community as a result of the proposed project: growth in town, tension between different social groups. • Increase in nuisance factors (noise and dust). • Community safety due to mining and infrastructure development. • A decrease/cessation in employment and community funds could negatively impact former beneficiaries. • Possible negative socio-economic intrusions. • Impact on localised individuals and groups in terms of employment and local procurement opportunities. • Possible increase in criminal activities due to people movement in the area during construction phase. • Resource efficiency is improved and optimised Health related impacts. <u>*Indirect impact:*</u> • 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. • Limited opportunities for local participation in labour supply during the construction phase of the project • Limited opportunities for local procurement during construction and operation. • Possible lack of available skills due to implementation of new international technology resulting in continued outsourcing of skills during construction and operational phases. • Possible social dissatisfaction with regards to no or limited job opportunities and local procurement associated with the proposed development. • Unfulfilled community expectations in terms of employment creation could result in social conflict • Possible inflow of jobseekers. • 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. • Movement of people in the area can increase criminal activity or opportunities for criminals. • Traffic accident risks due to mining related traffic flow. • Possible social dissatisfaction with regards to allocation of job opportunities and local procurement associated with the mining activities. • Increased tax income: Due to positive spin-offs on employment and income levels, it is expected that tax revenue to local, provincial and central government will occur. • Social funds for socio-economic development.						Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* Based on the outcome of the baseline assessment, social screening and site verification it was concluded that various socio-economic impacts can occur as a result of the proposed mining activities. Considering the site sensitivity verification of the site, the dominant agricultural land-use within the project area was identified as having a ***"very high sensitivity"*** from a socio-economic perspective. Loss of the resource use can occur which will result in high negative socio-economic consequences. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* The socio-economic impacts on the existing landowners will be ***"high (negative)"***, due to the loss in the land- and resource use. This will be difficult to mitigate and compensation may likely be the outcome. Negative impacts of a more moderate significance refer to demographic changes, nuisance factors, safety and security issues, increased pressure on public infrastructure and services, external costs (e.g. negative impacts on land-use, groundwater, air quality, biodiversity, traffic, road infrastructure, health and community safety) associated with mining, as well as the impact on the sense of place. At this stage, it is concluded that these impacts can be managed and mitigated to some extent. Positive impacts refer to employment and income due to the operation itself and due to supply-links with local suppliers, as well as possible job creation for low-income groups throughout the life of mine, availability of social funds for socio-economic development and subsequent positive impact on poverty levels. The positive impacts can be enhanced. Although attitude formation is not an impact per se, it serves an important indication of community sentiments toward the project. Attitudes can be defined as lasting, general evaluations of people. Attitudes can be formed through the individual's own experience and/or reports in the media. It could provide important information regarding the feelings and potential actions of Interested and Affected Parties (I&APs) that could become evident during the appeal period of the Environmental Impact Assessment process, and/or during the construction and operational phases of the proposed project. Initial responses to the project by the landowners in the area indicates that there is already some form of attitude formation against the proposed Vlakfontein project. These relate to opposition to the proposed development, due to the negative impacts on the land- and resource use, intrusions on the rural character of the area and possible devaluation of the property values, together with concerns regarding the possible negative environmental impacts. Issues raised should thus be seen as concerns, but also as inputs with regards to the way forward in terms of community involvement in the project and the detailed impact assessment phase. *DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED* The positive and negative impacts associated to the socio-economic impacts/risks may potentially be ***managed (controlled)*** through the effective planning and management of the following: • Landowner compensation and negotiation where directly effected; • Control through pre-construction planning and development of workers code of conduct, employment procurement policies and a skills development policy; • Ongoing open communication and expectation management of the local communities; • Management of social-economic intrusions;

• River and or drainage line crossings infrastructure removal or maintenance; • Storm water from access roads and erosion prevention; • Removal of contaminants from access roads; • Ripping, shaping and rehabilitation of access roads. **Final closure of mining pits:** • Monitoring of rehabilitated areas; • Final shaping, levelling, benching and stabilisation of mining pits; and • Importing and topsoil placement. **Decommissioning of Residue Stockpiles:** • Shaping, levelling, stabilising and capping of Residue Stockpiles; • Importing and topsoil placement; and • Active post decommissioning monitoring. • Importing of material to fill mining pit voids. **Employment of workers and employee management (including contractors and service providers)**	<u>*Cumulative impact:*</u> • Poor service delivery of municipal infrastructures. • Community unrest. • Job creation for local and district communities. • Local economic development. • Reduced access to livelihood resources. • Change in sense of place.							• Control through the management of job opportunities and skills development throughout the life cycle of the proposed development; • Management of population changes; and • Management of community safety. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

<u>*Waste Management*</u>

ASPECT	WASTE MANAGEMENT							
ACTIVITIES	POTENTIAL IMPACT/RISK	DESKTOP SIGNIFICANCE RATING (PRE-MITIGATION)					MITIGATION TYPE	MANAGEMENT AND/OR MITIGATION EXTEND SUMMARY
Demolition of mine related infrastructures: • Demolishing of mine offices, ablution facilities and medical station;	**<u>Waste generation/Increased pressure on municipal service delivery/Littering and illegal dumping</u>** <u>*Direct impact:*</u>	D	E	M	P	S	Control	*DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED* Implementation of the national waste management hierarchy (prevention, re-use, recycling, recovery and lastly disposal) will managed the identified protentional waste related impacts/risk associated with the proposed development. *DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE* Implementation and aligning management actions with a developed Waste Management Plan will reduce the significant effect of waste on the environment.

• Demolishing of workshops, wash bays, fuel storage facilities and hazardous substance stores; • Demolishing of storm water infrastructures; and • Importing and topsoil placement. **Dismantling of crushing and screening plant:** • Removal of temporary offices, ablution facilities and waste water management infrastructures; and • Removal of crushing and screening material; • Rehabilitation of laydown area; and • Importing and topsoil placement. **Rehabilitation of access roads, access control, demolishing weighbridge, and traffic:** • Increase in traffic from heavy vehicles during demolition activities; • Demolition of the weighbridge; • Movement of decommissioning plant and equipment; • River and or drainage line crossings infrastructure removal or maintenance; • Storm water from access roads and erosion prevention; • Removal of contaminants from access roads; • Ripping, shaping and rehabilitation of access roads. **Final closure of mining pits:**	• 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. • An increase in waste generation with disposal as the management measure increases the current strain on the municipal infrastructures. • Accidental spills or incorrect disposal of effluent from the chemical toilets used by the construction employees poses the risk of contaminating the surrounding natural environment. *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. • Due to the lack of capacity within the municipal landfill, the risk of illegally dumping general waste arises. *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.							DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED The impacts/risks associated with waste generation due to the proposed development may potentially be ***managed (avoided and or controlled)*** through the implementation of the following measures: • Avoid potential impact/risk through effectively implementing the existing Waste Management Plan and monitoring programme; • Avoid incident related to waste management activities by developing. • Implementing, and maintaining incident management and emergency preparedness plan; and • Control waste generation through record keeping. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.
		D	**E**	**M**	**P**	**S**		
	Leachates/ Wastewater effluent *Direct impact:* • Improper management of effluent and leachate from the Residue Stockpiles and RoM stockpiles may lead to the contamination of the surrounding natural environment. *Indirect impact:* • Contaminated effluent causes the degradation of soil and surface water quality. • 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 construction site having consequences on further downstream users.						Avoid	DEGREE TO WHICH IMPACT/RISK CAN BE REVERSED Implementation of the national waste management hierarchy (prevention, re-use, recycling, recovery and lastly disposal) will managed the identified protentional waste related impacts/risk associated with the proposed development. In order to understand the potential impact of leachates from the Residue Stockpiles, a Waste Classification of the waste rock material is required to determine the significant risks associated. This will be undertaken as part of the EIA phase. It is however, from a desktop perspective considered that if the area where the Residue Stockpiles are to be located is not suitably designed to manage the runoff and leachates, that it posed a ***"very high risk"*** of contaminating the surrounding environment. In addition, ***Acid Mine Drainage (AMD)*** is considered to be ***highly likely*** and will to be further assessed as part of the EIA phase. DEGREE TO WHICH IMPACT/RISK MAY CAUSE IRREPLACEABLE LOSS OF RESOURCE A suitably designed facility or storage area associated with the Residue Stockpiles and RoM has a potential to manage the risks associate with wastewater effluent and leachates to such an extend to prevent environmental contamination. If not managed suitably it is ***highly likely*** that the impacts cause a ***long-term significant impact*** and, in some instance, causes ***irreversible damages***. DEGREE TO WHICH IMPACT/RISK CAN BE AVOIDED, MANAGED OR MITIGATED The impacts/risks associated with waste generation due to the proposed development may potentially be ***managed (avoided and or controlled)*** through the implementation of the following measures: • Waste Classification of waste rock and designing a suitable facility to manage the waste stream; • Developing and suitably designing wastewater facilities to contain and/or prevent spillages or treatment of process water or contaminated water from/before entering the natural environment; • Obtaining the required Waste Management Licence in terms of GN.R 921 (GG 39020 dated 24 July 2015, as amended) and a Water Use Licence (WUL); • Avoid potential impact/risk through effectively implementing the existing Waste Management Plan and monitoring programme;

• Monitoring of rehabilitated areas; • Final shaping, levelling, benching and stabilisation of mining pits; and • Importing and topsoil placement. **Decommissioning of Residue Stockpiles:** • Shaping, levelling, stabilising and capping of Residue Stockpiles; • Importing and topsoil placement; and • Active post decommissioning monitoring. • Importing of material to fill mining pit voids.							• Avoid incident related to waste management activities by developing. • Implementing, and maintaining incident management and emergency preparedness plan; and • Control waste generation through record keeping. All mitigation options will be considered during the EIA phase to determine the degree to which the impact/risks can be avoided, managed, or mitigated.

VI) METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

(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 preliminary 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 75***.

Table 75: 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

VI) POSITIVE AND NEGATIVE IMPACTS THAT THE PROPOSED ACTIVITY (IN TERMS OF THE INITIAL SITE LAYOUT) AND ALTERNATIVES WILL HAVE ON THE ENVIRONMENT AND THE COMMUNITY THAT MAY BE AFFECTED

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

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

Recommendations was made by the specialist to conduct further investigations that will include field work that was not conducted as part of the desktop-scoping review process. See Section ***i)iii)*** **Table 74** for the specialist recommendations.

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

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

During the EIR and EMPr preparation a detailed management plan of each impact and risks identified in Section ***v)***. 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.

VIII) THE OUTCOME OF THE SITE SELECTION MATRIX (FINAL SITE LAYOUT PLAN)

(Provide a final site layout plan as informed by the process of consultation with interested and affected parties)

At the time of finalising the Scoping Report, no alternatives were assessed. However, based on the desktop sensitivity verification conducted by the various appointed specialist, a number of areas have been identified that will need to be avoided. As such, recommendations was made as to where the applicant should consider alternatives.

Find attached as ***Appendix C – Site Layout Plan, Sensitivities, and Land Use*** the final proposed site layout plan and alternatives that will be further assessed as part of the EIA phase..

IX) MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED

As discussed in Section ***i)*** 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, a number of alternatives regarding the placement of infrastructure within the property boundaries have been recommended and will be further investigated during the EIA phase.

The proposed alternative site layout (***Appendix C – Site Layout Plan, Sensitivities, and Land Use***) has been determined by considering both environmental and social sensitive receptors as well as considering operational feasibility.

X) STATEMENT MOTIVATING THE PREFERED SITE

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

As discussed in the previous sections, both environmental and social sensitive receptors were considered in the proposed site layout attached as ***Appendix C – Site Layout Plan, Sensitivities, and Land Use***.

As per ***Figure 5*** and discussed under Section ***f)*** of this report, 72% of the proposed mining pit as per the current layout plan is situated in an area restricting open cast or surface mining and 28% not permitted at all as per the MBSP. In terms of underground mining, the proposed mining pits is in areas where 72% is permitted and 28% is restricted.

It is therefore recommended that the feasibility of considering underground mining as supposed to above ground mining be investigated by the applicant. In the event of underground mining not being a feasible option, it is recommended that the applicant reduce its open cast mining pit and restricting it to areas of least concern (as per the recommended alternatives) and in line with the biodiversity objectives as define in the MBSP.

Alternatives recommended to be assessed during the EIA phase is attached as ***Appendix C – Site Layout Plan, Sensitivities, and Land Use***.

I) PLAN OF STUDY FOR THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The section to follow describes how the EIA process will be approach in the development of the EIR and EMPr.

I) DESCRIPTION OF ALTERNATIVES TO BE CONSIDERED INCLUDING THE OPTION OF NOT GOING AHEAD WITH THE ACTIVITY

As discussed in Section ***h)i)*** of this report, no property alternatives will be considered by the applicant as the proposed activities will occur on properties where the defined resource reef is situated.

As per ***Figure 5*** and discussed under Section ***f)*** of this report, 72% of the proposed mining pit as per the current layout plan is situated in an area restricting open cast or surface mining and 28% not permitted at all as per the MBSP. In terms of underground mining, the proposed mining pits is in areas where 72% is permitted and 28% is restricted.

Based on the outcomes of various of the appointed specialist desktop studies, it is clear that the proposed mine is situated in a very sensitive terrestrial and aquatic biodiversity. As per the current proposed site layout plan, the following are required to be taken into consideration:

- Mining pits – 57% of the proposed mining pits are situated in an area defined by the MBSP as a Terrestrial “CBA: Irreplicable”, 14% “Moderately Modified”, and 30 % “Heavily Modified”. From an aquatic biodiversity perspective, 42 % of the proposed mining pits is situated in a “Freshwater ESA”, 98% in an area classified as “Highly Significant” importance, 2% “Ecosystem Maintenance” and 16% as “Heavily Modified”. In addition, the proposed mine falls within the Upper Vaal strategic Water Resource Area (SWRA) and 84% falls within a catchment classified as a Freshwater Ecosystem Priority Area (FEPA). The wetlands identified in the surrounds are classified as "Critically Endangered", "Poorly Protected" or "Not Protected", and at high risk to a loss, with only the associated depressional (pan) system classified as "Least Concern". In terms of the Mining and Biodiversity Guideline (DEA *et al*, 2013), 72 % of the mining pit areas are situated in a zone defined by the MBSP as "Restricted" for "Surface Mining".

- RoM Stockpiles and Offices – The proposed location of the RoM Stockpiles and Offices are entirely situated in areas defined by the MBSP as a terrestrial "CBA: irreplaceable" and aquatic "Highly Significant".

The above is based on a desktop evaluation of the proposed site. At the time of finalising this Scoping Report, no onsite verifications (confirming or indicating the state) or alternative assessments were conducted. The proposed site layout plan assessed is in direct conflict with the biodiversity objectives as defined by the MBSP and various other sources guiding the decision makers, including the municipal IDP's, SDP's and EMF. The Draft National Biodiversity Offset Guideline (October 2021) defines a "fatal flaw" as a major defect or deficient in a project proposal that should result in an Environmental Authorisation being refused, and from a biodiversity perspective, a residual negative impact that would have a Very High significance rating. Various specialist highlighted that based on the desktop verification outcome, there is a high possibility that the proposed mine may be considered as a "fatal flaw" and recommended as a "No-Go" alternative.

It is therefore recommended that the feasibility of considering underground mining as supposed to above ground mining be investigated by the applicant. In the event of underground mining not being a feasible option, it is recommended that the applicant reduce its open cast mining pit and restricting it to areas of least concern (as per the recommended alternatives) and in line with the biodiversity objectives as define in the MBSP.

Alternatives recommended to be assessed during the EIA phase is attached as ***Appendix C – Site Layout Plan, Sensitivities, and Land Use***.

II) DESCRIPTION OF THE ASPECTS TO BE ASSESSED AS PART OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

(The EAP must undertake to assess the aspects affected by each individual mining activity whether listed or not, including activities such as blasting, Loading, hauling and transport, and mining activities such as Excavations, stockpiles, discard dumps or dams, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.).

In Section ***h)v)*** possible impacts and aspects associated to the proposed Vlakfontein Coal Mine have been predetermined. As part of the EIR and EMPr these impacts, and aspects will be explored further and mitigation and management measures will be developed to control reduce and or eliminate possible environmental impacts.

III) DESCRIPTION OF ASPECTS TO BE ASSESSED BY SPECIALIST

As part of the desktop studies undertaken by the appointed specialist, several aspects have been identified that will need to be assessed during the EIA phase. ***Table 74*** highlight the aspects identified.

Table 74: Aspects to be assessed by the appointed specialists

APPOINTED SPECIALIST	ASPECTS TO BE CONSIDERED
AGRICULTURAL AND SOIL	The proposed BCR Coal Vlakfontein Mine will involve both the operations of the open-cast coal mine as well as the development of associated infrastructure. The entire site as well as neighbouring sites will be impacted by the activities of the mine. Potential impacts to the soils and agricultural potential of the study site are associated with (i) the loss of agricultural land; (ii) soil compaction and exposure of topsoil which could lead to erosion and (iii) potential pollution of the soils as a result of both construction related activities for the associated infrastructure as well as the operations of the mine. Based on the information obtained during the desktop site sensitivity verification assessment, it is concluded that impacts of the proposed BCR Coal Vlakfontein Mine on the agricultural productivity within the study area will be both direct and indirect Direct loss of agriculturally productive land is likely to occur from the open cast mining operations as well as the development of associated infrastructure. Indirect impacts are likely on neighbouring properties, both from soil and water pollution sources, as well as an increase in air pollution and traffic within the area, having knock-on effects on the viability of agricultural operations within close proximity to the proposed mine. Further to this, the Preservation and Development of Agricultural Land Bill (2021) which has been introduced at the National Assembly and which aims to promote the preservation and sustainable development of agricultural land must be taken into consideration. The Bill seeks to prevent the fragmentation of agricultural land and to minimise the loss of agricultural land by promoting viable farming units and to encourage the optimal use of agricultural land for the promotion of food security, as well as increase the contribution of agriculture to the Gross Domestic Product. Given that the proposed BCR Coal Vlakfontein site is at least 70% agricultural productive and is located within an area dominated by agricultural activities, one must consider the aims of the Bill and minimise the loss of agriculturally viable land. The detailed Plan of Study (PoS) to be implemented by the specialist is explained in Section ***1) (a) IV***.
LANDSCAPE AND VISUAL ENVIRONMENT	Anticipated issues related to the potential visual impact of the proposed BCR Coal Vlakfontein mine include the following: • The potential visual impact of the construction of the facility and ancillary infrastructure on sensitive visual receptors in close proximity. • The visibility of the operational facility and ancillary infrastructure to, and potential visual impact on observers (homesteads and farmsteads) in close proximity.

	• The visibility of the operational facility and ancillary infrastructure to, and potential visual impact on observers within the region. • The visibility of the facility and ancillary infrastructure to, and potential visual impact on observers travelling along the national, main roads, as well as, secondary roads within the study area. • An investigation into the visibility of the mine to, and potential visual impact on residents of farm residences located within close proximity to the site. • The potential visual impact of operational, safety and security lighting of the facility at night on observers residing in close proximity to the facility. • The potential visual impact of the facility and ancillary infrastructure on the visual character of the landscape and sense of place of the region. • The visual absorption capacity of natural or planted vegetation (if applicable). • The potential to mitigate visual impacts. It is envisaged that the issues listed above may potentially constitute a significant visual impact at a local and/or regional scale. These need to be assessed in greater detail during the EIA phase of the project. The detailed Plan of Study (PoS) to be implemented by the specialist is explained in Section 1) (a) V.
ARCHAEOLOGICAL, CULTURAL, AND PALAEONTOLOGICAL	Based on the current information obtained for the area at a desktop level it is anticipated that any heritage resources that occur within the proposed development area will have a Local Significance (LS), Grade 3B or lower field rating and all sites should be mitigatable. Graves are of high social significance (Field rating GP A) and can be expected anywhere on the landscape. ***Table 17*** provides the expected impacts to be considered during the assessment phase. The detailed Plan of Study (PoS) to be implemented by the specialist is explained in Section ***1) (a) VI***.
TERRESTRIAL BIODIVERSITY – VEGETATION AND PLAN SPECIES	***Table 29*** summarises the potential impacts that will be further assessed during the EIA phase. The detailed Plan of Study (PoS) to be implemented by the specialist is explained in Section ***1) (a) VII***.
TERRESTRIAL BIODIVERSITY – MAMMAL AND INVERTEBRATE SPECIES	***Table 29*** summarises the potential impacts that will be further assessed during the EIA phase. The detailed Plan of Study (PoS) to be implemented by the specialist is explained in Section ***1) (a) VII***.
TERRESTRIAL BIODIVERSITY – HERPETOFAUNA SPECIES	The effects of the proposed mining operation on the herpetofaunal species will be assessed during the EIA phase.

TERRESTRIAL BIODIVERSITY - AVIFAUNAL SPECIES	The effects of any development on birds are highly variable and depend on a wide range of factors including the specification of the development, the topography of the surrounding land, the habitats affected and the number and diversity of species present. The principal areas of concern for SCC and non-SCC priority species related to the proposed development are listed below: • Displacement due to habitat loss in the physical BCR Coal Vlakfontein Mine and ancillary infrastructure footprint; • Displacement due to disturbance associated with establishment, construction, operation/maintenance and decommissioning of the proposed BCR Coal Vlakfontein Mine and its ancillary infrastructure; • Mortality due to collision with the power lines; • Mortality due to electrocution on the power line poles/towers; and • Mortality due to collision with motor vehicles. The aforementioned impacts will be described and assessed in detail, following the site survey to the proposed BCR Coal Vlakfontein Mine development area and PAOI during the EIA phase of the project process. The detailed Plan of Study (PoS) to be implemented by the specialist is explained in Section ***1) (a) VIII.***
AQUATIC BIODIVERSITY	Any activities associated with a natural system, whether historic, current, or proposed, will impact on the surrounding environment, usually in a negative way. The purpose of this phase of the study was to identify potential impacts associated with the proposed BCR Coal Vlakfontein Mine area. The following key issues are identified that needs to be assessed during the EIA phase: • ***Direct loss of wetland features*** - The presence of numerous wetland features within the proposed BCR Coal Vlakfontein Mine area is likely to result in the direct loss of some wetland systems. The proposed activity is further expected to 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. • ***Erosion and sedimentation of wetlands and watercourses*** - While the placement of various infrastructure associated with the proposed BCR Coal Vlakfontein Mine may not result in the direct loss of wetland habitat, activities associated with the establishment of the mine are likely to impact the adjacent and downstream wetlands 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 bulk density and therefore reduces the infiltration rate of stormwater into the soil profile. This leads to increase in overland flow and the increased likelihood of erosion gully formation and associated deposition of sediment within the associated wetlands. 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.

	• ***Water quality deterioration*** - 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 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 remaining wetlands and watercourses, affecting their ability to act as ecological corridors and provide ecosystem services within the larger 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. 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 uncontrolled 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. If no mitigatin measures are implemented following the completion of mining activities, the void of the opencast pits will be filled with unconsolidated material of differing physical properties. If there is an elevated pyrite content associated with fill material, these voids would start to generate sulphates and acid when the void fills with water. The mine drainage water exiting the mine area at the decant point then leads to the establishment of an acid and/or sulphate-rich seep, resulting in downstream water quality deterioration. This is of particular concern given the classification of the study area as being a SWSA, and origin of the Vaal River and mitigation measures would need to address this potential impact. • ***Loss of biodiversity*** - Mining activities, including blasting, is expected to result in the loss of biodiversity features within the immediate area, and as result, a depauperate aquatic biodiversity assemblage downstream of the proposed mining activities. This impact is of particular relevance given that currently undescribed fish species of potential conservation concern are known to be present within the reach of the Vaal River downstream of the proposed BCR Coal Vlakfontein Mine 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. Noise generated through mining activities is further expected to result in a localised decrease in amphibian species as a result of decreased mate attraction during breeding periods. The further likelihood of acid or sulphate-rich decant emanating from the filled void is further likely to result of a loss of aquatic diversity within the Vaal River system, resulting in the dominance of aquatic biota having a high tolerance to modified water quality, with the diatom assemblage expected to be dominated by species with a high affinity for industrially impacted waters and a high proportion of valve deformities. • ***Invasive alien plant species encroachment*** - Alien invasive trees and shrubs are expected to increase within the area as these species 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

<table>
<tr><td></td><td>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.
The detailed Plan of Study (PoS) to be implemented by the specialist is explained in Section 1) (a) VIII.</td></tr>
<tr><td>HYDROLOGY</td><td>The proposed site will result in the removal of soil surface cover and the presence of hard surfaces and drainage systems, which will accelerate flows and could result in the occurrence of erosion if storm water runoff is not properly controlled and disposed of. This could result in a deterioration in the water quality of downstream areas.

It is suggested that the two waste rock piles (soft), yellow polygon, be moved to the alternative location as indicated by the two green points (Figure 34). The reason for this is that the distance to the nearest water course will be increased, and the slope is decreased. This immediately reduces the risk of possible pollutants entering the system. This will increase the distance of the waste stockpiles from the 100m buffer, furthermore, it is recommended that a small area, circled in red be removed from the mining pit as this is also in close proximity to the water course. In the case of the rock pile on the eastern edge of the river, if it was moved to above the mining site, as per the green point, the risk would be virtually eliminated as any pollutants would flow into the mining site rather than the water course. The other infrastructure on the site appears to be in suitable location.

The detailed Plan of Study (PoS) to be implemented by the specialist is explained in Section 1) (a) IX.</td></tr>
<tr><td>GEOHYDROLOGY</td><td>It is expected that long term groundwater related impacts are expected at BCR Coal Vlakfontein Mining activities, and potentially include:
Lowering of the groundwater levels from dewatering resulting in a cone of depression (or dewatering) which may affect third party groundwater users.
Interception of ambient (and a decrease in) groundwater flow, which would under natural conditions discharge into the surface drainages, provided baseflow to the rivers, or contributed to deeper regional groundwater flow.
Exposure of sulphide bearing minerals (i.e., coal) during mining may negatively affect the ambient groundwater quality in the immediate vicinity of the Mine. Sources of pollution such may include stockpiles, discharges from mine workings and backfilled open pit (post-closure) (decant).
Opencast mining involves blasting and removal of the rocks overlying the coal layer, which is removed completely. The fragmented cover rock is then replaced (backfilled) and covered with soil and the terrain is landscaped ('rehabilitated'). Rainwater penetrating through the soil into the backfill becomes acidified by pyrite in the backfill material and can potentially decant to the surface.
As for most coal mines (in the Mpumalanga Highveld) there’s a risk for acid rock drainage and should be managed as such.
Diffuse pollution of groundwater from backfilled and flooded voids.</td></tr>
</table>

	The detailed Plan of Study (PoS) to be implemented by the specialist is explained in Section ***1) (a) X***.
NOISE	***Table 44*** and ***Table 45*** summarises potential impacts that will be further assessed during the EIA phase. The detailed Plan of Study (PoS) to be implemented by the specialist is explained in Section ***1) (a) XI***.
TRAFFIC	Based on the investigations conducted as part of this study, the following findings will require further investigation as part of the EIA phase: • Access to and from the Proposed Mining Development would be required from Road D1426 which is a gravel (unpaved) provincial class R4 road. Three viable access options (options 2, 3 and 4) were identified, therefore determining that access to and from the Proposed Mining Development would be possible from Road D1426. Access can potentially be provided for options 2, 3 and 4 from and to Road D1426. Access option 3 is deemed as the most suitable and therefore the recommended point of access based on: o The available sight distances. o The proposed layout of the Proposed Mining Development (where infrastructure will be located). o From a road geometric perspective. • Road D1426 is currently a gravel road between Points A and C, providing access from and to farms within the area, and as proposed in the future to the Proposed Mining Development. Broader access by Road D1426 is provided to Road N17 on the south, and Road R36 on the north. Currently Road D1426 is in a poor state from the northern boundary of the Proposed Mining Development (Point B) up to Point C. • In general, no public transport is available within the area of the Proposed Mining Development along Road D1426, with the nearest possible public transport operations available being approximately 16 kilometres to the north of the Proposed Mining Development at Breyten. Depending on where workers will be sourced from, workers of the Proposed Mining Development might have difficulties to get to and from work if making use of public transport. • The existing intersections investigated (Points A and C) does not have dedicated right-turn lanes. • Intersection performance evaluations concluded that the relevant existing intersections with existing vehicle traffic volumes are currently operating at acceptable levels of service and would remain relevant for at least the next ten years with an anticipated background vehicle traffic growth (which includes latent developments) of 3% per annum. • Reserve vehicle capacity along Roads N17, R36 and D1426 is available and is anticipated to remain relevant for the next ten years. The detailed Plan of Study (PoS) to be implemented by the specialist is explained in Section ***1) (a) XII***.
CLIMATE CHANGE	During the EIA phase, GHG emissions will be calculated taking the following into consideration: • *Blasting* – BCR Coal expects to use explosives to break through the hard overburden, as well as blasting of the coal seams. • *Diesel consumption* – Diesel consumption is expected to be 180 000 litres per month.

	• *Liquefied Petroleum Gas (LP Gas) consumption* – It is expected that 2 000 kg of LP Gas (used on a rental basis from a service provider) will be consumed by the mine per month, which equates to 432 000 kg (432 tonnes) over the 18-year LoM. GHG emissions can be expected from the use of LP Gas. • *Electricity consumption* – The mine will have 2 stationary generators (with 1 being a back-up generator). The mine expects to consume about 4 500 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). GHG emissions thereof will be included under diesel consumption. In future grid electricity may be used. Information has not been provided on whether the mine will make use of grid (Eskom) electricity on-site during future operations. The current mine works plan indicates that electricity will be generated from the two stationary generators. • *Construction of infrastructure onsite* – Infrastructure expected to be constructed onsite include a workshop, administration office, security and access control area, onsite change houses / ablution facilities, contractor yard, surface water management areas (such as stormwater diversion berms and trenches, pollution control dams), storage areas, etc. • *Sewage treatment* – A sewage treatment plant is not planned on being installed, however there will be a septic tank. • *Waste* – The mine will undertake temporary handling and storage of general and hazardous waste on-site. Hazardous waste may include oils, chemical waste, lubricants, fuels, explosives, raw material stockpiles, etc. General non-hazardous waste may include office waste, food waste, scrap metal, plastics and wood waste. It is assumed that this will either be collected by an external contractor or transported by the mine to a landfill site capable of handling hazardous waste. • *Other indirect GHG emissions* – The impact of other indirect GHG emissions cannot be assessed at this stage, however, will have an impact. • *Other impacts on climate change* – During the construction and operational phases, 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 following climate change impacts can be anticipated to affect the mine (MSDF, 2018): • Higher minimum, average and maximum temperatures over the next few decades Increased extreme weather events such as drought and floods • Increased total annual rainfall by between 85 and 303 mm per year • Increased water demand in Mpumalanga due to rapid industrialisation, mining, urbanization, and population growth will result in the province being unlikely to meet its water demand capacity As discussed by Ruttinger (2016), key climatic impacts on various stakeholders across the resources sector, can include, but are not limited to:

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Increased demand for water conservation during droughts;
Increased demand for emergency services during flood events;
Reduced asset operating life;
Health and Safety risks for workforce;
Inability to meet performance targets resulting in impacts on share prices;
Increased demand for changing infrastructure design standards;
Increase in costs of water;
Disrupted access routes, leading to forced mine closures;
Potential employment loss due to lack of safe access to sites;
Conflicts with other water users in the region over water availability;
Force Majeure, sometimes also leading to disputes around delivery obligations; and
Supply chain breakdowns.

The potential impact of climate change remains uncertain, and it is not possible to predict specific trends of the possible impacts it may have on the area. However, it can be anticipated that seasonal variations and fluctuations in water availability may increase. The variations between wet and dry periods may also become more pronounced and severe.
Flooding associated with high rainfall events has the potential to result in unplanned discharges from water storage dams at the operations. Infrastructure at Vlakfontein Opencast Mine such as buildings, storm water controls, water dams, wastewater collection and treatment systems, tailings and waste disposal ponds, transportation infrastructure such as river crossings and roads can all be easily affected by extreme conditions caused by changes in weather patterns.
Therefore, based on the above, adverse impacts that may occur could be increased temperatures resulting in heat waves, drought resulting in drying up of water resources (despite additional rainfall expected), and possible flooding in the area (depending on the site location versus the adjacent river). Therefore, the mine needs to take these impacts into consideration, and possibly consider what mitigation measures they could put in place to reduce these potential impacts.
The detailed Plan of Study (PoS) to be implemented by the specialist is explained in Section 1) (a) XIII.
</td></tr>
<tr><td>AIR QUALITY</td><td>It is expected that emissions from activities at the proposed mine will most likely result in air quality impacts in terms of dustfall, PM_{10} and $PM_{2.5}$.
Few existing key sources of air pollution surrounding the project site were identified during a desktop exercise and include (Figure 68 and Figure 69):</td></tr>
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	• Agricultural activity (temporary crops) and potential biomass burning ((surrounding areas); • Planted forest (surrounding areas); • Solid fuel combustion in nearby townships/informal settlements (south-west and north-west quadrants); and • Vehicle dust entrainment on unpaved roads (surrounding areas). Waste and resource dumps and permanent agricultural activities were identified as additional sources of air pollution in surrounding areas but to a minimal extent. Waste and resource dumps are in localised areas north, west, south-west and south of the proposed mine within a 7 – 20km radius, while permanent agricultural activities occur over 3 very small areas south-east, north-west and north-east of the proposed mine within a 5 – 20km radius.
HEALTH	With regard to the BCR Coal open pit mining operation, it is expected that potential impacts on air quality, and potential resultant impacts on the health of receptor communities, will be of primary interest. The main focus of the RAHIA is the impact of substances released or dispersed into air on the health of surrounding communities. Due to this focus, air dispersion modelling of the potential impact on air quality will be necessary. This should involve the potentially impacted geographical area, done according to the terms of reference for the Air Quality Impact Assessment (AQIA), by air quality specialists appointed by EMA.
SOCIO-ECONOMIC	Table 66 outlines the potential impacts and possible risks associated with the proposed project. These impacts and risks are based on existing baseline information. There is thus always an uncertainty with regards to the anticipated impact actually occurring, as well as the intensity thereof. Impact predictions have been made as accurately as possible based on the information available at the time of the study. Further studies would be required as part of the detailed phase of the project. The detailed Plan of Study (PoS) to be implemented by the specialist is explained in Section ***1) (a) XVI***.

Proposed method of assessing the environmental aspects including the proposed method of assessing alternatives. Environmental Management Assistance (Pty) Ltd as the appointed EAP took an [26]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.

The impact assessment will provide a full description of all environmental issues and risks identified during the EIA process. Secondly it will provide the assessment of the significance (as summarised in Section ***h)v)*** of this report) of each issue and risk according to the methodology discussed in section ***0*)** of this report. Lastly, it will provide with an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.

IV) THE PROPOSED METHOD OF ASSESSING DURATION SIGNIFICANCE

The same approach as described in section **vi)** will be used to assess the duration significance.

V) THE STAGES AT WHICH THE COMPETENT AUTHORITY WILL BE CONSULTED

The competent authority will be consulted throughout the EIR and EMPr process. All correspondence from and to the registered I&AP will be forwarded to the authority.

VI) PARTICULARS OF THE PUBLIC PARTICIPATION PROCESS WITH REGARD TO THE IMPACT ASSESSMENT PROCESS THAT WILL BE CONDUCTED

The process as outlined in Section ***h)ii)*** will be conducted during the Impact Assessment process. The process followed are in line with the NEMA 2014 EIA regulations and relevant PPP guidelines.

A detailed PPP Report providing all records to date of the process that has been implemented is attached as ***Appendix E – Public Participation***.

1. STEPS TO BE TAKEN TO NOTIFY INTERESTED AND AFFECTED PARTIES

(These steps must include the steps that will be taken to ensure consultation with the affected parties identified in (h) (ii) herein).

As discussed in Section ***h)ii)***.

Proof of notifications and engagement to date is attached as ***Appendix E – Public Participation***.

[26] 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.*

2. DETAILS OF THE ENGAGEMENT PROCESS TO BE FOLLOWED

(Describe the process to be 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 and records of such consultation will be required in the EIA at a later stage)

As discussed in Section ***h)ii)***.

Proof of notifications and engagement to date is attached as ***Appendix E – Public Participation***.

3. DESCRIPTION OF THE INFORMATION TO BE PROVIDED TO INTERESTED AND AFFECTED PARTIES

(Information to be provided must include the initial site plan and sufficient detail of the intended operation and the typical impacts of each activity, to enable them to assess what impact the activities will have on them or on the use of their land)

As discussed in Section ***h)ii)***.

Records of information shared to date is attached as ***Appendix E – Public Participation***.

VII) DESCRIPTION OF THE TASKS THAT WILL BE UNDERTAKEN DURING THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

As discussed in the previous sections in this report, all possible impacts and aspects associated with the propose mine will be assessed by the EAP and appointed Specialist.

Mitigation and management measures will be developed to reduce, avoid, and remedy all potential environmental impacts.

These findings will be discussed in the final EIR and EMPr that will be distributed for the required 30-days public comment period. Any comments received from the registered I&AP will be included in the final EIR and EMPr and be submitted to the competent authority for a decision to be made.

VIII) MEASURES TO AVOID, REVERSE, MITIGATE, OR MANAGE IDENTIFIED IMPACTS AND TO DETERMINE THE EXTENT OF THE RESIDUAL RISKS THAT NEED TO BE MANAGED AND MONITORED

Section ***1) h)v)*** of this report identified a number of potential impact/risks associated with the proposed development. These risks/impacts require further assessment and will be determined during the EIA phase.

Table 75 summarises the potential impacts and provides for the proposed mitigation type. This will however require further assessment and confirmation during the EIA phase.

Table 75: Measures to avoid, reverse, mitigate, or manage identified impacts and to determine the extent of the residual risks that nee to be managed and monitored

ACTIVITY whether listed or 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.).*	**POTENTIAL IMPACT** *(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc…)*	**MITIGATION TYPE** (*modify, remedy, control, or stop) through* *(e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc)*	**POTENTIAL FOR RESIDUAL RISK**
Site footprint & location of mining related infrastructure: • Locality selection of contractor's yard, mine offices and ablution facilities; • Locality of workshops, wash bays and hazardous substance stores; • Locality of pollution control facilities; and • Locality of access roads. **Stormwater Infrastructure:** • Stormwater infrastructure design and location. **Fencing and access control:** • Demarcation of mining related areas;	Potential impacts/risks associated with Soil and Agriculture: • Degradation of soil resources and loss of agricultural land; and • Hydrocarbon/soil contamination.	Control/Remediate	***Very High***
	Potential impacts/risks associated with the Landscape and Visual environment: • Visual disturbance on sensitive visual receptors; • Lighting impacts; and • Topography and visual alterations.	Control/Remediate	***Medium***
	Potential impacts/risks associated with Archaeology, Culture and Palaeontology:	Avoid	***Low***

• Fencing; and • Access control. **Clearing of development footprint:** • Clearing and grubbing; • Topsoil and subsoil stripping; and • Excavations associated with infrastructure. **Site establishment:** • Laydown areas; • Temporary offices including the contractors yard; and • Ablution facilities **Access roads, access control and traffic:** • Hauling of construction material to and from site; • Increase in traffic from heavy vehicles; • Movement of construction plant and equipment; • River and or drainage line crossings; and • Storm water from access roads. **Temporary hazardous substances stores** **Employment of workers and employee management (including contractors and service providers)** **Relocation of peoples currently occupying properties associated with the proposed mine**	• Loss of heritage and sites of cultural importance; and • Loss of Palaeontological resources.		
	Potential impacts/risks associated with Terrestrial Biodiversity: • Disturbance to Terrestrial Biodiversity; • Influx of alien and invasive species; • Increased risk of fire risks/veldt fires; and • Limiting faunal movement.	Avoid/Remediate/Offset	***Very High***
	Potential impacts/risks associated with Aquatic Biodiversity: • Loss of aquatic biodiversity; • Direct loss of wetland features; • Erosion and sedimentation of wetlands and drainage lines; • Water quality deterioration and or contamination of water resources; • Invasive alien plant encroachment; • Alteration of drainage patterns; and • Destruction of upstream tributaries and reduction in water in the catchment.	Avoid/Remediate/Offset	***Very High***
	Potential impacts/risks associated with Ground and Surface Water Resources: • Degradation of natural water resources; • Water resource contamination; • Water level reduction;	Avoid/Remediate/Offset	***Very High***

Blasting and opencast excavations: • Topsoil and subsoil stripping; • Blasting and removal of overburden; • Trucking and shovelling raw materials; and • Safety benching construction. **Residue, RoM and Product, and Topsoil Stockpiles:** • Surface and wastewater management; and • Importing and exporting material from stockpiles. **Access roads, access control, weighbridge, and traffic:** • Importing and exporting RoM and product from operational areas; • Increase in traffic from heavy vehicles; • Traffic management at weighbridge; • Movement of operational plant and equipment; • River and or drainage line crossings; and • Storm water from access roads. **Workshops, wash bays, fuel storage, generator and hazardous substance stores:** • Mine vehicle and equipment servicing; • Washing of mine equipment and vehicles; • Storing, decanting and fuel use; • Electricity generation using the generator; and	• All impacts listed under Aquatic Biodiversity.		
	Potential impacts/risks associated with Noise: • Noise generation	Control	***Low to Very High***
	Potential impacts/risks associated with Traffic: • Increased pressure on local roads; and • Degradation of road infrastructure.	Control	***Low***
	Potential impacts/risks associated with Air Quality and Climate Change: • Degradation of air quality; and • GHG and CO2 emissions.	Control	***TBA***
	Potential impacts/risks associated with Health and Safety: • Health effects of pollutants on community/ employees.	Avoid/Control	***TBA***
	Potential Socio-economic impacts/risks: • Socio-economic intrusions; • Job opportunities and economic impacts; • Population change; • Sense of place; • Community safety risks; and • Resource efficiency and community health.	Control/Compensate	***Medium to High***
	Waste Management impacts/risks: • Waste generation;	Avoid/Control	***Very High***

• Storing, handling and transport of hazardous substances. **Crushing and screening of raw materials:** • Storm water management within the laydown area; • Access and layout control; and • Servicing of crushing and screening equipment. **Water supply and storage and power supply:** • Borehole abstraction for office use; • Re-use of process water for dust suppression; • Storage of water in conservancy tanks for domestic use; and • Overhead transmission lines to supply electricity to mine offices and laydown areas. **Backfilling and concurrent rehabilitation of the mining pits:** • Backfilling, levelling and rehabilitation of mining pits; and • Importing of material to fill mining pit voids. **Demolition of mine related infrastructures:** • Demolishing of mine offices, ablution facilities and medical station; • Demolishing of workshops, wash bays, fuel storage facilities and hazardous substance stores; • Demolishing of storm water infrastructures; and • Importing and topsoil placement. **Dismantling of crushing and screening plant:**	• Increased pressure on municipal service delivery; • Littering and illegal dumping; and • Leachate and waste water generation.		

• Removal of temporary offices, ablution facilities and waste water management infrastructures; and • Removal of crushing and screening material; • Rehabilitation of laydown area; and • Importing and topsoil placement. **Rehabilitation of access roads, access control, demolishing weighbridge, and traffic:** • Increase in traffic from heavy vehicles during demolition activities; • Demolition of the weighbridge; • Movement of decommissioning plant and equipment; • River and or drainage line crossings infrastructure removal or maintenance; • Storm water from access roads and erosion prevention; • Removal of contaminants from access roads; • Ripping, shaping and rehabilitation of access roads. **Final closure of mining pits:** • Monitoring of rehabilitated areas; • Final shaping, levelling, benching and stabilisation of mining pits; and • Importing and topsoil placement. **Decommissioning of Residue Stockpiles:** • Shaping, levelling, stabilising and capping of Residue Stockpiles;			

• Importing and topsoil placement; and • Active post decommissioning monitoring.			

L) OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

At the time of finalising this report for public comment, no specific information was requested by the competent authority.

l) 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 EIR and EMPr that will follow this report will fulfil 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)

As part of the scoping phase the following desktop studies took place:

- Socio-economic assessment (***Appendix F. 11 - Socio-economic Assessment***); and
- Health impact assessment (***Appendix F.10 - Health Assessment)***.

The applicant also compiled a Social and Labour plan (***Appendix D – Social and Labour Plan***) for the proposed mine.

A summary of the desktop outcomes of the above specialist assessments are provided in Section ***1) (a) XV*** and ***XVI*** respectively.

(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 desktop Heritage Impact Assessment is attached as ***Appendix F.3 - Archaeological, Cultural and Palaeontology Assessment.*** Section ***1) (a) 0*** summarises the findings and recommendations made by the specialist investigation.

M) 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 indicated in previous sections, it is recommended that the proposed alternatives as per ***Appendix C – Site Layout Plan, Sensitivities, and Land Use*** be further assessed during the EIA phase.

J) UNDERTAKING REGARDING CORRECTNESS OF INFORMATION

I, **Anandi Alers**, herewith undertake that the information provided in the foregoing report is correct, and that the comments and inputs from stakeholders and Interested and Affected parties have been correctly recorded in the report.

Signature of the EAP
DATE: 16 August 2022

K) UNDERTAKING REGARDING LEVEL OF AGREEMENT

I, **Anandi Alers**, herewith undertake that the information provided in the foregoing report is correct, and that the level of agreement with interested and Affected Parties and stakeholders has been correctly recorded and reported herein.

Signature of the EAP
DATE: 16 August 2022

-END-

APPENDIX A – EAP QUALIFICATIONS AND TEAM MEMBERS

APPENDIX B – LOCALITY MAP

APPENDIX C – SITE LAYOUT PLAN, SENSITIVITIES, AND LAND USE

APPENDIX D – SOCIAL AND LABOUR PLAN

APPENDIX E – PUBLIC PARTICIPATION

APPENDIX F – SPECIALIST STUDIES

APPENDIX F.1 – AGRICULTURAL ASSESSMENT

APPENDIX F.2 – LANDSCAPE AND VISUAL ASSESSMENT

APPENDIX F.3 - ARCHAEOLOGICAL, CULTURAL AND PALAEONTOLOGY ASSESSMENT

APPENDIX F.4 – TERRESTRIAL BIODIVERSITY

APPENDIX F.4.1 – DESKTOP VEGETATION AND PLANT SPECIE ASSESSMENT

APPENDIX F.4.2 – MAMMAL AND INVERTEBRATE DESKTOP ASSESSMENT

APPENDIX F4.3 – HERPETOFAUNAL DESKTOP ASSESSMENT

APPENDIX F4.4 – AVIFAUNAL DESKTOP ASSESSMENT

APPENDIX F.5 – AQUATIC BIODIVERSITY & WETLANDS

APPENDIX F.6 – HYDROLOGICAL ASSESSMENT

APPENDIX F.7 – NOISE ASSESSMENT

APPENDIX F.8 – TRAFFIC ASSESSMENT

APPENDIX F.9 – CLIMATE ASSESSMENT

APPENDIX F.10 - HEALTH ASSESSMENT

APPENDIX F. 11 - SOCIO-ECONOMIC ASSESSMENT

APPENDIX F.12 - AIR QUALITY ASSESSMENT

APPENDIX F.13 – GEOHYDROLOGICAL ASSESSMENT

APPENDIX G – EAP DECLARATION