Ilima Coal Company Kranspan Mining Right Extension, Near Carolina, Mpumalanga Province

Draft Environmental Impact Assessment Report

March 2023

ABS Africa
Sustainability Advisors

EXECUTIVE SUMMARY

INTRODUCTION

This Executive Summary provides a summary of the Environmental Impact Assessment Report (EIAR) compiled and distributed for review and comment as part of the Scoping and EIA process that is being undertaken for a proposed extension of the Kranspan Mine near Carolina, Mpumalanga.

The Scoping and EIA process is a planning tool that is used to assess the potential impacts of a development on the physical, biological and socio-economic environment in which the land use and infrastructure development is proposed.

The process strives to identify and, where possible, quantify the negative impacts of a development before it takes place so that these negative impacts can ideally be avoided or at least reduced through engineering design modifications, operational controls or other mitigation measures. The process also seeks to identify opportunities for enhancing the positive impacts of a development. In addition, the process seeks to inform and consult those who may be affected by the proposed development and to provide an opportunity for people to be involved in the decision-making process regarding the proposed development.

The Scoping and EIA process consists of two phases, a Scoping Phase and an EIA Phase. The EIAR presents the information applicable to the EIA Phase. Legislation[1] requires that the Scoping and EIA process must be conducted by an independent Environmental Assessment Practitioner (EAP). ABS Africa has been appointed as the EAP.

PROJECT OVERVIEW

The Applicant, Ilima Coal Company (Pty) Ltd. (Ilima), is the holder of Mining Right "MP 30/5/1/2/2/10224 MR" for coal minerals over the Farm Kranspan 49 IT. Ilima has applied for the variation of their approved Mining Right Area (MRA) by incorporating two adjacent Prospecting Right Areas (PRAs), namely Farm Vaalbank 212 IS and Farm Roodebloem 51 IT.

The planned operations on the proposed extension areas entail surface mining of the coal seams as well as the establishment of various mine support infrastructure. Based on the mine planning studies completed to date, the following is proposed:

- Surface (opencast) mining focusing on extraction of the B, CL and E Seam via the roll over mining method;
- Besides the opencast mining; haul roads, temporary topsoil and overburden stockpiles, ROM stockpiles and pollution control dams will be established on the proposed extension areas as part of the mining process. In addition, temporary container-type office and ablution facilities and potable water abstraction boreholes will be established;
- A coal wash plant with filter press will be established on Farm Roodebloem to process the export coal product. Dry crushing and screening of the local coal product (sold to Eskom) will take place at the existing dry screening and crushing coal plant at the Kranspan Mine; and
- Dewatering of seepage water will be required for the surface mining over the Life of Mine (LoM). Water removed from pits will be retained in pollution control dams and used for mine activities.

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[1] The Environmental Impact Assessment Regulations, 2014 (as amended)

Below is a summarised list of the proposed mining activities to be undertaken on the proposed extension areas.

- Exploration geophysical surveying, drilling, pit sampling and trenching;
- Clearing and grubbing;
- Topsoil removal and stockpiling;
- Overburden removal and stockpiling;
- Drilling and blasting (when necessary);
- Excavation of coal and material transfer to a coal stockpile area;
- Beneficiation of the export coal product; and
- Loading, hauling and transport of coal product.

EXISTING AUTHORISATIONS

The existing Kranspan Mine currently operates in accordance with the following key authorisations:

- A Mining Right in terms of the Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA). The Mining Right was granted by the Department of Mineral Resources and Energy (DMRE) on 05 April 2022 as per reference "MP 30/5/1/2/2/10224 MR";
- An Integrated Environmental Authorisation (EA) and an approved Environmental Management Programme Report (EMPr) in terms of the National Environmental Management Act (Act No. 107 of 1998), as amended (NEMA) and National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM:WA). Authorisation was granted by the DMRE on 09 November 2021 as per reference "(MP) 30/5/1/2/3/2/1/ (10224) EM)"; and
- An Integrated Water Use License (IWUL) in terms of the National Water Act (Act No. 36 of 1998) (NWA). The IWUL was granted by the Department of Water and Sanitation (DWS) on 23 September 2021 as per reference 05/X11B/ACGIJ/10834.

REQUIRED AUTHORISATIONS

A Section 102 amendment application process as per the MPRDA is required for the variation to the existing Kranspan MRA. The proposed Section 102 amendment application requires the following environmental approvals:

- The intended coal mining and mine support activities trigger various listed activities identified in Listing Notice 1, 2 and 3 of the 2014 EIA Regulations (as amended) and in Category B of the List of Waste Management Activities (GN No. 921, as amended);
- These listed activities require an EA and a Waste Management Licence (WML) to be granted prior to the activities commencing. To inform the applications for an EA and a WML, legislation[2] requires that a Scoping and EIA process be undertaken;
- In terms of the Regulation 31 and 37 amendment process of the 2014 EIA Regulations (as amended), the existing EA and EMPr will be consolidated with this application as per the NEMA; and
- An Integrated Water Use Licence Application (IWULA) in terms of the NWA will be required for various water uses in terms of Section 21 of the NWA.

[2] The Environmental Impact Assessment Regulations, 2014 (as amended)

Need and Desirability

Security of energy supply is recognised throughout the world as a key factor for the economic and social development of a country. Being an abundant and cheap source of energy for local electricity production, coal continues to significantly contribute to South Africa's economic development. Coal in South Africa is in high demand as it is needed by Eskom locally and it is also exported to other countries. With the impact of the Covid-19 pandemic in 2020, worldwide coal production declined by 4.8% due to lower electricity demand during lockdown as well as growth in renewable generation and low gas prices. The IEA Coal (2021) Report expected global coal-fired power generation to increase by 9% in 2021, recovering to above 2019 levels. However, production increases in 2021 were hampered by, among other things, adverse weather conditions, supply chain disruptions and Covid-19 containment measures. With demand increasing faster than production, resulting in coal supply shortages, large coal-producing countries were expected to boost efforts to expand their output. Coal production is forecast to reach an all-time high in 2022 and then plateau as demand flattens.

At present, coal provides more than 75% of the country's electricity requirements. In addition, the critical shortage of anthracite-grade coal, used in steel production, has resulted in record prices for this commodity. Hence, the need to mine coal in South Africa is justified. In terms of the 2019 Integrated Resource Plan, it can be concluded that the demand for coal for use in the electricity sector is projected to decrease over time as other primary energy sources and the related installed generation capacity is established. However, this shift will not happen in the near future. There will be a need for coal for the country's power generation requirements for at least the next two decades.

Project Alternatives

The extension areas have been selected based on the availability of coal, access to mineral rights and proximity to the existing Kranspan Mine. No other site alternatives were identified.

The placement of the proposed surface infrastructure and opencast mining areas was informed by the findings from the various specialist studies which developed an environmental sensitivity plan which considered the locations of identified sensitive physical, social and environmental features within the Mining Right Extension surface area. The environmental sensitivity plan resulted in several changes to the initial site layout plan, and a final (preferred option) site layout plan was developed and assessed in the EIAR.

EIAR Public Review Period

The public participation process for the proposed project is governed by NEMA and GN No. R. 982 of the 2014 EIA Regulations, as amended. In order to provide opportunities for Interested and Affected Parties (IAPs) to participate in the Scoping and EIA process, including the site selection and alternatives analysis process, IAPs were informed of the details of the EIAR review period via newspaper adverts, site notices, e-mails, SMS and/or hand delivered letters.

The Draft EIAR has been available for public review and comment for a period of 30 days from **03 April 2023 to 08 May 2023**. The report is available as follows:

- By download: http://www.abs-africa.com/project-documents/;
- By e-mail on request: consultation@abs-africa.com; and
- Hard copies are available publicly for review at the Carolina Public Library, 11 Voortrekker Street, Carolina.

Comments on the Draft EIAR may be sent to ABS Africa via one of the contact channels provided below by no later than **08 May 2023** in order for the comments to be addressed and included in the Final EIAR.

ABS AFRICA (PTY) LTD. CONTACT DETAILS	
Contact Person:	Ms. Louisa de Wet
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Baseline Environment

A general description of the status quo of the receiving environment in the project area is provided from the specialist studies undertaken. It also allows for an appreciation of sensitive environmental features and possible receptors of the effects of the proposed Kranspan Mining Right Extension Project.

The following environmental features have been considered:

- Climate;
- Topography;
- Geology;
- Soils and Agricultural Land Capability;
- Hydropedology;
- Terrestrial Ecology (Flora);
- Terrestrial Ecology (Fauna);
- Surface Water;
- Groundwater;
- Air Quality;
- Environmental Noise;
- Heritage and Palaeontological Resources;
- Visual Aesthetics; and
- Socio-Economic Environment.

Identified Potential Impacts

Potential impacts of the proposed Kranspan Mining Right Extension Project on the baseline environment were identified through the following:

- An appraisal of the project activities and components;
- Impacts associated with listed activities;
- An assessment of the receiving biophysical, social, economic and built environment;
- Findings from specialist reports;
- Issues highlighted by authorities; and
- Comments received during public participation from IAPs.

A summary of the potential environmental impacts is provided below.

NO.	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	SIGNIFICANCE (IF MITIGATED)
1	Greenhouse Gas Emissions	Climate	Operation	Low	Low
2	Change in topography of the area which could have impacts on the sense of place and visual aesthetics as well as potentially intercepting natural runoff	Topography	Construction and Operation	Low-Medium	Low
	Topography will be (as far as practically possible) restored to that of the pre-mining state, and must be free draining		Rehabilitation	Medium-High (+)	Medium-High (+)
3	Underlying geology will be affected in that mineral resources will be lost	Geology	Construction and Operation	Medium-High	Very Low
4	The construction phase for the proposed contractor's yards, office areas and haul roads will lead to compaction and erosion of soil resources due to altered surface dynamics, the presence of hardened surfaces and general degradation of soil resources, which could result in the loss of land capability.	Soils and Agricultural Land Capability	Construction	Medium-High	Low-Medium
	The operational phase for the proposed contractor's yard, office areas and haul roads will lead to compaction and erosion of soil resources due to altered surface dynamics, increased traffic, foot movement and the general presence of foundations, which could result in the loss of land capability.		Operation	Low-Medium	Low
	The decommissioning phase for the proposed contractor's yard (office areas and haul roads) will lead to compaction and erosion of soil resources predominantly due to increased traffic, demolition of buildings and other infrastructure etc. which could result in the loss of land capability.		Decommissioning (Including Rehabilitation)	Low-Medium	Low
	During construction, stockpiles will lead to compaction and erosion of soil resources due to altered surface dynamics, the increased volume of traffic (dump trucks in specific) and general degradation of soil resources, which could result in the loss of land capability.		Construction	Low-Medium	Low
	During operation, stockpiling will lead to compaction and erosion of soil resources due to the sheer weight of the stockpiles, the slope of the stockpiles which will induce overland flow and increased traffic which could result in the loss of land capability.		Operation	Medium-High	Low-Medium
	The decommissioning phase for the proposed stockpiles will lead to compaction and erosion of soil resources predominantly due to increased traffic which could result in the loss of land capability.		Decommissioning (Including Rehabilitation)	Low-Medium	Low
	The construction phase for the proposed opencast mining activities will lead to compaction and erosion of soil resources due to increased traffic, stripping activities and the general degradation of soil resources, which could result in the loss of land capability.		Construction	High	Medium-High
	Opencast mining activities will involve soil stripping activities which will lead to the removal of soil resources together with bedrock, which will result in the loss of land capability to some extent.		Operation	High	Medium-High
	The decommissioning phase for the proposed open cast mining areas will lead to compaction and erosion of soil resources predominantly due to increased traffic relating to backfilling activities, which could result in the loss of land capability.		Decommissioning (Including Rehabilitation)	Medium-High	Medium-High
5	Increased erosion and sedimentation due to increase overland flow on the environment	Hydropedology	Construction	Low-Medium	Low
	Increased overland flow will result in decreased infiltration and therefore less lateral flow at the soil bedrock/ interface or return flow from groundwater. Open cast areas will intercept lateral flow paths		Construction and Operation	Medium-High	Low

NO.	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	SIGNIFICANCE (IF MITIGATED)
	and remove connectivity between recharge zones and lateral flow zones. Alteration of this flow path will likely change the wetland water regimes negatively				
6	Loss of Natural Habitat (untransformed habitat) of High Ecological Importance: The proposed infrastructure footprint includes a total of 545.9 ha of Natural Habitat with High Ecological Importance and these areas which will be lost comprise mostly of Untransformed Grassland (337.1ha) and Valley-bottom & Seep wetlands (199.5ha) but also include smaller areas of Sandstone Scarp Shrubland (9.3 ha).	Terrestrial Ecology – Flora	Pre-Construction, Construction and Operational	High	Medium-High
	Loss of Plant Species of Conservation Concern (SCC): Two plant SCC were confirmed to occur within the project area during fieldwork, namely Sensitive Species 1200 and *Khadia carolinensis*. In addition, two other SCC not recorded during fieldwork but which are extremely difficult to detect due to their small size (*Aspidoglossum xanthosphaerum*) or occurrence in habitat that remains flooded for protracted periods (*Lessertia phillipsiana*), are thought to have a Moderate to High likelihood of occurring within the project area.			Medium-High	Low-Medium
	Introduction and Proliferation of Alien Invasive Plant Species: Construction activities will provide transformed habitat ideal for the establishment and proliferation of alien invasive plant species. These concentrations of alien plants in areas disturbed by mining will provide a source of seeds and other propagules which are likely to are likely to be dispersed by mining activities and natural dispersal agents (e.g. wind and water dispersal). Highly aggressive alien invaders and habitat transformers are highly likely to colonise the verges of haul roads and access roads throughout the project area from where they are likely to spread into adjacent areas of Untransformed Habitats of high Ecological Importance.		Pre-Construction, Construction Operational and Closure	Medium-High	Low-Medium
	Illegal Utilisation of Plant Resources: The highly species rich Natural Habitats of the project area contain numerous plant species that are popular medicinal plants (e.g. Boophone disticha and Eucomis autumnalis) which are likely to be targeted by any illegal medicinal plant harvesters entering the project area. The influx of labourers and contractors could result in an increase in the illegal harvesting of medicinal plants. Furthermore, mines often practice lax access control in the parts of their extensive properties that are not being actively utilised for mining activities leading to an increase in illegal medicinal plant harvesting relative to that which occurs on private farmland.		Pre-Construction, Construction and Operational	Low-Medium	Low
7	Displacement and Loss of Habitat for Faunal Species: The proposed open cast mining and associated activities will result in the clearing and loss of Natural Habitat. Approximately 545.9 ha of Natural Habitat (comprising vegetation units with High Ecological Importance) is expected to be lost due to mining activities. Areas which will be lost comprise mostly of Untransformed Grassland (337.1ha) and Valley-bottom & Seep wetlands (199.5ha) and smaller areas of Sandstone Scarp Shrubland (9.3 ha).	Terrestrial Ecology – Fauna	Construction and Operational	High	Medium-High
	Disruption of Ecological Connectivity and Faunal Dispersal:			High	Medium-High

NO.	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	SIGNIFICANCE (IF MITIGATED)
	The open cast mining activities and mine expansion proposed for the project area will aggravate habitat fragmentation and the disruption of natural ecological corridors in the area, thereby impeding the dispersal of faunal species as well as the potential for re-colonisation and recruitment of fauna to the project area during rehabilitation. It is especially sub-populations of medium to large mammal species such as Mountain Reedbuck and Southern Reedbuck that are at risk of becoming fragmented if natural connectivity is disrupted and when the surface area of natural corridors is reduced to the point that these animals can no longer disperse across the project area.				
	Illegal Utilisation of Faunal Resources: The presence of a large labour force within the project area during mining activities will increase the risk of illegal utilisation of fauna resources, such as hunting and snaring of antelope, small mammals and birds. It is assumed that labour force will be accommodated in nearby towns and not on site, which would lower this risk of hunting and poaching considerably. In addition, the project may also result in increased utilisation of natural resources due to potential human encroachment and accessibility to the project area owing to people seeking jobs. This could result in the establishment of illegal settlements on areas consisting of natural habitat on the project area where active mining is absent.			Low-Medium	Low
8	Destruction of sensitive habitat: Destruction of wetland units during all construction phase activities due to heavy machinery and indiscriminate habitat destruction.	Surface Water Ecosystems	Construction and Operation	Medium-High	Medium-High
	Destruction of sensitive habitat: Wetland vegetation alteration following disturbances that will enhance exotic vegetation encroachment.			Medium-High	Very Low
	Fragmentation of linear surface water habitat: Fragmentation of interconnected wetland units (watercourses) that would otherwise offer migratory corridors.			Medium-High	Very Low
	Impact to the hydrological functioning of wetlands: Excavation of deep opencast pits near to wetland habitat that will deviate lateral inter soil flow patterns into the pits that would otherwise sustain wetland units, leading to loss of water source for the wetland and subsequent loss of the unit.		Operation	High	Medium-High
	Soil erosion that impacts watercourses and wetland habitat: All construction phase activities that result in soil destabilisation.		All	High	Very Low
	Water quality degradation: Impacts to wetland units during the operations phase from runoff pollution, siltation, habitat smothering and vegetation alteration.		Operation	High	Low-Medium
	Water quality: All construction phase and operations phase activities associated with water contamination		All	High	Low-Medium

NO.	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	SIGNIFICANCE (IF MITIGATED)
9	Potential contamination of groundwater quality from accidental spillages of hazardous substances stored on site	Groundwater	Construction	Very Low	Very Low
	Groundwater availability - The rate of groundwater seepage could be influenced by: ➲ The extent of mining: groundwater seepage rates will increase for larger and mining areas. ➲ Depth of mining: groundwater seepage rates to shallower mining areas are expected to be higher compared to deeper mining areas where the water-bearing fractures are expected to be tighter. ➲ The intersection of water-bearing features: the three main lineaments are expected to increase the groundwater seepage volumes if and when intersected during mining.		Operation	Medium-High	Low-Medium
	Impacts on private groundwater users: ➲ Boreholes located within the opencast mining areas would be destroyed during operation. ➲ Boreholes not located within the planned opencast mining areas (but are located close enough to all planned mining activities that groundwater levels could be lowered by more than 5m during the operational phase) could be significantly affected by mine dewatering. It is likely that this would result in a significant reduction in borehole performance. ➲ Boreholes that fall within the zone of influence (where groundwater levels in these boreholes are not expected to be lowered by more than 2m during mining) are not likely to be significantly impacted.		Operation	High	Low-Medium
	Shallow weathered aquifer, wetlands and springs: ➲ Wetlands could be affected or destroyed by the lowering of groundwater levels during mining, as they will not function optimally in these areas and may be permanently lost due to a decrease in groundwater availability as a result of mine dewatering. It is likely that the wetlands associated with the Kranspan would be most significantly affected during mining. Mining in this area is deeper as the pits target the E Seam. The lowering of groundwater levels is therefore likely to be more significant. Mining on the farm Vaalbank will be shallower as the B and C Seams will be targeted. In this area, the impact on wetlands will be restricted to areas closer to the pits. ➲ It is further likely that spring flow will be negatively affected during mining. Six springs were identified during the hydrocensus. One spring is associated with Pit 7 and would be affected during Year 5 – 10 of mining. Three of these springs are located near Pit 17 and would be affected during Year 15 – 20 of mining.		Operation	Low-Medium	Low
	Contamination of groundwater quality and long-term zone of impact on groundwater quality		Operation and Post-closure	Medium-High	Low-Medium

NO.	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	SIGNIFICANCE (IF MITIGATED)
	Rate of groundwater level recovery once mining is completed and risk of decant		Post-closure	High	Low
10	The main pollutant of concern from construction operations is particulate matter, including PM_{10}, $PM_{2.5}$ and TSP. PM_{10} and $PM_{2.5}$ concentrations are associated with potential health impacts due to the size of the particulates being small enough to be inhaled. Nuisance effects are caused by the TSP fraction (20 µm to 75 µm in diameter) resulting in soiling of materials and visibility reductions. Thus the impact on air quality is the elevated PM_{10} and $PM_{2.5}$ concentrations and elevated dustfall levels	Air Quality	Construction	Low-Medium	Low-Medium
	Elevated PM_{10} and $PM_{2.5}$ concentrations and elevated dustfall levels		Operation	Medium-High	Low-Medium
				Low-Medium	Low-Medium
	Elevated PM_{10} and $PM_{2.5}$ concentrations and elevated dustfall levels		Decommissioning / Post Closure	Low-Medium	Low-Medium
11	Elevated Noise Levels	Noise	Construction	Low-Medium	Low-Medium
			Operation	Medium-High	Low-Medium
			Decommissioning / Post Closure	Low-Medium	Low-Medium
12	May destroy, damage, alter, or remove structures of heritage importance	Heritage Resources	Construction	Low-Medium	Very Low
	May destroy, damage, alter, or remove ruins of heritage importance			Low	Low
	May destroy, damage, alter, or remove stone cairns of heritage importance			Low	Low
	May destroy, damage, alter, or remove burial sites of heritage importance			Medium-High	Low
13	May destroy, damage, alter, or remove resources of palaeontological importance	Palaeontological Resources	Construction and Operation	Low-Medium	Low
14	Visual disturbance of the sense of place	Visual Aesthetics	Construction and Operation	High	Medium-High
	Visual improvement of the sense of place		Rehabilitation	Medium-High (+)	Medium-High (+)
15	Coal Production for Electricity Generation	Socio-economic	Operational	Very High (+)	-
	Economic Growth		Operational	Very High (+)	-
	Employment Opportunities		Pre-construction, Construction and Operational	High (+)	High (+)
	Skills Development and Education Opportunities		Construction, Operational and Decommissioning and Post Closure	Medium-High (+)	High (+)
	Local Economic Development		All	Medium-High (+)	Medium-High (+)
	Government Revenue and Royalties		Construction and Operational	Low-Medium (+)	-

NO.	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	SIGNIFICANCE (IF MITIGATED)
	Change in Land Use resulting in loss of agricultural land and loss of jobs		Construction, Operational and Decommissioning and Post Closure	High	Low-Medium
	Population Influx		Pre-Construction, Construction and Operational	Low-Medium	Low-Medium
	Security Risks		Pre-Construction, Construction and Operational	Medium-High	Low-Medium
	Mine Health and Safety - General		Pre-Construction, Construction and Operational	High	Low
	Mine Health and Safety – Spontaneous Combustion can occur during opencast mining and stockpiling of coal which can damage infrastructure and result in staff injuries		Operation	Medium-High	Low
	Community Health and Safety - Diseases		Pre-Construction, Construction and Operational	Medium-High	Low
	Community Health and Safety – Traffic and Road Safety		Construction, Operational and Decommissioning and Post Closure	Medium-High	Low
	Blasting – Ground Vibration		Operation	Medium-High	Low-Medium
	Blasting – Fly Rock			Medium-High	Low
	Blasting – Air Blast			High	Low
	Blasting – Dissolved Nitrates			High	Very Low
	Blasting – Dust and Fumes			Medium-High	Low
	Blasting – Ground Vibration and Fly Rock: Heritage Sites and Graves			Medium-High	Low
	Mine Closure and Associated Effects on the Local Economy		Decommissioning and Post Closure	Medium-High	Low-Medium

Recommended Mitigation Measures

The mitigation hierarchy was applied throughout the Scoping and EIA process. The mitigation hierarchy is an approach to mitigation planning and can be summarised into the following steps:

- Avoidance;
- Minimisation;
- Restoration; and
- Offsets.

In the Scoping Phase, mitigation measures were predominantly focussed on avoidance and minimisation. This was done through activities such as the site layout selection process and implementation of the environmental design criteria including the environmental sensitivity plan, by the engineering team.

In the Impact Assessment Phase, the findings and recommendations of the specialist studies were used to refine the site layout selection and to develop the environmental and operational controls which are focused on impact minimisation and restoration (as part of mine rehabilitation and closure).

The mitigation measures are summarised in the EIAR as well as in the EMPr (Part B of the EIAR).

Summary of Specialist Reports

Several specialist studies were undertaken to inform the impact assessment for the proposed Kranspan Mining Right Extension project. The findings of the impact assessment and key recommendations from the studies are summarised in the EIAR.

The following specialist studies were undertaken during the EIA Phase:

- Soil and Agricultural Potential Assessment
- Hydropedological Assessment
- Terrestrial Biodiversity Assessment
- Hydrological Report
- Surface Water Assessment
- Geohydrological Impact Assessment
- Geochemical Characterisation and Waste Classification
- Air Quality Impact Assessment
- Noise Impact Assessment
- Heritage Impact Assessment
- Palaeontological Impact Assessment
- Social Impact Assessment
- Blasting Impact Study
- Visual Impact Assessment
- Mine Rehabilitation and Closure Plan

Environmental Impact Statement

Key findings of the impact assessment for the proposed Kranspan Mining Right Extension are as follows:

- The need and desirability of the proposed development has been established;
- With mitigation measures applied, the proposed development is compatible with surrounding land uses;
- The proposed development has the potential to create significant employment and economic development opportunities for local communities during the construction and operational phases of the project;
- The mine Social and Labour Plan (SLP) has provided plans for optimising local employment, skills development and a commitment to implementing local economic development projects, identified in collaboration with the Chief Albert Luthuli Local Municipality (CALLM);
- Impacts to ecologically sensitive habitat and surface and groundwater resources have been assessed to be the most significant potential impacts associated with the proposed development. Mitigation measures for these impacts have been recommended. Compliance with these mitigation measures in this report should be included as conditions of the environmental authorisation.

Several conditions were recommended in the EIAR for the DMRE to consider for inclusion into the EA.

Closure Plan and Financial Provision for Closure

The estimate for rehabilitation and closure for the proposed Kranspan Mining Right Extension project is based on the principles and closure activities as set out in the EIAR. The closure plan is considered conceptual and therefore certain uncertainties relating to the actual activities to be implemented as part of the decommissioning and closure phases of the project will only be confirmed once a detailed closure plan has been developed.

The cost estimate for rehabilitation and closure for the Kranspan Mining Right Extension project is provided in the EIAR, as well as a summary of the key facilities to be rehabilitated as well as the costs associated with the rehabilitation.

Environmental Management Programme

The key objectives of the Environmental Management Programme (EMPr) are to set out the management and monitoring measures required to both minimise any potentially adverse environmental impacts and enhance the environmental benefits of the project, and to ensure that responsibilities and appropriate resources are efficiently allocated to implement the plan. Management and monitoring measures have been developed from the recommendations and mitigation measures listed in the EIAR. The EMPr comprises of PART B of the EIAR.

UITVOERENDE OPSOMMING

INLEIDING

Hierdie uitvoerende opsomming omvat kortliks die Omgewingsimpak bepalings verslag (OIBV) van die voornemende Kranspan myn uitbreiding, naby Carolina, in Mpumalanga. Die opsomming is beskikbaar gestel vir insette en kommentaar en vorm deel van die Omvang- en Omgewingsimpak bepaling (OIB)-proses wat onderneem word vir die voornemende uitbreiding van die Kranspan-myn.

Die Omvang- en OIB-proses is 'n beplannings raamwerk wat gebruik word om die moontlike fisiese, biologiese en sosio-ekonomiese impakte van 'n ontwikkeling op die omgewing vas te stel.

Die proses poog om die skadelike impak van 'n ontwikkeling te identifiseer, en waar moontlik, te kwantifiseer voordat dit plaasvind. Sodoende kan die impak vermy of minstens verminder word deur middel van wysigings tot die ingenieursontwerpe, operasionele beheermaatreëls of ander versagtingsmaatreëls. Die proses poog ook om geleenthede te identifiseer om die positiewe impak van die ontwikkeling te versterk. Daarbenewens poog die proses om diegene wat deur die voorgestelde ontwikkeling geraak word, in te lig en te raadpleeg, sowel as om 'n geleentheid te bied vir die publiek om betrokke te wees by die besluitnemingsproses rakende die voorgestelde ontwikkeling.

Die Omvang- en OIB-proses bestaan uit twee fases, 'n Omvangsbepalings fase en 'n OIB-fase. Verwante inligting rakende die omgewings impakte en die OIB fase word uit een gesit in die OIBV.

Wetgewing[1] vereis dat die Omvang- en OIB-proses uitgevoer word deur 'n onafhanklike Omgewingsevaluerings praktisyn (OIP). ABS Africa is aangestel as die OIP.

PROJEK OORSIG

Die Aansoeker, Ilima Coal Company (Edms.) Bpk. (Ilima), is in besit van die "MP 30/5/1/2/2/10224 MR" Mynreg vir die steenkool erts op die Plaas Kranspan 49 IT. Ilima beoog om aansoek te doen vir die uitbreiding van hul goedgekeurde Mynreg gebied (MRG). Die uitbreiding sal die twee aangrensende Prospekterings regsgebiede (PRG), naamlik Plaas Vaalbank 212 IS en Plaas Roodebloem 51 IT met die bestaande MRG verenig.

Die beplande mynbou bedrywighede behels oppervlak ontginning van die steenkoollae en die oprigting van verskeie mynbou ondersteunings infrastruktuur op die voornemende uitbreidingsgebied. Volgens die Mynbou beplanning studies wat tot dusver voltooi is, word die volgende beplan:

- Oppervlak- of oop groef mynbou wat spesifiek fokus op die ontginning van steenkool in die B-, CL- en E-naat, deur die lint bou ("roll over") metode;
- Buiten vir die oop groef myn, sal daar sleeppaaie, tydelik bogrond- en deklaag voorraad stapels, onverwerkte steenkool ("run of mine") voorraad stapels en besoedelingsbeheer damme op die uitbreidings gebiede opgerig word as deel van die mynbouproses. Boonop sal tydelike bus- of houer kantore, ablusie geriewe en boorgate vir die voorsiening van drinkwater ook gevestig word. Die ligging van die bogenoemde moet nog bepaal word;
- 'n Steenkool verwerkings aanleg ('n steenkool was aanleg en filter pers) sal opgerig word op die Roodebloem plaas vir die verwerking van uitvoer steenkool produk. Droë klip breek en sifting van plaaslike steenkool produk (word aan Eskom verskaf) sal op die bestaande droë klip breek en siftings steenkool aanleg by die Kranspan Myn plaasvind; en

[1] Die Omgewings impak studie regulasies, 2014 (soos gewysig)

- Dit sal noodsaaklik wees om sypelwater gedurende die myn leeftyd uit te pomp. Water wat uitgepomp word (ontwatering) sal in die besoedelingsbeheer damme gehou word.

Hieronder volg 'n opsommende lys van die beoogde mynbou bedrywighede wat op die uitbreidings gebiede uitgevoer gaan word.

- Geofisiese opsporing, boor, put monsterneming en die grawe van slote;
- Die uitkap en verwydering van omliggende plantegroei;
- Bogrond verwydering en -ophoping;
- Deklaag verwydering en voorraad stapels;
- Boor en skietwerk (indien nodig);
- Ontginning van steenkool en materiaal oordrag na 'n steenkool voorraad stapel;
- Veredeling (was) van die uitvoer steenkool produk; en
- Oplaai en vervoer van steenkool produkte.

BESTAANDE MAGTIGINGS

Die bestaande Kranspan Myn werk tans in ooreenstemming met die volgende belangrike magtigings:

- 'n Mynreg ingevolge die Wet op die Ontwikkeling van Mineraal en Petroleum hulpbronne (Wet Nr. 28 van 2002) (OMP), toegestaan deur die Departement van Mineraal Hulpbronne en Energie (DMHE) op 05 April 2022, verwysing "MP 30/5/1/2/2/10224 MR";
- 'n Geïntegreerde Omgewingsmagtiging (OM) en 'n Omgewingsbestuursprogram verslag (OBPr) ingevolge die Wet op Nasionale Omgewingsbestuur (Wet Nr. 107 van 1998), soos gewysig ("die Omgewingswet") en die Wet op Nasionale Omgewingsbestuur: Afval (Wet Nr. 59 van 2008). Magtiging is op 09 November 2021 deur die DMHE verleen, verwysing "(MP) 30/5/1/2/3/2/1/ (10224) EM)"; en
- 'n Geïntegreerde Watergebruikslisensie (GWGL) ingevolge die Nasionale Waterwet (Wet Nr. 36 van 1998) (NWW). Die GWGL is op 23 September 2021 deur die Departement van Water en Sanitasie (DWS) toegestaan, verwysing 05/X11B/ACGIJ/10834.

VEREISTE MAGTIGINGS

'n Artikel 102-wysigingsaansoekproses soos uiteengesit in die OMP, vereis die wysiging van die bestaande Kranspan MRG. Die voornemende wysigings aansoek soos omskryf in Artikel 102 vereis die volgende omgewings goedkeurings:

- Die voornemende steenkoolmyn en mynbou ondersteunings aktiwiteite gee aanleiding tot verskeie gelyste aktiwiteite wat uit Lystings kennisgewing 1, 2 en 3 van die 2014 OIB-regulasies (soos gewysig) en Kategorie B van die Lys van Afval bestuursaktiwiteite (GN Nr. 921, soos gewysig) geïdentifiseer is;
- Die bogenoemde aktiwiteite vereis dat 'n OM en 'n Afval bestuurslisensie (ABL) toegestaan word voor die aanvang van die aktiwiteite. Die wetgewing [2] vereis dat 'n Omvang- en OIB-proses onderneem word as deel van die OM en ABL aansoeke;
- 'n Wysiging ingevolge Regulasie 31 en 37, in ooreenstemming met die 2014 OIB-regulasies (soos gewysig), sal ook onderneem word om die bestaande OM en OBPr in een verslag te konsolideer; en

[2] Die Omgewings impak studie regulasies, 2014 (soos gewysig)

- ’n Geïntegreerde Watergebruikslisensie-aansoek (GWGLA) word ook vereis vir verskeie watergebruike ingevolge Artikel 21 van die NWW.

Behoefte en Wenslikheid

Sekerheid in energievoorsiening word wêreldwyd erken as 'n sleutelfaktor vir die ekonomiese en sosiale ontwikkeling van 'n land. Omdat steenkool ’n oorvloedige en goedkoop bron van energie vir plaaslike elektrisiteitsvoorsiening is, het dit steeds ’n beduidende rol in Suid-Afrika se ekonomiese ontwikkeling. Die hoë aanvraag vir steenkool in Suid-Afrika kan toegeskryf word aan die plaaslike elektrisiteit voorsiener, Eskom en uitvoere na die buiteland. Die invloed van die Covid-19 pandemie in 2020 het ’n wêreldwye afname van 4,8% in steenkoolproduksie teweeg gebring. Dit is verskuldig aan ’n afname in die vraag na elektrisiteit gedurende die grendel tydperk asook ’n groei in hernubare energiebronne en dalende brandstof pryse.

Die IEA Steenkool (“IEA Coal") (2021) verslag het verwag dat steenkool vlakke in 2021 tot bo 2019-vlakke sou herstel, met ’n toename van 9% in wêreldwye steenkool kragopwekking. Produksie verhogings in 2021 is egter belemmer deur onder meer ongunstige weerstoestande, onderbrekings in produksielyne en verdere Covid-19-inperkingsmaatreëls. ’n Onlangse toename in vraag, met ’n groeitempo hoër as die van produksie, het gelei tot ’n tekort aan steenkool voorraad en groot steenkool produserende lande moes na verwagting pogings aanwend om uitsette te verhoog. Steenkoolproduksie sal na verwagting in 2022 'n allemintige hoogtepunt bereik en dan afplat soos die aanvraag ’n plato bereik.

Tans word meer as 75% van die land se elektrisiteit behoeftes deur steenkool voorsien. Daarby het die tekort aan antrasiet-graad steenkool, wat in staal produksie gebruik word, gely tot rekordpryse vir die handelsware. Die behoefte om steenkool in Suid-Afrika te ontgin is dus geregverdig. Die gevolgtrekking na aanleiding van die 2019 Geïntegreerde Hulpbron plan, is dat die aanvraag na steenkool in die elektrisiteit sektor na verwagting mettertyd sal afneem namate ander primêre energiebronne en verwante geïnstalleerde opwekkings kapasiteit opgerig word. Hierdie verskuiwing sal egter nie in die nabye toekoms plaasvind nie. Daar sal vir minstens die volgende twee dekades nog ’n behoefte aan steenkool vir die land se kragopwekking vereistes wees.

Project Alternatiewes

Die uitbreidings gebiede is uitgekies op grond van die beskikbaarheid van steenkool, toegang tot mineraalregte en die afstand vanaf die bestaande Kranspan Myn. Geen ander alternatiewe areas is geïdentifiseer nie. Die ligging van die beplande infrastruktuur was deur die verskeie veldwerk bevindinge beïnvloed om enige omgewing sensitiewe areas wat deur die spesialis studies geïdentifiseer word, in ag te neem en sodoende is ’n omgewing sensitiwiteit plan ontwikkel. Die omgewing sensitiwiteit plan het verskeie veranderinge aan die aanvanklike terrein uitlegplan tot gevolg gehad, en 'n finale (voorkeur opsie) terrein uitlegplan is ontwikkel en in die OIBV geassesseer.

Openbare Hersienings periode vir die Konsep-OIBV

Die proses vir openbare betrekking vir die voornemende projek word onder die Omgewingswet en GK Nr. R. 982 van die 2014 OIB-regulasies, soos gewysig, bestuur.

Die volgende take was onderneem om sodoende geleentheid te bied vir Belanghebbende en Geaffekteerde Partye (hierna verwys as “persone”) om deel te neem aan die Omvangsbepaling en OIB-proses, asook die terrein plasing en die ontleding van alternatiewe opsies:

- Wetlike advertensies (in Afrikaans, Engels en isiZulu) was in relevante streeks- en plaaslike koerante geplaas;
- Terrein kennisgewings was op verskeie plekke binne die studie area opgesit; en

- Deurlopende verbintenis met persone deur middel van e-posse, telefoon, faks of hand afgelewerde briewe tydens die Omvang- en OIB-proses.

Die Konsep-OIBV is vir 30-dag periode beskikbaar vir insae en publieke kommentaar vanaf **03 April 2023 tot 08 Mei 2023**. Die verslag kan deur die volgende maniere verkry word:

- Aanlyn te: http://www.abs-africa.com/project-documents/;
- E-pos op aanvraag: consultation@abs-africa.com; en
- Harde kopieë vir insae is beskikbaar by die Carolina Openbare Biblioteek, Voortrekker straat 11, Carolina.

Enige kommentaar op die Konsep-OIBV moet teen **08 Mei 2023** deur een van die onderstaande kanale aan ABS Africa gestuur word sodat die kommentaar aangespreek en in die Finale OIBV bygewerk kan word.

ABS AFRICA (PTY) LTD. KONTAKBESONDERHEDE	
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OMGEWINGS GRONDSLAG

Hierdie is 'n algemene bespreking van die huidige omgewingstoestand in die projek omgewing soos uiteengesit in die spesialis studies wat onderneem is. Dit maak ook voorsiening vir 'n waardering van sensitiewe omgewings kenmerke en die uitwerking van die voornemende Kranspan-mynreg uitbreidings projek op moontlike reseptore.

Die volgende omgewings kenmerke is in ag geneem:

- Klimaat;
- Topografie;
- Geologie;
- Grond- en Landbou potensiaal;
- Hidropedologie;
- Terrestriële Ekologie (Flora);
- Terrestriële Ekologie (Fauna);
- Oppervlak Water;
- Grondwater;
- Luggehalte;
- Omgewings geraas;
- Erfenis en paleontologiese hulpbronne
- Visuele estetika; en
- Sosio-ekonomiese omgewing.

POTENSIËLE IMPAK

Die moontlike inpak van die voornemende Kranspan-mynreg uitbreidings projek op die huidige omgewing was geïdentifiseer met behulp van die volgende:

- 'n Evaluering van die projek aktiwiteite en komponente;
- Impak geassosieer met die gelyste aktiwiteite;
- 'n Evaluering van die ontvangende biofisiese, sosiale-en-ekonomiese en geboude omgewing;
- Bevindinge uit die spesialis verslae;
- Kwessies wat deur owerhede uitgelig word; en
- Kommentaar ontvang vanaf persone tydens die openbare deelname.

'n Opsomming van die potensiële omgewings impakte word hieronder weergegee.

NO.	IMPAK	ASPEK	FASE	BELANGRIKHEID (INDIEN NIE VERMAG NIE)	BELANGRIKHEID (INDIEN VERMAG)
1	Kweekhuisgasse vrystellings	Klimaat	Bedryfsfase	Laag	Laag
2	Verandering in die area se topografie wat sodoende die gevoel en die visuele estetika van die area beïnvloed, asook die moontlike belemmering van die natuurlike afloop.	Topografie	Konstruksie en Bedryfsfase	Laag-Medium	Laag
	Die topografie sal (soveel prakties moontlik) na die status wat dit was voor ontginning herstel word, en moet vry dreinerend wees.		Rehabilitasie	Medium-Hoog (+)	Medium-Hoog (+)
3	Die onderliggende geologie sal geaffekteer word as gevolg van die feit dat die minerale hulpbronne verlore gaan.	Geologie	Konstruksie en Bedryfsfase	Medium-Hoog	Baie Laag
4	Die konstruksie van die voornemende kontrakteurs area, kantore en paaie sal bydra tot die verdigting en erosie van grond hulpbronne as gevolg van die oppervlak dinamika verandering, die teenwoordigheid van verharde oppervlaktes en die algemene degradasie van grond hulpbronne. Dit kan dus lei tot die verlies van die grond se landboupotensiaal.	Grond, en landbougrond potensiaal	Konstruksiefase	Medium-Hoog	Laag-Medium
	Die bedryfsfase van die voornemende kontrakteurs area, kantore en paaie sal bydra tot die verdigting en erosie van grond hulpbronne as gevolg van die oppervlak dinamika verandering, meer verkeer in die area, meer voetgangers in die area en die teenwoordigheid van fondasies. Dit kan dus lei tot die verlies van die grond se landboupotensiaal.		Bedryfsfase	Laag-Medium	Laag
	Die ontmanteling van die kontrakteurs area (kantore en paaie) word beplan en sal dus ook bydra tot die verdigting en erosie van grond hulpbronne. Dit sal meestal plaasvind as gevolg van meer verkeer in die area, die sloping van geboue en ander infrastruktuur ens., en sal sodoende lei tot die verlies van die grond se landboupotensiaal.		Ontmanteling fase (insluitend rehabilitasie)	Laag-Medium	Laag
	Die voorraad stapels sal tydens konstruksie lei tot die verdigting en erosie van grond hulpbronne as gevolg van die oppervlak dinamika verandering, meer verkeer in die area (stortwaens spesifiek) en die algemene degradasie van grond hulpbronne. Dit kan dus lei tot die verlies van die grond se landboupotensiaal.		Konstruksiefase	Laag-Medium	Laag
	Die voorraad stapels sal tydens die bedryfsfase lei tot die verdigting en erosie van grond hulpbronne as gevolg van die blote gewig van die stapel, die helling van die stapels wat lei tot oorland vloei en meer verkeer in die area, wat sodoende lei tot die verlies van die grond se landboupotensiaal.		Bedryfsfase	Medium-Hoog	Laag-Medium

NO.	IMPAK	ASPEK	FASE	BELANGRIKHEID (INDIEN NIE VERMAG NIE)	BELANGRIKHEID (INDIEN VERMAG)
	Die ontmanteling van die voorraad stapels sal lei tot die verdigting en erosie van grond hulpbronne. Dit word verwag meestal as gevolg van verkeer en sal sodoende lei tot die verlies van die grond se landboupotensiaal.		Ontmanteling fase (insluitend rehabilitasie)	Laag-Medium	Laag
	Die voornemende oopgroefmyn aktiwiteite sal tydens die konstruksie fase lei tot die verdigting en erosie van grond hulpbronne as gevolg van meer verkeer in die area, die stroping aktiwiteite en die algemene degradasie van grond hulpbronne, wat sodoende lei tot die verlies van die grond se landboupotensiaal.		Konstruksiefase	Hoog	Medium-Hoog
	Grond stroping is gepaardgaande met die oopgroefmyn aktiwiteite. Dit lei dus tot die verwydering van grond hulpbronne saam met gesteentes wat sodoende tot 'n mate 'n bydrae het tot die verlies van die grond se landboupotensiaal.		Bedryfsfase	Hoog	Medium-Hoog
	Die ontmanteling van die voornemende oopgroefmyn areas, sal bydra tot die verdigting en erosie van grond hulpbronne. Dit is meestal as gevolg van meer verkeer in die area wat gepaard gaan met die hervulling aktiwiteite en dra sodoende by tot die verlies van die grond se landboupotensiaal.		Ontmanteling fase (insluitend rehabilitasie)	Medium-Hoog	Medium-Hoog
5	Meer kans vir erosie en sedimentasie as gevolg van vermeerderde oorland vloei in die omgewing.	Hidropedologie	Konstruksiefase	Laag-Medium	Laag
	Vermeerderde oorland vloei lei tot 'n vermindering in filtrasie vermoë en sodoende die verlies in laterale watervloei by die grond gesteente/grensvlak of verlies in grondwater terugvloei. Die oopgroefmyn areas sal laterale vloei belemmer en sodoende die verbinding tussen herlaai sones en laterale vloei sones verwyder. Die verandering van hierdie vloei sal waarskynlik die water skemas van die vleiland negatief verander.		Konstruksie en Bedryfsfase	Medium-Hoog	Laag
6	Die verlies van natuurlike habitat (onversteur) met Hoë Ekologiese Belang: Die voetspoor van die voornemende infrastruktuur strek oor 'n totaal van 545.9 ha van natuurlike habitat met hoë ekologiese belang. Die areas wat verlore sal gaan, bestaan meestal uit onversteurde grasland (337.1 ha) en Vallei-bodem- en Deursypel-vleilande (199,5 ha). Die area bestaan ook uit kleiner areas van Sandsteen Eskarp Struik veld (9,3 ha).	Terrestriële Ekologie–Flora	Voor-konstruksie, konstruksie en Bedryfsfase	Hoog	Medium-Hoog
	Die verlies van bewaarde plantspesies: Tydens veldwerk was daar vasgestel dat twee bewaarde plantspesies teenwoordig is in die projek area. Die spesies sluit Spesie 1200 en *Khadia carolinensis* in. Twee ander bewaarde spesies kom ook vermoedelik in die area voor, alhoewel hulle nie gevind was tydens die veldwerk nie. Die twee			Medium-Hoog	Laag-Medium

NO.	IMPAK	ASPEK	FASE	BELANGRIKHEID (INDIEN NIE VERMAG NIE)	BELANGRIKHEID (INDIEN VERMAG)
	spesies ter sprake is uiters moeilik om op te spoor as gevolg van die feit dat dit baie klein is (*Aspidoglossum xanthosphaerum)* of voorkom in 'n habitat wat oorgestroom is vir verlengde tydperke (*Lessertia phillipsiana).*				
	Die vestiging en verspreiding van uitheemse en indringer plantspesies: Die konstruksie aktiwiteite lei tot 'n getransformeerde habitat wat ideaal is vir die vestiging en verspreiding van uitheemse indringer plantspesies. Die hoë konsentrasie van indringer plantspesies in versteurde areas is 'n bron van sade wat waarskynlik deur mynbouaktiwiteite en natuurlike verspreidings metodes (bv. Wind en water) versprei word. Die hoogs aggressiewe indringers en habitat transformators sal waarskynlik die rande van paaie en ander toegangspaaie regdeur die projek gebied koloniseer. Hulle kan dus maklik versprei na aangrensende gebiede van wat uit onversteurde habitatte van hoë ekologiese belang bestaan.		Voor-konstruksie, konstruksie, Bedryf en Sluitings fase	Medium-Hoog	Laag-Medium
	Die onwettige benutting van plant hulpbronne: Die spesieryke natuurlike habitatte in die projek gebied bevat talle plantspesies wat van medisinale belang is (bv. *Boophone disticha* en *Eucomis autumnalis).* Hierdie plante sal waarskynlik geteiken word deur die onwettige medisinale plant stropers wat die projek gebied betree. Die toeneming van arbeiders en kontrakteurs in die area kan ook lei tot die toename in onwettige oes van medisinale plante. Verder beoefen myne dikwels nalatige toegangsbeheer in dele van die eiendom wat nie aktief gebruik word vir wynbou aktiwiteite nie. Dit lei dus ook sodoende na die toename in onwettige oes van medisinale plante in vergelyking met dit wat voorkom op private plaasgrond.		Voor-konstruksie, konstruksie en Bedryfsfase	Laag-Medium	Laag
7	Verplasing en verlies van habitat vir die fauna spesies: Die voornemende oopgroefmyn en die gepaardgaande aktiwiteite dra by tot die stroping en verlies van natuurlike habitat. Die verlies van om en by 545.9 ha van natuurlike habitat (wat uit plantegroei-eenhede met 'n hoë ekologiese belang bestaan) word verwag as gevolg van die mynbou aktiwiteite. Die geaffekteerde gebiede wat dus verlore sal gaan, bestaan meestal uit onversteurde grasland (337.1 ha), Vallei-bodem- en Deursypel-vleilande (199.5 ha) en kleiner Sandsteen Eskarp Struik veld (9,3 ha) in.	Terrestriële Ekologie–Fauna	Konstruksie en Bedryfsfase	Hoog	Medium-Hoog
	Die ontwrigting van ekologiese deurlopendheid en fauna verspreiding: Die oopgroefmynbou aktiwiteite en die voornemende uitbreiding van die myn sal lei tot habitat fragmentasie en sodoende bydra tot die ontwrigting van die natuurlike ekologiese korridors in die			Hoog	Medium-Hoog

NO.	IMPAK	ASPEK	FASE	BELANGRIKHEID (INDIEN NIE VERMAG NIE)	BELANGRIKHEID (INDIEN VERMAG)
	area. Die ontwrigting verhinder dus die verspreiding van fauna spesies asook die potensiaal vir herkolonisering en werwing van fauna na die projek gebied tydens rehabilitasie. Dit stel veral die sub-bevolkings van medium tot groot soogdiere, soos die rooiribbok en die vaalribbok in gevaar om gefragmenteer te word wanneer die natuurlike deurlopendheid van so aard ontwrig word dat hierdie diere nie meer kan nie versprei oor die projek gebied nie.				
	Onwettige benutting van Fauna hulpbronne: Die teenwoordigheid van 'n groot arbeidsmag in die projek gebied tydens die mynbou verhoog die risiko van onwettige benutting van fauna hulpbronne bv. jag en vang van wildsbokke, klein soogdiere en voëls. Daar word aanvaar dat arbeidsmag in nabygeleë dorpe geakkommodeer sal word en nie op die terrein nie, wat hierdie risiko van jag en stropery aansienlik sal verlaag. Die projek kan ook lei tot die verhoogde benutting van natuurlike hulpbronne as gevolg van menslike indringing en die toeganklikheid tot die projek deur mense wat opsoek is na werk. Dit kan ook lei tot die vestiging van onwettige nedersettings op die gebiede wat uit natuurlike en onversteurde habitat bestaan.			Laag-Medium	Laag
8	Die vernietiging van sensitiewe habitat: Die vernietiging van vleiland eenhede deur swaar voertuie en die onoordeelkundige vernietiging van habitat tydens al die konstruksie fases.	Oppervlak Water Ekosisteme	Konstruksie en Bedryfsfase	Medium-Hoog	Medium-Hoog
	Die vernietiging van sensitiewe habitat: Die verandering van vleiland plantegroei deur die versteuring sal dus ook die indringing van uitheemse plantegroei bevorder.			Medium-Hoog	Baie Laag
	Fragmentasie van lineêre oppervlakwater habitat: Die fragmentasie van onderling verbonde vleiland eenhede (waterlope) wat andersins migrerende korridors sou bied.			Medium-Hoog	Baie Laag
	Die impak op die hidrologiese funksie van vleilande: Die uitgrawing van diep oopgroefputte naby die vleiland habitat sal lei dat die laterale tussengrond vloei patrone afwyk. Die water wat andersins vleiland eenhede sou onderhou, sal dus eerder in die		Bedryfsfase	Hoog	Medium-Hoog

NO.	IMPAK	ASPEK	FASE	BELANGRIKHEID (INDIEN NIE VERMAG NIE)	BELANGRIKHEID (INDIEN VERMAG)
	putte in vloei en sodoende lei tot die verlies van 'n waterbron vir die vleiland en daaropvolgend die verlies van die hele eenheid.				
	Gronderosie wat die waterlope en vleiland habitat beïnvloed: Al die aktiwiteite wat met konstruksie gepaard gaan lei tot grond destabilisering en sodoende erosie.		Al die fases	Hoog	Baie Laag
	Die degradasie van watergehalte: Die impak op vleiland eenhede tydens die bedryfsfase as gevolg van afloop besoedeling, toeslikking, habitat versmoring en plantegroei verandering.		Bedryfsfase	Hoog	Laag-Medium
	Watergehalte: Al die aktiwiteite wat gepaard gaan met die konstruksie en bedryfsfases wat lei tot water besoedeling.		Al die fases	Hoog	Laag-Medium
9	Die moontlike besoedeling van grondwater deur mors van gevaarlike stowwe wat op die terrein gestoor word.	Grondwater	Konstruksiefase	Baie Laag	Baie Laag
	Die beskikbaarheid van grondwater - Die tempo van grondwater sypeling kan beïnvloed word deur: ➲ Die omvang van ontginning: die sypel tempo van grondwater sal toeneem in groter myngebiede. ➲ Die diepte van die ontginning: die sypel tempo van grondwater in vlakker myngebiede sal na verwagting hoër wees as die van dieper myngebiede waar die water draende frakture na verwagting stywer is. ➲ Die kruising van water draende kenmerke: die drie hooflyne sal na verwagting die grondwater sypel volumes verhoog indien en wanneer dit tydens mynbou gesny word.		Bedryfsfase	Medium-Hoog	Laag-Medium
	Die impak op privaat grondwater verbruikers: ➲ Die boorgate wat binne die oopgroefmyn gebiede teenwoordig is, sal vernietig word tydens die bedryfsfase.		Bedryfsfase	Hoog	Laag-Medium

NO.	IMPAK	ASPEK	FASE	BELANGRIKHEID (INDIEN NIE VERMAG NIE)	BELANGRIKHEID (INDIEN VERMAG)
	➲ Die boorgate wat nie in die oopgroefmyn gebiede teenwoordig is nie, maar naby genoeg geleë is, sal deur die ontwatering van die groewe geaffekteer word. Die boorgate sal moontlik 'n verlaging van grondwater vlakke ervaar. Die vlakke kan moontlik verlaag met meer as 5 m tydens die bedryfsfase van die myn. Dit sal dus waarskynlik lei tot aansienlike vermindering in watervoorsiening. ➲ Die boorgate wat binne die impak sone val (waar die grondwater vlakke na verwagting nie met meer as 2 m tydens die bedryfsfase sal val nie) word waarskynlik nie beduidend geraak word nie.				
	Vlak verweerde waterdraer, vleilande en fonteine: ➲ Vleilande kan beïnvloed of vernietig word deur die verlaging van grondwater vlakke tydens die bedryfsfase, aangesien dit nie optimaal in hierdie gebiede sal funksioneer nie. Die vleilande kan dus permanent verlore gaan as gevolg van die 'n afname in beskikbaarheid van grondwater as gevolg van die ontwatering. Die vleilande wat met Kranspan geassosieer word, sal waarskynlik die meeste geraak word tydens die bedryfsfase. Mynbou in hierdie gebied is dieper aangesien die putte die E-naat teiken. Die verlaging van die grondwater vlakke sal dus waarskynlik meer beduidend wees. Mynbou op die plaas Vaalbank sal vlakker wees aangesien die B- en C-nate geteiken word. In hierdie gebied sal die impak op die vleilande beperk word tot gebiede nader aan die putte. ➲ Dit is verder waarskynlik dat die lente vloei negatief beïnvloed sal word tydens mynbou. Ses fonteine is tydens die hidrosensus geïdentifiseer. Een veer word met put 7 geassosieer en sal gedurende Jaar 5 – 10 van mynbou geraak word. Drie van hierdie fonteine is naby Put 17 geleë en sal gedurende Jaar 15 – 20 van mynbou geraak word.		Bedryfsfase	Laag-Medium	Laag
	Besoedeling van grondwater gehalte en die langtermyn-sone van impak op grondwater gehalte.		Bedryf en Na-sluitings fase	Medium-Hoog	Laag-Medium
	Die tempo waarmee die grondwatervlak herstel sodra mynbou voltooi is en die risiko van dekantering.		Na-sluitings fase	Hoog	Laag
10	Die hoof kommer tydens die konstruksiefase is partikel besoedeling, insluitend PM_{10}, $PM_{2.5}$ en TSP. Die PM_{10} en $PM_{2.5}$ konsentrasies word geassosieer met die moontlike inpak op gesondheid, as gevolg van die feit dat die partikels klein genoeg is om in te asem. Die TSP fraksie (20 µm tot 75 µm in diameter) veroorsaak ongewensde of oorlas-effekte soos die besoedeling van materiale en vermindering van algemene sigbaarheid.	Luggehalte	Konstruksiefase	Laag-Medium	Laag-Medium

NO.	IMPAK	ASPEK	FASE	BELANGRIKHEID (INDIEN NIE VERMAG NIE)	BELANGRIKHEID (INDIEN VERMAG)
	Die impak op luggehalte word dus aangebring deur die verhoogde PM10- en PM2.5-konsentrasies en verhoogde stof val vlakke.				
	Verhoogde PM_{10} en $PM_{2.5}$ konsentrasies en verhoogde stof val vlakke.		Bedryfsfase	Medium-Hoog	Laag-Medium
				Laag-Medium	Laag-Medium
	Verhoogde PM_{10} en $PM_{2.5}$ konsentrasies en verhoogde stof val vlakke.		Ontmanteling/ Na-sluitings fase	Laag-Medium	Laag-Medium
11	Verhoogde geraas vlakke.	Klank	Konstruksiefase	Laag-Medium	Laag-Medium
			Bedryfsfase	Medium-Hoog	Laag-Medium
			Ontmanteling/ Na-sluitings fase	Laag-Medium	Laag-Medium
12	Die moontlike vernietiging, beskadiging, verandering of verwydering van <u>strukture</u> met erfenisbelang.	Erfenis hulpbronne	Konstruksiefase	Laag-Medium	Baie Laag
	Die moontlike vernietiging, beskadiging, verandering of verwydering van <u>bouvalle</u> met erfenisbelang.			Laag	Laag
	Die moontlike vernietiging, beskadiging, verandering of verwydering van <u>klip stapels of altare</u> met erfenisbelang.			Laag	Laag
	Die moontlike vernietiging, beskadiging, verandering of verwydering van <u>grafte</u> met erfenisbelang.			Medium-Hoog	Laag
13	Die moontlike vernietiging, beskadiging, verandering of verwydering van hulpbronne met paleontologiese belang.	Paleontologiese hulpbronne	Konstruksie en Bedryfsfase	Laag-Medium	Laag
14	Visuele versteuring van die omgewings gevoel.	Visuele estetika	Konstruksie en Bedryfsfase	Hoog	Medium-Hoog
	Visuele versteuring van die omgewings gevoel.		Rehabilitasie	Medium-Hoog (+)	Medium-Hoog (+)

NO.	IMPAK	ASPEK	FASE	BELANGRIKHEID (INDIEN NIE VERMAG NIE)	BELANGRIKHEID (INDIEN VERMAG)
15	Steenkool produksie vir elektrisiteit opwekking.	Sosio-ekonomies	Bedryfsfase	Baie Hoog (+)	-
	Ekonomiese groei.		Bedryfsfase	Baie Hoog (+)	-
	Werkskepping geleenthede.		Voor-konstruksie, konstruksie en Bedryfsfase	Hoog (+)	Hoog (+)
	Vaardigheidsontwikkeling en Opvoedings geleenthede.		Konstruksie, bedryf, ontmanteling en Na-sluitings fase	Medium-Hoog (+)	Hoog (+)
	Ontwikkeling van plaaslike ekonomie.		Al die fases	Medium-Hoog (+)	Medium-Hoog (+)
	Staatsinkomste en tantième.		Konstruksie en Bedryfsfase	Laag-Medium	-
	Die verandering in Grondgebruik wat lei tot die verlies van landbougrond en werksgeleenthede.		Konstruksie, bedryf, ontmanteling en Na-sluitings fase	Hoog	Laag-Medium
	Bevolkingsgroei in die omgewing.		Voor-konstruksie, konstruksie en Bedryfsfase	Laag-Medium	Laag-Medium
	Sekuriteitsrisiko's.		Voor-konstruksie, konstruksie en Bedryfsfase	Medium-Hoog	Laag-Medium
	Arbeids gesondheid en veiligheid- Algemeen.		Voor-konstruksie, konstruksie en Bedryfsfase	Hoog	Laag

NO.	IMPAK	ASPEK	FASE	BELANGRIKHEID (INDIEN NIE VERMAG NIE)	BELANGRIKHEID (INDIEN VERMAG)
	Arbeids gesondheid en veiligheid – Spontane ontploffings kan gebeur tydens die bedryfsfase van die oopgroefmyn en voorraad ophoping van steenkool. Dit lei dus tot die beskadiging van infrastruktuur en die besering van personeel.		Bedryfsfase	Medium-Hoog	Laag
	Die veiligheid en gesondheid van die gemeenskap – Siektes.		Voor-konstruksie, konstruksie en Bedryfsfase	Medium-Hoog	Laag
	Die veiligheid en gesondheid van die gemeenskap – Verkeer en Padveiligheid.		Konstruksie, bedryf, ontmanteling en Na-sluitings fase	Medium-Hoog	Laag
	Skietwerk – Grond vibrasie.		Bedryfsfase	Medium-Hoog	Laag-Medium
	Skietwerk – Vlieënde rots skerwe.			Medium-Hoog	Laag
	Skietwerk – Lug ontploffing.			Hoog	Laag
	Skietwerk – Opgeloste Nitrate.			Hoog	Baie Laag
	Skietwerk – Stof en dampe.			Medium-Hoog	Laag
	Skietwerk – Grond vibrasie en Vlieënde rots skerwe: Erfenisterreine en grafte.			Medium-Hoog	Laag
	Myn sluiting en die gepaardgaande uitwerking op die plaaslike ekonomie.		Ontmanteling/ Na-sluitings fase	Medium-Hoog	Laag-Medium

Die Aanbevole Versagtingsmaatreëls

Die versagtings hiërargie was regdeur die Omvang- en OIB-proses toegepas. Die versagtings hiërargie is 'n benadering tot die beplanning van versagtingsmaatreëls en kan opgesom word in die volgende stappe:

- Vermyding;
- Vermindering;
- Restourering; en
- Verrekeninge.

Tydens die Omvang fase, het die versagtingsmaatreëls meestal gefokus op vermyding en vermindering. Dit was uitgevoer deur middel van aktiwiteite wat die perseel uitleg en seleksie proses insluit. Dit sluit ook die implementering van die omgewings ontwerp kriteria en die omgewing sensitiwiteit plan, deur die ingenieur span.

Die bevindinge en aanbevelings soos uiteengesit in die spesialis studies was tydens die impak bepalings fase gebruik om die om die terrein uitleg keuse te verfyn en om die omgewings- en operasionele beheermaatreëls te ontwikkel. Hierdie beheermaatreëls het gefokus op die vermindering en restourering van die impak (dit vorm deel van die rehabilitasie en sluitings fases).

Die versagtingsmaatreëls word in die OIBV en die Omgewingsbestuursprogram (Afdeling B van die OIBV).

Opsomming van Die Spesialis Verslae

'n Aantal spesialis studies was onderneem om die impak bepaling van die voornemende Kranspan-mynreg uitbreidings projek in te lig. Die bevindinge en hoof aanbevelings van die studies word in die OIBV opgesom.

Die volgende spesialis studies was tydens die OIB fase onderneem:

- Die studie op Grond- en Landbou potensiaal
- Die studie op Hidropedologie
- Die studie op Terrestriële Biodiversiteit
- Hidrologiese Verslag
- Die studie op Oppervlak Water
- Die studie van die impak op Geohidrologie
- Geochemiese karakterisering en afval klassifikasie
- Die studie van die impak op luggehalte
- Die studie van die impak op klank
- Die studie van die impak op Erfenishulpbronne
- Die studie van die impak op Paleontologie
- Die studie van die impak op die omliggende Sosiale-ekonomie
- Ontploffings impak studie
- Die studie op van die impak op die omliggende estetiek

- Die myn se rehabilitasie en sluitings plan

Omgewingsimpak Verklaring

Die hoof bevindings in die impak bepaling van die voornemende Kranspan mynreg uitbreiding word hieronder gelys:

- Die behoefte en wenslikheid van die voornemende ontwikkeling is vasgestel;
- Wanneer die versagtingsmaatreëls toegepas word, sal die voornemende ontwikkeling versoenbaar met omliggende grondgebruike wees;
- Tydens die konstruksie- en operasionele fases van die voornemende projek is daar potensiaal vir werksgeleenthede en ekonomiese ontwikkelingsgeleenthede vir plaaslike gemeenskappe te skep;
- Die myn se Sosiale en Arbeids plan (SAP) het 'n uiteensetting van planne vir die optimalisering van plaaslike indiensneming, vaardigheidsontwikkeling en 'n verbintenis tot die implementering van plaaslike ekonomiese ontwikkelingsprojekte. Hierdie planne was geïdentifiseer in samewerking met die Chief Albert Luthuli Plaaslike Munisipaliteit (CALPM);
- Die impak studies op ekologies sensitiewe habitatte en die impak op oppervlak en grondwater hulpbronne het die beduidendste potensiële impakte gevind wat met die voornemende ontwikkeling geassosieer word en die versagtingsmaatreëls word uiteengesit en aanbeveel. Die gehoorsaamheid tot hierdie versagtingsmaatreëls wat in hierdie verslag uiteengesit is moet ingesluit word as deel van die voorwaardes van die omgewingsmagtiging.

Daar is verskeie voorwaardes in die OIBV wat aanbeveel word aan die DMHE om te oorweeg en in te sluit by die OM.

Sluitings plan En Finansiële Voorsiening Vir Sluiting

Die omvang van die rehabilitasie en sluitings fase vir die voornemende Kranspan-mynreg uitbreidings projek is gebaseer op die beginsels en sluitings aktiwiteite soos uiteengesit in die OIBV. Die sluitings plan word as teoreties beskou en dus is daar steeds onsekerheid met betrekking tot die aktiwiteite wat geïmplementeer moet word as deel van die ontmanteling- en sluitings fases van die projek. Hierdie aktiwiteite sal eers vas gestel kan word wanneer daar 'n gedetailleerde sluitings plan ontwikkel is.

Die kosteberaming vir rehabilitasie en sluiting vir die Kranspan-mynreg uitbreidings projek word in die OIBV uiteengesit. Die hoof fasiliteite wat moet gerehabiliteer word en die koste daaraan verbonde word ook in die verslag weergegee.

Omgewingsbestuursprogram

Die hoof doelwitte van die Omgewingsbestuursprogram is om die bestuur en moniterings maatreëls uit een te sit wat benodig word om enige moontlike nadelige omgewings impakte te verminder die omgewingsvoordele van die projek te verhoog. Die program verseker ook dat die verantwoordelikhede en toepaslike hulpbronne doeltreffend toegewys word om die plan te implementeer. Bestuur- en moniterings maatreëls is ontwikkel gebaseer op die aanbevelings en versagtingsmaatreëls wat in die OIBV gelys en uiteengesit is. Die Omgewingsbestuursprogram word weergegee in afdeling B van die OIBV.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF MAPS IN APPENDIX 3

LIST OF ACRONYMS AND ABBREVIATIONS

CALLM	Chief Albert Luthuli Local Municipality
CBA	Critical Biodiversity Area
CRR	Comment and Response Register
DFFE	Department of Forestry Fisheries and the Environment
DMRE	Department of Mineral Resources and Energy
DSR	Draft Scoping Report
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMPr	Environmental Management Programme
ESA	Ecological Support Area
FSR	Final Scoping Report
IAPs	Interested and Affected Parties
IDP	Integrated Development Plan
IRP	Integrated Resource Plan
IWULA	Integrated Water Use Licence Application
IWWMP	Integrated Water and Waste Management Plan
kg	Kilogramme
Kcal/kg	Kilocalories per kilogramme
kl	Kilolitre
l	Litre
LoM	Life of Mine
m	Metre
mamsl	Metres above mean sea level
mm	Millimetre
MPRDA	Minerals and Petroleum Resources Development Act
MR	Mining Right
MRA	Mining Right Area
Mtpa	Million tons per annum
MW	Megawatts
NEMA	National Environmental Management Act
NEM:AQA	National Environmental Management: Air Quality Act
NEM:BA	National Environmental Management: Biodiversity Act
NEM:WA	National Environmental Management: Waste Act
NHRA	National Heritage Resources Act
NWA	National Water Act
p.a.	Per Annum
PCD	Pollution Control Dam
PR	Prospecting Right
PRA	Prospecting Right Area
RBCT	Richards Bay Coal Terminal

SAHRA	South African Heritage Resource Agency
SDF	Spatial Development Framework
SLP	Social and Labour Plan
WML	Waste Management Licence

STRUCTURE OF THE REPORT

This document serves as the Draft Environmental Impact Assessment Report (EIAR) for the proposed Kranspan Mining Right Extension project and has been prepared in accordance with the latest Department of Mineral Resources and Energy (DMRE) report template format. The EIAR also meets the requirements of the 2014 Environmental Impact Assessment (EIA) Regulations, as amended, as stipulated in Appendix 3 and Appendix 4 of Government Notice (GN) No. 982, as promulgated in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA). The table below states the summary of requirements, with cross references to the report sections where these requirements have been addressed.

STRUCTURE OF THE EIAR

REQUIREMENTS				SECTION OF REPORT
DMRE TEMPLATE		GN NO. 982 – APPENDIX 3		
Objective of the Environmental Impact Assessment Process				
2.	The objective of the environmental impact assessment process is to, through a consultative process - (a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context; (b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted scoping report; (c) identify the location of the development footprint within the approved site as contemplated in the accepted scoping report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment; (d) determine the - (i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and (ii) degree to which these impacts— (aa) can be reversed; (bb) may cause irreplaceable loss of resources, and (cc) can be avoided, managed or mitigated; (e) identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment; (f) identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity; (g) identify suitable measures to avoid, manage or mitigate identified impacts; and (h) identify residual risks that need to be managed and monitored.			-
PART A **Scope of Assessment and Content of Environmental Impact Assessment Reports**				
3	Contact person and correspondence address:	3(1)(a)	Details of - (i) The EAP who prepared the report; and (ii) The expertise of the EAP, including a curriculum vitae	Section 1 Appendix 1 and 2
3(a)	Details of: (i) The EAP (ii) Expertise of the EAP			

REQUIREMENTS				SECTION OF REPORT
DMRE TEMPLATE		GN NO. 982 – APPENDIX 3		
	(1) The qualifications of the EAP (with evidence) (2) Summary of the EAPs past experience (in carrying out the EIA procedure)			
3(b)	Description of the property	3(1)(b)	The location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including: (i) The 21 digit Surveyor General code of each cadastral land parcel; (ii) Where available, the physical address and farm name; (iii) Where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties.	Section 2
3(c)	Locality plan (show nearest town, scale not smaller than 1: 250 000)	3(1)(c)	A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is - (i) A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) On land where the property has not been defined, the coordinates within which the activity is to be undertaken.	Section 2.2 Appendix 3
3(d)	Description of the scope of the proposed overall activity:	3(1)(d)	A description of the scope of the proposed activity, including - (i) all listed and specified activities triggered and being applied for; (ii) A description of the associated structures and infrastructure related to the development.	Section 3 Appendix 4
3(d)(i)	Listed and specified activities (provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site)			
3(d)(ii)	Description of the activities to be undertaken (Describe methodology or technology to be employed, including the type of commodity to be mined and for a linear activity, a description of the route of the activity)			
3(e)	Policy and legislative context	3(1)(e)	A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context.	Section 4

REQUIREMENTS				SECTION OF REPORT
DMRE TEMPLATE		GN NO. 982 – APPENDIX 3		
3(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).	3(1)(f)	A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report.	Section 5
3(g)	Motivation for the preferred development footprint within the approved site including a full description of the process followed to reach the proposed development footprint within the approved site.	3(1)(g)	A motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report.	Section 6
		3(1)(h)	A full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including-	
3(g)(i)	Details of the development footprint alternatives considered.	3(1)(h)(i)	Details of the development footprint alternatives considered.	Section 6.1
3(g)(ii)	Details of the public participation process followed.	3(1)(h)(ii)	Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs.	Section 6.2
3(g)(iii)	Summary of issues raised by IAPs.	3(1)(h)(iii)	A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	Section 6.3
3(g)(iv)	The environmental attributes associated with the development footprint alternatives.	3(1)(h)(iv)	The environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	Section 6.4
3(g)(v)	Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts.	3(1)(h)(v)	The impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts - (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated.	Section 6.5
3(g)(vi)	Methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks.	3(1)(h)(vi)	The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks.	Section 6.6
3(g)(vii)	The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected.	3(1)(h)(vii)	Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the	Section 6.7

REQUIREMENTS				SECTION OF REPORT
DMRE TEMPLATE		GN NO. 982 – APPENDIX 3		
			geographical, physical, biological, social, economic, heritage and cultural aspects.	
3(g)(viii)	The possible mitigation measures that could be applied and the level of risk.	3(1)(h)(viii)	The possible mitigation measures that could be applied and level of residual risk.	Section 6.8
3(g)(ix)	Motivation where no alternative sites were considered.	3(1)(h)(ix)	If no alternative development footprints for the activity were investigated, the motivation for not considering such.	Section 6.9
3(g)(x)	Statement motivating the alternative development location within the overall site.	3(1)(h)(x)	A concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report.	Section 6.10
3(h)	Full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred site (in respect of the final site layout plan) through the life of the activity.	3(1)(i)	A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including – (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	Section 7
3(i)	Assessment of each identified potentially significant impact and risk.	3(1)(j)	an assessment of each identified potentially significant impact and risk, including - (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be mitigated;	Section 8
3(j)	Summary of specialist reports.	3(1)(k)	Where applicable, a summary of the findings and recommendations of any specialist report.	Section 9

REQUIREMENTS				SECTION OF REPORT
DMRE TEMPLATE		GN NO. 982 – APPENDIX 3		
			complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	
3(k)	Environmental impact statement.	3(1)(l)	An environmental impact statement which contains - (i) a summary of the key findings of the environmental impact assessment: (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	Section 10
3(l)	Proposed impact management outcomes for the development for inclusion in the EMPr.	3(1)(m)	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation.	Section 11
3(m)	Final proposed alternatives.	3(1)(n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment.	Section 12
3(n)	Aspects for inclusion as conditions of Authorisation.	3(1)(o)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	Section 13
3(o)	Description of any assumptions, uncertainties and gaps in knowledge.	3(1)(p)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed.	Section 14
3(p)	Reasoned opinion as to whether the proposed activity should or should not be authorised.	3(1)(q)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	Section 15
3(q)	Period for which the environmental authorisation is required.	3(1)(r)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is	Section 16

REQUIREMENTS				SECTION OF REPORT
DMRE TEMPLATE		GN NO. 982 – APPENDIX 3		
			required and the date on which the activity will be concluded and the post construction monitoring requirements finalised.	
3(r)	Undertaking.	3(1)(s)	An undertaking under oath or affirmation by the EAP in relation to – (i) The correctness of the information provided in the reports; (ii) The inclusion of comments and inputs from stakeholders and interested and affected parties; (iii) The inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties.	Section 17
3(s)	Financial provision.	3(1)(t)	Where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts.	Section 18
3(t)	Deviations from the approved scoping report and plan of study.	3(1)(u)	An indication of any deviation from the approved scoping report, including the plan of study, including - (i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and (ii) a motivation for the deviation.	Section 19
3(u)	Other information required by the competent authority.	3(1)(v)	Any specific information that may be required by the competent authority.	Section 20
3(v)	Other matters required in terms of section 24(4)(a) and (b) of the Act.	3(1)(w)	Any other matter required in terms of section 24(4)(a) and (b) of the Act.	Section 21

REQUIREMENTS				SECTION OF REPORT
DMRE TEMPLATE		GN NO. 982 – APPENDIX 4		
PART B Environmental Management Programme Report				
1	Draft Environmental Management Programme	1(1)	An EMPr must comply with section 24N of the Act and include -	Section 22
1(a)	Details of the EAP	1(1)(a)	details of– (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae	Section 22.1

REQUIREMENTS				SECTION OF REPORT
DMRE TEMPLATE		GN NO. 982 – APPENDIX 4		
1(b)	Description of the Aspects of the Activity	1(1)(b)	A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	Section 22.2
1(c)	Composite Map	1(1)(c)	A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.	Section 22.3
1(d)	Description of Impact Objectives Including Management Statements	1(1)(d)	A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including— (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities;	Section 22.4
1(e)	Impact Management Outcomes	-	-	Section 22.5
1(f)	Impact Management Actions	1(1)(f)	A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to - (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	Section 22.6
-	-	1(1)(g)	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f).	Table 22-5
-	-	1(1)(h)	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f).	

REQUIREMENTS				SECTION OF REPORT
DMRE TEMPLATE		GN NO. 982 – APPENDIX 4		
-	-	1(1)(i)	An indication of the persons who will be responsible for the implementation of the impact management actions.	
-	-	1(1)(j)	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented.	
-	-	1(1)(k)	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f).	
-	-	1(1)(l)	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.	
1(i)	Financial Provision	-	-	Section 22.7
1(l)	Indicate the Frequency of the Submission of the Performance Assessment Report	-	-	Section 22.8
1(m)	Environmental Awareness Plan	1(1)(m)	An environmental awareness plan describing the manner in which - (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 22.9
1(n)	Specific Information Required by the Competent Authority	1(1)(n)	Any specific information that may be required by the competent authority.	Section 22.10
2	Undertaking	-	-	Section 23

PART A

SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1 CONTACT PERSON AND CORRESPONDENCE ADDRESS

1.1 DETAILS OF THE EAP WHO PREPARED THE REPORT

TABLE 1-1: EAP DETAILS

COMPANY DETAILS		
Company Name:	ABS Africa (Pty) Ltd.	
Physical Address:	Block C Suite 2, Carlswald Close Office Park, c/o New & 7th Roads, Carlswald, 1685	
Telephone Number:	+27 11 805 0061	
NAME	**ROLE**	**EMAIL**
Kristy Robertson	Environmental Assessment Practitioner (EAP)	kristy@abs-africa.com
Paul Furniss	Report Reviewer	paul@abs-africa.com

1.2 EXPERTISE OF THE EAP

1.2.1 THE QUALIFICATIONS OF THE EAP

Name: Ms. Kristy Robertson

Academic Qualifications:

- Bachelor of Science in Zoology and Ecological and Environmental Sciences: University of the Witwatersrand, 2010
- Bachelor of Science (Honours) in Zoology: University of the Witwatersrand, 2011
- Master of Science in Environmental Sciences: University of the Witwatersrand, 2013

Professional Registration:

- Pr.Sci.Nat. Professional Natural Scientist (Environmental Science): The South African Council for Natural Scientific Professions, 2016
- Registered Environmental Assessment Practitioner (2020/2129): Environmental Assessment Practitioners Association of South Africa

1.2.2 SUMMARY OF THE EAPS PAST EXPERIENCE

ABS Africa (Pty) Ltd is a professional environmental advisory company with a focus on the mining environment. The ABS Africa personnel included in the project team structure for the independent environmental assessment have collectively completed more than 100 EIAs across the African continent.

Much of this experience has been gained in undertaking complex and challenging EIAs involving the management of specialist teams, conducting public participation processes, aligning international standards with in-country legislation and interfacing with project engineering teams.

The EAP responsible for this submission has over 9 years environmental assessment and management experience in the energy, water, mining and infrastructure sectors.

Please refer to Appendix 1 and Appendix 2 for a record of the experience of the EAP.

2 DESCRIPTION OF THE PROPERTY

2.1 OVERVIEW

The applicant, Ilima Coal Company (Pty) Ltd. ("Ilima"), is the holder of Mining Right "MP 30/5/1/2/2/10224 MR" for coal minerals over the Farm Kranspan 49 IT. Ilima has applied for the variation of their approved Mining Right Area (MRA) to incorporate two adjacent Prospecting Right Areas (PRAs), namely Farm Vaalbank 212 IS (30/5/1/1/2/1100PR) and Farm Roodebloem 51 IT (30/5/1/1/2/218PR).

Carolina Town is situated approximately 18 km north-east of the proposed Kranspan Mining Right Extension site, within the Chief Albert Luthuli Local Municipality and Gert Sibande District Municipality, Mpumalanga Province. Table 2-1 provides a summary of the proposed areas to be incorporated into the approved Kranspan MRA.

TABLE 2-1: DESCRIPTION OF THE PROPERTIES

<table>
<tr><td>FARM NAMES:</td><td>
<table>
<tr><th>FARM NAME</th><th>PORTION</th></tr>
<tr><td colspan="2">EXISTING KRANSPAN MRA</td></tr>
<tr><td>Kranspan 49 IT</td><td>RE, 1, 2, 3, 4, 5, 6, 7 and 8</td></tr>
<tr><td colspan="2">PROPOSED KRANSPAN MINING RIGHT EXTENSION</td></tr>
<tr><td>Vaalbank 212 IS</td><td>RE, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11</td></tr>
<tr><td>Roodebloem 51 IT</td><td>RE, 1, 2 and 3</td></tr>
</table>
</td></tr>
<tr><td>APPLICATION AREA (HA):</td><td>Ilima propose to extend the existing Mining Right Area (MRA) at Farm Kranspan 49 IT (approximately 3 383.42 Ha) by 4 974.96 Ha (3 579.23 Ha on Farm Vaalbank 212 IS and 1 395.73 Ha on Farm Roodebloem 51 IT)</td></tr>
<tr><td>MAGISTERIAL DISTRICT:</td><td>Carolina Magisterial District</td></tr>
<tr><td>MUNICIPALITIES</td><td>Chief Albert Luthuli Local Municipality
Gert Sibande District Municipality</td></tr>
<tr><td>DISTANCE AND DIRECTION TO NEAREST TOWNS</td><td>Carolina is situated approximately 18 km north-east of the proposed Kranspan Mining Right Extension site.</td></tr>
<tr><td>21-DIGIT SURVEYOR GENERAL CODE FOR EACH FARM PORTION:</td><td>
<table>
<tr><th>FARM NAME</th><th>PORTION</th><th>21 DIGIT SURVEY OR GENERAL CODE FOR EACH FARM PORTION</th></tr>
<tr><td colspan="3">EXISTING KRANSPAN MRA</td></tr>
<tr><td>Kranspan 49 IT</td><td>RE</td><td>T0IT00000000004900000</td></tr>
<tr><td>Kranspan 49 IT</td><td>1</td><td>T0IT00000000004900001</td></tr>
<tr><td>Kranspan 49 IT</td><td>2</td><td>T0IT00000000004900002</td></tr>
<tr><td>Kranspan 49 IT</td><td>3</td><td>T0IT00000000004900003</td></tr>
<tr><td>Kranspan 49 IT</td><td>4</td><td>T0IT00000000004900004</td></tr>
<tr><td>Kranspan 49 IT</td><td>5</td><td>T0IT00000000004900005</td></tr>
<tr><td>Kranspan 49 IT</td><td>6</td><td>T0IT00000000004900006</td></tr>
<tr><td>Kranspan 49 IT</td><td>7</td><td>T0IT00000000004900007</td></tr>
<tr><td>Kranspan 49 IT</td><td>8</td><td>T0IT00000000004900008</td></tr>
<tr><td colspan="3">PROPOSED KRANSPAN MINING RIGHT EXTENSION</td></tr>
<tr><td>Vaalbank 212 IS</td><td>RE</td><td>T0IS00000000021200000</td></tr>
</table>
</td></tr>
</table>

	Vaalbank 212 IS	1	T0IS00000000021200001
	Vaalbank 212 IS	2	T0IS00000000021200002
	Vaalbank 212 IS	3	T0IS00000000021200003
	Vaalbank 212 IS	4	T0IS00000000021200004
	Vaalbank 212 IS	5	T0IS00000000021200005
	Vaalbank 212 IS	6	T0IS00000000021200006
	Vaalbank 212 IS	7	T0IS00000000021200007
	Vaalbank 212 IS	8	T0IS00000000021200008
	Vaalbank 212 IS	9	T0IS00000000021200009
	Vaalbank 212 IS	10	T0IS00000000021200010
	Vaalbank 212 IS	11	T0IS00000000021200011
	Roodebloem 51 IT	RE	T0IT00000000005100000
	Roodebloem 51 IT	1	T0IT00000000005100001
	Roodebloem 51 IT	2	T0IT00000000005100002
	Roodebloem 51 IT	3	T0IT00000000005100003

2.2 LOCALITY MAP

The proposed Kranspan Mining Right Extension is situated near the town of Carolina and falls within the jurisdiction of the Chief Albert Luthuli Local Municipality, which is located in the Gert Sibande District Municipality, Mpumalanga Province. Refer to the locality map depicted in Figure 2-1 as well as the locality maps provided in Appendix 3 Map 1 to Map 4.

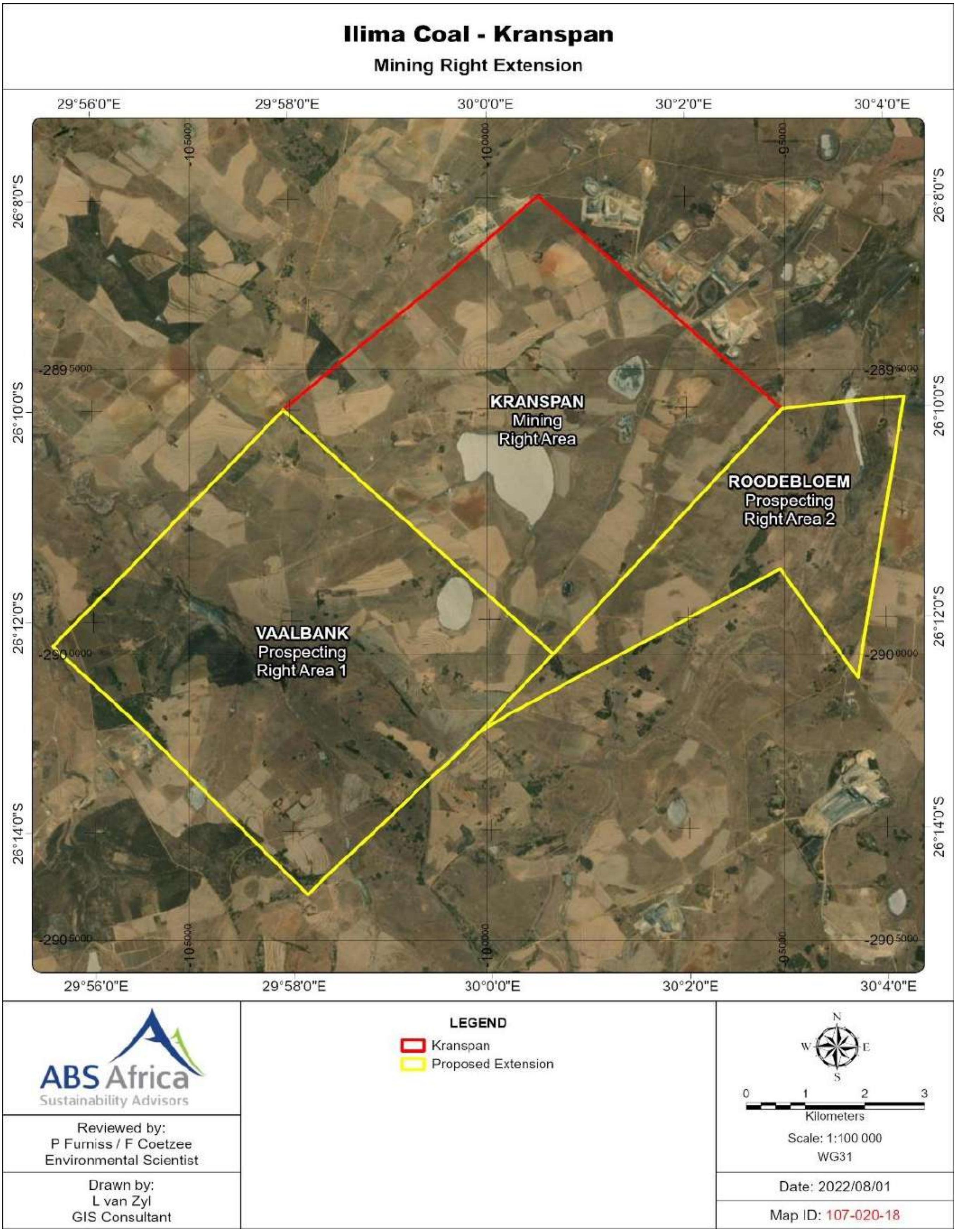


FIGURE 2-1: LOCALITY MAP

3 DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY

3.1 LISTED AND SPECIFIED ACTIVITIES

In terms of Section 24 of NEMA and the 2014 EIA Regulations (as amended), certain activities require Environmental Authorisation (EA) prior to their commencement. Activities identified in Listing Notice 1 and 3 of the 2014 EIA Regulations (as amended) require that a Basic Assessment (BA) process be followed when applying for an EA. Activities identified in Listing Notice 2 require a Scoping and EIA process to be undertaken.

In addition, certain listed waste management activities require a Waste Management Licence (WML) in terms of the National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM:WA) and the schedule of listed waste management activities in GN No. 921 of 29 November 2013 (as amended). Waste activities identified in Category A of GN No. 921 (as amended) require that a BA process be carried out in accordance with the 2014 EIA Regulations (as amended). Waste activities identified in Category B require that a Scoping and EIA process be undertaken.

The existing Kranspan Mine currently operates in accordance with the following key authorisations:

- A Mining Right in terms of the Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA). The Mining Right was granted by the DMRE on 05 April 2022 as per reference "MP 30/5/1/2/2/10224 MR";
- An Integrated Environmental Authorisation (EA) and an approved Environmental Management Programme Report (EMPr) in terms of the NEMA and NEM:WA. Authorisation was granted by the DMRE on 09 November 2021 as per reference "(MP) 30/5/1/2/3/2/1/ (10224) EM"; and
- An Integrated Water Use License (IWUL) in terms of the National Water Act (Act No. 36 of 1998) (NWA). The IWUL was granted by the Department of Water and Sanitation (DWS) on 23 September 2021 as per reference 05/X11B/ACGIJ/10834.

A Section 102 amendment application process as per the Minerals and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA) will be required for the variation to the existing Kranspan MRA. The proposed Section 102 amendment application requires the following environmental approvals:

- The intended coal mining and mine support activities trigger various listed activities identified in Listing Notice 1, 2 and 3 of the 2014 EIA Regulations (as amended) and in Category B of the List of Waste Management Activities (GN No. 921, as amended);
- These listed activities require an EA and a WML to be granted prior to the activities commencing. To inform the applications for an EA and a WML, legislation requires that a Scoping and EIA process be undertaken;
- The existing EA and EMPr will be consolidated in accordance with Regulation 31 and 37 (amendment process) of the EIA Regulations, 2014 (as amended); and
- An Integrated Water Use Licence Application (IWULA) in terms of the NWA will be required for various water uses in terms of Section 21 of the NWA.

Table 3-1 details all the activities approved in terms of NEMA and NEM:WA that forms part of the Kranspan mining operation that have already been approved.

The proposed activities for the proposed extension areas which require approval through a Scoping and EIA process are provided in Table 3-2.

TABLE 3-1: APPROVED LISTED ACTIVITIES FOR KRANSPAN MRA

NAME OF ACTIVITY	NEMA 2014 EIA REGULATIONS (AS AMENDED): LISTING NOTICES (GNR 983, 984 AND 985)	NEM:WA LIST OF WASTE MANAGEMENT ACTIVITIES: CATEGORY A AND B
Mine Contractors Camp	GNR 983: Activity No. 2, 9, 12, 13, 14, 19, 20, 21, 24, 25, 28 and 56 GNR 984: Activity No. 6, 11, 15 and 17 GNR 985: Activity 4, 10, 12, 14, 18 and 23	Category A: Activity No. 1 and 12 Category B: Activity No. 1, 10 and 11
Opencast Mine Areas		
Overburden Stockpiles		
Topsoil Stockpiles		
Discard Stockpile (alternative to in-pit discard disposal)		
Pollution Control Dams		
Fuel Storage Area and Back-Up Power Generation (generator sets)		
Explosives Storage Area (Rapid reload area 100m*50m) (Magazine 70m x 45m)		
Mine Haul Road and Internal Roads – Main Roads (7 km @15m wide)		
Mine Haul Road and Internal Roads – Pit Roads (3 km @ 15m wide)		
Mine Haul Road and Internal Roads – Roads for Final Rehabilitation (2 km @10m wide)		
Run of Mine (ROM) Stockpiles (Located near opencast pits)		
ROM and Product Stockpile (Located near plant)		
Coal Processing Plant (Dry Crushing and Screening and Wash Plant)		
In-Pit Discard Disposal (Pit 5)		
Mine Support and Administration Block (Sewage treatment facility, workshops, offices, ablutions, change houses, lamp room, first aid station, stores, weighbridges, solid waste handling area, vehicle parking area, and vehicle wash bay, water supply boreholes)		
Mine Access Shaft and Ventilation Shaft		
Underground Mining Area		

TABLE 3-2: NEW LISTED ACTIVITIES TRIGGERED FOR THE PROPOSED KRANSPAN MINING RIGHT EXTENSION

NAME OF ACTIVITY (ALL ACTIVITIES INCLUDING ACTIVITIES NOT LISTED)	AERIAL EXTENT OF THE ACTIVITY (HA OR M^2)	LISTED ACTIVITY (Mark with an X where applicable or affected)	APPLICABLE LISTING NOTICE (GNR 544, GNR 545 OR GNR 546)/ NOT LISTED	WASTE MANAGEMENT AUTHORISATION (Indicate whether an authorisation is required in terms of the Waste Management Act). (Mark with an X)
The extension of the Kranspan MRA to include two new properties	Proposed increase of 4 974.96 Ha	X	Listing Notice 1 (GNR 983): Activity 21D	-
Opencast Mine Areas	1 632 Ha	X	Listing Notice 1 (GNR 983): Activity 9 Listing Notice 1 (GNR 983): Activity 12 Listing Notice 1 (GNR 983): Activity 19 Listing Notice 1 (GNR 983): Activity 28 Listing Notice 2 (GNR 984): Activity 6 Listing Notice 2 (GNR 984): Activity 11 Listing Notice 2 (GNR 984): Activity 15 Listing Notice 2 (GNR 984): Activity 17 Listing Notice 3 (GNR 985): Activity 12 Listing Notice 3 (GNR 985): Activity 14 Listing Notice 3 (GNR 985): Activity 23	-
Mine Contractors Yard (Includes ablutions and water supply boreholes)	9 Ha	X	Listing Notice 1 (GNR 983): Activity 9 Listing Notice 1 (GNR 983): Activity 10 Listing Notice 1 (GNR 983): Activity 12 Listing Notice 1 (GNR 983): Activity 28 Listing Notice 2 (GNR 984): Activity 6 Listing Notice 2 (GNR 984): Activity 15 Listing Notice 3 (GNR 985): Activity 12 Listing Notice 3 (GNR 985): Activity 14 Listing Notice 3 (GNR 985): Activity 23	-

NAME OF ACTIVITY (ALL ACTIVITIES INCLUDING ACTIVITIES NOT LISTED)	AERIAL EXTENT OF THE ACTIVITY (HA OR M^2)	LISTED ACTIVITY (Mark with an X where applicable or affected)	APPLICABLE LISTING NOTICE (GNR 544, GNR 545 OR GNR 546)/ NOT LISTED	WASTE MANAGEMENT AUTHORISATION (Indicate whether an authorisation is required in terms of the Waste Management Act). (Mark with an X)
Overburden Stockpiles (including topsoil stockpiles) as well as In-Pit Discard Disposal (Pit 5[3] at Farm Kranspan)	579 Ha	X	Listing Notice 1 (GNR 983): Activity 12 Listing Notice 1 (GNR 983): Activity 19 Listing Notice 1 (GNR 983): Activity 28 Listing Notice 2 (GNR 984): Activity 6 Listing Notice 2 (GNR 984): Activity 15 Listing Notice 3 (GNR 985): Activity 12 Listing Notice 3 (GNR 985): Activity 14 Listing Notice 3 (GNR 985): Activity 23	X
Pollution Control Dams	20 Ha	X	Listing Notice 1 (GNR 983): Activity 10 Listing Notice 1 (GNR 983): Activity 12 Listing Notice 1 (GNR 983): Activity 19 Listing Notice 1 (GNR 983): Activity 28 Listing Notice 2 (GNR 984): Activity 6 Listing Notice 2 (GNR 984): Activity 15 Listing Notice 3 (GNR 985): Activity 12 Listing Notice 3 (GNR 985): Activity 14 Listing Notice 3 (GNR 985): Activity 23	X
ROM Stockpiles	19 Ha	X	Listing Notice 1 (GNR 983): Activity 12 Listing Notice 1 (GNR 983): Activity 19 Listing Notice 1 (GNR 983): Activity 28 Listing Notice 2 (GNR 984): Activity 6	-

[33] Pit 5 of the 2019 Kranspan Mine Plan correlates to Pits 2, 9 and 24 of the 2022 Mine Plan upon which the Kranspan Mine Extension is based

NAME OF ACTIVITY (ALL ACTIVITIES INCLUDING ACTIVITIES NOT LISTED)	AERIAL EXTENT OF THE ACTIVITY (HA OR M^2)	LISTED ACTIVITY (Mark with an X where applicable or affected)	APPLICABLE LISTING NOTICE (GNR 544, GNR 545 OR GNR 546)/ NOT LISTED	WASTE MANAGEMENT AUTHORISATION (Indicate whether an authorisation is required in terms of the Waste Management Act). (Mark with an X)
			Listing Notice 2 (GNR 984): Activity 15 Listing Notice 3 (GNR 985): Activity 12 Listing Notice 3 (GNR 985): Activity 14 Listing Notice 3 (GNR 985): Activity 23	
Coal Processing Plant (Dry Crush and Screening and Wash Plant) and Product Stockpile	16 Ha	X	Listing Notice 1 (GNR 983): Activity 28 Listing Notice 2 (GNR 984): Activity 15 Listing Notice 3 (GNR 985): Activity 12	-
Siding	37,8 Ha	X	Listing Notice 1 (GNR 983): Activity 28 Listing Notice 2 (GNR 983): Activity 12 Listing Notice 2 (GNR 984): Activity 15 Listing Notice 3 (GNR 985): Activity 12	-
Mine Haul Road and Internal Roads – Main Roads	10,5 Ha	X	Listing Notice 1 (GNR 983): Activity 12 Listing Notice 1 (GNR 983): Activity 19 Listing Notice 1 (GNR 983): Activity 24 Listing Notice 1 (GNR 983): Activity 28 Listing Notice 1 (GNR 983): Activity 56 Listing Notice 2 (GNR 984): Activity 6 Listing Notice 3 (GNR 985): Activity 4 Listing Notice 3 (GNR 985): Activity 12 Listing Notice 3 (GNR 985): Activity 14 Listing Notice 3 (GNR 985): Activity 18 Listing Notice 3 (GNR 985): Activity 23	-
Mine Haul Road and Internal Roads – Pit Roads	4,5 Ha	X	Listing Notice 1 (GNR 983): Activity 12	-

NAME OF ACTIVITY (ALL ACTIVITIES INCLUDING ACTIVITIES NOT LISTED)	AERIAL EXTENT OF THE ACTIVITY (HA OR M^2)	LISTED ACTIVITY (Mark with an X where applicable or affected)	APPLICABLE LISTING NOTICE (GNR 544, GNR 545 OR GNR 546)/ NOT LISTED	WASTE MANAGEMENT AUTHORISATION (Indicate whether an authorisation is required in terms of the Waste Management Act). (Mark with an X)
			Listing Notice 1 (GNR 983): Activity 19 Listing Notice 1 (GNR 983): Activity 24 Listing Notice 1 (GNR 983): Activity 28	
			Listing Notice 2 (GNR 984): Activity 6	
Mine Haul Road and Internal Roads – Roads for Final Rehabilitation	2,0 Ha		Listing Notice 3 (GNR 985): Activity 4 Listing Notice 3 (GNR 985): Activity 12 Listing Notice 3 (GNR 985): Activity 14 Listing Notice 3 (GNR 985): Activity 23	
Fuel Storage Area and Back-Up Power Generation (generator sets)	0,04 Ha	X	Listing Notice 1 (GNR 983): Activity 2 Listing Notice 1 (GNR 983): Activity 14 Listing Notice 1 (GNR 983): Activity 28	-
			Listing Notice 3 (GNR 985): Activity 10 Listing Notice 3 (GNR 985): Activity 12	
			Listing Notice 3 (GNR 985): Activity 12	

The planned operations on the proposed extension areas entail surface mining of the coal seams as well as the establishment of various mine support infrastructure.

Based on the mine planning studies completed to date, the following is proposed:

- Surface (opencast) mining focusing on extraction of the B, CL and E Seam via the roll over mining method;
- Besides the opencast mining; haul roads, temporary topsoil and overburden stockpiles, ROM stockpiles and pollution control dams will be established on the proposed extension areas as part of the mining process. In addition, temporary container-type office and ablution facilities and potable water abstraction boreholes will be established;
- A coal wash plant with filter press will be established on Farm Roodebloem to process the export coal product. Dry crushing and screening of the local coal product (sold to Eskom) will take place at the existing dry screening and crushing coal plant at the Kranspan Mine; and
- Dewatering of seepage water will be required for the surface mining over the Life of Mine (LoM). Water removed from pits will be retained in pollution control dams and used for mine activities.

The proposed layout of the key infrastructure is shown in Appendix 4.

Below is a summarised list of the proposed mining activities to be undertaken on the proposed extension areas.

- Exploration geophysical surveying, drilling, pit sampling and trenching;
- Clearing and grubbing;
- Topsoil removal and stockpiling;
- Overburden removal and stockpiling;
- Drilling and blasting (when necessary);
- Excavation of coal and material transfer to a coal stockpile area;
- Beneficiation of the export coal product; and
- Loading, hauling and transport of coal product.

3.2 DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN[4]

3.2.1 MINING OVERVIEW

All the required mine infrastructure for the Project Area will be established within the proposed Kranspan Mining Right Extension site. The B Seam, C Upper and Lower and the E Seam are all considered economic to mine (Ilima Mine Works Programme, 2022). On the Farm Vaalbank 212 IS, the C and B Seam reserve will be mined through opencast mining, and mine infrastructure will be established. On Farm Roodebloem 51 IT, the E Seam will be mined through opencast mining, and mine infrastructure will be established.

All the required mine infrastructure for the additional mining areas (Vaalbank 212 IS and Roodebloem 51 IT) that are being incorporated through the Section 102 application will be serviced from the existing Kranspan Mining Right infrastructure. Infrastructure will be positioned on the no coal or uneconomic areas. The proposed mine infrastructure will consist of the following (refer to proposed layout of the key infrastructure in Appendix 4):

- Mine contractor's camps;

[4] The information presented in this section has primarily been summarised from the Kranspan Project Section 102 Application Mining Works Programme (Ilima, 2022). The MWP contains information which is confidential to Ilima and is therefore not appended to the EIAR.

- Overhead powerlines and related electrical infrastructure from the nearest Eskom take-off position;
- Back-up power supply (generators);
- Bunded fuel storage area;
- Potable water supply infrastructure;
- Wastewater (sewage) treatment infrastructure for the contractor's camps;
- Mine haul roads and associated stormwater control structures;
- Mine offices, parking areas, first aid station, stores, laboratory, workshop, change house and lamp room (pre-fabricated structures);
- Product stockpiles and loading area;
- ROM stockpile areas;
- Dense medium beneficiation (coal wash) plant;
- New railway siding; and
- Weighbridges.

The mine will operate on a 2-shift system 6 days per week. Coal will be out-loaded to rail 7 days per week. The raw coal handling, stockpiling, processing, and out-loading facilities are designed to cater for the differences between mining, coal preparation, and product handling operations.

The proposed Kranspan mine extension project has an estimated production life of 30 years. The proposed mining schedule as per the Ilima Mine Works Programme (2022) shows that mining will be conducted progressively over the LoM (Table 3-3). The table below provides quantities of the Eskom coal products (resultant from the dry crushing and screening plant located at Farm Kranspan) and the export coal products (resultant from the coal wash plant to be located at Farm Roodebloem).

TABLE 3-3: MINING PRODUCTION BUILD-UP AND SCHEDULE

Production	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10
Export Opencast (Tonnes)	304 993	1 219 973	1 219 973	739 973	739 973	739 973	850 000	1 219 973	1 219 973	1 219 973
Eskom Opencast (Tonnes)		2 150 000	2 150 000	2 150 000	2 150 000	2 150 000	2 150 000	2 150 000	2 150 000	2 150 000
Underground (Tonnes)				480 000	480 000	480 000	362 088		0	0
Total Production (Tonnes)	304 993	3 369 973	3 369 973	3 369 973	3 369 973	3 369 973	3 362 088	3 369 973	3 369 973	3 369 973
Export (RB2) Primary Yield %	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%
Export (RB2) Secondary Yield %	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%
Eskom Raw 0x50mm Yield %	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Export Sales Tonnes	211 787	847 149	847 149	847 149	847 149	847 149	841 674	847 149	847 149	847 149
Eskom Sales Tonnes	25 070	2 427 012	2 427 012	2 427 012	2 427 012	2 427 012	2 426 364	2 427 012	2 427 012	2 427 012

Production	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
Export Opencast (Tonnes)	1 219 973	1 219 973	1 219 973	1 219 973	1 219 973	1 219 973	1 219 973	1 219 973	1 219 973	1 219 973
Eskom Opencast (Tonnes)	2 150 000	2 150 000	2 150 000	2 150 000	2 150 000	2 150 000	2 150 000	2 150 000	2 150 000	2 150 000
Underground (Tonnes)									0	0
Total Production (Tonnes)	3 369 973	3 369 973	3 369 973	3 369 973	3 369 973	3 369 973	3 369 973	3 369 973	3 369 973	3 369 973
Export (RB2) Primary Yield %	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%
Export (RB2) Secondary Yield %	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%
Eskom Raw 0x50mm Yield %	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Export Sales Tonnes	847 149	847 149	847 149	847 149	847 149	847 149	847 149	847 149	847 149	847 149
Eskom Sales Tonnes	2 427 012	2 427 012	2 427 012	2 427 012	2 427 012	2 427 012	2 427 012	2 427 012	2 427 012	2 427 012

Production	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Export Opencast (Tonnes)	1 219 973	1 219 973	1 219 973	1 219 973	1 219 973	1 219 973	1 219 973	1 219 973	1 219 973	1 219 973
Eskom Opencast (Tonnes)	2 150 000	2 150 000	2 150 000	2 150 000	2 150 000	2 150 000	2 150 000	2 150 000	2 150 000	2 150 000
Underground (Tonnes)									0	0
Total Production (Tonnes)	3 369 973	3 369 973	3 369 973	3 369 973	3 369 973	3 369 973	3 369 973	3 369 973	3 369 973	3 369 973
Export (RB2) Primary Yield %	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%
Export (RB2) Secondary Yield %	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%
Eskom Raw 0x50mm Yield %	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Export Sales Tonnes	847 149	847 149	847 149	847 149	847 149	847 149	847 149	847 149	847 149	847 149
Eskom Sales Tonnes	2 427 012	2 427 012	2 427 012	2 427 012	2 427 012	2 427 012	2 427 012	2 427 012	2 427 012	2 427 012

3.2.2 OPENCAST MINING

A conventional strip mining (roll-over) method will be employed for each of the opencast pits. Material from the boxcut phase will be stored per overburden classification, with the bulk of the material placed in a position alongside the final strip, to facilitate filling of the final void (Figure 3-1).

Each of the steps in the open cast mining method is summarised below:

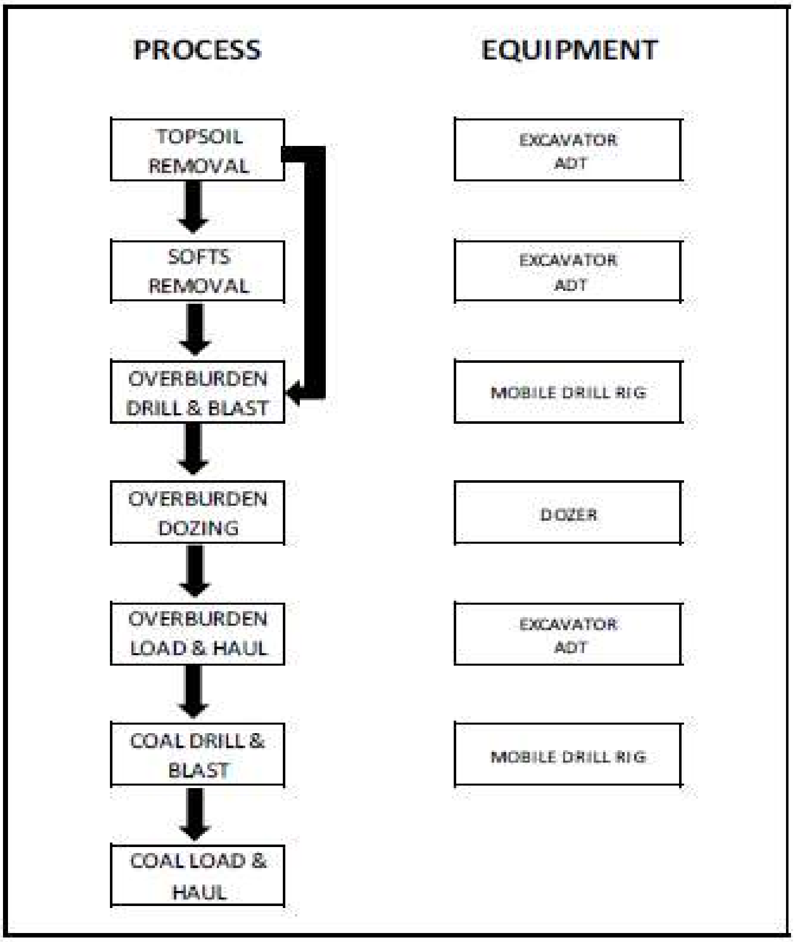


FIGURE 3-1: MINING METHOD

Topsoil Removal

Topsoil will be removed two strips in advance of the current working strip and will be either stockpiled separately or placed directly on the rehabilitated area behind the advancing strip. Topsoil will be removed using excavators and hauled with Articulated Dump Trucks (ADTs).

Softs Removal

Soft subsoil will be removed one strip in advance of the current working strip and will be either stockpiled separately or placed directly on the rehabilitated area behind the advancing strip. Softs will be removed using excavators and hauled with ADTs.

Overburden Drill and Blast

Drilling of the overburden will be done using a mobile drill rig drilling a 110 mm diameter hole and with a planned burden and spacing of 4 m x 5 m. This may be adjusted once mining has commenced.

Overburden Dozing

The first overburden removal process will be to doze overburden material to the spoil side. For modelling purposes, it is assumed that 30% of the overburden can be dozed. The assumption is based on current mining practice at similar sites.

Overburden Load and Haul

After dozing, remaining overburden will be loaded and hauled and dumped on the spoil side of the current strip. The load and haul will be conducted using excavators and ADTs.

Coal Drill and Blast

Drilling of the overburden will be done using a mobile drill rig drilling a 110 mm diameter hole and with a planned burden and spacing of 7 m x 8 m. This may be adjusted once mining has commenced.

Coal Load and Haul

Permanent haul roads will be constructed in line with relevant safety requirements. The coal be loaded and hauled to the ROM Stockpile using excavators and ADTs.

Rehabilitation

Rehabilitation of the open pit will be done concurrently with the opencast mining using the recognised roll over method of mining and the stated mining sequence.

Materials are placed back into the void in the former stratigraphic sequence i.e. topsoil on the surface, subsoil directly below the topsoil, while all hard material (sandstone and shale) is deposited in the bottom of the void. It is envisaged that the final reinstated surface level will be approximately 0.52 m above the original surface level. However, the existing surface drainage pattern will remain unchanged and the total disturbed area will be free draining. On completion of surface reinstatement, the area will be re-vegetated with suitable pasture grass species.

3.2.3 OVERBURDEN STOCKPILES

Several overburden stockpiles will be established during the LoM. These overburden stockpiles comprise of the hards and softs sub-soil material removed in order to gain access to the coal seam. The stockpiles will be placed as close to the pits as possible but outside of areas identified as environmentally sensitive. The proposed location of the stockpiles is shown in the proposed layout in Appendix 4. Topsoil is stored separately to the overburden stockpiles.

The stockpiles are temporary in that they are only on surface for as long as it takes to extract the coal from the relevant pit. After the coal has been removed, the overburden material is placed back into the pit in the same order as it was removed, typically hards, softs and then topsoil. Whilst on surface, the overburden stockpiles are managed as part of the dirty water management area. Runoff from the stockpile areas thus drains and is contained in the Pollution Control Dams (PCDs).

3.2.4 ROM STOCKPILES AND PRODUCT STOCKPILE

Several ROM stockpiles will be established at the opencast mine areas, refer to the proposed layout in Appendix 4. Raw coal extracted from the pits is temporarily stockpiled at these locations before being transported to the coal processing plant area, either for dry crushing and screening or washing.

Following processing, the coal is placed on the product stockpile. The latter will be situated adjacent to the processing plant. From here, the product is transported to the customer. The product stockpile will be in place for the LoM.

The ROM and product stockpile areas are managed as part of the dirty water management system. Runoff from the stockpile areas thus drains and is contained in the PCDs.

3.2.5 POLLUTION CONTROL DAMS

Several PCDs will be established on the mine site, where all dirty water will be collected and stored for reuse. The location of the PCDs is shown in the proposed layout in Appendix 4. The location of the PCDs have been placed to try avoid areas identified as environmentally sensitive. The capacity of the PCDs will be based on a 1:50 year storm event.

3.2.6 COAL PROCESSING PLANT

Following extraction, coal processing will be undertaken. Dry crushing and screening of the local coal product (sold to Eskom) will take place at the existing dry screening and crushing coal plant at the Kranspan Mine on Farm Kranspan. A coal wash plant with filter press will be established on Farm Roodebloem to process the export coal product.

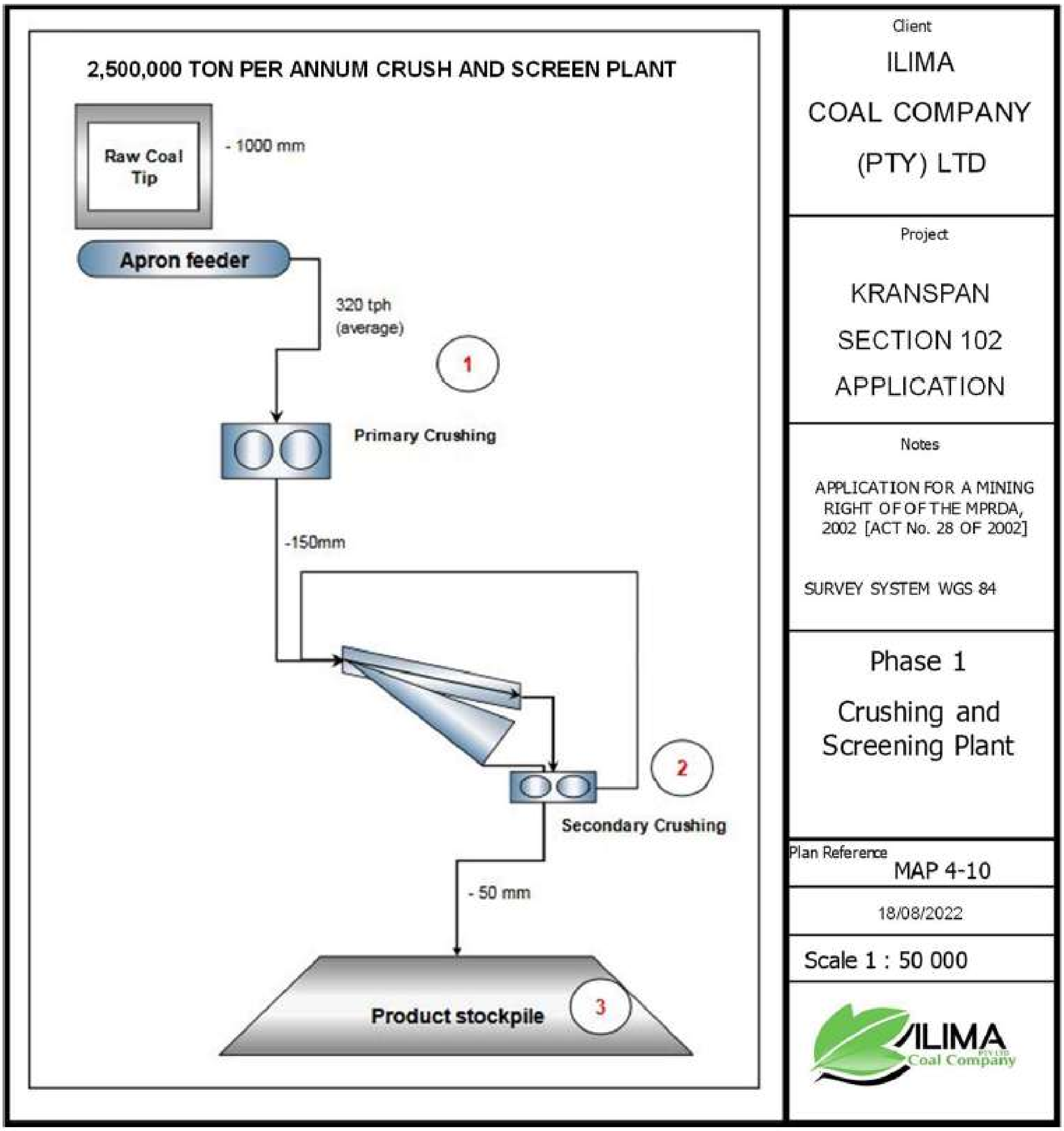
The mine will thus commission the coal processing operations in two separate phases. Phase 1 includes the standalone crushing and screening plant at Farm Kranspan for the Eskom coal product. Phase 2 involves the construction of a coal washing plant at Farm Roodebloem for the beneficiation of the export coal product.

Dry Crushing and Screening Plant

Certain areas will be mined to produce a high Ash, medium Volatile, thermal coal product for power station consumption by screening and crushing the ROM coal. The crushing and screening plant will be situated at Farm Kranspan (under the existing Kranspan EA).

Phase 1 consists of crushing and screening the mined coal to produce an Eskom product (-50mm), and this phase will continue throughout the LoM. The raw coal is fed into the crushing plant by a FEL (Front End Loader). The coal is crushed mechanically in the plant by jaw crushers. This reduces the size of the raw coal so that it can be more easily handled. The crushed coal then moves into the screening plant where vibrating screens separate the crushed coal into different sizes or grades of coal. Refer to Figure 3-2 for a diagram describing this process.

Mining at the Vaalbank and Roodebloem areas will follow conventional truck and shovel opencast mining methods, with Eskom ROM coal, approximately 2.15 million tonnes per annum (Mtpa), hauled to the current Kranspan dry crushing and screening plant. This coal product is then loaded onto trucks for delivery to the Eskom market.



Source: Kranspan Project Section 102 Application Mining Works Programme (Ilima, 2022)

FIGURE 3-2: PHASE 1 CRUSHING AND SCREENING PLANT

Dense Medium Beneficiation (Coal Washing) Plant

Phase 2 will be initiated a few years after Phase 1, and involves crushing, screening and washing the coal to produce an RB2 grade export product and a secondary wash to produce an Eskom product. The purpose of washing is primarily to reduce the ash content of the coal so that it meets the quality requirements of the export market.

Mining at the Vaalbank and Roodebloem areas will follow conventional truck and shovel opencast mining methods, with export thermal ROM coal, approximately 1.22 Mtpa, hauled to the new wash plant at Farm Roodebloem. After processing, trucks deliver the washed coal product to the proposed new rail siding where the coal is loaded onto railcars for delivery to the Richards Bay Coal Terminal (RBCT).

The coal preparation plant is designed on a modular basis to allow for a phased build-up in coal production. The washing plant design comprises of the following modules:

- Dense medium (DM) cyclone modules each inclusive of de-sliming screen clean coal drain and rinse screen, 2 x 600 dense medium cyclones and associated tanks and pumps;
- Discard modules comprising 1 drain and rinse screen fed from 2 dense medium cyclone modules;
- Fines treatment plants fed from 2 dense medium cyclone modules each module inclusive of de-sliming cyclones, spirals, spiral clean coal dewatering cyclones and screens, spiral discard dewatering cyclones and water clarification system;
- Clean coal dewatering module fed from the 4 dense medium cyclone modules by a common conveyor feeding 2 clean coal centrifuges; and
- Plant services for magnetite addition, compressed air, and high-pressure water.

The modules are sized to handle the design tonnage plus 10% and the expected variations in yield and size consist as set down in the design criteria.

The 40 mm x 0 raw coal is fed onto fixed sieve panels followed by de-sliming screens where water is added and the 1 mm x fines are removed. The 40 x 1 mm de-slimed raw coal is then mixed in a magnetite in water suspension and laundered to a DM cyclone feed tank from where it is pumped to 2 x 600 mm DM cyclones. The cyclones are sized to handle the feed tonnage and particle top size. The 1 mm x 0 fines gravitate to a de-sliming tank and are pumped to the fines treatment for further processing.

The DM cyclones separate the coal by density into clean coal and discard fractions. Clean coal gravitates over a fixed sieve to a horizontal vibrating drain and rinse screen where medium is drained from the coal and the coal is then rinsed with water to remove any adhering medium. Discard from the cyclones similarly gravitates to a horizontal vibrating drain and rinse screen where medium is again drained from the coal and the coal is again rinsed with water to remove any adhering medium.

Correct medium from the fixed sieve and drainage section of the drain and rinse screens gravitates to a correct medium tank and is then pumped to a head-box from where it is distributed to the pump tank and bleed-off to dilute medium to remove excess water entering the circuit with the raw coal.

Dilute medium from the drainage section of the drain and rinse screens gravitates to a dilute medium tank from where it is pumped to a magnetic separator for recovery of the magnetite. Magnetic separator effluent is used as primary rinse water on the drain and rinse screens or flood box water on the de-sliming screen. Over dense magnetite from the magnetic separator gravitates to the correct medium tank. An automatic nucleonic density controller measures the density of the correct medium and controls the addition of clarified water into the correct medium tank to maintain the correct density in the circuit.

Fresh magnetite slurry is periodically added at the required density to the correct medium tank from the magnetite mixing plant if the density of the medium or the tank level drops. Clean coal from the drain and rinse screens is discharged onto a common collection conveyor and fed to clean coal centrifuges for further dewatering of the coal. Effluent from the centrifuges is pumped back via flood-box onto the drainage section of the clean coal drain and rinse screens. Discard from the drain and rinse screens is collected on a common discard conveyor and conveyed to the discard bin. Floor clean-up sumps and pumps are provided in each module.

3.2.7 SLURRY DISCARD

Raw coal is fed from a ROM stockpile into a crusher and crushed to market related sizing. The <3 mm particles are screened out and the >3 mm are washed in a dense medium separation plant (DMS) at the wash plant. Washing of the coal in the coal wash plant will result in the generation of a slurry waste stream.

During the beneficiation process, the slurry produced contains approximately 80% water and 20% solids. Slurry will be routed to a filter press, where the slurry is dried to a filter cake before being transported as discard via trucks for in-pit disposal at Pit 5 at Farm Kranspan. The supernatant water is piped off for reuse at the wash plant.

Coal discard generated at the wash plant generally comprises of larger coal particle sizes and less moisture. Discard from the coal preparation plant is planned to be deposited back into Pit 5 at Farm Kranspan, after extraction of the target coal seam has been completed. In accordance with the recommendations from the previous geochemical characterisation testwork, geochemical modelling and groundwater study undertaken for the initial Kranspan Mine EIA, only Pit 5 at Farm Kranspan is proposed to be used for the in-pit disposal of the discard material.

The volume of discard material which will be generated over the LoM is dependent on several factors including the tonnage of coal processed through the wash plant. This, in turn, is dependant on the quality of the coal seams and the difference in the export versus Eskom price of the coal per tonne. Both of these factors cannot be predicted with absolute certainty at the mine planning stage and are expected to fluctuate over the LoM.

Based on the mine planning undertaken to date and informed by the findings of the geochemical modelling, approximately 5 384 455 m3 of discard material is proposed to be backfilled in Pit 5 as part of the rehabilitation of this pit. This comprises of a surface area of approximately 143 ha and is based on backfilling of the discard into the mined pit up to the average height of the roof of the coal seam. Should additional discard disposal capacity be required and the material be backfilled to above the pre-mining coal seam depth, geochemical and groundwater modelling will be undertaken to estimate this impact prior to the implementation of this management option.

This will limit the extent to which carbonaceous material is placed back in the pit at a different height to that which occurred naturally in the pre-mining profile. The height of the coal seam increases towards the north and north-west of Pit 5 and decreases towards the south. The backfilling height will follow the same gradient as the coal seam with greater height of discard material backfilled in the north and north-west of the pit. Ilima have indicated that there will be enough capacity in Pit 5 for the in-pit disposal of all discard material that will be generated over the LoM.

3.2.8 CONVEYORS

All the opencast mining equipment will be diesel powered and all the coal will be transported from the production pits to the processing plant by truck i.e. no conveyors.

3.2.9 POWER SUPPLY

Based on the planned mining operation, surface plant, and product handling, the calculated Total Power Demand is 5.0 megavolt amperes (MVA). The Maximum Demand is dependent on correct operation of a Power Factor Correction (PFC) system to keep the Power Factor above 0.96. Should the PFC system fail, the Maximum Demand can substantially increase to 7.3 MVA.

Calculation of the Maximum Demand for surface power requirements is based on:

- Office complexes;
- Change house facilities;
- Ventilation fans;

- Incline conveyors;
- Surface stockpile conveyors;
- Crushing and screening plant (at Kranspan)
- Modular Coal Processing Plant (at Kranspan)
- Water purification and sewer plants; and
- Workshops.

3.2.10 Explosives Magazine

Explosives for blasting of overburden and coal will be stored at selected areas across the site. Storage areas will comply with all relevant legislation.

3.2.11 Water Supply

Water requirements for use by the mine staff is calculated at 100 litres (L) per person per day. The total number of employees and subcontractors are estimated to be between 350 and 400 and the water supply capacity has therefore been calculated at 40 kilolitres (kL) per day.

Boreholes will be established to supply water for staff requirements. A small water treatment plant will be available at the adjacent Kranspan Mine to produce potable water from the borehole water.

Industrial water requirements include:

- Beneficiation Plant (Dense Medium); and
- Dust suppression.

Supply of water to the beneficiation plant will be considered from ground or surface water resources or water from dirty water containment facilities. The processing plant water consumption has been estimated to be between 10 000 and 20 000 m^3 per month.

3.2.12 Sewage Management

A wastewater treatment facility for the treatment of sewage as well as a treatment facility for contaminated water has been approved in the EA for the Kranspan MRA. Septic tanks at the mine contractor yard will be required for the treatment of sewage.

3.2.13 Water Management

All rainfall run-off in mining areas will be regarded as dirty water and separated from clean water run-off through cut-off drains. The polluted run-off water collected will be stored in high-density polyethylene-lined (HDPE) PCDs. The water from the PCDs will be used for dust suppression on roads and the ROM and product stockpiles.

Water management across the site will be in compliance with all requirements of Government Notice 704, promulgated in terms of the National Water Act (Act No. 36 of 1998), specifically in respect of the following:

- Collection of the water arising within any dirty area, including water seeping from mining operations, outcrops or any other activity, into a dirty water system;
- Design, construction, maintenance and operation of the clean water and dirty water management systems so that it is not likely for either system to spill into the other more than once in 50 years;
- Design, construction, maintenance and operation of any dam that forms part of a dirty water system to have a minimum freeboard of 0.8 m above full supply level, unless otherwise specified in terms of Chapter 12 of the Act;

- Design, construction, and maintenance of all water systems in such a manner as to guarantee the serviceability of such conveyances, for flows up to and including those arising as a result of the maximum flood, with an average period of recurrence of once in 50 years; and
- Prevention of erosion or leaching of materials from any residue deposit or stockpile from any area and containment of material or substances so eroded or leached in such area by providing suitable barrier dams, evaporation dams or any other effective measures to prevent this material or substance from entering and polluting any water resources.

3.2.14 Non-Mineral Waste Management

No solid waste disposal facilities are to be constructed as part of the mine development. All waste will be managed in accordance with the waste management hierarchy as required by the National Environmental Management: Waste Management Act (Act No. 59 of 2008).

Waste will be segregated into general and hazardous waste and contractors will be appointed to remove the waste to licensed waste disposal facilities.

Recyclable waste like glass, wood and plastic will similarly be segregated (where practically possible) on site and removed by licensed waste transporters. An oil recycling company will also be appointed to remove waste oil generated by the mining activities.

3.2.15 Main Mine Access Road and Internal Roads

The Project Area will be directly accessed from the R36 Provincial Road, which runs in a north to south direction from Carolina to Breyten. The Farm Vaalbank 212 IS is situated west of the R36 and the Farm Roodebloem 51 IT is situated east of the R36. Existing roads used by current landowners and site occupiers will be used to access these farms.

The internal roads will be 15 m wide compacted roads, with side berms to channel stormwater runoff. These roads will be equipped with all the required storm water systems and structures to prevent any possible flooding. Dust from these roads will be controlled by applying road binders and regular watering with water tankers.

Stormwater runoff from the roads will be regarded as dirty water and managed through the mine's dirty water management system.

3.2.16 Rail

A 20 tonne/axle railway line runs from Belfast in the north, to Ermelo in the south. This rail line passes to the east of the Farm Roodebloem 51 IT. There is currently a siding, Droogvallei siding, located approximately 19 km north east of the project area. The rail route links to the RBCT mainline at Ermelo and onto the export facility at Richards Bay. The rail haul route from the Project Area to Majuba Power Station goes south to Ermelo, and then onto the newly constructed rail line that links the export rail line at Ermelo with Majuba Power Station.

As part of the Kranspan MRA extension, a new rail siding is proposed to be constructed on the Farm Roodebloem 51 IT, refer to the proposed layout in Appendix 4. Product destined for the export market will be transported via truck to the new rail siding.

3.2.17 Offices, Workshops and Change Houses

Based on the anticipated management structure at the mine, office and ablution facilities have been designed to accommodate all on-site personnel. The office design contains the reception area, offices, boardroom, male and female ablution facilities, kitchen, and change house and laundry facility.

The mine offices, workshops, and change houses will be in the form of portable containers and placed on concrete plinths, so that they can be easily removed at the end of the LoM.

4 POLICY AND LEGISLATIVE CONTEXT

Table 4-1 provides a description of the legislation which has particular importance to the Scoping and EIA process being undertaken for the proposed Kranspan Mining Right Extension.

TABLE 4-1: POLICY AND LEGISLATIVE CONTEXT

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED
ACTS	
The Constitution of the Republic of South Africa (Act No. 108 of 1996)	The Constitution is the supreme law of the land and provides the overarching framework for sustainable development. **The Scoping and EIA process is being undertaken to identify and determine the potential impacts associated with the proposed Kranspan Mining Right Extension. Mitigation measures have aimed to ensure that the potential impacts are managed to acceptable levels to support the rights in terms of the Constitution.**
Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA) • GN R 527 (MPRDA Regulations) of 23 April 2004, as amended 27 March 2020	The MPRDA regulates the acquisition, use and disposal of mineral and petroleum rights. **Ilima is applying for the variation of the existing Kranspan MRA in terms of Section 102 of the MPRDA.** The Amendment Regulations repeal various environmental related provisions in Chapter 2 of the MPRDA Regulations, as the matters dealt with in these regulations have been incorporated into the NEMA and the EIA Regulations. The Amendment Regulations also provides for new consultation requirements. Consultation required for prospecting right, mining right and mining permit applications and applications under the Social and Labour Plan ("SLP") process must be conducted terms of the public participation process prescribed in the EIA Regulations promulgated in terms of section 24(5) of the NEMA. **The amendments to the mine closure provisions contained in regulations 56 – 62 refer to the NEMA, the EIA Regulations and the Financial Provision Regulations, 2015. These have been adhered to as part of the Scoping and EIA process for the project.**
National Environmental Management Act (Act No. 107 of 1998) (NEMA) • 2014 EIA Regulations: GN R 982, GN R 983, GN R 984 and GN R 985 of 04 December 2014, as amended.	NEMA provides 18 specific principles relating to Environmental Management. Of key importance are the precautionary principle and the polluter pays principle. The 18 principles of NEMA are to be recognised during the undertaking of the Scoping and EIA process and play a key role during the decision-making process. Section 24 of NEMA requires EA to be obtained for certain activities identified in the three listing notices, published on 04 December 2014 (as amended). The EIA Regulations have been made applicable to prospecting and mining activities. The procedure for obtaining an EA requires either a BA process (activities in Listing Notice

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED
• GN R 1147 (Financial Provisioning Regulations) of 20 November 2015, as amended	1 and 3) or Scoping and EIA process (activities in Listing Notice 2) to be undertaken to inform the application for authorisation. **The proposed Kranspan Mining Right Extension triggers various listed activities in Listing Notice 1, 2 and 3. Since activities in Listing Notice 2 apply, a Scoping and EIA process is being followed. The Scoping and EIA process is being undertaken in compliance with the requirements of NEMA and the 2014 EIA Regulations (as amended).** The Financial Provisioning Regulations prescribe methods for determining the quantum of financial provision for rehabilitation and mechanisms for providing for it. Section 41 (1) of the MPRDA has been repealed. Section 24P of NEMA, as amended, provides that the holder of a mining right must make financial provision for rehabilitation of negative environmental impacts. The financial provision must guarantee the availability of sufficient funds. **The Financial Provisioning Regulations are applicable to rehabilitation and closure plans as they prescribe the minimum content of an annual rehabilitation plan and the minimum content of a final rehabilitation, decommissioning and mine closure plan. This has been finalised and included in Section 22.7 of PART B of the EIA Report.**
National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM:WA) • GN R 632 (Regulations regarding the planning and management of residue stockpiles and residue deposits) of 24 July 2015, as amended • GN R 921 (list of waste management listed activities) of 29 November 2013, as amended	The NEM:WA provides for the reform of waste management legislation and repeals or amends the legislation under which waste was previously regulated. Part 4 of the NEM:WA pertains to listed waste management activities. In accordance with section 19(2) of the NEM:WA, the Minister published a schedule of listed waste management activities in GN 921 of 29 November 2013 (as amended). These are considered activities that have or are likely to have a detrimental effect on the environment. Category A and Category B listed waste management activities above certain thresholds are subject to a process of impact assessment and licensing. Category C listed waste management activities do not require a waste management license but are subject to the provisions of National Norms and Standards (GN R 926, November 2013). The assessment and reporting process in support of a Waste Management Licence (WML) application must be undertaken in accordance with the 2014 EIA Regulations (as amended). Activities listed in Category A require a BA process, while activities listed in Category B require a Scoping and EIA process in order for authorities to consider an application in terms of NEM:WA. According to Regulation 2 of GN 921, no person may commence, undertake, or conduct a listed waste management activity unless a licence is issued in respect of that activity. **The proposed Kranspan Mining Right Extension triggers waste management listed activities under Category B, requiring a WML for the PCDs and mine residue stockpiles. The material stockpiles (topsoil and overburden) fall within the definition of a residue stockpile, and these are included in the definition of hazardous waste in NEMWA. In addition, all mineral and non-mineral waste generated by the mine**

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED
	activities will need to be managed in accordance with the provisions of NEMWA and its associated regulations, norms and standards. As the DMRE is the competent authority for the NEMA and NEM:WA activities, Ilima will apply for an integrated EA, as provided for in section 24L of the NEMA.
The National Water Act (Act No. 36 of 1998) (NWA)	The NWA identifies 11 consumptive and non-consumptive water uses, which must be authorised under a tiered authorisation system, which includes Scheduled uses, General Authorisations, or Licenses. In terms of Section 21 of the NWA, the following water uses are identified: (a) Taking water from a water resource; (b) Storing water; (c) Impeding or diverting the flow of water in a watercourse; (d) Engaging in a stream flow reduction activity contemplated in section 36; (e) Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1); (f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit; (g) Disposing of waste in a manner which may detrimentally impact on a water resource; (h) Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process; (i) Altering the bed, banks, course or characteristics of a watercourse; (j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and (k) Using water for recreational purposes. **The proposed Kranspan Mining Right Extension activities requires a water use licence for a number of listed water uses. An IWULA for Farm Roodebloem has been prepared in parallel with the Scoping and EIA process.** **The potential impacts on surface water and wetlands are discussed further in Section 7. A Surface Water Ecosystems / Wetland Impact Assessment was undertaken during the EIA phase to assess these impacts, refer to Appendix 8.**
National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM:BA)	The NEM:BA regulates the management and conservation of the biodiversity of South Africa within the framework provided under NEMA. This Act also regulates the protection of species and ecosystems that require national protection and also takes into account the management of alien and invasive species. The Mpumalanga

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED
	Biodiversity Sector Plan (MBSP) is a spatial tool with land-use guidelines that forms part of a broader set of national biodiversity planning tools and initiatives that are provided for in national legislation and policy. **The potential impacts on flora and fauna as well as terrestrial ecosystems are discussed further in Section 7. A Terrestrial Ecological Impact Assessment was undertaken during the EIA phase to assess these impacts, refer to Appendix 8.**
National Environmental Management: Protected Areas Act (Act No. 57 of 2003) (NEM:PA)	The aim of NEM:PA is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural seascapes. The purpose of a Protected Environment is amongst others to protect a specific ecosystem outside a special nature reserve world heritage site or nature reserve and also to ensure the use of the natural resources in the area is sustainable. **The proposed Kranspan Mining Right Extension does not occur near any formal Protected Areas according to the Register of Protected Areas (PAR) published by the Department of Environment, Forestry and Fisheries (DFFE). This is discussed further in Section 6.4.1.5.3.**
National Environmental Management: Air Quality Act (Act No. 39 of 2004) (NEM:AQA)	The NEM:AQA provides for the setting of national norms and standards for regulating air quality monitoring, management and control and describes specific air quality measures so as to protect the environment and human health or well-being by providing reasonable legislative and other measures to prevent air pollution and promote conservation and secure ecologically sustainable development. It also includes measures for the control of dust, noise and offensive odours that may be relevant to the construction. **The proposed Kranspan Mining Right Extension will involve the generation of emissions to atmosphere, including dust, and air pollutants. These will need to be monitored and managed in accordance with the requirements of the Act. The Project site is located outside the Highveld Priority Area.** **No Air Emissions License (AEL) application has been identified as being necessary for the proposed Kranspan Mining Right Extension. The potential impacts on air quality are discussed further in Section 7. An Air Quality Impact Assessment and Noise Impact Assessment was undertaken during the EIA phase to provide recommendations for mitigation, monitoring and management measures, refer to Appendix 8.**
Mine Health and Safety Act (Act No. 29 of 1996) (MHSA)	The objective of the Act is to cover all aspects relating to health and safety of employees and other persons on the mine property. The Act places the responsibility on the mine owner for ensuring that the mine is designed, constructed and equipped in a manner which allows for a safe and healthy working environment. **The safety precautions in Section 7 of the MHSA have been incorporated into the EMPr.**
Occupational Health & Safety Act (Act No. 85 of 1993)	The Act provides for the health and safety of people at work as well as the health and safety of persons using plant and machinery. **The EMPr has made provision for health and safety measures.**

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED
Hazardous Substances Act (Act No. 15 of 1973)	The objective of the Act is to provide for the control of substances which may cause injury or ill health to or death of human beings due to their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure. In terms of the Act, substances are divided into schedules, based on their relative degree of toxicity and the Act provides for the control of importation, manufacture, sale, use, operation, application, modification, disposal and dumping of substances in each schedule. **The chemicals typically found in petroleum products, for example, benzene, are regulated in terms of this Act. The chemical storage area, proposed fuel storage facility and refuelling bay, with all appropriate controls in place, will not conflict with the Act. The EMPr provides measures in this regard.**
National Heritage Resources Act (Act No. 25 of 1999) (NHRA)	The NHRA describes the importance of heritage in the South African context, and designates the South African Heritage Resource Agency (SAHRA) as guardian of the national estate which may include heritage resources of cultural significance that link to biodiversity, such as places to which oral traditions are attached or which are associated with living heritage, historical settlements, landscapes and natural features of cultural significance, archaeological and palaeontological sites, graves and burial grounds, or movable objects associated with living heritage. Section 38 of the Act requires a Heritage Impact Assessment (HIA) to be undertaken for various types of development. If the HIA demonstrates that the development will have an impact on a heritage resource, approval from SAHRA, or the relevant provincial heritage authority, is needed prior to proceeding with the development. **The potential impacts on heritage resources are discussed further in Section 7. A HIA was undertaken during the EIA phase to assess these impacts, refer to Appendix 8.**
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	The CARA provides for control over the utilization of natural agricultural resources to ensure the conservation of soil, water resources and vegetation. In this regard, the CARA includes provisions for the combating of weeds and invader plants, as well as associated issues. The provisions of CARA were considered in conjunction with the provisions of the NEM:BA, to ensure conservation of biodiversity, soil, water resources and vegetation. **Based on the DFFE screening tool, the proposed Kranspan Mining Right Extension falls on agricultural land with high sensitivity. The potential impacts on land capability are discussed further in Section 7. A Soil and Agricultural Potential Assessment as well as a Hydropedology Assessment was undertaken during the EIA phase to assess these impacts, refer to Appendix 8.**
National Forests Act (Act No. 84 of 1998) (NFA) • GN R 650 (List of Protected Tree Species) of 29 August 2014	In terms of the NFA, trees in natural forests or protected tree species (as listed in Government Gazette Notice 1012 of 27 August 2004) may not be cut, disturbed, damaged, destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold - except under licence granted by the DFFE. **No Protected Trees were found according to the Terrestrial Ecological Impact Assessment.**

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED
POLICIES	
Just Energy Transition Investment Plan (JET IP) for the five-year period, 2023–2027	The JET IP is premised on South Africa's 2030 National Development Plan, with its focus on tackling the country's systemic challenges of poverty, inequality, and unemployment. One of the main interventions of the JET IP is within coal-producing and coal-reliant areas to spearhead diversification and socio-economic transition for those most impacted by the phase down of coal, in line with energy policy. This is especially important given the high concentration of distributional impacts that will be felt in Mpumalanga over the period covered by this IP and hence guides prioritisation in terms of timing. **The Scoping and EIA process has taken cognisance of this Plan.**
DMRE (2021). Towards a Just Energy Transition Framework in the Minerals and Energy Sectors	The DMRE has published a Draft Just Transition Framework to support the decarbonisation of the mining and energy sectors in a socially acceptable manner that contributes to the economic development of the country, focussing on the issues related to workers in the coal value chain and specifically coal miners, the economic development of coal dependent regions, mitigating impacts on vulnerable groups such as youth and women associated with fossil fuel value chains, as well as access to modern energy services. **The Scoping and EIA process has taken cognisance of this Framework.**
GUIDELINES	
Department of Environmental Affairs, Department of Mineral Resources, Chamber of Mines, South African Mining and Biodiversity Forum, and South African National Biodiversity Institute (2013), Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector, Pretoria, South Africa	The mining and biodiversity guideline interprets the best available biodiversity knowledge and science in terms of the implications and risks for mining in a practical guideline and user-friendly decision support tool for both industry and regulators to ensure that biodiversity issues are consistently incorporated into the decision-making processes for mining projects. **The Scoping and EIA process has taken cognisance of this guideline.**
Department of Environmental Affairs (2017), Public Participation guideline in terms of NEMA EIA Regulations, Department of Environmental Affairs, Pretoria, South Africa	The public participation guideline outlines the importance of public participation as well as the minimum legal requirements for the public participation process, the steps to be taken and the guideline for planning a public participation process. **The public participation process for this application has incorporated the relevant requirements of the guideline.**
Department of Environmental Affairs (2017), Guideline on Need and Desirability, Department of Environmental Affairs, Pretoria, South Africa	The need and desirability guideline highlights the importance of establishing and assessing the need and desirability for a project. The consideration of need and desirability in the EIA decision making process requires the consideration of the strategic importance of the development alongside the broader societal need and public interests.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED
	The need and desirability description for the proposed development has taken cognisance of this guideline.

4.1 LISTED ACTIVITIES IDENTIFIED IN TERMS OF NEMA, NEM:WA AND NWA

TABLE 4-2: NEMA LISTED ACTIVITIES APPLICABLE TO THE PROPOSED KRANSPAN MINING RIGHT EXTENSION PROJECT

NEMA LISTED ACTIVITIES		
REGULATION	**ACTIVITY NUMBER**	**SUMMARY DESCRIPTION**
GN R.983, 8 December 2014 (as amended on 7 April 2017) Listing Notice 1: Basic Assessment	1(2)	The development and related operation of facilities or infrastructure for the generation of electricity from a non-renewable resource where (i) the electricity output is more than 10 megawatts but less than 20 megawatts or (ii) the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare. **The back-up power requirements (diesel generator sets), in the event of a power failure, may fall within the ambit of this activity.**
	1(9)	The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water. **Mine support infrastructure will include pipelines for potable water, storm water and dewatering of the open pit mine workings.**
	1(10)	The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes. **Mine support infrastructure may include pipelines for transportation of sewage and water from pollution control dams.**
	1(12)	The development of (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more; or (ii) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. **The placement of dams required for effectively managing water on the site, including pollution control dams, as well as road infrastructure and material stockpiles, may fall within the ambit of this activity. Avoidance of**

NEMA LISTED ACTIVITIES		
REGULATION	**ACTIVITY NUMBER**	**SUMMARY DESCRIPTION**
		these areas has been prioritised as part of the environmental sensitivity planning to be undertaken in the Scoping and EIA process.
	1(14)	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres. **This includes explosives, solvents, lubricants, vehicle and generator fuel, waste oils etc. Various storage containers and storage areas, each of different sizes will be required for the different dangerous goods that will be necessary for the mining activities on the proposed extension areas.**
	1(19)	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse. **The placement of dams required for effectively managing water on the site, including pollution control dams, as well as road infrastructure and material stockpiles, may fall within the ambit of this activity. Avoidance of these areas has been prioritised as part of the environmental sensitivity planning to be undertaken in the Scoping and EIA process.**
	1(21D)	Any activity including the operation of that activity which requires an amendment or variation to a right or permit in terms of section 102 of the Minerals and Petroleum Resources Development Act, as well as any other applicable activity contained in this Listing Notice or in Listing Notice 3 of 2014, required for such amendment. **This application for EA / WML is submitted in support of a variation to the existing Kranspan Mining Right (proposed extension of the MRA) in terms of Section 102 of the MPRDA.**
	1(24)	The development of a road— (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres but excluding a road (a) which is identified and included in activity 27 in Listing Notice 2 of 2014; (b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter. **This activity may be triggered by the cumulative extent of internal mine haul roads developed to provide safe and efficient movement of man and materials across the site.**
	1(28)	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 1 April 1998 and where such development will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.

NEMA LISTED ACTIVITIES		
REGULATION	**ACTIVITY NUMBER**	**SUMMARY DESCRIPTION**
		The area to be affected by mining and infrastructure development exceeds 1 ha.
	1(56)	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas. **This activity may be triggered by the cumulative extent of widening or lengthening existing roads necessary for the safe and efficient transport of man and materials.**
GN R.984, 8 December 2014 (as amended on 7 April 2017) Listing Notice 2: Scoping and EIA	2(6)	The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding— (i) activities which are identified and included in Listing Notice 1 of 2014; (ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; (iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or (iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day. **The proposed extension areas will require a water use licence as per the NWA.**
	2(11)	The development of facilities or infrastructure for the transfer of 50 000 cubic metres or more water per day, from and to or between any combination of the following — (i) water catchments; (ii) water treatment works; or (iii) impoundments; excluding treatment works where water is to be treated for drinking purposes. **Although considered unlikely, the removal of water from the dewatering of the open pit mine workings may fall within the ambit of this activity.**
	2(12)	The development of railway lines, stations or shunting yards excluding - (i) railway lines, shunting yards and railway stations in industrial complexes or zones;

NEMA LISTED ACTIVITIES		
REGULATION	**ACTIVITY NUMBER**	**SUMMARY DESCRIPTION**
		(ii) underground railway lines in a mining area; or (iii) additional railway lines within the railway line reserve. **The application involves a new rail siding and associated infrastructure.**
	2(15)	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan. **More than 20 ha of indigenous vegetation is planned to be removed for the proposed extension areas.**
	2(17)	Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including - (a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or (b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing; but excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in this Notice applies. **The application involves the conversion of an existing Prospecting Right into a Mining Right in terms of the MPRDA.**
GN R.985, 8 December 2014 (as amended on 7 April 2017) Listing Notice 3: Basic Assessment	3(4)	The development of a road wider than 4 metres with a reserve less than 13,5 metres (i) outside urban areas (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. **The development of mine roads may trigger this activity. Avoidance of these areas has been prioritised as part of the environmental sensitivity planning to be undertaken in the Scoping and EIA process.**
	3(10)	The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres (i) outside urban areas (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans (hh) Areas within a watercourse or wetland, or within 100 metres of a watercourse or wetland. **The proposed fuel storage facilities may trigger this activity. Avoidance of these areas has been prioritised as part of the environmental sensitivity planning to be undertaken in the Scoping and EIA process.**

NEMA LISTED ACTIVITIES		
REGULATION	ACTIVITY NUMBER	SUMMARY DESCRIPTION
	3(12)	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan (i) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004 (ii) within critical biodiversity areas identified in bioregional plans (iv) On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning. **Cumulative removal of more than 300 m^2 of indigenous vegetation from sections identified as a CBA and/or endangered ecosystem may be required. Avoidance of these areas has been prioritised as part of the environmental sensitivity planning to be undertaken in the Scoping and EIA process.**
	3(14)	The development of (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse (i) outside urban areas (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans **The placement of dams required for effectively managing water on the site, including pollution control dams, as well as road infrastructure and material stockpiles, may fall within the ambit of this activity. Avoidance of these areas has been prioritised as part of the environmental sensitivity planning to be undertaken in the Scoping and EIA process.**
	3(18)	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. (i) outside urban areas (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. **The development of mine roads may trigger this activity. Avoidance of these areas has been prioritised as part of the environmental sensitivity planning to be undertaken in the Scoping and EIA process.**
	3(23)	The expansion of (i) dams or weirs, where the dam or weir, is expanded by 10 square metres or more; or (ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such expansion occurs—

NEMA LISTED ACTIVITIES		
REGULATION	**ACTIVITY NUMBER**	**SUMMARY DESCRIPTION**
		(ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback adopted in the prescribed manner; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse (i) outside urban areas (ff) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans **The placement of dams required for effectively managing water on the site, including pollution control dams, as well as road infrastructure and material stockpiles, may fall within the ambit of this activity. Avoidance of these areas has been prioritised as part of the environmental sensitivity planning to be undertaken in the Scoping and EIA process.**

TABLE 4-3: NEMWA LISTED ACTIVITIES APPLICABLE TO THE PROPOSED KRANSPAN MINING RIGHT EXTENSION PROJECT

REGULATION	ACTIVITY NUMBER	SUMMARY DESCRIPTION
GN R.921, 29 November 2013 Category B: Scoping and EIA	1	The storage of hazardous waste in lagoons excluding storage of effluent, wastewater or sewage. **The pollution control dams, needed for management of dirty stormwater, are regarded as evaporation dams, as per the definition of lagoon in GN R. 921.**
GN R.921, 29 November 2013 Category B: Scoping and EIA	10	The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity). **The construction of the pollution control dams and residue stockpiles will fall within the ambit of this activity.**
GN R.921, 29 November 2013 Category B: Scoping and EIA	11	The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002). **The material stockpiles (overburden, ROM and product) fall within the definition of a residue stockpile.**

TABLE 4-4: POTENTIAL WATER USES IDENTIFIED FOR THE PROPOSED KRANSPAN MINING RIGHT EXTENSION PROJECT

PROPERTY AND PORTION NUMBER	WATER USE	DESCRIPTION
Portions RE, 1, 2 and 3 of the Farm Roodebloem 51 IT	Section 21 (a)	Taking of water from a water resource
	Section 21(c)	Impeding or diverting the flow of water in a water course
	Section 21(i)	Altering the bed, banks, course or characteristics of a water course
	Section 21 (g)	Disposing of waste in a manner which may impact on a water resource
	Section 21 (j)	Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity, or for the safety of people

The IWULA and Integrated Water and Waste Management Plan (IWWMP) is being undertaken for the water use activities on Farm Roodebloem 51 IT only. A separate IWULA process will be undertaken for the water use activities on Farm Vaalbank 212 IS at a later stage. The IWULA specifies the water uses per farm portion of Roodebloem 51 IT associated with the preferred site infrastructure layout options.

4.2 REQUIRED ENVIRONMENTAL LICENCES

A Section 102 amendment application process as per the Minerals and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA) will be required for the variation to the existing MRA. The proposed Section 102 amendment application requires the following environmental approvals:

- Various listed activities are triggered in terms of Listing Notice 1, 2 and 3 of the 2014 EIA Regulations (as amended) and in Category B of the List of Waste Management Activities (GN No. 921, as amended), and therefore a Scoping and EIA process is required to obtain an EA and WML;
- The existing EA and EMPr will be consolidated in accordance with Regulation 31 and 37 (amendment process) of the EIA Regulations, 2014 (as amended); and
- An IWULA in terms of the National Water Act (Act No. 36 of 1998) (NWA) will be required for various water uses in terms of Section 21 of NWA.

5 NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES

South Africa's coal resources are contained in the Ecca deposits, which are largely located in the north-eastern area of the country. The coal resources are generally shallow, largely unfaulted and lightly inclined, making their exploitation suitable for opencast and mechanised mining (SA Minerals Council, 2021).

Ilima is a coal mining company and, although considered small in comparison with the larger coal mining companies, it contributes significantly to local and regional economic development through, among others, royalties and taxes, direct and indirect employment and procurement of various goods and services.

The SA Minerals Council (2021) noted the following with respect to the contribution of the coal mining sector as a whole to the economy of South Africa for the year 2021:

- The coal industry employed 92,670 people;
- Employment earnings in the sector was R31.4 billion;
- 228.6 million tonnes produced (248.1Mt in 2020) with total coal sales of R150.1 billion (R130.6 billion in 2020); and
- Coal provides more than 75% of the country's electricity requirements.

With the impact of the Covid-19 pandemic in 2020, worldwide coal production declined by 4.8% due to lower electricity demand during lockdown as well as growth in renewable generation and low gas prices (IEA Coal, 2021). Industrial production was also depressed because of confinements and the economic slowdown, resulting in lower coal consumption in non- power sectors. The IEA Coal (2021) Report expected global coal-fired power generation to increase by 9% in 2021, recovering to above 2019 levels. However, production increases in 2021 were hampered by, among other things, adverse weather conditions, supply chain disruptions and Covid-19 containment measures. With demand increasing faster than production, resulting in coal supply shortages, large coal-producing countries were expected to boost efforts to expand their output. Coal production is forecast to reach an all-time high in 2022 and then plateau as demand flattens (IEA Coal, 2021). The increasing coal consumption trend is due to gas-to-coal switching in many countries as rising natural gas prices, largely influenced by the Russian invasion of Ukraine, has made coal more competitive.

The Ilima intention is to provide value to their shareholders through responsibly expanding the Kranspan Mine, managing it safely and in a manner that does not result in a significant detrimental impact to the environment and in compliance with the requirements of the relevant legislation. The expansion of the Kranspan Mine is an important component of the company's business development and future planning. Design and licensing of the mine extension is needed to ensure that the company can continue to operate when it has completed mining and rehabilitation activities at its other MRA in the Carolina region.

Over and above the Ilima need for the expansion of the Kranspan Mine, the broader need and desirability aspects of the proposed coal mine expansion, are discussed below.

5.1 NEED

At present, coal provides more than 75% of the country's electricity requirements (SA Minerals Council, 2021). The domestic demand for coal is led by electricity generation, then the basic iron and steel sector, followed by the synthetic fuel and chemical industries.

Being an abundant and cheap source of energy for local electricity production, coal continues to significantly contribute to South Africa's economic development (Jeffrey *et al*. 2015; DMRE Coal Resources, 2022). Coal in South Africa is in high demand as it is needed by Eskom locally and it is also exported to other countries. In addition, the critical shortage of anthracite-grade coal, used in steel production, has resulted in record prices for this commodity.

Exploration for new coalfields is thus very active at present, both in South Africa and in the rest of Africa. In South Africa, exploration is mainly targeted towards mineable reserves within known coalfields, and its success in several areas has created environmental issues related to the establishment of mines. Eskom coal-fired power stations were built close to mines from which the feedstock was easily derived. These nearby coal reserves are, however, being depleted, and there is a pressing need to convert identified coal resources into mineable coal reserves by continued exploration. This type of 'brownfields' or close-to-mine exploration is vital for sustainable mining. Coal exploration will continue to be an important activity both locally and on a global scale as the world's population and economy continue to grow, along with the demand for cheap energy that is needed to sustain that growth (Jeffrey *et al.* 2015).

The proposed Kranspan Mining Right Extension comprises part of the Mpumalanga coal fields, which accounts for most of South Africa's coal production (SA Minerals Council, 2021). The mining sector is one of the main contributors to Mpumalanga's Gross Value Added (GVA). The coal mining activities enable the electricity generation by the coal fired power stations in the District Municipality. The processing of the mined products either for electricity generation or petrochemicals contributes immensely to the economy of the country (Gert Sibande SDF, 2014).

Ilima began coal mining at the Kranspan Mine in 2022. Ilima has identified the need to expand the approved Kranspan MRA to exploit identified coal resources found on the proposed adjacent properties. Thus it is not the intention of Ilima to prolong the period of the LoM, but to mine additional coal resources. Given the size and quality of the reserve, the proposed Kranspan Mine extension intends to target both the export (RB2 thermal coal) and Eskom markets for power generation and will be a multiproduct operation (Ilima Mine Works Programme, 2022).

5.1.1 ESKOM MARKET

ESKOM is a South African electricity public utility, established in 1923 as the Electricity Supply Commission (ESCOM) by the government of South Africa in terms of the Electricity Act (1922). The utility is the largest producer of electricity in Africa. The company is divided into Generation, Transmission and Distribution divisions and together ESKOM generates approximately 95% of electricity used in South Africa (Ilima Mine Works Programme, 2022). Eskom is the country's largest consumer of coal, burning roughly 110 million tonnes annually (SA Minerals Council, 2021).

Security of energy supply is recognised throughout the world as a key factor for the economic and social development of a country. In addition, the availability of a secure electricity supply is a fundamental consideration for any investment decision, particularly for energy-intensive sectors like industry and manufacturing. South Africa's economic development policies and plans, including the National Development Plan 2030, provide a strong focus on the latter and the availability of a cost-effective and consistent quality electricity supply is therefore vital for the country's economy.

The National Development Plan 2030 also identifies the need for South Africa to reduce its reliance on coal for power generation. The 2019 Integrated Resource Plan (IRP), published by the DMRE, indicates that by 2030, coal will comprise approximately 43% of total installed power generation capacity (Figure 5-1). It is important to note that the 2019 IRP did not take into account the Covid-19 pandemic in 2020 and this is the latest version of the IRP available to date. Approximately 5 400 MW of electricity from coal generation by Eskom will be decommissioned by year 2022, increasing to 10 500 MW by 2030 and 35 000 MW by 2050.

	Coal	Coal (Decommissioning)	Nuclear	Hydro	Storage	PV	Wind	CSP	Gas & Diesel	Other (Distributed Generation, CoGen, Biomass, Landfill)
Current Base	37 149		1 860	2 100	2 912	1 474	1 980	300	3 830	499
2019	2 155	-2373					244	300		Allocation to the extent of the short term capacity and energy gap.
2020	1 433	-557				114	300			
2021	1 433	-1403				300	818			
2022	711	-844			513	400 1000	1600			
2023	750	-555				1000	1600			500
2024			1860				1600		1000	500
2025						1000	1600			500
2026		-1219					1600			500
2027	750	-847					1 600		2000	500
2028		-475				1000	1 600			500
2029		-1694			1575	1000	1 600			500
2030		-1050		2 500		1 000	1 600			500
TOTAL INSTALLED CAPACITY by 2030 (MW)	33364		1860	4600	5000	8288	17742	600	6380	
% Total Installed Capacity (% of MW)	43		2.36	5.84	6.35	10.52	22.53	0.76	8.1	
% Annual Energy Contribution (% of MWh)	58.8		4.5	8.4	1.2*	6.3	17.8	0.6	1.3	

Installed Capacity
Committed / Already Contracted Capacity
Capacity Decommissioned
New Additional Capacity
Extension of Koeberg Plant Design Life
Includes Distributed Generation Capacity for own use

Source: 2019 IRP (DMRE)

FIGURE 5-1: ENERGY MIX IN THE 2019 INTEGRATED RESOURCE PLAN

From the above, it can be concluded that the demand for coal for use in the electricity sector will decrease over time as other primary energy sources and the related installed generation capacity is established. However, this shift will not happen in the near future. There will be a need for coal for the country's power generation requirements for at least the next two decades (DMRE IRP, 2019; DMRE Coal Resources, 2022).

The global goal to reach net zero emissions should have very strong implications for coal demand but these are not yet visible in the near-term forecast (IEA Coal, 2021). The fate of coal depends on how quickly and effectively countries move to implement their net zero commitments. And the level of coal demand in a net zero carbon economy will depend on how successful efforts are to deploy carbon capture, utilisation and storage technologies (IEA Coal, 2021).

Certain areas of the Kranspan Mining Right Extension will be mined to produce a high ash, medium volatile, thermal coal product (Eskom product) for power station consumption by screening and crushing the ROM coal. Approximately 74% of the coal produced at Kranspan will be for the local South African national power utility, with the balance being thermal coal for export via Richards Bay to the international market (Ilima Mine Works Programme, 2022).

5.1.2 EXPORT MARKET

Areas of the Kranspan Mining Right Extension Area will be mined and the coal will be processed which consists of crushing, screening and washing the coal (primary beneficiation) to produce an RB2 grade export product. Approximately 25.9% of the coal produced at Kranspan will be for thermal coal for export via Richards Bay to the international market (Ilima Mine Works Programme, 2022).

Higher grades of final product are delivered to export markets with the lower grade product burned by Eskom's specially designed power station boiler hearths (SA Minerals Council, 2021). Almost all coal exported from South

Africa is steam coal, most of which is exported through RBCT. In 2021, total coal exports were valued at R 63.7 billion (SA Minerals Council, 2021).

Although subject to significant price volatility, the average export price per tonne is typically higher than the average domestic price per tonne.

The current market conditions have RB2 prices at US$250/t, however the Kranspan Mining Right Extension Project is evaluated on a long-term export (RB2) product at a selling price of US$120/t and a R/$ exchange rate of 16:1 (Ilima Mine Works Programme, 2022).

5.2 DESIRABILITY

The desirable aspects of the proposed Kranspan Mining Right Extension includes the significant socio-economic benefits associated with employment, procurement of goods and services. Community benefits such as skills development and education opportunities will also be realised from the implementation of the mine Social and Labour Plan. Furthermore, royalties and taxes from the coal mine will accrue to the government of South Africa.

Notwithstanding these benefits, coal extraction and processing does present several physical, social and environmental hazards. These hazards can generally be managed through the application of various engineering design standards and the health, safety and environmental procedures and plans which the operating company implements during the day-to-day operation of the site.

Other specific aspects related to the desirability of the proposed Kranspan Mining Right Extension include:

- The proposed mine extension will contribute to air emissions within the Highveld Priority Area. Coal mining, handling and transportation results in the release of various airborne pollutants like NO2, SO2 and particulate matter which, depending on pollutant concentration and duration of exposure among others, can have a negative impact on human and ecosystem health;
- Given the proximity of mining to surface and groundwater resources, there is a high likelihood of water pollution if water management on the site is not properly practiced;
- For the Life of Mine, the mine will result in an increase in traffic volume on the R36, including heavy vehicles like ADTs. This may negatively influence traffic flows, accelerate degradation of the road surface and possibly result in collision incidents;
- The mining and mineral processing is likely to result in a loss of some remaining natural habitat within a listed threatened ecosystem; and
- In response to climate change concerns and the dominant contribution of CO_2 emissions from coal combustion, several developed economies in the world are selecting low carbon alternatives to coal-fired power plants. At the 26th UN Climate Change Conference of the Parties (COP26), 65 countries committed to phasing out the use of coal for power generation. Major coal financing countries also agreed to end international coal financing of coal-fired power plants by the end of 2021.

The desirability of the Project, within the context of the above, is summarised as follows:

- The Project will result in the availability of an additional source of coal for the Eskom market and export market;
- Benefits will accrue with respect to royalties and taxes to the Government of South Africa;
- Direct and indirect employment opportunities will be created at a time when unemployment is historically at its highest;

- South Africa has committed to becoming less reliant on coal and moving towards a low carbon economy. However, this transition is expected to be gradual, with the 2019 IRP identifying the need for coal for power generation for at least the next two decades;
- The scoping study conducted for the proposed development has not identified any significant risks or impacts associated with the development at the proposed site which are irreversible, or which cannot be mitigated;
- With the appropriate environmental controls in place, the proposed development is considered to be compatible with surrounding land uses;
- The proposed development is consistent with the spatial development planning context applicable to the area; and
- With proper rehabilitation and mine closure planning and implementation, the land surface can be restored to productive use post-mining with no latent or residual environmental impacts.

Accordingly, it is concluded that there is a need for the Project and that undesirable aspects of the development can be satisfactorily mitigated.

5.3 2017 DEA GUIDELINE

The Guideline on Need and Desirability (DEA, 2017) sets out a list of questions which should be addressed when considering need and desirability of a proposed development. These are divided into questions that relate to ecological sustainability and justifiable economic and social development.

Table 5-1 presents the needs and desirability analysis undertaken for the proposed Kranspan Mining Right Extension project.

TABLE 5-1: NEED AND DESIRABILITY FOR THE PROPOSED KRANSPAN MINING RIGHT EXTENSION

NO.	QUESTION	RESPONSE
SECURING ECOLOGICAL SUSTAINABLE DEVELOPMENT AND USE OF NATURAL RESOURCES		
1	How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?	The total extent of the extension area for the application is 4 956.02 Ha and the proposed development footprint (all surface infrastructure) is approximately 2 500 Ha which will be completely transformed by the proposed mining activities. The vegetation and topsoil will be stripped and the coal resource will be removed through mining activities. It should be noted that the project area has been disturbed through anthropogenic activity, including farming. The site is also located adjacent to the existing Kranspan Mine. While the ecological integrity of the areas within the development footprint will be destroyed through mining, with appropriate management measures, impacts on surrounding intact sensitive habitats can be minimised through rehabilitation practices.
1.1	How were the following ecological integrity considerations taken into account?	
1.1.1	Threatened Ecosystems	The proposed surface infrastructure and opencast pits are situated within the Endangered Eastern Highveld Grassland, which represents part of the untransformed grassland vegetation unit classified as highly sensitive. This vegetation unit constituted part of the environmental sensitivity map. The final layout plan considered avoiding these highly sensitive areas to minimise the level of impact on threatened ecosystems, refer to Table 6-34.
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	Several wetland systems are located on both Farm Vaalbank 212 IS and Farm Roodebloem 51 IT, as described in Section 6.4.1.8. The wetlands on site were categorised into the following different priority rating units: Wetland Priority Rating 1 (with a 100 m buffer zone), Wetland Priority Rating 2 (with a 50 m buffer zone), Wetland Priority Rating 3 (with a 30 m buffer zone), and a Wetland Priority Rating 4 (with no buffer zone). The final layout plan considered avoiding wetlands, especially highly sensitive Priority 1 and 2 wetlands as their associated buffer zones to minimise the level of impact on surface water, refer to Table 6-34. A WULA will be submitted to the Department of Water and Sanitation (DWS) to obtain the required permissions to mine the proposed areas.
1.1.3	Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs)	The proposed surface infrastructure and opencast pits are situated within CBAs. The 2014 MBSP mapping of CBAs coincides very closely with the biodiversity specialists mapping of the four vegetation units representing Natural Habitat (Untransformed Grassland, Sandstone Scarp Shrubland, Valley-bottom & seep wetlands and Pan wetland). Almost all areas of the Untransformed Grassland, Sandstone Scarp and Valley-bottom & seep wetlands vegetation units have been classified as CBA: Irreplaceable, which also includes small areas of Secondary Grassland

NO.	QUESTION	RESPONSE
		of historically cultivated areas, while smaller areas of these vegetation units are classified as CBA: Optimal. The Pan wetland vegetation unit has been classified as CBA: Optimal. The infrastructure overlap (of the final layout plan) with all CBAs is 838.8 Ha, compared to the overall 2 224 Ha of CBA that occurs within the proposed extension area. These vegetation units constituted part of the environmental sensitivity map. The final layout plan considered avoiding these highly sensitive areas to minimise the level of impact on CBAs, refer to Table 6-34.
1.1.4	Conservation targets	CBAs are areas that are regarded as essential for meeting provincial biodiversity conservation targets for species, ecosystems and ecological processes. Thus conservation targets were considered with CBAs as discussed above.
1.1.5	Ecological drivers of the ecosystem	The principal ecological drivers or processes within the project area were assessed for the three relevant themes, namely Animal, Plant and Terrestrial Biodiversity themes. Fieldwork conducted by the biodiversity specialist in October 2022 and January 2023 confirmed the presence of all of the drivers of sensitivity for the Terrestrial Biodiversity. Fieldwork also confirmed some of the drivers of sensitivity for the Animal and Plant themes and the established that others are not present or unlikely to be present. These drivers constituted part of the environmental sensitivity map. The final layout plan considered avoiding these highly sensitive areas to minimise the level of impact on principal ecological drivers, refer to Table 6-34.
1.1.6	Environmental Management Framework (EMF)	There are no EMFs for the Project Area.
1.1.7	Spatial Development Framework (SDF)	The following SDFs were considered: The 2014 Gert Sibande District Municipality SDF, the 2017 CALLM SDF, and the 2019 Mpumalanga SDF. The latest 2019 Mpumalanga SDF classifies the Kranspan Mining Right Extension site as a "mining area" as part of economic diversification. An overall view from the collective SDFs acknowledge that mining in Mpumalanga needs to be undertaken in a sustainable manner in order to support local electricity generation and industrial development without compromising agricultural potential or the ecological corridors identified by the Mpumalanga Biodiversity Conservation Plan. This correlates with the Strategic Objective 6 in the 2019 Mpumalanga SDF: "To optimally utilise the mining potential without compromising the long term sustainability of the natural environment". The Special Control Mining Areas map in the 2019 Mpumalanga SDF shows that the proposed Kranspan Mining Right Extension site coincides with a major mining area as well as environmental sensitive areas. The SDFs aim to provide for environmental management mechanisms to ensure that mining areas are sufficiently rehabilitated (for ecological or agricultural purposes). Hence, to ensure the optimal

NO.	QUESTION	RESPONSE
		protection and sustainable utilisation of the district's natural environmental resources and areas of high biodiversity value, environmentally sensitive areas, biodiversity hotspots and ecological corridors should be treated as special control zones to be actively protected, managed and enhanced, so as to ensure that these are not degraded by mining and other activities. The proposed extension of the MRA will be adjacent to the already disturbed footprint of the mining activities currently taking place at the Kranspan MRA. This type of 'brownfields' or close-to-mine exploration is vital for sustainable mining.
1.1.8	Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.)	The Surface Water Ecosystems Impact Assessment that was undertaken (refer to Appendix 8) has identified that no RAMSAR sites are present in the vicinity of the project area. The Air Quality Impact Assessment that was undertaken (refer to Appendix 8) considered the implications of climate change on the project (such as temperature increase and possible reduction in rainfall), however the study focused more on identifying the estimated greenhouse gas emissions for the proposed mining operations. The mitigation measures and recommendations to address these impacts have been included in Section 6.8 and Section 9.
1.2	How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	The proposed expansion will have impacts on the terrestrial ecology (fauna and flora) as well as on the wetlands present on site. The Terrestrial Ecological Impact Assessment (refer to Appendix 8) assessed the following impacts on flora: loss of natural habitat of high ecological importance, loss of plant species of conservation concern, introduction and proliferation of alien invasive plant species, and the illegal utilisation of plant resources. The Terrestrial Ecological Impact Assessment (refer to Appendix 8) assessed the following impacts on fauna: displacement and loss of habitat for faunal species, disruption of ecological connectivity and faunal dispersal, and illegal utilisation of faunal resources. The Surface Water Ecosystems Impact Assessment (Appendix 8) assessed the destruction of sensitive wetland habitat features, soil impacting features, and water quality. The measures taken to avoid the above mentioned negative impacts included amendment of the layout plan, i. e. positioning of the surface infrastructure and opencast mining areas to occur outside of sensitive areas such as CBAs, ESAs, sensitive habitat and wetlands (and associated buffer zones). Where these areas could not be avoided, the specialists provided various mitigation measures to minimise the impacts, refer to Table 6-33. The concurrent rehabilitation method that is planned after mining activities will ensure continued reinstatement of mined-out areas, thereby keeping the impact on the receiving environment as low as possible.
1.3	How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what	The development can potentially cause pollution to climate, soils, vegetation, surface water, groundwater, air quality and noise. These impacts are discussed in Table 8-1.

NO.	QUESTION	RESPONSE
	measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	The measures taken to avoid the above mentioned negative impacts included amendment of the layout plan, i. e. positioning of the surface infrastructure and opencast mining areas to occur as far away as possible from the sensitive receptors or sensitive areas and associated buffer zones. Where these areas could not be avoided, the specialists provided various mitigation measures to minimise the impacts, refer to Table 6-33. Based on the findings of the specialist studies, the sensitivity features that need to be protected were mapped in relation to the proposed mine layout (refer to Appendix 8 Map 5).
1.4	What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided 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?	All waste will be managed in accordance with the waste management hierarchy as required by the NEM:WA. Waste will be segregated into general and hazardous waste and contractors will be appointed to remove the waste to licensed waste disposal facilities. Recyclable waste like glass, wood and plastic will similarly be segregated on site and removed by licensed waste transporters. An oil recycling company will also be appointed to remove waste oil generated by the mining activities. Hazardous waste will be removed offsite by a hazardous waste contractor. A safe disposal certificate for the removal of hazardous waste will be retained as proof of safe disposal.
1.5	How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	The Heritage Impact Assessment that was undertaken (refer to Appendix 8) identified cultural heritage sites within the proposed extension area. The measures taken to avoid the above mentioned negative impacts included amendment of the layout plan, i. e. positioning of the surface infrastructure and opencast mining areas to occur outside of heritage resources such as stone cairns, structures and burial sites (and associated 100 m buffer zone). Where these areas could not be avoided, the specialist provided various mitigation measures to minimise the impacts, refer to Table 6-33.
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?	The proposed mining development will deplete the coal resource (a non-renewable natural resource) within the expansion area. The coal will be used for electricity generation and will continue to be an integral contribution to the economy of the country while low-carbon power generation facilities are developed. The potential impacts of the proposed mining development have been identified (Table 8-1) and mitigation measures aimed at avoiding, reducing and / or managing the negative impacts as well as enhancing the positive impacts have been included.
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	In terms of water use by the proposed mining development, boreholes will be established to supply water for drinking. The IWULA Process will further assess the impacts on groundwater

NO.	QUESTION	RESPONSE
	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?	abstraction and advise on the capacity constraints. Consideration of fitting these boreholes with windpumps or solar submersible pumps should be investigated during the design phase.
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)	Security of energy supply is recognised throughout the world as a key factor for the economic and social development of a country. Being an abundant and cheap source of energy, coal continues to significantly contribute to South Africa's economic development (Jeffrey *et al.* 2015). Coal in South Africa is in high demand as it is needed by Eskom locally and it is also exported to other countries. At present, coal provides more than 75% of the country's electricity requirements. In addition, the critical shortage of anthracite-grade coal, used in steel production, has resulted in record prices for this commodity. Hence, the need to mine coal in South Africa is highly justified. In terms of the 2019 IRP, it can be concluded that the demand for coal for use in the electricity sector will decrease over time as other primary energy sources and the related installed generation capacity is established. However, there will be a need for coal for the country's power generation requirements for at least the next two decades.
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	Does the proposed location, type and scale of development promote a reduced dependency on resources?	Resource extraction is limited to the local geology and location of a targeted resource. The approved Kranspan mining operations was dependent on the location and extent of the coal seam which was targeted and defined through the prospecting phase. The proposed extension of the existing Kranspan MRA is therefore also dictated by the existing location of the approved Kranspan MRA. Ilima has identified the need to expand the approved Kranspan MRA to exploit identified coal resources found on the proposed adjacent properties. Thus it is the intention of Ilima to mine additional coal resources. Given the size and quality of the reserve, the proposed Kranspan Mine extension intends to target both the export (RB2 thermal coal) and Eskom markets for power generation and will be a multiproduct operation.
1.8	How were a risk-averse and cautious approach applied in terms of ecological impacts?	Previous information available from the Kranspan MRA EIA was gathered prior to the onset of this process to understand the ecological impacts in the area. Desktop wetland data and CBA/ESA data were considered when siting the infrastructure in the initial layout plan.

NO.	QUESTION	RESPONSE
1.8.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	Terrestrial Ecological Study: A total of sixteen days of field work and eighteen of data analysis, mapping and reporting were available for the completion of the terrestrial ecology assessment presented here, and fieldwork included surveys conducted in both October 2022 and January 2023. Due to time constraints inherent in a rapid ecological assessment such as that presented here and large size of the project area (4 956 ha) and the fact that almost 40% of the project area comprises Natural Habitat (untransformed habitat), the plant species list provided in Appendix 1 cannot be regarded as comprehensive. The compilation of a complete plant species list for an area the size of the project area in this region of the Mpumalanga Highveld requires surveys to include comprehensive seasonal coverage over a number of years. Based on the author's extensive experience in this region of the Highveld, the plant species list provided in Appendix 1 is likely to include approximately 85% of the plant species actually present within the study area, which provides an accurate indication of the floristic diversity of the project area and is regarded as an appropriate level of accuracy for the nature and objectives of this study. This limitation is also mitigated by the fact that particular emphasis was placed on searching for potentially occurring plant SCC and recommendations for the conduction additional floristic surveys which should be included in the EMP and conducted prior to construction, are provided in this report. In order to obtain a comprehensive understanding of the faunal communities in the project area, as well as the status of rare or threatened species in the area, faunal surveys should consider investigations at different time scales (across seasons/years) and through replication. However, the authors have conducted extensive faunal surveys on the Mpumalanga Highveld and based on this experience, the current survey is considered to be appropriate for the objectives of this study and is likely to include approximately 70 % - 75% of the vertebrate fauna richness that is expected to be present within the study area. Due to the large size of the area and time constraints, it was decided not to use standard small mammal trapping methods, such as live Sherman traps since the faunal specialists would have needed to check traplines early each morning, which would impose time restrictions to access key habitat types for bird species of conservation concern during the early mornings. Surface Water Ecosystems Study: The conclusions to the overall perceived impacts have been based on a desktop survey that was reiterated by ground-truthing through field surveys of the area encompassing the proposed development. Comprehensive physical surveys for an area as large as the survey area are not always possible nor practical, which necessitates that a trend analysis of the correlation between
1.8.2	What is the level of risk associated with the limits of current knowledge?	
1.8.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	

NO.	QUESTION	RESPONSE
		the physical site conditions and what can be ascertained from the aerial imagery be used to delineate wetland conditions in some areas. Aerial imagery analysis therefore plays an integral part in wetland analyses within large areas. Vegetation structures and some floral species are mentioned within the report. This mention is purely for the purpose of delineating the wetland boundaries and is not meant as an account of the full species lists and ecological potential of the proposed development site and should not be taken as such. Detailed biodiversity accounts should be taken from the relevant specialist assessments.
1.9	How will the ecological impacts, resulting from this development impact on people's environmental right in terms following:	The proposed Kranspan Mining Right Extension project will have the following negative impacts: ➲ Climate: Greenhouse Gas Emissions ➲ Topography: Change in topography of the area which could have impacts on the sense of place and visual aesthetics as well as potentially result in the interception of natural runoff ➲ Geology: Underlying geology will be affected in that mineral resources will be lost ➲ Soils and Agricultural Land Capability: Loss of Land Capability through erosion, soil degradation, compaction, increase in salinity, land contamination and loss of soil via aeolian processes ➲ Hydropedology: Increased erosion and sedimentation due to increase overland flow on the environment; Increased overland flow will result in decreased infiltration and therefore less lateral flow at the soil bedrock/ interface or return flow from groundwater. Open cast areas will intercept lateral flow paths and remove connectivity between recharge zones and lateral flow zones. Alteration of this flow path will likely change the wetland water regimes negatively. ➲ Terrestrial Ecology – Flora: Loss of Natural Habitat (untransformed habitat) of High Ecological Importance; Loss of Plant Species of Conservation Concern (SCC); Introduction and Proliferation of Alien Invasive Plant Species; and Illegal Utilisation of Plant Resources ➲ Terrestrial Ecology – Fauna: Displacement and Loss of Habitat for Faunal Species; Disruption of Ecological Connectivity and Faunal Dispersal; and Illegal Utilisation of Faunal Resources
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?	

NO.	QUESTION	RESPONSE
		➲ Surface Water: Destruction of sensitive wetland habitat features; Soil erosion that impacts watercourses and wetland habitat; and Surface water quality ➲ Groundwater: Groundwater availability and rate of groundwater seepage; Contamination of groundwater quality; Impacts on the shallow weathered aquifer, wetlands and springs; Groundwater users (destruction of private boreholes); and Risk of decant. ➲ Air Quality: Elevated PM10 and PM2.5 Concentrations and Elevated Dust Fall Levels ➲ Noise: Elevated Noise Levels ➲ Heritage Resources: May destroy, damage, alter, or remove structures of heritage importance; ruins of heritage importance, stone cairns of heritage importance; and burial sites of heritage importance. ➲ Palaeontological Resource: May destroy, damage, alter, or remove resources of palaeontological importance ➲ Visual Aesthetics: Visual disturbance of the sense of place Socio-economic impacts are discussed under Point 2.7.1 of this table.
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?	The only positive impacts from an ecological point of view will be during the rehabilitation phase: ➲ Topography: During rehabilitation, topography will be (as far as practically possible) restored to that of the pre-mining state, and must be free draining ➲ Visual Aesthetics: Visual improvement of the sense of place during rehabilitation
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.)?	One of the main impacts on surface water resources from the proposed development includes water contamination. Water quality degradation will displace dependent biodiversity and will have an impact that will also perpetuate downstream throughout the system. Possible sources of contamination include hydrocarbons (from poorly designed and managed fuelling stations and/or workshop and maintenance areas), and runoff water from processing areas that should be kept separate from clean water runoff with a suitable stormwater management system, and

NO.	QUESTION	RESPONSE
		general surface water runoff that should be treated prior to release into the environment. Coupled to this, erosion management also plays an important role in preventing water quality degradation. Onsite sewerage treatment and/or management also plays a crucial role in avoiding contamination of the surface water ecosystems. Untreated sewerage contamination of the surface water ecosystems could occur due to poorly designed sewerage treatment systems, treatment systems where processing capacity is exceeded, poorly maintained infrastructure leading to water-borne effluent leaks prior to processing, sewerage spills during (for example) septic tank pumping, and informal ablutions near watercourses. Sewerage contamination of the surface waters leads to proliferation of *E. coli*, which is a potentially dangerous risk to human and livestock health. Thus a water quality monitoring plan has been proposed that is aimed at abating ecological degradation and to reduce the risk to both human and livestock health. In terms of groundwater quality, private boreholes could be destroyed during the proposed opencast mining activities and could be significantly affected by mine dewatering. If any of the current boreholes are destroyed during mining, they must be replaced. Several heritage resources were found during the study, including built environment features (such as structures and farmsteads) and burial sites (graves, cemeteries and stone cairns). All recorded heritage features should be indicated on development plans and construction crews and employees should be made aware of heritage features and the requirements for each type of heritage feature. Graves and cemeteries impacted on (C004, C010B, C010C, C014, C015B, C020, C027, C103 & C105) should be avoided with a 100m buffer zone (following the SAHRA Burial Grounds and Graves permitting policy 2020) and access for families should be ensured. If this is not possible graves can be relocated adhering to all legal requirements.
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?	<u>Surface Water Ecosystems:</u> It is regarded as inevitable that some portions of wetland units will be lost if the mining development is undertaken. The significance of the impacting features that will affect the wetland units within the survey area is dependent on what level the unit will lose functionality. This can be anywhere from total loss (both physical and functional) to barely perceptible marginal losses that do not alter functioning within the landscape. The significance of the impact on ecologically sensitive habitat (i.e., wetland units) is therefore largely dependent on the overall loss of habitat through transformation to accommodate the mining infrastructure. It is therefore recommended that the mining infrastructure layout be planned to accommodate as much of the wetland habitat functioning areas as possible. A priority ranking based on this principle has been proposed for

NO.	QUESTION	RESPONSE
		the project, where highly functional, well developed, and ecologically significant core wetland zones have been prioritised over fringing and poorly developed wetland units and those that have suffered ecological degradation. <u>Terrestrial Ecology:</u> The desired management objectives for areas categorised as CBA: Irreplaceable are that they should be maintained in a natural state with no further loss of ecosystems, functionality, or species. The current location of infrastructure, and in particular opencast pits and overburden stockpiles, in Natural Habitat of High EI and categorized as CBAs significantly increases the severity of the impact resulting in a High impact significance rating. The only option within the mitigation hierarchy that could significantly reduce the significance of this impact would be Avoidance.
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?	The details of the alternatives considered in the EIR are discussed in Section 6.1. Layout alternatives were considered, this included amending the placement of the site infrastructure and opencast pits to take into consideration the findings of the environmental sensitive areas identified in the specialist studies. The changes between the initial layout plan and the final layout plan are discussed in detail in Table 6 2, Table 6 3 and Table 6 32 in Section 6.1.3. A comparative analysis of the layout alternatives was undertaken (Table 6 34) in order to determine that the Final Layout Plan is the Best Practicable Environmental Option (BPEO) for the proposed Kranspan Mining Right Extension project. The avoidance of environmental sensitive areas has resulted in the Final Layout Plan reducing the extent of the impacts on the environment significantly.
1.13	Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	Cumulative impacts have been assessed and identified for the project, refer to Section 6.5.4 and Table 6-28: ➲ Climate: Contribute to Greenhouse Gas Emissions. ➲ Topography: The topography of the area has already been affected by mining and related infrastructure. The proposed project will add to these impacts. ➲ Soils and Agricultural Land Capability: Existing impacts on the soil resources in the area include water abstraction, farm roads, powerlines, overgrazed agricultural lands, erosion, mining; and vegetation removal. The impact on soil is irreplaceable because natural soil layers are stripped and mined, and land capability as well as the agricultural potential are impacted on. Mining and associated activities impacting the soil resources include changes

NO.	QUESTION	RESPONSE
		to the chemical properties of the soil. The cumulative impacts may, therefore, have a significant effect on the soil resources therefore impacting the land capability and agricultural potential of the area. Contaminated soils will directly impact the water quality and quantity as well as the vegetation and land capability of the area. ➲ Hydropedology: Existing developments (especially mining) within and around the project area have contributed to losses of water resources including wetlands and rivers systems. Vegetation has been altered due to crop cultivation and cattle grazing which in turn has led to overgrazing, as well as the contamination of water resources from the surrounding developments, have contributed to the physical impacts on the watercourses in the area such as erosion and sedimentation. The mining activities within the catchment have led to losses in wetland areas that may have facilitated increased water flow and quantity of pollutants flowing into the water resources. Vegetation alteration and surface flow may have led to the onset of erosion in the wetland areas, and this may be worsened further by the proposed mining activities. Mining may disturb the hydrological patterns further which could in turn lead to large scale desiccation of wetland areas and the direct loss of some of the wetland areas because of water flow being cut off. ➲ Terrestrial Ecology – Flora: Loss of CBA and ESA will negatively contribute to the impacts on important ecological processes and ecological connectivity at a provincial scale. Loss of sensitive habitat results in loss of more SCC. ➲ Terrestrial Ecology – Fauna: Loss of fauna that are at risk of becoming fragmented if natural connectivity is disrupted and natural corridors are reduced. Other development in the area also limits where these animals can disperse across the project area. ➲ Surface Water: Destruction of sensitive habitat - Wetland vegetation alteration following disturbances that will enhance exotic vegetation encroachment. Soil erosion that impacts watercourses and wetland habitat - All construction phase activities that result in soil destabilisation.

NO.	QUESTION	RESPONSE
		Water quality - Contamination of surface water will impact the integrity of all surface water resources and will reach further downstream to the greater aquatic system. ➲ Groundwater: Cumulative impact of mine dewatering: The rate of groundwater seepage may be high when new ground is broken, but may reduce as the aquifers around the mining areas are dewatered. Groundwater levels will also start to recover in areas where pits are backfilled and rehabilitated, thus affecting groundwater flow gradients and seepage rates. The cumulative impact of historical mining at Union Colliery: Available groundwater level measurements suggest that groundwater levels are lowered by 10 – 20m above the old workings from which decant is currently taking place. The cumulative zone of influence on groundwater availability is presented in the groundwater study and represents the maximum expected impact at the end of the Ilima operational phase of mining. ➲ Air Quality: Dust generated as a result of this project (from earthworks, use of haul roads and other gravel roads, stockpiles, material crushing, etc.) will add to the impacts on air quality. ➲ Noise: Noise from other mines in the vicinity of the Kranspan Mine Extension could contribute to elevated noise levels. ➲ Heritage and Palaeontological Resources: In the case of this project, impacts can be mitigated to an acceptable level. However, this and other projects in the area can have a negative impact on heritage sites in the area where these sites have been destroyed unknowingly. ➲ Visual Aesthetics: The visual landscape has already been impacted on by the development of mining in the area. The project would contribute to the negative cumulative effect of mining activities on the scenic values of the landscape. The cumulative socio-economic impacts are discussed in Point 2.22 of this table.
PROMOTING JUSTIFIABLE ECONOMIC AND SOCIAL DEVELOPMENT		
2.1	What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?	

NO.	QUESTION	RESPONSE
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,	The social baseline took into consideration both the Gert Sibande District Municipality IDP (2022-2027) and the Chief Albert Luthuli Local Municipality IDP (2022-2027). The Gert Sibande District Municipality IDP (2022-2027) states that mining activity in the district is one of the main contributors to the Province's GVA. Coal and gold are the most important mining products, with electricity generation, petrochemical and metallurgical production, and industrial and domestic applications dominating the local consumption of coal. Mining is one of the main economic sectors in the district, identified as pivotal in spurring economic growth and employment creation. The Chief Albert Luthuli Local Municipality IDP (2022-2027) identifies the Carolina area as an area of mixed farming and small-scale coal mining. The IDP also identifies mining as a pivotal sector in the municipality. The Gert Sibande SDF (2014) acknowledges that environmentally sensitive areas found within the district are negatively impacted by economic activities such as mining. Mining activities, especially coal, poses one of the most significant threats to the natural environment in the district. The SDF aims to provide for environmental management mechanisms to ensure that mining areas are sufficiently rehabilitated to continue agricultural activity/production on the land in future.
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.),	The latest 2019 Mpumalanga SDF classifies the Kranspan Mining Right Extension site as a "mining area" as part of economic diversification.
2.1.3	Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and	
2.1.4	Municipal Economic Development Strategy ("LED Strategy").	The vision for the 2017 GSDM LED Strategy is to promote long-term sustainable growth within the GSDM, through job creation, the eradication of poverty and unemployment, meeting the socio-economic needs of the community and diversification of the economic base. One of the strategic programmes of the LED Strategy is the "Rejuvenation of Mining Activity": There are various opportunities available within the sector which must be explored to ensure that the district can take full advantage of the potential of the mining sector. These include rehabilitation of abandoned mines as well as new mining opportunities that are presented.
2.2	Considering the socio-economic context, what will the socioeconomic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?	The project has several significant positive impacts on the local and regional socio-economic environment (Table 8-1). These impacts include the procurement of local goods and services, employment opportunities for local communities as well as other South African citizens, income generation, skills development and education opportunities, local economic development, Gross Domestic Product (GDP) improvement and wealth creation and the distribution of revenue and wealth. With the expected influx of people seeking employment, the project also has the potential

NO.	QUESTION	RESPONSE
		to adversely affect existing community structures and place greater demand on public services like police stations and clinics. Mitigation measures have been provided to ensure that the negative impacts are avoided or minimised, while the positive impacts are maximised. One of the most significant positive impacts will be the provision of coal which will be used to generate electricity and meet the country's electricity supply demands.
2.2.1	Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	Ilima Coal will implement an integrated and sustainable LED strategy in the area that will be in line with the Chief Albert Luthuli Local Municipality's IDP strategic objectives. Based on extensive research in the local Carolina community, it was decided that the most effective means by which to promote socio-economic development within the community would be to form a Community Development Trust. This trust has formed Ilima Development Agency (IDA) which is a central pivot mechanism around which all LED projects are initiated. The Agency is 100% owned by the local community in the form of the Trust and is truly broad-based in its nature. Currently the Agency is run by a Board of Trustees of which one member was born and bred within the local community of Carolina and three members are representatives from Ilima. Institutional, infrastructural, and financial support is provided by Ilima; however, the Agency can also source funding from other businesses around the area and from other development institutions. Thus, the entity is empowered and capacitated by Ilima to become a self-reliant and sustainable Agency into the future beyond mine closure. Ilima has entered into a project management contract with IDA where the entity manages all development projects and community up-liftment activities initiated by Ilima around the area. The primary aim of the IDA is to utilise the window of opportunity created by mining to promote meaningful socio-economic up-liftment and human resource development of the community. Further, the company is wholly committed to involvement in plans that already exist or are envisaged at a government level and aims to use its expertise and resources for the benefit of all affected parties.
2.3	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	The proposed mining development will supply coal for electricity generation to the local and regional area. In addition, the mine is required meet the commitments of the SLP regarding Human Resources Development, LED, and the process pertaining to management of downscaling and retrenchment. The SLP is required to comply with the following: Skills Development Legislative Compliance, Skills Development Plan, Career Progression Path, Mentorship, Talent management, Internship and Bursary Plan, Human Resourcing, and Employment Equity. The proposed extension of the mining footprint will not impact negatively on the social status of the area.

NO.	QUESTION	RESPONSE
2.4	Will the development result in equitable (intra- and intergenerational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short and long-term?	The mine will offer portable skills to employees throughout the LoM, to ensure that they have skills other than those required by the mine, to lessen the negative impact and foster continued livelihood. In terms of the 2019 IRP, it can be concluded that the demand for coal for use in the electricity sector will decrease over time as other primary energy sources and the related installed generation capacity is established. However, there will be a need for coal for the country's power generation requirements for at least the next two decades.
2.5	In terms of location, describe how the placement of the proposed development will	
2.5.1	result in the creation of residential and employment opportunities in close proximity to or integrated with each other,	The Chief Albert Luthuli Local Municipality IDP (2022-2027) reported that the net provincial job losses in the period 1 April 2020 to December 2020 were almost 44 200. Mining was one of the sectors where job losses were of concern. There will be additional employment directly created at the existing Kranspan mine should the extension application be granted. The extension will also result in the prolonging of the existing jobs at the existing mine. The electricity generation industry will also provide employment opportunities. During the construction phase, it is estimated that approximately 180 people will be on-site. At full production, the mine will employ 26 permanent staff. Additionally, between 250 and 290 contract staff will be employed on mining, processing, security, occupational health, cleaning services, and coal quality analysis services.
2.5.2	reduce the need for transport of people and goods	Staff already currently commute to the existing Kranspan Mine and thus the proposed extension project would not significantly increase this. During operation, there will be transport of coal via trucks within the mine itself as well as to customers. Product destined for the export market will be transported via truck to the new rail siding.
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,	The proposed extension will compliment the adjacent existing Kranspan mine. The project is planned in line with the SDFs and IDPs for 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,	The proposed extension project is outside an urban area.
2.5.7	optimise the use of existing resources and infrastructure,	Most of the mining infrastructure already established for the Kranspan Mine will be used for the extension areas. No permanent infrastructure will be constructed on site for the mining operation. Most machinery used at the existing Kranspan Mine can be used for the extension project.

NO.	QUESTION	RESPONSE
2.5.8	opportunity costs in terms of bulk infrastructure expansions in nonpriority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	No bulk infrastructure will form part of this development.
2.5.9	discourage "urban sprawl" and contribute to compaction/densification,	The project area and surrounds are mostly rural and therefore the project is not likely to influence urban sprawl. No accommodation is planned on the mine and all employees and contract workers will live in the surrounding towns of Carolina, Breyten and Middelburg.
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,	The Community Development projects associated with the SLP prioritises Historically Disadvantaged South Africans as beneficiaries. The Social Impact Assessment that was undertaken informed the SLP.
2.5.11	encourage environmentally sustainable land development practices and processes,	Ilima Coal will implement an integrated and sustainable LED strategy in the area that will be in line with the municipality SDFs and IDPs strategic objectives. Planning in line with these SDFs and IDPs ensures the optimal protection and sustainable utilisation of the district's natural environmental resources and areas of high biodiversity value, and that the environmental heritage and conservation areas, biodiversity hotspots and ecological corridors should be treated as a special Biodiversity Management Zone to be actively protected, managed and enhanced, so as to ensure that these are not degraded by mining and other activities.
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.),	Resource extraction is limited to the local geology and location of a targeted resource. The approved Kranspan mining operations was dependent of the location and extent of the coal seam which was targeted and defined through the prospecting phase. The proposed extension of the existing Kranspan MRA is therefore also dictated by the existing location of the approved Kranspan MRA.
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),	The proposed project will allow the mine to continue contributing to the local, regional and national GDPs, and also to the local communities through job security, as well as other influences and community upliftment programmes that are undertaken by the mine through their SLP.
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	Any impacts on cultural heritage resources were investigated by the HIA, refer to Appendix 8.
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?	The proposed project will ensure job security, as well as programmes implemented from the mine's SLP.

NO.	QUESTION	RESPONSE
2.6	How were a risk-averse and cautious approach applied in terms of socio-economic impacts?	Previous information available from the Kranspan MRA EIA was gathered prior to the onset of this process to understand the socio-economic impacts in the area. The Social Impact Assessment assessed the potential socio-economic impacts by the project, refer to Appendix 8.
2.6.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	Social Impact Assessment: ➲ Are based on the legal requirements for undertaking an EIA, as defined in the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the scope of services as defined within the contractual undertakings between Ilima and ABS Africa; ➲ Are specific to the intended development at the proposed extension area. The report shall not be used nor relied upon neither by any other party nor for any other purpose without the written consent of ABS Africa. ABS Africa accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report; ➲ Reflect the best judgement of ABS Africa in light of the information available at the time of preparation. The analyses contained in this report has been developed from information provided by Ilima and other parties. This information is not within the control of ABS Africa and ABS Africa has not audited such information and makes no representations as to the validity or accuracy thereof; ➲ Are based on the project description provided by the Applicant. Changes to this project description may influence the assessment and the mitigation measures in the Environmental Management Programme (EMPr); ➲ Where relevant, have placed reliance on the information and recommendations in the specialist studies completed for the Project; ➲ Have assumed that the respective specialists have ensured that the relevant quality control standards were applied with respect to sample collection, preparation and laboratory testing protocols, including equipment calibration; and ➲ Are based on the understanding that the Applicant will establish the financial and administrative framework necessary for the complete implementation of the mitigation measures outlined in the EMPr over the LoM.
2.6.2	What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	
2.6.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	

NO.	QUESTION	RESPONSE
2.7	How will the socio-economic impacts, resulting from this development impact on people's environmental right in terms following:	The proposed Kranspan Mining Right Extension project will have the following negative socio-economic impacts: ➲ Coal Production for Electricity Generation ➲ Economic Growth ➲ Employment Opportunities ➲ Skills Development and Education Opportunities ➲ Local Economic Development ➲ Government Revenue and Royalties
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?	The proposed Kranspan Mining Right Extension project will have the following positive socio-economic impacts: ➲ Change in Land Use – Loss of Agricultural Land ➲ Change in Land Use – Loss of Jobs ➲ Population Influx ➲ Security Risks ➲ Mine Health and Safety: General ➲ Mine Health and Safety: Spontaneous Combustion ➲ Community Health and Safety: Diseases ➲ Community Health and Safety: Traffic and Road Safety ➲ Community Health and Safety: Blasting

NO.	QUESTION	RESPONSE
		➲ Blast induced damage to road surfaces and earth dams; ➲ Damage to structures or injury to people closer than 1000 m from fly rock; ➲ Damage to structures or complaints from neighbours caused by high air blast; ➲ Water pollution from dissolved nitrates; and ➲ Fumes generated by blasting affecting health and wellbeing of surrounding neighbours. ➲ Mine Closure and Associated Effects on the Local Economy
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.)?	The highly species rich Natural Habitats of the project area contain numerous plant species that are popular medicinal plants (e.g. *Boophone disticha* and *Eucomis autumnalis*) which are likely to be targeted by any illegal medicinal plant harvesters entering the project area. The influx of labourers and contractors could result in an increase in the illegal harvesting of medicinal plants. Furthermore, mines often practice lax access control in the parts of their extensive properties that are not being actively utilised for mining activities leading to an increase in illegal medicinal plant harvesting relative to that which occurs on private farmland. The presence of a large labour force within the project area during mining activities will increase the risk of illegal utilisation of fauna resources, such as hunting and snaring of antelope, small mammals and birds. It is assumed that labour force will be accommodated in nearby towns and not on site, which would lower this risk of hunting and poaching considerably. In addition, the project may also result in increased utilisation of natural resources due to potential human encroachment and accessibility to the project area owing to people seeking jobs. This could result in the establishment of illegal settlements on areas consisting of natural habitat on the project area where active mining is absent.
2.9	What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	The details of the alternatives considered in the EIR are discussed in Section 6.1. Layout alternatives were considered, this included amending the placement of the site infrastructure and opencast pits to take into consideration the findings of the sensitive receptors identified in the specialist studies. The changes between the initial layout plan and the final layout plan are discussed in detail in Table 6 2, Table 6 3 and Table 6 32 in Section 6.1.3. A comparative analysis of the layout alternatives was undertaken (Table 6 34) in order to determine that the Final Layout Plan is the

NO.	QUESTION	RESPONSE
		Best Practicable Environmental Option (BPEO) for the proposed Kranspan Mining Right Extension project. The avoidance of sensitive receptors has resulted in the Final Layout Plan reducing the extent of the impacts on the social environment.
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?	Refer to Section 6.1.3 for a comparative analysis of the layout alternatives. Refer to Section 10 for a description on the selection of the final layout plan and the environmental impact statement. Key findings of the impact assessment for the proposed Kranspan Mining Right Extension are as follows: ➲ The need and desirability of the proposed development has been established; ➲ The proposed development has the potential to create significant employment and economic development opportunities for local communities during the construction and operational phases of the project; ➲ The mine SLP has provided costed plans for optimising local employment, skills development and a commitment to implementing local economic development projects, identified in collaboration with the CALLM; ➲ Impacts to ecologically sensitive habitat and surface and groundwater resources have been assessed to be the most significant potential impacts associated with the proposed development; ➲ The direct loss of wetland and sensitive vegetation (untransformed grassland and sandstone scarp shrubland) was assessed by the relevant specialists to be a high impact before mitigation with avoidance recommended as the primary mitigation measure. The high impact significance is due to the conservation value of these habitats and the CBA designation of some of these areas. The Biodiversity Study has noted that the impacted CBAs can only be sufficiently mitigated through avoidance; ➲ Heritage resources, including graves and cemeteries, will be impacted on. Measures to mitigate these impacts include avoidance with a 100m buffer zone (following the SAHRA Burial Grounds and Graves permitting policy 2020). If this is not possible graves must be relocated adhering to all legal requirements;
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?	

NO.	QUESTION	RESPONSE
		➲ There are several SRs currently residing within the MRA whose current land-use activities are unlikely to be compatible with the intended mining activities. SRs that fall within the surface infrastructure footprint or opencast mining areas would need to be removed (either demolished or relocated) in order for any mining operations to be allowed to commence.
2.13	What measures were taken to:	
2.13.1	ensure the participation of all interested and affected parties,	Section 6.2 of the report outlines the public participation process that was followed for the proposed project, governed by NEMA and GN No. R. 982 of the 2014 EIA Regulations, as amended. During the Scoping phase, an IAP database was developed to identify and verify the direct and adjacent landowners or land occupiers as well as the potentially affected surrounding communities. This database was updated throughout the EIA process to ensure adequate consultation.
2.13.2	provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,	Public notification was undertaken through newspaper adverts, site notices and notification letters. All notices were available in English, Afrikaans and Zulu to accommodate the communities that reside in the project area. The newspaper notices were placed in local newspapers of the area. Site notices were placed in various locations around the site and in the nearest communities to announce the project. The notification letters were hand delivered to landowners/occupiers in the area or sent via email, SMS or registered mail. The IAP Database has been maintained and updated to ensure communication with all registered IAPs. For IAPs who do not have email addresses to receive correspondence, either SMS notification or registered mail was undertaken to keep IAPs informed about the project.
2.13.3	ensure participation by vulnerable and disadvantaged persons,	During public notification, ABS Africa explained the proposed project in the best way possible to ensure that all participants could participate in a language they are able to understand and that any disabled participants had access to the information they required on the project.
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,	The public participation consultation process has been a transparent process that seeks to inform affected communities of the positive and negative impacts associated with the proposed development and provided opportunity for any stakeholder to raise concerns which have been responded to both on record in the reports and through direct written response.
2.13.5	ensure openness and transparency, and access to information in terms of the process	The public participation consultation process has been a transparent process as governed by NEMA and GN No. R. 982 of the 2014 EIA Regulations, as amended.

NO.	QUESTION	RESPONSE
2.13.6	ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge, and	All comments have been captured in the Comments and Responses Report (CRR). This report summarises the correspondence received by IAPs and Organs of State and contains all comments forwarded to project team members, raised at various meetings, received through comment sheets, letters, faxes and e-mail. The CRR captures all the significant issues and queries raised, any statements that were made, and a record of all IAPs that registered. This report also attempts to address every comment through responses and input provided by the project team.
2.13.7	ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein was be promoted?	No demographic will be excluded from the public participation consultation process.
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)?	The Social Impact Assessment that was undertaken (refer to Appendix 8) assessed the interest, needs and values of the affected IAPs.
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	The Applicant must adhere and comply with the Mine Health and Safety Act (Act No. 29 of 1996). The EMPr requires that staff must be educated on a regular basis as to the environmental, health and safety risks that may occur within their work environment. Also, adequate measures need to be taken to ensure that the appropriate personal protective equipment is issued to staff based on the areas that they work and the requirements of their job.
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,	There will be additional employment directly created at the existing Kranspan mine should the extension application be granted. The extension will also result in the prolonging of the existing jobs at the existing mine. The electricity generation industry will also provide employment opportunities. During the construction phase, it is estimated that approximately 180 people will be on-site. At full production, the mine will employ 26 permanent staff. Additionally, between 250 and 290 contract staff will be employed on mining, processing, security, occupational health, cleaning services, and coal quality analysis services.
2.16.2	whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),	
2.16.3	the distance from where labourers will have to travel,	
2.16.4	the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and	
2.16.5	the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	The Social Impact Assessment (refer to Appendix 8) assessed the opportunity costs in terms of job creation by the proposed development while the Soil and Agricultural Potential Assessment assessed the impact on agriculture.

NO.	QUESTION	RESPONSE
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	Section 4 describes all the applicable environmental legislation that was considered for the project to ensure compliance with all regulatory requirements. The key regulatory authorities have been identified for the project and included in the IAP Database to be given the opportunity to provide input and comments into the project. This application is in line with the One Environmental System to align the various approvals.
2.17.2	that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	This is not applicable at this stage.
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?	All recommendations and mitigation measures from the Specialist Reports, as well as the comments/conditions from the public and Organs of State have been included in the EIAR and the EMPr. The EMPr is a legally binding document for Ilima, and all conditions need to be adhered to. If DMRE decide to grant a positive EA for the project, then Ilima will also legally need to adhere to the conditions in the EA. In addition, as part of the EIA process, financial liability for the Applicant was calculated to determine the cost of decommissioning and rehabilitating the mine site to an end-land use which is sustainable and in the best interest of both the surrounding communities and the environment, refer to Section 18.
2.19	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	Ilima will implement all mitigation measures included in the EIAR and EMPr to minimise all the identified impacts. The Impact Assessment has assessed the level of impact before and after mitigation for each environmental feature, refer to Section 7.
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?	A variety of measures for the management of pollution generation potential are contained in the EMPr. The EMPr also outlines the fines/penalties that will apply to the Contractors responsible for the maintenance or repair work, should they fail to comply with the provisions of the EMPr and EA.
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 socioeconomic considerations?	Refer to Section 6.1.3 for a comparative analysis of the layout alternatives. Refer to Section 10 for a description on the selection of the final layout plan and the environmental impact statement.

NO.	QUESTION	RESPONSE
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?	Cumulative impacts have been assessed and identified for the project, refer to Section 6.5.4 and Table 6-28: ➲ Population influx from the presence of mining activities in the area may result in housing backlog and / or growth of informal settlements. This may also affect the demand for goods and services, and put constraints on supply because of pressure on resources. ➲ Increased risks associated with road traffic accidents between humans, livestock and crop farming and mining vehicles. In some cases, this could lead to fatalities. ➲ Accumulation of dissolved nitrates in the water system by blasting causing an increase in algal and weed growth in waterways. ➲ Dust and fumes are a risk to health of people within a zone of 2 to 3 km from blasting. ➲ Vibration and fly rock may cause damage to structures and graves. ➲ Economic dependency on surrounding mines in this area will negatively impact local, regional, and national economies with decommissioning and mine closure.

6 MOTIVATION FOR THE PREFERRED DEVELOPMENT FOOTPRINT WITHIN THE APPROVED SITE INCLUDING A FULL DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PROPOSED DEVELOPMENT FOOTPRINT WITHIN THE APPROVED SITE

6.1 DETAILS OF THE DEVELOPMENT FOOTPRINT ALTERNATIVES CONSIDERED

The broad approach to determining the development footprint was as follows:

- Review applicant mine works programme and initial mine and infrastructure layout plan;
- Develop an understanding of the technical and economic aspects of the development that influence the location and extent of the proposed mining development;
- Develop an environmental sensitivity plan based on the findings of the specialist studies;
- Compare the initial mine and infrastructure layout plan against the environmental sensitivity plan and identify areas of conflict; and
- Apply the mitigation hierarchy to refine the mine and infrastructure layout plan.

In assessing the footprint, the following alternatives were identified and analysed.

- Mining method - Underground mining versus surface mining;
- Rehabilitation of the Opencast Mining Areas and Post-closure Land Use
- Placement of infrastructure and opencast pits;
- No-go alternative.

The alternatives analysis was undertaken qualitatively, based on a comparison of the options against selected criteria. The evaluation of these alternatives is discussed in the sections that follow.

6.1.1 THE PROPERTY ON WHICH OR LOCATION WHERE IT IS PROPOSED TO UNDERTAKE THE ACTIVITY

Resource extraction is limited to the local geology and location of a targeted resource. The approved Kranspan mining operations was dependent of the location and extent of the coal seam which was targeted and defined through the prospecting phase. The proposed extension of the existing Kranspan MRA is therefore also dictated by the target resource defined through prospecting. Therefore, the consideration of an alternative site is not feasible.

6.1.2 THE TYPE OF ACTIVITY TO BE UNDERTAKEN

The applicant intends to mine the shallower coal seam via opencast mining (roll-over or strip mining). On the Farm Vaalbank 212 IS, the C and B Seam reserve will be mined through opencast mining, and mine infrastructure will be established. On Farm Roodebloem 51 IT, the E Seam will be mined through opencast mining, and mine infrastructure will be established.

Surface mining is generally considered to have a greater cumulative impact on the environment due to the significant change in the landscape that occurs and the potential impact to sensitive areas such as wetlands. However, although the underground mining only option will have less of an overall environmental impact, underground mining alone is not an economically feasible option. This is because the depth of the coal seam of economic interest in the open cast areas is too shallow to mine safely by underground methods. The relatively small tonnage of coal that would be extracted with this option would not justify the high capital investment cost associated with developing the infrastructure needed to safely develop an underground mine.

The mining activities and required infrastructure are described in more detail in section 3. There are no alternatives for the type of mining.

6.1.3 The Design or Layout of the Activity

6.1.3.1 Location of Infrastructure and Opencast Mining Areas

The broad placement of the surface infrastructure and opencast mining areas was informed by the environmental sensitivity plan which considered the location of identified sensitive physical, social and environmental features within the Mining Right Extension surface area. This included consideration of the following:

- The extent of the proposed coal seams, as presently understood, to be mined over the LoM was delineated;
- Existing physical structures such as roads and railways;
- Buffer distances (minimum safe distances), determined from legislation, including GN704 and the MHSA (Table 6-1).
- Findings from the Specialist Studies undertaken that are of environmental importance:
- Natural features, for example wetlands and sensitive ecological areas and species of conservation importance;
- Heritage and cultural resources, such as graves, burial sites, historical structures, ruins and stone cairns; and
- Sensitive receptors within and near the MRA extension area.

TABLE 6-1: PRESCRIBED BUFFER DISTANCES FOR DEVELOPMENTS

INFRASTRUCTURE	BUFFER (M)	LEGISLATION / COMMENT
Buildings	100	MHSA and Regulations
Roads		
Railways		
Tailings Storage Facility and Waste Rock Dump		
Structures		
Restricted areas	50	MHSA GN93
Watercourses	100	NWA GN704
Wetlands	500	NWA GN704 and GN509
Powerlines	25	A proposed buffer (either side of centre-line) for protection of powerline infrastructure

An environmental sensitivity map was compiled from data provided by the applicant, various specialist studies and national datasets. The environmental sensitivity plan resulted in several changes to the initial site layout plan. The resulting final site layout plan in relation to the environmental sensitivities is shown in Appendix 3 Map 5. The following sensitivity classes were assigned to the site: High sensitivity areas (No-Go areas), medium sensitivity areas, low sensitivity areas and transformed areas (no sensitivity):

<u>High Sensitivity Areas (No-Go Areas)</u>

- Untransformed Grassland
- Sandstone Scarp Shrubland
- Wetlands with a Priority Rating of 1 (inclusive of 100 m buffer)
- Communities/sensitive receptors within MRA

- Cultural and heritage sites such as graves, cemeteries (inclusive of a 100m buffer) and stone cairns
- Threatened fauna and flora species (inclusive of associated buffers)

Medium Sensitivity Areas

- Wetlands with a Priority Rating of 2 and associated 50 m buffer
- Wetlands with a Priority Rating of 3 and associated 30 m buffer

Low Sensitivity Areas

- Wetlands with a Priority Rating of 4
- Secondary Vegetation
- African Grass-owl (*Tyto capensis*) Habitat (inclusive of 170 m buffer)

Transformed Areas

- Cultivation, infrastructure (homesteads, excavations, railway lines, roads etc), plantations and invasive stands of alien trees

The changes to the initial site layout plan are summarised in Appendix 3 Map 6 and Table 6-2 below.

TABLE 6-2: CHANGES BETWEEN INITIAL SITE LAYOUT AND FINAL SITE LAYOUT

<table>
<tr><th>MAP ID NO.</th><th>CHANGE FROM INITIAL LAYOUT</th><th>REASON FOR CHANGE</th></tr>
<tr><td>A</td><td rowspan="2">Avoidance of identified sensitive areas through removal of surface area of opencast mining area as well as removal of overburden stockpiles, contractor's yard, ROM stockpile and PCD</td><td rowspan="2">The surface infrastructure and opencast mining areas (on the north-eastern section on Farm Roodebloem) were located in the following areas:
• High sensitivity areas:
  ➢ Untransformed grassland areas
  ➢ Sandstone scarp shrubland areas
  ➢ Wetland Priority 1 Rating Unit and respective 100 m buffer zone
  ➢ Wetland Priority 2 Rating Unit and respective 50 m buffer zone
  ➢ Sensitive receptors within MRA
  ➢ Cultural and heritage sites:
    C105 (burial site and respective 100 m buffer) and C106 (modern farmstead)
    C023 (burial site and respective 100 m buffer), C024 (packed stone foundations) and C025 (packed stone foundations)
• Medium sensitivity areas:
  ➢ Secondary vegetation area
  ➢ Wetland Priority 3 Rating Unit and respective 30 m buffer zone
• Low sensitivity areas:
  ➢ Wetland Priority 4 Rating Unit</td></tr>
<tr><td>B</td></tr>
<tr><td>C</td><td>Avoidance of identified sensitive areas through reduction of the extent of the opencast mining area</td><td>Opencast mining area has been reduced to avoid the following areas:
• High sensitivity areas:
  ➢ Untransformed grassland area</td></tr>
</table>

MAP ID NO.	CHANGE FROM INITIAL LAYOUT	REASON FOR CHANGE
		➢ The recommended specialist buffer for a plant species of conservation concern (Sensitive Species 1200) ➲ Medium sensitivity areas: ➢ Secondary vegetation area ➢ Wetland Priority 3 Rating Unit and respective 30 m buffer zone ➲ Low sensitivity areas: ➢ Potential roosting/breeding habitat for the African Grass-owl (*Tyto capensis*) ➢ Wetland Priority 4 Rating Unit
D	Avoidance of identified sensitive areas through reduction of the extent of the opencast mining area as well as removal of overburden stockpile	Opencast mining area has been reduced and surface infrastructure removed to avoid the following areas: ➲ High sensitivity areas: ➢ Untransformed grassland area ➢ Sandstone scarp shrubland areas ➢ Wetland Priority 1 Rating Unit and respective 100 m buffer zone ➢ Wetland Priority 2 Rating Unit and respective 50 m buffer zone ➲ Medium sensitivity areas: ➢ Secondary vegetation area ➢ Wetland Priority 3 Rating Unit and respective 30 m buffer zone ➲ Low sensitivity areas: ➢ Wetland Priority 4 Rating Unit
E	Avoidance of identified sensitive areas through reduction of the extent of the opencast mining area as well as relocation of overburden stockpiles, contractor's yard, ROM stockpile and PCD	Opencast mining area has been reduced and surface infrastructure relocated to avoid the following areas: ➲ Medium sensitivity areas: ➢ Secondary vegetation area ➢ Wetland Priority 3 Rating Unit and respective 30 m buffer zone
F	Avoidance of identified sensitive areas through reduction of the extent of the opencast mining area as well as relocation of overburden stockpiles and PCD	Opencast mining area has been reduced and surface infrastructure relocated to avoid the following areas: ➲ High sensitivity areas: ➢ Wetland Priority 1 Rating Unit and respective 100 m buffer zone ➲ Medium sensitivity areas: ➢ Secondary vegetation area
G	Increase in surface area of opencast mining	Opencast mining area extent increased to compensate for the sterilised reserve mentioned in Points A and B above. The extent of the increased area occurs within a non-sensitive area: transformed area (cultivation)
H		Opencast mining area extent increased to compensate for the sterilised reserve mentioned in Points A and B above. The extent of the increased area occurs within an untransformed grassland area (high sensitivity) and

MAP ID NO.	CHANGE FROM INITIAL LAYOUT	REASON FOR CHANGE
		also includes heritage resource C005, a large informal cemetery. However, this will be avoided by the required 100 m buffer.
I		Opencast mining area extent increased to compensate for the sterilised reserve mentioned in Points A and B above. The extent of the increased area occurs within a Wetland Priority 1 and 2 Rating Unit (high sensitivity) as well as in a secondary vegetation area (medium sensitivity)
J		Opencast mining area extent increased to compensate for the sterilised reserve mentioned in Points A and B above. The extent of the increased area occurs within the 100 m buffer zone of a Wetland Priority 1 Rating Unit (high sensitivity) as well as in a secondary vegetation area (medium sensitivity)
K		Opencast mining area extent increased to compensate for the sterilised reserve mentioned in Points A and B above. The extent of the increased area occurs within an untransformed grassland area (high sensitivity) as well as in a secondary vegetation area (medium sensitivity)

A comparative analysis summary of the environmental aspects between the two layout plans is provided in Table 6-3 below. It can be seen that the final site layout overlaps less areas of sensitivity (high, medium and low) than the initial layout, while the overlap with transformed areas are almost the same, with a slight increase in the final layout. These show positive changes in terms of the environmental sensitivities listed above.

TABLE 6-3: COMPARATIVE SUMMARY OF INITIAL AND FINAL SITE LAYOUT

AREA OF SENSITIVITY	AREA OF OVERLAP (HA)		DIFFERENCE (%)
	INITIAL LAYOUT	FINAL SITE LAYOUT	
HIGH (NO-GO)	617.996382	575.436109	↓ 6.9
MEDIUM	196.452935	156.818878	↓ 20.2
LOW	655.657899	594.642189	↓ 9.3
TRANSFORMED	834.332568	840.021797	↑ 0.07

6.1.3.2 Rehabilitation of the Opencast Mining Areas and Post-closure Land Use

Rehabilitation of the opencast pits will be undertaken concurrently with mining using the recognised roll over method of mining. This is a recognised best practice method for opencast mining. There are no alternative methods proposed for rehabilitation.

With this method, material from the boxcut phase will be stored per overburden classification, with the bulk of the material placed in a position alongside the final strip, to facilitate filling of the final void. Materials are placed back into the void in the former stratigraphic sequence, i.e. topsoil on the surface, subsoil directly below the topsoil and soft overburden, while all carbonaceous shales and hard material (such as sandstone and shale) is deposited in the bottom of the void. Once all the voids have been backfilled, 300 mm thick topsoil or soft overburden in place of soil will be spread on rehabilitated areas. Once placed, the "growth medium" will then be fertilised, ripped and revegetated with suitable pasture grass species. A small topsoil stockpile should be left for remedial work. The infrastructure and associated facilities not required for the post-mining land use will be removed.

The general method by which each opencast mining area will be concurrently mined and rehabilitated is set out below and illustrated in Appendix 5:

- Opencast or surface mining is undertaken in the form of strip mining where the strips are laid out to follow the surface contours. As the strips progress, the previous strip (pit) is rehabilitated. This method is beneficial in that it ensures that continuous rehabilitation with mining is practiced and results in a reduction in the total area that is exposed during mining;
- Topsoil will be removed two strips in advance of the current working strip and will be either stockpiled separately or placed directly on the rehabilitated area behind the advancing strip. Topsoil will be removed using excavators and hauled with ADTs;
- Soft subsoil will be removed one strip in advance of the current working strip and will be either stockpiled separately or placed directly on the rehabilitated area behind the advancing strip. Softs will be removed using excavators and hauled with ADTs;
- Drilling of the overburden is done using a mobile drill rig typical drilling a 110 mm diameter hole and with a specific burden and spacing specific to the area being mined;
- The first overburden removal process is to doze overburden material to the spoil side;
- After dozing, remaining overburden is loaded and hauled and dumped on the spoil side of the current strip. The load and haul is conducted using excavators and ADTs;
- Following removal of the coal seam, materials are placed back into the void in the former stratigraphic sequence i.e. topsoil on the surface, subsoil directly below the topsoil, while all hard material (sandstone and shale) is deposited in the bottom of the void. The final reinstated surface level is typically above the original surface level. However, the existing surface drainage pattern should remain unchanged and the total disturbed area must be free draining; and
- On completion of surface reinstatement, the area is re-vegetated with suitable pasture grass species.

It is envisaged that the final reinstated surface level will be approximately 0.52 m above the original surface level. However, the existing surface drainage pattern will remain unchanged and the total disturbed area will be free draining.

This method assists in reducing the surface area extent of open pits at any one time. This also allows for rehabilitation to occur at a faster pace which is beneficial for the environment. The proposed mine has an estimated production life of 30 years. The proposed mining schedule as per the Ilima Mine Works Programme (2022) shows the different pits that will be each be mined over a 5-year period (Figure 6-1).

The objective of the rehabilitation closure process is to restore as much as possible of the area disturbed during the operation of the development and mine to a land use as close as possible to that previously practiced before mining operations. While the total area disturbed may ultimately be different to that surveyed, the objective would be to maintain the balance of land use and return as much of the area disturbed to productive use.

Ilima's objective for the rehabilitation and closure of the mine is to ensure that the site is left in a condition that is safe and stable where long-term environmental impacts are minimised and any future liability to the community and future land use restrictions are minimised. The final post-mining land use will be determined in consultation with affected landowners and land-users. The land use options could include livestock grazing, cultivation, wildlife habitat, future mining resource area (both formal and informal) or community facilities and structures.

For health and safety reasons as well as the protection of specific rehabilitation works, specific areas may be designated as exclusion zones. Natural soil covers and vegetation will as far as possible be re-established over these areas but access by humans and / or livestock will be prohibited.

The post-closure land use options have been assessed as part of the Closure Plan (Appendix 8).

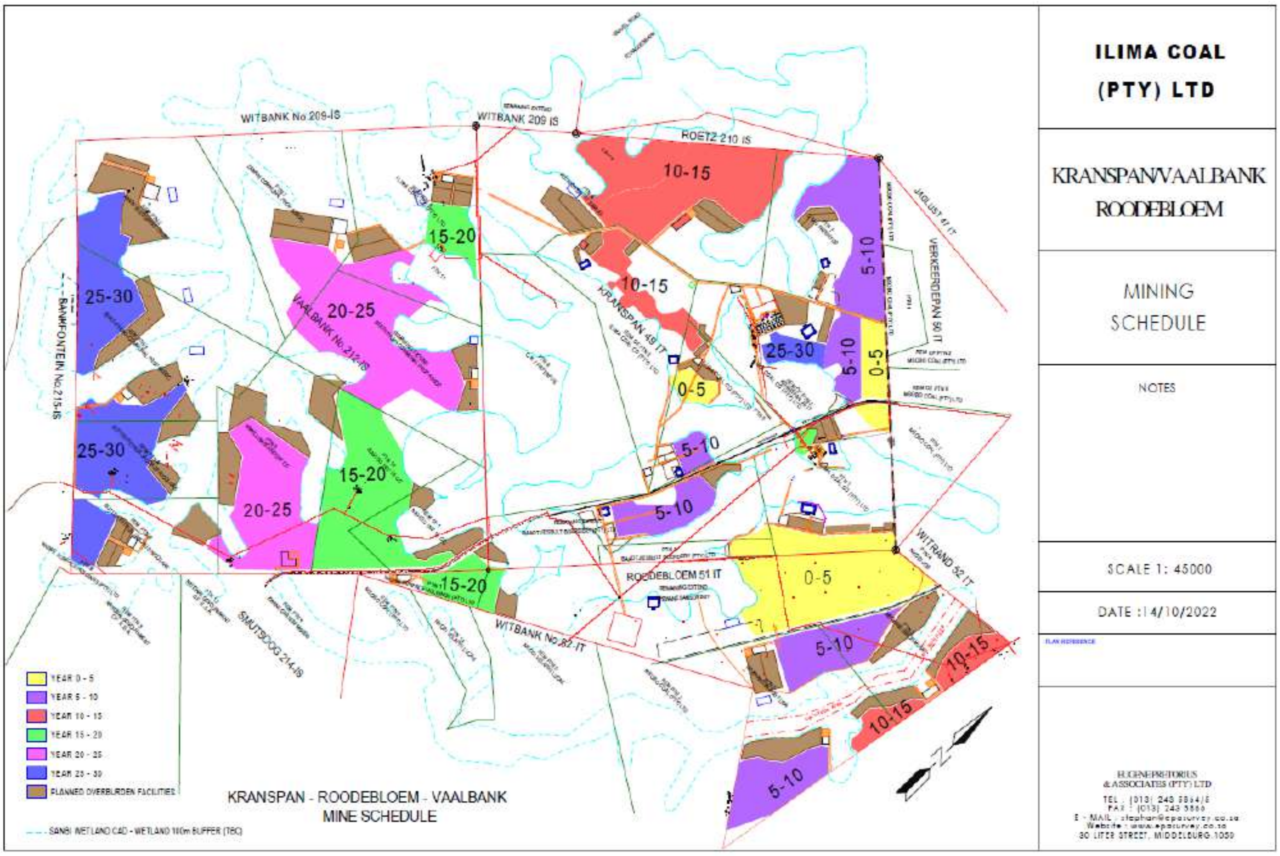


FIGURE 6-1: PROPOSED MINING SCHEDULE

6.1.4 THE TECHNOLOGY TO BE USED IN THE ACTIVITY AND THE OPERATIONAL ASPECTS OF THE ACTIVITY

6.1.4.1 Coal Processing Plant

Dry crushing and screening was initially considered as an alternative to the establishment of a wash plant. The benefit of dry crushing and screening is that it would have a lower water consumption and also remove the requirement for discard disposal. However, current dry-processing technologies are not suitable to prepare export-quality coal and therefore the markets that are available are limited. If the coal processing is limited to dry crushing and screening, the only market that can then be considered would be Eskom, which is not as profitable as potential export markets.

Thus, a coal wash plant will be established on the proposed extension area to process the coal following extraction. Discard management is discussed below.

6.1.4.2 Discard Management

Two discard management alternatives were considered as part of the previous Kranspan Mine Scoping and EIA process, namely surface and in-pit discard disposal. The results of the impacts and risks assessed during this process confirmed that in-pit discard disposal was the preferred option from a feasible and environmental point of view.

Thus, all discard produced from the new wash plant on the proposed extension area will be transported via trucks for in-pit disposal at Pit 5 at Farm Kranspan (approved as part of the EA for the Kranspan MRA).

6.1.4.3 Conveyors

All the opencast mining equipment will be diesel powered and it is proposed that all the coal will be transported from the production pits to the processing plant by truck i.e. no conveyors. An overland conveyor was considered, however the overland conveyor was considered less viable. Besides the capital and operating cost implications, conveyor servitudes result in large strips of vegetation clearance and the removal of topsoil. Conveyor rollers and trolleys also result in noise and dust pollution on site.

Even with conveyors, haul roads will be required in any case to access the mining areas and thus there is no need for additional clearance if the haul roads are used for the trucks to transport the coal to the processing plant. This will involve the use of fuel (diesel) which results in carbon emissions, contributing to the carbon footprint of the mine. However, the operation of the conveyors will also require the use of fuel.

6.1.4.4 Railway Siding

During operation, there will be transport of coal via trucks within the mine itself as well as to customers. Product destined for the export market will be transported via truck to the proposed new rail siding. The rail route links to the RBCT mainline at Ermelo and from there either goes onto the export facility at Richards Bay or to Majuba Power Station.

The Droogvallei siding, which is 50% owned and currently used by Ilima, is located approximately 19 km north east of the project area. The use of the existing siding was compared to the construction of a new siding and it was found that use of the existing siding would not be feasible due to the reasons described below:

- The location of the existing siding would result in mine vehicles having to travel further distances resulting in higher carbon emissions, increased road traffic safety risks and cost implications.
- The proposed new siding would be located within the Mining Right Extension area in close proximity to the mine.
- The siding would be fully owned and operated by Ilima.
- In addition, a larger siding is required than the existing siding in terms of capacity of coal to be stored on the siding.

6.1.5 THE OPERATIONAL ASPECTS OF THE ACTIVITY

Alternatives in terms of the operational aspects have already been taken into account for the mining operations, such as the type of activities to be undertaken, technology to be used as well as the layout of the activities.

6.1.6 THE OPTION OF NOT IMPLEMENTING THE ACTIVITY (NO-GO OPTION)

Should the proposed project not be implemented, the two PRAs will remain as is and:

- The royalties and tax revenue from mining will not accrue to the South African Government;
- The local economic development opportunities associated with the procurement of local goods and services to support the mine activities will not be realised;
- Projected employment opportunities during the construction and operational phases will not be fulfilled;
- The various social development projects under discussion with local government as part of the applicant's social and labour plan commitments, will not be implemented;
- An additional supply of coal needed for power generation will not be available to Eskom; and
- The potential environmental risks and impacts of the coal mining and beneficiation process on Farm Vaalbank 212 IS and Farm Roodebloem 51 IT will be eliminated.

6.2 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

The public participation process that was followed for the proposed project is governed by NEMA and GN No. R. 982 of the 2014 EIA Regulations, as amended.

6.2.1 PRIOR CONSULTATION AND EXISTING AGREEMENTS

Several Interested and Affected Parties (IAPs), including landowners, land users and surrounding landowners/land users, have been previously consulted with in terms of the original prospecting right applications and the exploration work undertaken by Ilima, as well as in terms of the Scoping and EIA process undertaken for the Kranspan MRA.

6.2.2 IAP IDENTIFICATION, CONSULTATION AND DATABASE MANAGEMENT

Throughout the Scoping and EIA process, the Public Participation Process (PPP) Team will compile and maintain an electronic database of IAPs that will include a record of all public participation activities.

Building on the prior and ongoing consultation, all landowners and land occupiers required to be notified in terms of the 2014 EIA Regulations (as amended) were identified and captured on the IAP database, and were requested to participate in the Scoping and EIA process.

In terms of representative democracy and in line with the provisions of the Municipal Systems Act (2000) Councillors are recognised as the elected representatives of the people. Councillors have a mandate as elected representatives to participate on behalf of and also to provide feedback to their constituencies. Therefore, the PPP team ensured that the relevant Councillors as well as the relevant Key Organs of State/Authorities were identified on the IAP database and were encouraged to participate in the Scoping and EIA process.

6.2.3 SCOPING PHASE

The following tasks were undertaken, providing opportunities for IAPs to participate in the Scoping and EIA process, including the site selection and alternatives analysis process:

- Letters were distributed to IAPs identified in the IAP Database, including landowners and land occupiers. The letters contained a brief background and description of the project, an overview of the Scoping and EIA process, and the details on the availability of the Draft Scoping Report (DSR) public commenting period and details for submitting comments regarding the proposed development. The letters were available in English, Afrikaans and Zulu. The letters were sent by e-mail and where no e-mail address was provided, through registered mail or SMS;
- Statutory advertisements (English, Afrikaans and Zulu) were placed in relevant regional and local newspapers. The newspaper adverts contained the same information as the letter;
- Placement of site notices at various locations within the study area. The site notices contained the same information as the letter; and
- Ongoing engagement throughout the Scoping and EIA process with IAPs via e-mail, telephone, fax or regular mail.

Proof of the copies of written notifications, site notices and newspaper adverts developed and distributed during the Scoping Phase were provided to DMRE with the Final Scoping Report. The updated IAP database is provided in Appendix 6.

As part of project notification, the DSR was made available for public review and comment for a period of 30 days from 24 October 2022 to 22 November 2022. The report was made available as follows:

- By download: http://www.abs-africa.com/project-documents/
- By e-mail on request: consultation@abs-africa.com
- Hard copies were made available publicly for review at the Carolina Public Library, 11 Voortrekker Street, Carolina

6.2.4 EIA Phase

This Draft EIAR will be made available for a 30-day comment period. Notification of the availability of the draft report will be undertaken via newspaper adverts, site notices, e-mails, SMS and/or hand delivered letters to all registered IAPs. The Draft EIAR will also be made available in the same way as was done for the DSR. Proof of notification will be provided in Appendix 6 of the Final EIA Report.

Registered IAPs will be notified in writing of the submission of the Final EIAR to the DMRE. A copy of the Final EIAR will be made available on the ABS Africa website and on request from ABS Africa.

Regulation 24(1) of Government Notice R.982 provides that the DMRE must review the Final EIAR and EMPr and issue a decision on the EA and WML application within 107 days of submission of the document.

6.2.5 Comments and Responses Report

All issues raised by registered IAPs have been captured in a Comments and Response Report (CRR). The CRR contains comments forwarded to project team members, raised at various meetings, received through comment sheets, letters, faxes and e-mail. The CRR will accompany the corresponding Final EIAR.

6.2.6 Notification of Decision

Upon receipt of the decision on the EA, the EIA Project Team will assist the applicant in making the application decisions available to all registered IAPs and notifying them of the appeal procedure to be followed in terms of the National Appeal Regulations (Government Notice No. R.993 promulgated in terms of section 44(1a) and 43(4) of NEMA).

6.3 SUMMARY OF ISSUES RAISED BY IAPS

This section will be FINALISED in the Final EIAR, once comments and responses have been received from the public. A summary of comments/issues received to date are provided below.

TABLE 6-4: SUMMARY OF ISSUES RAISED BY IAPS

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 THE ISSUES RAISED	SECTION AND PARAGRAPH REFERENCE IN THIS REPORT WHERE THE ISSUES AND/OR RESPONSE WERE INCORPORATED
AFFECTED PARTIES					
Landowner/s (Owners of land included in the proposed Mining Rights Area Boundary)	**X**				
Directly affected landowners on Farms Vaalbank 212 IS and Roodebloem 51 IT	**X**	September 2022	Ilima Coal Company had on-site meetings with various landowners to introduce the project and to request access to undertake specialist studies needed for the EIA on their properties. ABS Africa spoke telephonically with various landowners to introduce the project and to request access to undertake specialist studies needed for the EIA on their properties and confirmed detailed information on the project in the form of a letter which was emailed to the landowner.	The landowners provided consent and their various contact details to receive the information on the project.	N/A

INTERESTED AND AFFECTED PARTIES LIST THE NAMES OF PERSONS CONSULTED IN THIS COLUMN; AND MARK WITH AN X WHERE THOSE WHO MUST BE CONSULTED WERE IN FACT CONSULTED		DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO THE ISSUES RAISED	SECTION AND PARAGRAPH REFERENCE IN THIS REPORT WHERE THE ISSUES AND/OR RESPONSE WERE INCORPORATED
Directly Affected Landowner: Portion 5 of Farm Vaalbank 212 IS Anton Fourie	X	September 2022	ABS Africa spoke telephonically with Mr. Anton Fourie to introduce the project and to request access to undertake specialist studies needed for the EIA on his property and confirmed detailed information on the project in the form of a letter will be emailed to the landowner.	Mr. Anton Fourie provided his email address to receive the information on the project.	N/A
			ABS Africa emailed a letter of notification in connection with the environmental studies to be carried out on Mr. Anton Fourie's property (Portion 5 of Farm Vaalbank 212 IS). The studies are in support of the feasibility of the proposed expansion of the Kranspan Mining Right Area.	Mr. Anton Fourie responded via email stating that he unfortunately cannot give permission to enter his property for this matter due to personal reasons.	N/A
			ABS Africa spoke telephonically with Mr. Anton Fourie to determine why the landowner is refusing access to his property to undertake the required specialist studies for the EIA application.	Mr. Anton Fourie stated that he is against the mining project and does not want to allow any specialist investigations on his property. He indicated that he previously applied for a mining right on his property five years ago and undertook all the relevant specialist studies which was	N/A

INTERESTED AND AFFECTED PARTIES LIST THE NAMES OF PERSONS CONSULTED IN THIS COLUMN; AND MARK WITH AN X WHERE THOSE WHO MUST BE CONSULTED WERE IN FACT CONSULTED		DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO THE ISSUES RAISED	SECTION AND PARAGRAPH REFERENCE IN THIS REPORT WHERE THE ISSUES AND/OR RESPONSE WERE INCORPORATED
				submitted to the DMRE. The landowner advised he has had no feedback from DMRE and was last notified by the DMRE that his application is "in process". ABS Africa advised the Applicant of the response from Mr. Anton Fourie. Portion 5 of Vaalbank 212 IS has been excluded from the specialist fieldwork.	
		November 2022	Completed the online Google Form and registered as an IAP. Selected the following for Concerns, Questions & Queries on the Scoping Report: Baseline environment and impacts identified, Specialist studies, Health & safety concerns, Social governance, Proposed activity & operations, Public Participation Process.	ABS Africa confirmed with Mr. Anton Fourie that he had no formal comments on the Scoping Report at this stage.	N/A
		06 December 2022	ABS Africa spoke telephonically with Mr. Anton Fourie to request access again to his property to	Mr. Anton Fourie agreed that the specialists may undertake the studies on his property. An email was sent to	N/A

INTERESTED AND AFFECTED PARTIES LIST THE NAMES OF PERSONS CONSULTED IN THIS COLUMN; AND MARK WITH AN X WHERE THOSE WHO MUST BE CONSULTED WERE IN FACT CONSULTED		DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO THE ISSUES RAISED	SECTION AND PARAGRAPH REFERENCE IN THIS REPORT WHERE THE ISSUES AND/OR RESPONSE WERE INCORPORATED
			undertake the required specialist studies for the EIA application.	Mr. Anton Fourie to confirm the conversation.	
Thulani Mtsuki Attorneys on behalf of directly affected landowner	**X**	25 October 2022	The following letter was submitted in response to the Scoping Phase notification letter: We act herein on behalf of the trustees and/or lawful beneficiaries for Zamani Community Property Association, who are the registered owners of Portion 7 of the Farm Vaalbank 212 IS Mpumalanga Province. Our client is in possession of your Notice for Environmental Authorisation dated 20 October 2022. Our client would like to register as an Interseted and Affected Part herein and would be pleased if your goodselves will furnish is with copies of the relevant Mining Right and the Prospecting Right on Vaalbank Portions herein. We thank you and look forward to hearing from your goodselves in due course.	ABS Africa confirmed the IAPs registration on behalf of Zamani Community Property Association. The IAP was informed that there is no Mining Right over Vaalbank at present, the extension of the existing Mining Right Area (MRA) at the Farm Kranspan 49 IT to incorporate the adjacent Prospecting Right Areas (PRAs), namely Farm Vaalbank 212 IS and Roodebloem 51 IT, is currently being applied by Ilima Coal Company through the Section 102 amendment application process as per the Minerals and Petroleum Resources Development Act (Act No. 28 of 2002) (“MPRDA”).	N/A

INTERESTED AND AFFECTED PARTIES LIST THE NAMES OF PERSONS CONSULTED IN THIS COLUMN; AND MARK WITH AN X WHERE THOSE WHO MUST BE CONSULTED WERE IN FACT CONSULTED		DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO THE ISSUES RAISED	SECTION AND PARAGRAPH REFERENCE IN THIS REPORT WHERE THE ISSUES AND/OR RESPONSE WERE INCORPORATED
				Ilima were copied in this correspondence and ABS Africa advised that Ilima can be contacted if there are any queries related to the Prospecting Right or Section 102 Process in terms of the MPRDA (such as the Vaalbank Prospecting Right), separate to the Scoping and EIA Process. The renewal of the Vaalbank Prospecting Right was provided to the IAP.	
Directly Affected Landowner: Portion 2 of Roodebloem 51 IT Bob Fuga Nzimande	X	31 October 2022	Mr. Bob Fuga requested a meeting with ABS Africa and Ilima Coal Company to discuss the project, the mining process and planning. He advised that his neighbour would also like to attend the meeting: Mr. Simon Musa Mbokani (Owner of Portion 3 of Roodebloem 51 IT).	A meeting was arranged for 16 November 2022, however, the meeting had to be rescheduled because the landowner was unable to attend the scheduled meeting on his property. It was agreed telephonically with the landowner on 15 November 2022 to meet during the EIA Phase of the project in early 2023.	N/A

INTERESTED AND AFFECTED PARTIES LIST THE NAMES OF PERSONS CONSULTED IN THIS COLUMN; AND MARK WITH AN X WHERE THOSE WHO MUST BE CONSULTED WERE IN FACT CONSULTED		DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO THE ISSUES RAISED	SECTION AND PARAGRAPH REFERENCE IN THIS REPORT WHERE THE ISSUES AND/OR RESPONSE WERE INCORPORATED
		March 2023	A meeting has been arranged with Mr. Bob Fuga for March 2023, during the EIA public review period.	Any issues or concerns raised during the meeting will be included in the Final EIAR.	N/A
Directly Affected Landowner: Portion RE/4 and RE/6 of Farm Vaalbank 212 IS Petra du Plessis	**X**	15 November 2022	Can you please send me the following: 1. Form to register as a stakeholder; 2. Copy of the Draft Scoping Report	The link to the form was provided to the IAP (https://forms.gle/9q4ZUiXhffS3hztf8), and the IAP was added to the IAP Database. The link to the Draft Scoping Report was provided to the IAP: http://www.abs-africa.com/project-documents/ .	N/A
Occupiers of the Site (Parties using land within the Mining Rights Area Boundary)	**X**				
Land occupiers on the site	**X**	September 2022	ABS Africa spoke telephonically with various land occupiers to introduce the project and to inform them that specialist studies needed for the EIA will be undertaken on their properties and confirmed	The land occupiers provided consent and their various contact details to receive the information on the project.	N/A

INTERESTED AND AFFECTED PARTIES LIST THE NAMES OF PERSONS CONSULTED IN THIS COLUMN; AND MARK WITH AN X WHERE THOSE WHO MUST BE CONSULTED WERE IN FACT CONSULTED		DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO THE ISSUES RAISED	SECTION AND PARAGRAPH REFERENCE IN THIS REPORT WHERE THE ISSUES AND/OR RESPONSE WERE INCORPORATED
			detailed information on the project in the form of a letter which was emailed to the landowner.		
Adjacent Landowners (Owners of land immediately adjacent to the Mining Rights Area Boundary)	X				
Adjacent landowners	X	Verbal discussions during on-site notification: 20 October 2022	During on-site public notification, several discussions were held with adjacent landowners when handing out project notification letters. A summary of the comments/concerns raised by the adjacent landowners included the following: • Relocation of their households; • Noise from blasting; and • If the mine will implement local employment.	The following responses were provided during the discussions: • There will be no relocation of the households visited as these are adjacent properties to the proposed Mining Right Extension area; • Noise impacts from blasting will be assessed in the EIA Phase and depends on the mining schedule; and	Refer to Social Impact Assessment in Appendix 8 regarding relocation of households and local employment concerns.

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 THE ISSUES RAISED	SECTION AND PARAGRAPH REFERENCE IN THIS REPORT WHERE THE ISSUES AND/OR RESPONSE WERE INCORPORATED
				• The Environmental Management Programme (EMPr) will require implementation of the mine Social and Labour Plan which supports local employment.	Refer to the Blasting Impact Assessment in Appendix 8 regarding noise from blasting activities.
Adjacent Occupiers of Site (Occupiers and users of land immediately adjacent to the Mining Rights Area Boundary)	**X**				
Adjacent land occupiers	**X**	Verbal discussions during on-site notification: 20 October 2022	During on-site public notification, several discussions were held with adjacent landowners when handing out project notification letters. A summary of the comments/concerns raised by the adjacent landowners included the following: • Relocation of their households; • Noise from blasting; and	The following responses were provided during the discussions: • There will be no relocation of the households visited as these are adjacent properties to the proposed Mining Right Extension area;	Refer to Social Impact Assessment in Appendix 8 regarding relocation of households

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 THE ISSUES RAISED	SECTION AND PARAGRAPH REFERENCE IN THIS REPORT WHERE THE ISSUES AND/OR RESPONSE WERE INCORPORATED
			• If the mine will implement local employment.	• Noise impacts from blasting will be assessed in the EIA Phase and depends on the mining schedule; and • The Environmental Management Programme (EMPr) will require implementation of the mine Social and Labour Plan which supports local employment.	and local employment concerns. Refer to the Blasting Impact Assessment in Appendix 8 regarding noise from blasting activities.
Competent Authorities	**X**				
DMRE	**X**	02 December 2022	Acknowledgement of receipt of Scoping Report.	Acknowledged.	N/A
		13 December 2022	Acceptance of Scoping Report.	Acknowledged.	N/A

INTERESTED AND AFFECTED PARTIES LIST THE NAMES OF PERSONS CONSULTED IN THIS COLUMN; AND MARK WITH AN X WHERE THOSE WHO MUST BE CONSULTED WERE IN FACT CONSULTED		DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO THE ISSUES RAISED	SECTION AND PARAGRAPH REFERENCE IN THIS REPORT WHERE THE ISSUES AND/OR RESPONSE WERE INCORPORATED
Municipal Councillor	**N/A**				
Ward Councillor: Ward 21	**X**	September 2022	Ward Councillor for Ward 21 was notified about the Scoping and EIA Process.	No comments received to date.	N/A
Local and District Municipality	**N/A**				
Albert Luthuli Local Municipality and Gert Sibande District Municipality	**X**	September 2022	Departments were notified about the Scoping and EIA Process.	No comments received to date.	N/A
Communities	**N/A**				
Siyathuthuka Community Association	**X**	March 2023	A meeting has been arranged with the Siyathuthuka Community Association for March 2023 to discuss the project and capture any issues/concerns.	Any issues or concerns raised during the meeting will be included in the Final EIAR.	N/A
Traditional Leaders	**N/A**				
There is no traditional leadership structure known to be applicable to the Mining Right Extension Area.					N/A
Department of Environmental Affairs	**X**				

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Department of Forestry Fisheries and the Environment (DFFE): Biodiversity Conservation Ms Mmatlala Rabothata	X	23 November 2022	The following comments on the Draft Scoping Report were received from Directorate: Biodiversity Conservation. The Directorate: Biodiversity Conservation reviewed and evaluated the report. Based on the information provided in the report, the site overlaps within portions of Critical Biodiversity Area (CBA) and Ecological Support Areas (ESAs). There are several surface water features within the proposed Kranspan Mining Right Extension site, including several rivers and streams and at least four wetland types, namely channelled valley bottom wetlands, un-channelled valley-bottom wetlands, depression and seeps. The footprint of the extension area falls within the Amersfoort-Bethal-Carolina Important Bird Area (IBA). The following recommendations should be considered in the next phase of the report: • All biodiversity specialist studies must be prepared and submitted according to the procedures for the assessment and minimum	The IAP Database has been updated by adding Birdlife South Africa and the relevant contact details of the DFFE Biodiversity Conservation unit. The desktop environmental sensitivities identified by DFFE have been included in the Scoping Report. The impacts of the proposed development have been assessed by the relevant environmental specialist studies, refer to Appendix 8. Comments from Birdlife SA have been requested on the Draft EIA Report which include the findings of the terrestrial specialist. All procedures, protocols and biodiversity guidelines have been considered in the EIAR and specialist studies.	Section 6.1.4.5 and Section 6.1.4.6 for the description of the biodiversity baseline. Refer to the Terrestrial Biodiversity Assessment in Appendix 8.

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 THE ISSUES RAISED	SECTION AND PARAGRAPH REFERENCE IN THIS REPORT WHERE THE ISSUES AND/OR RESPONSE WERE INCORPORATED
			criteria for reporting on identified environmental themes in terms of sections 24(5)(A) and (H) and 44 of the National Environmental Management Act, 1998. • Comments from Birdlife South Africa must be obtained and submitted as part of the final scoping report. • The sensitivity Layout Map overlaid with sensitivities and indicating the final footprint for the proposed development avoiding environmentally sensitive areas must be included in the Final Scoping Report. • All the relevant National and Provincial biodiversity guidelines must be considered. The Directorate does not support any development within a very highly sensitive area (CBAs) and that will result with significant negative residual impacts after mitigation. In conclusion, please note that all Public Participation Process documents related to Biodiversity EIA review and any other Biodiversity EIA queries must be submitted to the Directorate: Biodiversity Conservation at Email:		

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 THE ISSUES RAISED	SECTION AND PARAGRAPH REFERENCE IN THIS REPORT WHERE THE ISSUES AND/OR RESPONSE WERE INCORPORATED
			BCAdmin@environment.co.za for attention of Mr Seoka Lekota.		
		23 January 2023	The following comments on the Final Scoping Report were received from Directorate: Biodiversity Conservation. The Directorate: Biodiversity Conservation reviewed and evaluated the report. The Directorate Biodiversity Conservation has noted the respond in the final scoping report relating to the recommendations made in the Draft Scoping Report and does not have any objections. All Public Participation Process documents related to Biodiversity EIA review and any other Biodiversity EIA queries must be submitted to the Directorate: Biodiversity Conservation at Email: BCAdmin@environment.gov.za for attention of Mr Seoka Lekota.	The Draft EIAR will be provided to the Department for comment during the EIA public review period.	N/A

INTERESTED AND AFFECTED PARTIES LIST THE NAMES OF PERSONS CONSULTED IN THIS COLUMN; AND MARK WITH AN X WHERE THOSE WHO MUST BE CONSULTED WERE IN FACT CONSULTED		DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO THE ISSUES RAISED	SECTION AND PARAGRAPH REFERENCE IN THIS REPORT WHERE THE ISSUES AND/OR RESPONSE WERE INCORPORATED
Organs of State with Jurisdiction	**X**				
Mpumalanga Tourism and Parks Agency (MTPA)	**X**	25 October 2022	MPTA confirmed the correct person to send the Draft Scoping Report to: Thabile Mnisi (Thabile.Mnisi@mtpa.co.za) or Phumla Nkosi (Phumla.Nkosi@mtpa.co.za). MPTA also requested a hardcopy of the Scoping Report to the following address: MTPA, N4 National Road, Hall's Gateway, Mataffin, Mbombela, 1200 Att: Thabile Mnisi or Att: Phumla Nkosi, Office G3D	The suggested contact persons for MTPA were added to the IAP Database and were emailed the link to the Scoping Report for comments.	N/A
Department of Rural Development and Land Reform	**X**	September 2022	Department was notified about the Scoping and EIA Process.	No comments received to date.	N/A
Department of Water and Sanitation	**X**	September 2022	Department was notified about the Scoping and EIA Process.	No comments received to date.	N/A
Inkomati Usuthu Catchment Management Agency (IUCMA)	**X**	September 2022	Department was notified about the Scoping and EIA Process.	No comments received to date.	N/A

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Eskom Holdings SOC LTD	X	September 2022	Department was notified about the Scoping and EIA Process.	No comments received to date.	N/A
Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs	X	September 2022	Department was notified about the Scoping and EIA Process.	No comments received to date.	N/A
Mpumalanga Department of Education	X	September 2022	Department was notified about the Scoping and EIA Process.	No comments received to date.	N/A
Mpumalanga Department of Health	X	September 2022	Department was notified about the Scoping and EIA Process.	No comments received to date.	N/A
Mpumalanga Department of Human Settlements	X	September 2022	Department was notified about the Scoping and EIA Process.	No comments received to date.	N/A
Mpumalanga Department of Public Works, Roads and Transport	X	September 2022	Department was notified about the Scoping and EIA Process.	No comments received to date.	N/A
Mpumalanga Department of Social Development	X	September 2022	Department was notified about the Scoping and EIA Process.	No comments received to date.	N/A

INTERESTED AND AFFECTED PARTIES LIST THE NAMES OF PERSONS CONSULTED IN THIS COLUMN; AND MARK WITH AN X WHERE THOSE WHO MUST BE CONSULTED WERE IN FACT CONSULTED		DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO THE ISSUES RAISED	SECTION AND PARAGRAPH REFERENCE IN THIS REPORT WHERE THE ISSUES AND/OR RESPONSE WERE INCORPORATED
Mpumalanga Economic Growth Agency	X	September 2022	Department was notified about the Scoping and EIA Process.	No comments received to date.	N/A
Mpumalanga Heritage Resources Authority	X	September 2022	Department was notified about the Scoping and EIA Process.	No comments received to date.	N/A
South African Heritage Resource Agency (SAHRA)	X	September 2022	Department was notified about the Scoping and EIA Process.	No comments received to date.	N/A
SANRAL SOC LTD.	X	September 2022	Department was notified about the Scoping and EIA Process.	No comments received to date.	N/A
Transnet SOC LTD.	X	September 2022	Department was notified about the Scoping and EIA Process.	No comments received to date.	N/A
Other Competent Authorities Affected	**N/A**				
N/A					N/A
Other Affected Parties	**N/A**				

INTERESTED AND AFFECTED PARTIES LIST THE NAMES OF PERSONS CONSULTED IN THIS COLUMN; AND MARK WITH AN X WHERE THOSE WHO MUST BE CONSULTED WERE IN FACT CONSULTED		DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO THE ISSUES RAISED	SECTION AND PARAGRAPH REFERENCE IN THIS REPORT WHERE THE ISSUES AND/OR RESPONSE WERE INCORPORATED
Chrissiesmeer Lake District	**X**	September 2022	Organisation was notified about the Scoping and EIA Process.	No comments received to date.	N/A
Endangered Wildlife Trust	**X**	September 2022	Organisation was notified about the Scoping and EIA Process.	No comments received to date.	N/A
BirdLife South Africa	**X**	September 2022	Organisation was notified about the Scoping and EIA Process.	No comments received to date.	N/A
Interested Parties	**X**				
Anonymous Registered IAP	X	15 November 2022	Registered as an IAP. Did not give consent for their personal information to be used for the purpose of this project.	Acknowledged. IAP added to Database and contact details protected.	N/A

6.4 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE DEVELOPMENT FOOTPRINT ALTERNATIVES

6.4.1 BASELINE ENVIRONMENT - TYPE OF ENVIRONMENT AFFECTED BY THE PROPOSED ACTIVITY

6.4.1.1 Climate

No weather station is located close to the proposed project area, and use was made of Weather Research and Forecasting (WRF) data to quantify the atmospheric dispersion potential. Data for the period January 2019 to December 2021 (3 years) was obtained as required by the regulations on Air Dispersion Modelling (DEA, 2014). The dataset is regarded as representative of the weather conditions at the project site.

Temperature

Air temperature is important, both for determining the effect of plume buoyancy (the larger the temperature difference between the plume and the ambient air, the higher a pollution plume is able to rise) and determining the development of the mixing and inversion layers. The monthly temperature pattern is shown in Figure 6-2. The area experienced mild temperatures during summer. Winter temperatures were relatively low especially in the month of July. Maximum temperatures range from 33.2°C in November to 23.6°C in June, with minima ranging between -7.5°C in July and 8.1°C in January.

The diurnal temperature profile for the site is given in Figure 6-3. During the day, temperatures increase to reach maximum at around 12:00 in the afternoon. Ambient air temperature decreases to reach a minimum at around 05:00 i.e. just before sunrise.

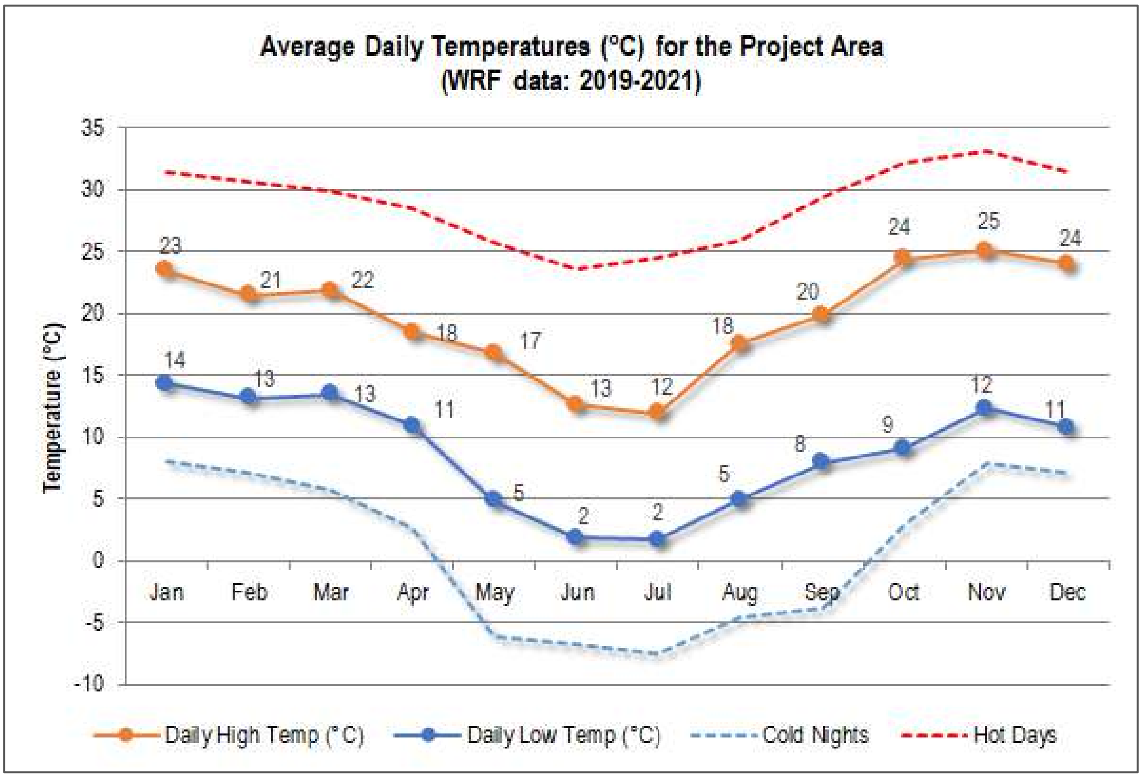


FIGURE 6-2: MONTHLY TEMPERATURE PROFILE (WRF DATA: 2019-2021)

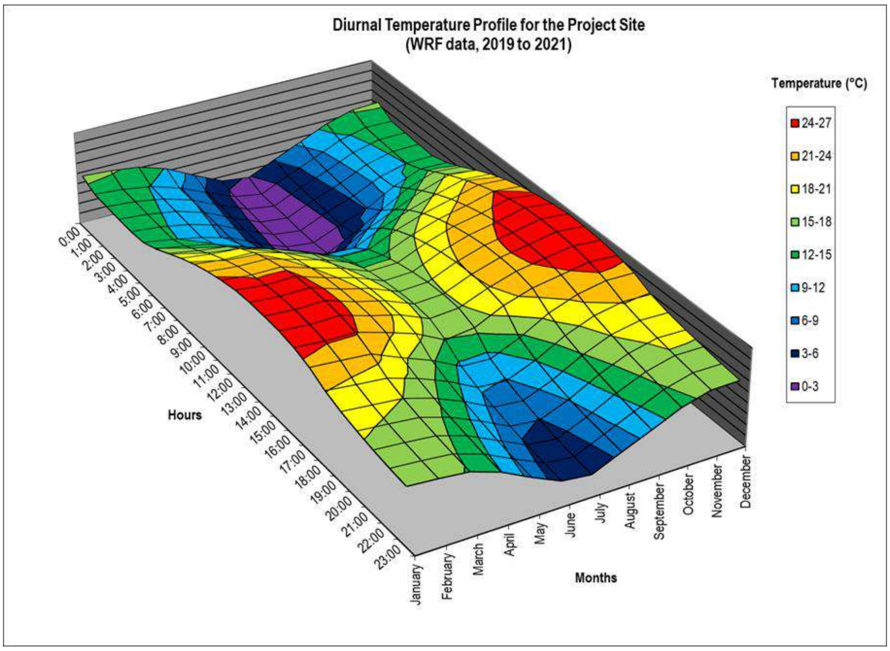


FIGURE 6-3: DIURNAL TEMPERATURE PROFILE (WRF DATA; 2019-2021)

Precipitation

Precipitation is important to air pollution studies since it represents an effective removal mechanism for atmospheric pollutants and inhibits dust generation potentials. Monthly rainfall for the nearby town of Carolina, located 13 km away, is given in Figure 6-4 (based on data obtained from http://www.saexplorer.co.za/south-africa/climate/carolina_climate.asp). Months wherein the most rain occur stretch from October to March. The average annual rainfall for Carolina is given as 613 mm.

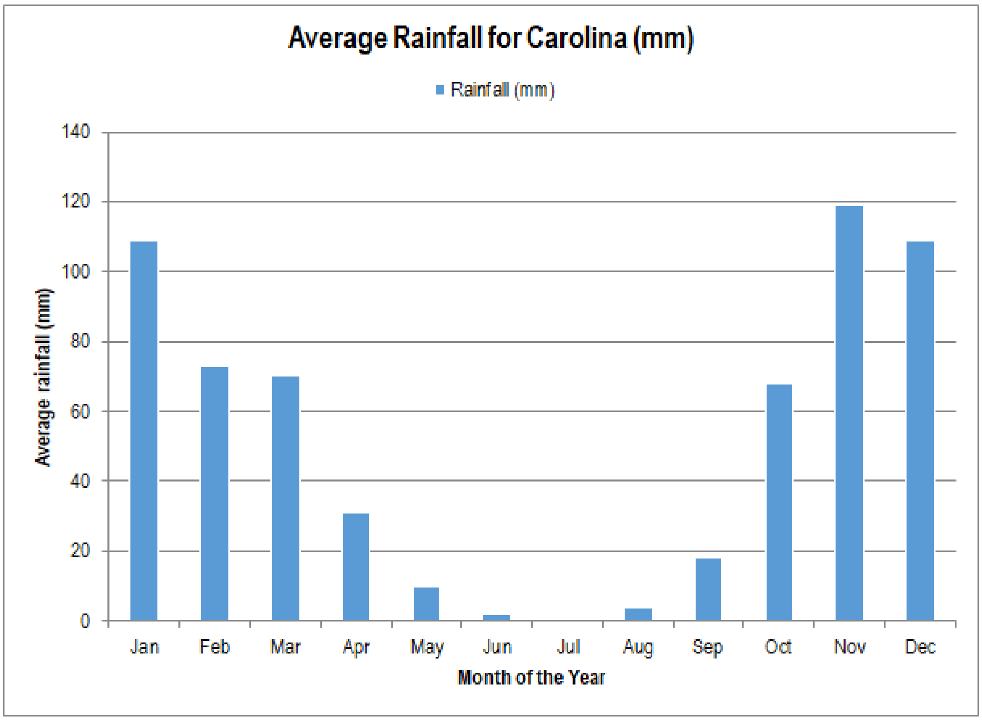


FIGURE 6-4: MONTHLY PRECIPITATION (HTTP://WWW.SAEXPLORER.CO.ZA/SOUTH-AFRICA/CLIMATE/CAROLINA_CLIMATE.ASP)

Surface Wind Field

The wind field determines both the distance of downward transport and the rate of dilution of pollutants. The generation of mechanical turbulence is a function of the wind speed, in combination with the surface roughness. The wind field for the study area is described with the use of wind roses. Wind roses comprise 16 spokes, which represent the directions from which winds blew during a specific period. The colours used in the wind roses below, reflect the different categories of wind speeds; the yellow area, for example, representing winds in between 4 and 5 m/s. The dotted circles provide information regarding the frequency of occurrence of wind speed and direction categories. Calm conditions are periods when the wind speed was below 1 m/s. These low values can be due to “meteorological” calm conditions when there is no air movement; or, when there may be wind, but it is below the anemometer starting threshold.

The period wind field and diurnal variability in the wind field are shown in Figure 6-5. Seasonal variations in the wind field are provided in Figure 6-6. The wind field was predominantly from the west-northwest and north-east. Calm conditions occurred 3.72% of the time. There is a great contrast between day-time and night-time wind fields. During the day, winds occurred more frequently from the north-westerly sector, with 4.2% calm conditions. Night-time airflow showed winds which occurred most frequently from the north-easterly sector. The frequency of calm conditions during night-time decreased to 3.2%. From Figure 6-6, autumn and winter show similar wind direction profiles to the period average, while summer shows more frequent winds from the east-northeast and a decrease in wind speeds from the north-west. There is an increased frequency of high wind speeds during spring.

According to the Beaufort wind force scale (https://www.metoffice.gov.uk/guide/weather/marine/beaufort-scale), wind speeds between 6-8 m/s equates to a moderate breeze, with wind speeds between 9-11 m/s referred to as a fresh breeze. Wind speeds between 11-14 m/s are described as a strong breeze with winds between 14-17 m/s near gale force winds and 17 - 21 m/s as gale force winds. Based on the three years of WRF data, wind speeds between 6 m/s and 8 m/s occurred 10.4% of the time; wind speeds between 9 m/s and 11 m/s occurred 5.4% of the time and wind speeds higher than11 m/s occurred 0.3% of the time.

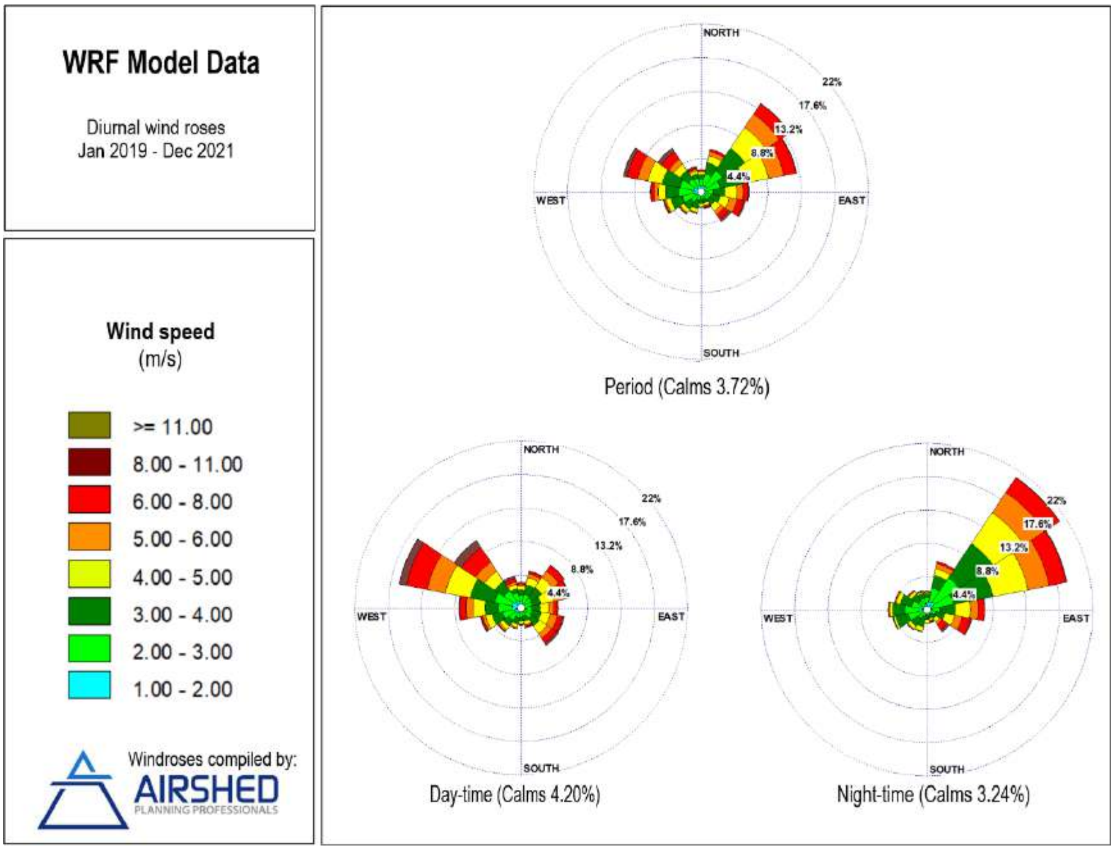


FIGURE 6-5: PERIOD, DAY- AND NIGHT-TIME WIND ROSES (WRF DATA; 2019-2021)

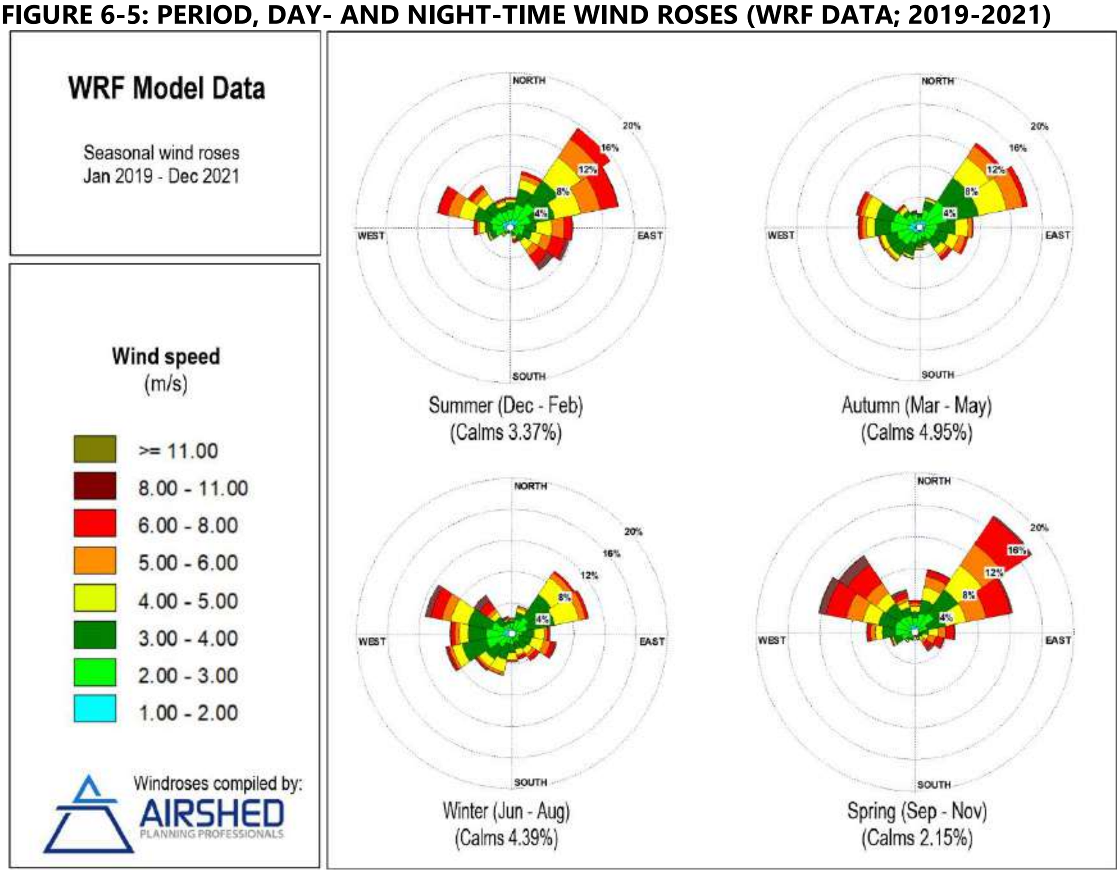


FIGURE 6-6: SEASONAL WIND ROSES (WRF DATA; 2019-2021)

6.4.1.2 Topography

From a regional topographical perspective, the largest part of the Gert Sibande District Municipality is situated on the Highveld Grasslands of Mpumalanga. Undulating to strongly undulating landscape with intermittent hills are generally associated with this district. The intensity of the undulations generally increases from west to east, in the direction of the Drakensberg Escarpment and Swaziland. Once past the escarpment (in the general direction of Piet Retief), the landscape is characterised by undulating hills and lowlands. The far north-eastern and south-eastern extents of the District (in the direction of Barberton and Volksrust / Wakkerstroom) are characterised by the occurrence of low to high mountains (GSDM IDP, 2022-2027).

Appendix 3 Map 7 shows the topography across the proposed Kranspan Mining Right Extension. The topography of the site can be categorized as plains with low hills or ridges (Figure 6-7). The highest elevation on Farm Vaalbank 212 IS occurs on the central northern and south eastern sections of the farm, approximately 1740 m. The lowest elevation, towards the eastern section of the farm, is approximately 1680 m. The highest elevation on Farm Roodebloem 51 IT occurs on the south western section of the farm, approximately 1700 m. The lowest elevation, towards the northern and eastern section of the farm, is approximately 1660 m.

FIGURE 6-7: GENTLE UNDULATING TERRAIN OF PROJECT AREA

6.4.1.3 Geology

The proposed Kranspan Mining Right Extension site is located in the Ermelo Coal Field, which is underlain by glacial pre-Karoo rock formations, including the Dwyka tillite. The study area is underlain by the Karoo Supergroup sedimentary rocks of the Vryheid Formation and Quaternary superficial deposits of the Ecca Group, refer to Appendix 3 Map 8 (based on the South Africa 1:250 000 Scale Geological Map). These are largely comprised of sandstone, mudstone, shale, siltstone, and coal seams.

The Vryheid Formation is world renowned for the occurrence of coal beds formed by the accumulation of plant material over long periods of time. It is characterized by light grey, fine to course sandstone and siltstone sediments. The dark coloured siltstones can be ascribed to the presence of carbon enrichment and coal beds.

Infrequent coal seams, deltaic mudrocks and sandstones as well as coastal and fluvial deposits are present in this formation. These sediments were probably deposited on a sandy shoreline that stretched out beyond swamplands. In these swamps, plants accumulated and formed the coal deposits that are mined today (Johnson *et al*. 2009). Five coal seams are recognised within an 80 – 90m thick sedimentary succession. These are, from the top down, the A to E Seams.

The Vryheid Formation coal is classified as follows (Jeffrey, 2005) :

- E Seam: High quality and low ash and has a thickness of 3 m;
- D Seam: Overlain by a sandstone layer followed by a persistent shale layer and has a thickness of 0.5 m;
- C Seam: Consists of a C Lower Seam which is 1.5 m in thickness with sandstone partings in upper section and a C Upper Seam which varies from 0.7m–4 m in thickness. The C Lower Seam is the most important seam as it is the main source of export coal whereas The C Upper Seam is generally of poorer quality;
- B Seam: Consists of a B upper and a B lower seam separated by a sandstone parting. Coal in this seem has a low quality and high ash content; and
- A Seam: This seem has mainly been removed by recent erosion and has thickness of 0–1.5 m.

Quaternary fossil assemblages are generally rare and low in diversity and occur over a wide-ranging geographic area. These fossil assemblages may sometimes occur in extensive alluvial and colluvial deposits cut by dongas. The Tertiary to Quaternary Cenozoic superficial deposits consist of aeolian sand, alluvium (clay, silt and sand deposited by flowing floodwater in a river valley/ delta producing fertile soil), colluvium (material collecting at the foot if a steep slope), spring tufa/tuff (a porous rock composed of calcium carbonate and formed by precipitation from water, for example, around mineral springs) and lake deposits, peats, pedocretes or duricrusts (calcrete, ferricrete), soils and gravels.

The Geohydrological (groundwater) specialist study (ILEH, 2023) stated that there are two major structural geological features which may have an impact on groundwater flow and possibly mining. These possible dyke structures extend from north to south, with the one structure underlying the big pan on the farm Kranspan and the second roughly following the R36 road. In addition, five regional lineaments strike in a northeast-southwest direction across the mining area. These are sub-parallel and are thought to sub-outcrop in the area. The dip of these structures is not fully understood, but they are generally horizontal to sub-horizontal in nature. The coal seams are underlain by Dwyka Tillite, which forms the basement of the Karoo sediments.

6.4.1.4 Soils, Agricultural Land Capability and Hydropedology

The section below has been extracted from the Soil and Agricultural Potential Assessment and the Hydropedological Assessment undertaken for the project, refer to Appendix 8.

6.4.1.4.1 Soil Forms

The soil forms for the proposed Kranspan MRA extension areas are provided in Table 6-5 and Figure 6-8 below and described according to depth, clay percentage, indications of surface crusting, signs of wetness and percentage rock.

TABLE 6-5: DESCRIPTION OF THE SOIL FORMS FOUND WITHIN THE PROPOSED PROJECT AREA[5]

	A-horizon					B-horizon				B-horizon/C-horizon			
	Depth (mm)	Clay (%)	Signs of wetness	Rock %	Surface crusting	Depth (mm)	Clay (%)	Signs of wetness	Rock %	Depth (mm)	Clay (%)	Signs of wetness	Rock %
*Champagne	*340	>15	W4	0	None	*340 - 700	20 - 25	W4	10	N/A			
*Ermelo	*640	0 - 15	None	0	None	*640 –1200	15 - 20	None	0	N/A			
Fernwood	250	0 - 15	W4	0	None	250 - 1200	15 - 20	W4	0	N/A			
*Glenrosa	*250	15 - 20	None	0	None	*250 - 380	15 - 20	None	30	N/A			
*Glenrosa	*150	0 - 15	None	0	None	*150 - 350	15 - 20	None	40	N/A			
*Inhoek	*300	25 - 30	None	0	None	*300 – 500	0 - 15	W2	5	N/A			
Manguzi	200	0 - 15	W4	0	None	200 – 550	0 - 15	W4	0	N/A			
Mispah	150	0 - 15	None		None	>150	0 - 15	None	100	N/A			
Avalon	300	0 - 15	None	0	None	300 - 600	0 - 15	None	0	600 - 1200	0 - 15	W2	Only plinthic
*Cartref	*150	0 - 15	None	0	None	*150 - 350	15 - 20	None	0	*350 - 580	15 - 20	None	30
Clovelly	320	0 - 15	None	0	None	320 – 480	0 - 15	None	0	480 - 600	0 - 15	None	20
Kroonstad	230	0 - 15	W2	0	None	230 – 450	15 - 20	W4	0	450 – 870	30 - 35	W4	30
Lichtenburg	200	0 - 15	None	0	None	200 – 360	0 - 15	None	0	360 - 800	0 - 15	None	Only plinthic
Nkonkoni	300	0 - 15	None	0	None	300 - 600	0 - 15	None	0	600 - 1200	0 - 15	None	40
*Tukulu	*300	0 - 15	W2	0	None	*300 - 400	15 - 20	W2	0	*400 -1200	20 - 25	W4	5

W4 - Semi-permanently or permanently wet with water visible on surface.

W2 - Temporarily wet during wet season. No mottling within top 200 mm with signs of wetness between 200 and 500 mm.

(*) - The delineated soil forms differ significantly in terms of depths. The value illustrated in the above-mentioned table represents the average depth between all identified soils for the specific soil form.

[5] TBC, 2022

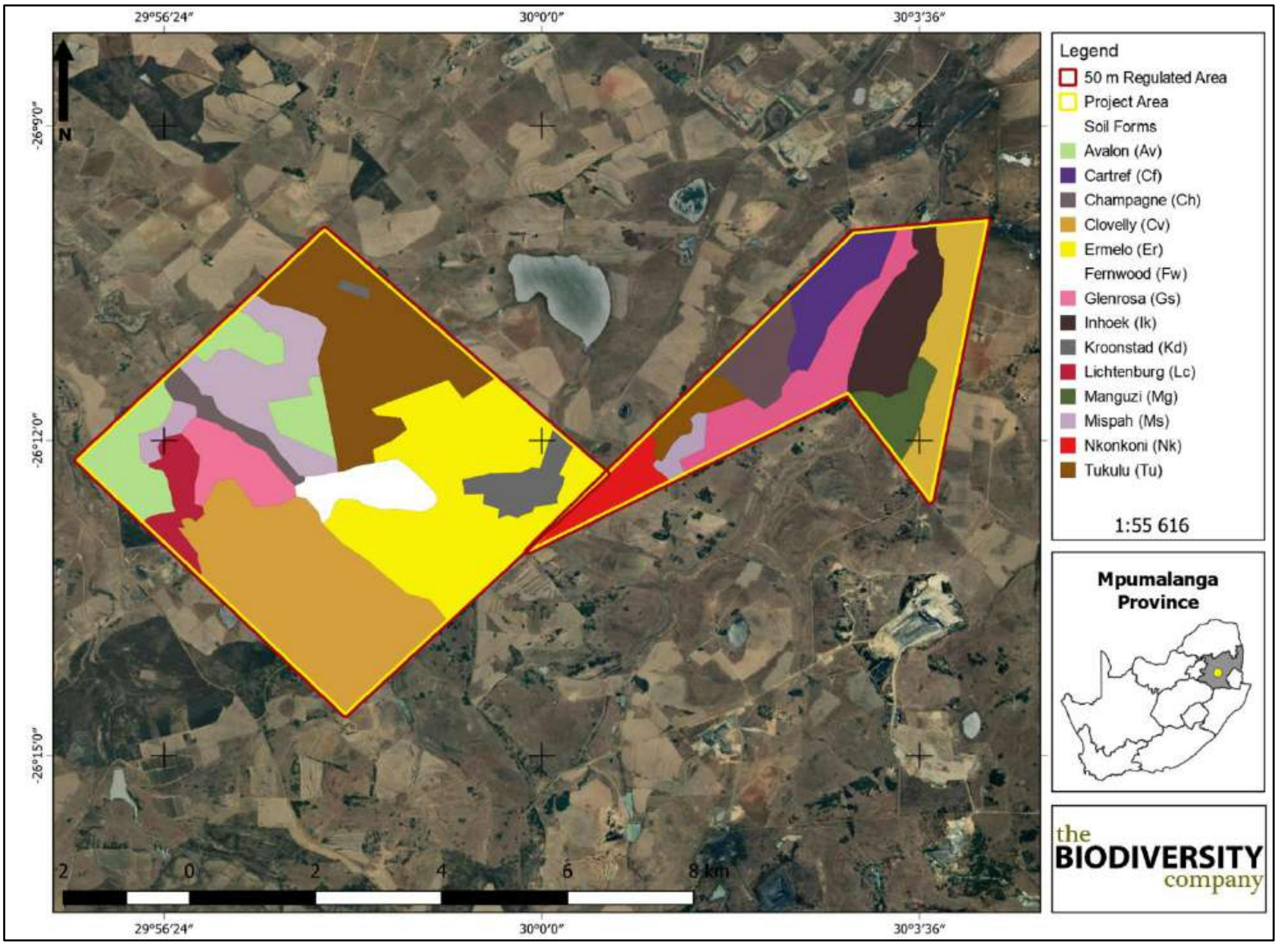


FIGURE 6-8: SOIL DELINEATIONS WITHIN THE PROJECT AREA

6.4.1.4.2 Soil Physical Properties

Physical properties are defined by particle size distribution (soil textural classes) which refers to the percentage clay, silt, and sand. Soil samples were undertaken as part of the Soil and Agricultural Potential Assessment (Appendix 8) and the results of the average soil texture for all the soil samples are illustrated in Table 6-6.

TABLE 6-6: PHYSICAL PROPERTIES FOR THE SAMPLED SOILS

Sample Site	Horizon	Clay %	Silt %	Sand %
1 (Glenrosa)	Topsoil	16	4	80
	Subsoil	16	8	76
2 (Cartref)	Topsoil	10	4	86
	Subsoil	16	8	76
	Subsoil	18	6	76
3 (Champagne)	Topsoil	16	8	76
	Subsoil	28	6	66

Sample Site	Horizon	Clay %	Silt %	Sand %
4 (Ermelo)	Topsoil	14	4	82
	Subsoil	20	8	72
7 (Tukulu)	Topsoil	10	10	86
	Subsoil	16	4	80
	Subsoil	22	6	72
10 (Inhoek)	Topsoil	26	8	66
	Subsoil	8	2	90
15 (Glenrosa)	Topsoil	8	8	84
	Subsoil	16	8	76

6.4.1.4.3 Soil Chemical Properties

The guidelines used for relevant chemical properties are provided in Table 6-7 (Fertilizer Society of South Africa, 2007). Soil samples were undertaken as part of the Soil and Agricultural Potential Assessment (Appendix 8) and the results of the chemical analysis are illustrated in Table 6-8.

TABLE 6-7: GUIDELINES FOR SOIL CHEMICAL PROPERTIES

Guidelines (mg/kg)

	Low Values	High Values
Calcium (Ca)	<200	>3000
Magnesium (Mg)	<50	>300
Potassium (K)	<40	>250
Phosphorus (Ph)	<5	>35
Sodium (Na)	<50	>200

pH (KCl)

Very Acidic	Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Alkaline
<4	4.0-5.9	6-6.7	6.8-7.2	7.3-8	>8

Phosphate (P) P bray 2 (mg/kg)

Very Low	Low	Moderate	High	Very High
0-8	9-15	16-20	21-30	>31

Na:K ratio

0.001-0.9	**>0.99**

TABLE 6-8: CHEMICAL PROPERTIES FOR THE SAMPLED SOILS

Site	Horizon	Phosphorus (Bray 2) (mg/kg)	pH (KCl)	Exchangeable Cations				Na:K
				Na (mg/kg)	**K (mg/kg)**	**Ca (mg/kg)**	**Mg (mg/kg)**	
1	A	4.1	4.4	0.07	0.18	1.6	0.67	0.39
	B	2.7	4.5	0.06	0.18	1.5	0.85	0.33
2	A	11.6	4.5	0.13	0.18	2.4	0.58	0.72
	B	2.6	4.1	0.05	0.10	0.32	0.17	0.5
	C	2.7	4.3	0.08	0.07	0.47	0.23	1.14
3	A	3.4	3.9	0.20	0.35	1.1	0.60	0.57
	B	2.2	3.9	0.19	0.20	0.79	0.88	0.95
4	A	<2.2	4.4	0.05	0.15	0.72	0.46	0.33
	B	<2.2	4.1	0.07	0.20	0.28	0.08	0.35
7	A	2.5	4.1	0.16	0.28	0.82	0.41	0.57
	B	<2.2	4.2	0.06	0.20	0.36	0.24	0.3
	C	5.6	4.3	0.09	0.40	0.20	0.48	0.23
10	A	2.3	4.1	0.17	0.48	3.5	2.1	0.35
	B	2.8	4.3	0.07	0.06	0.65	0.33	1.17
15	A	86.3	4.1	0.12	0.58	4.7	1.6	0.21
	B	24.8	4.0	0.05	0.22	0.78	0.50	0.23

6.4.1.4.4 Land Capability

The land capability was determined in the Soil and Agricultural Potential Assessment (Appendix 8) by using the guidelines described in "The farming handbook" (Smith, 2006). Key parameters used to determine the land capability include topsoil texture, depth, and the permeability class of a soil form. The land capabilities for the project area are described in Table 6-9. The land capability of the site has low, medium and high sensitivity, which correlates with the desktop findings in the DFFE screening tool report.

TABLE 6-9: LAND CAPABILITY FOR THE SOILS WITHIN THE PROJECT AREA

Land Capability Class	Definition of Class	Conservation Need	Use-Suitability	Percentage of Land Capability within Project Area	Land Capability Group	Sensitivity
3	Moderate limitations. Some erosion hazard.	Special conservation practice and tillage methods.	Rotation of crops and ley (50%).	7.14%	Arable	High
4	Severe limitations. Low arable potential. High erosion hazard.	Intensive conservation practice.	Long-term leys (75%).	35.7%	Arable	Moderate
6	Limitations preclude cultivation. Suitable for perennial vegetation.	Protection measures for establishment, e.g., sod-seeding	Veld, pasture, and afforestation.	57.14%	Non-Arable	Low

Due to the land capability classes described above and the site's climatic conditions, the project area falls within the restricted to very restricted land potential, which is regarded as having low to moderate sensitivity. In addition, according to the DFFE screening tool results, the site predominately falls within the low to moderate land capability sensitivity.

Therefore, the site's overall land capability was categorised as "Moderate". Refer to Appendix 3 Map 9.

6.4.1.4.5 Land Potential

Two land potential levels have been determined in the Soil and Agricultural Potential Assessment (Appendix 8) by means of the Guy and Smith (1998) methodology. The land potential for the project area is 5 (moderate = restricted potential) and 6 (low = very restricted potential), refer to Table 6-10.

TABLE 6-10: LAND POTENTIAL FOR THE SOILS WITHIN THE PROJECT AREA

Land Potential	Percentage	Description of Land Potential Class	Sensitivity
5	42.86%	**Restricted potential:** Regular and/or moderate to severe limitations due to soil, slope, temperatures, or rainfall.	Moderate
6	57.14%	**Very restricted potential**: Regular and/or severe limitations due to soil, slope, temperatures, or rainfall. Non-arable.	Low

6.4.1.4.6 Hydropedology

The following hydropedological groups relevant to the site area were identified in the Hydropedological Assessment (TBC, 2022b) and are discussed below:

- Recharge soils: Soils without any morphological indication of saturation in the profile. Vertical flow through and out of the profile into the underlying bedrock is the dominant flow direction. These soils can either be shallow on fractured rock with limited contribution to evapotranspiration (recharge shallow) or deep freely drained soils which can contribute significantly to evapotranspiration (recharge deep);
- Interflow soils: Two types of interflow soils occur, those where interflow is dominant at the A/B horizon interface and those where interflow is dominant at the soil/bedrock interface. The first type occurs in duplex soils where the textural discontinuity facilitates build-up of water in the topsoil (interflow shallow). In the second, freely drained soils overly relatively impermeable bedrock. Hydromorphic properties signify periodic saturation associated with a water table at the soil bedrock/interface (interflow deep). The duration and magnitude of lateral flow in interflow soils depend on the rate of ET, position in the hillslope (lateral addition/release), slope angle and the anisotropy in permeability between conducting and impeding layer; and
- Responsive soils: These soils 'respond' quickly to rain events and typically generate overland flow. These soils can either be shallow and overly relatively impermeable bedrock, with limited storage capacity which is quickly exceeded following a rain event (responsive shallow). Or they are soils with morphological indications of long periods of saturation. Since these soils are close to saturation during the rainy season additional precipitation will typically flow overland due to saturation excess (responsive wet).

Refer to the Hydropedological map in Figure 6-9 below. Farm Vaalbank is dominated by Interflow soil (soil/bedrock) while Roodebloem is the combination of both Recharge (shallow) and Interflow (A/B) soil.

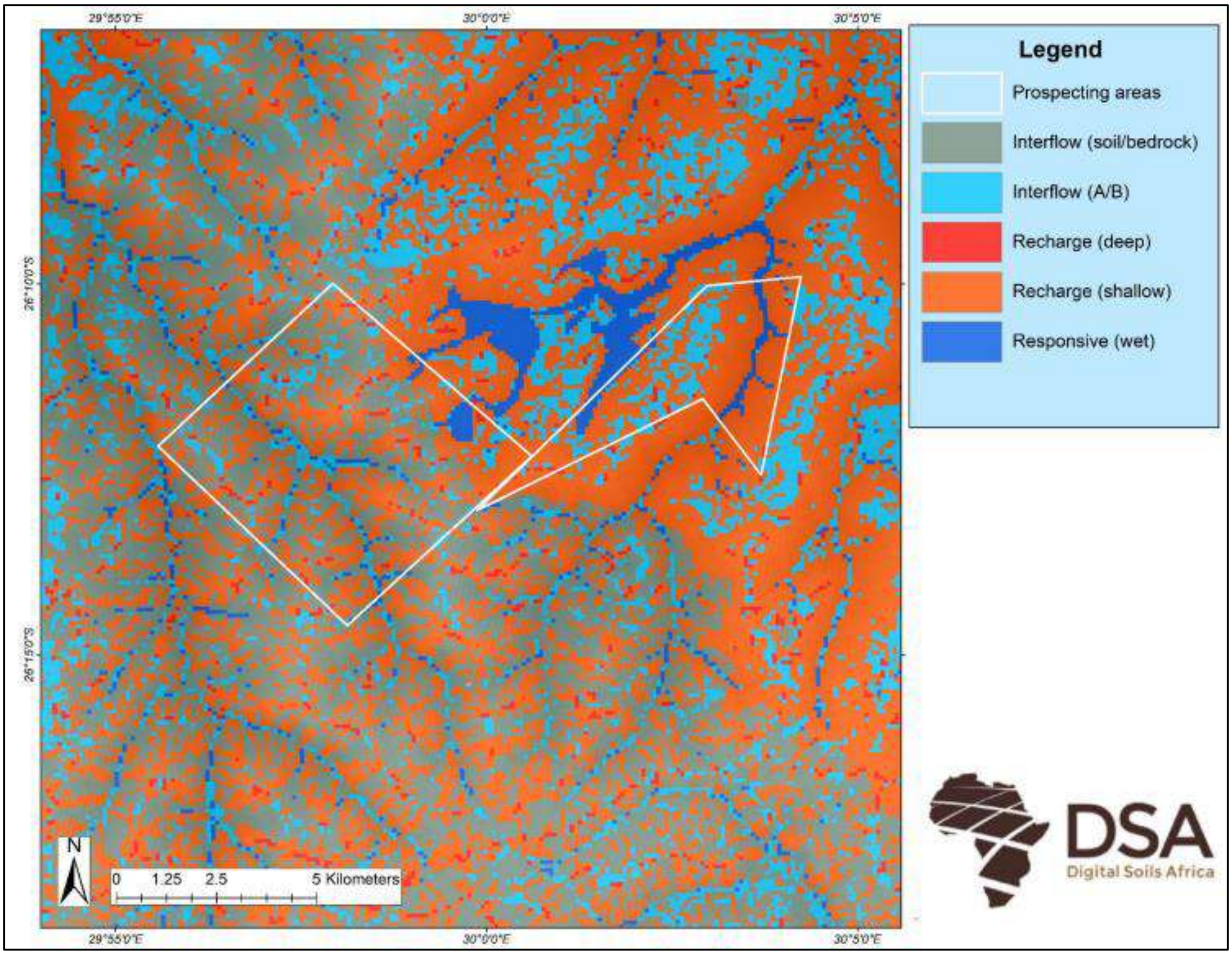


FIGURE 6-9: HYDROPEDOLOGICAL MAP OF THE STUDY AREA

6.4.1.5 Terrestrial Ecology - Flora

6.4.1.5.1 Regional Context

National Biomes and Vegetation Types

The project area is situated within the Grassland Biome which comprises the high elevation central and eastern plateau of South Africa (the 'Highveld') as well as the mountainous areas of the Eastern Cape and Kwa-Zulu Natal Drakensberg and the mountainous region of Mpumalanga.

This area is characterized by summer rainfall and dry winters with regular winter frosts (Mucina and Rutherford, 2006). Four geographically distinct bioregions have been distinguished within the Grassland Biome, namely Drakensberg Grassland, Dry Highveld Grassland, Mesic Highveld Grassland and Sub-escarpment Grassland.

The National Vegetation Types map, maps the vegetation of the entire project area and its immediate surrounds as Eastern Highveld Grassland (Gm 12), a vegetation type included in the Mesic Highveld Grassland Bioregion of the Grassland Biome (Mucina and Rutherford, 2006) (Appendix 3 Map 10). Eastern Highveld Grassland occurs almost entirely within the Mpumalanga Province, although a small section of the eastern parts of Gauteng is also covered by this vegetation type. Eastern Highveld Grassland occurs on plains between Belfast in the east and Johannesburg in the west, extending southwards to Bethal, Ermelo and to the west of Piet Retief. The conservation status of Eastern Highveld Grassland has been categorized as Endangered (Mucina and Rutherford 2006 and Skonow *et al.* 2019), as only a very small fraction is conserved in statutory reserves (Nooitgedacht Dam and Jericho Dam Nature Reserves) and approximately 44% has been transformed, primarily by cultivation, plantations, mines, urbanisation and the building of dams. Dominant and common plant species listed for Eastern Highveld Grassland Mucina and Rutherford (2006) are presented in Table 6-11. The letter "d" indicates a dominant.

TABLE 6-11: DOMINANT AND COMMON AND CONSPICUOUS PLANT TAXA OF THE EASTERN HIGHVELD GRASSLAND VEGETATION TYPE (MUCINA AND RUTHERFORD 2006)

GROWTH FORM	EASTERN HIGHVELD GRASSLAND (GM12)
Dominant Graminoids	*Aristida aequiglumis, A. junciformis, A. congesta, Brachiaria serrata, Cynodon dactylon, Digitaria monodactyla, D.tricholaenoides, Elionurus muticus, Eragrostis chloromelas, E. curvula, E.plana, E. racemosa, E. sclerantha, Heteropogon contortus, Loudetia simplex, Michrochloa caffra, Monocymbium ceresiiforme, Setaria sphacelata, Sporobolus africanus, S. Pectinatus, Themeda triandra, Trachypogon spicatus, Tristachya leucothrix, Tristachya rehmanii.*
Herbs	*Berkheya setifera* (d), *Haplocarpha scaposa*(d), *Justicia anagalloides*(d), *Pelargonium luridum*(d), *Acalypha angustata, Chamaecrista mimosoides, Dicoma anomala, Euryops gilfillanii, E. transvaalensis, Helichrysum aureonitens, H. caespititium, H. callicomum, H. oreophilum, H. rugulosum, Ipomoea crassipes, Pentanisia prunelloides, Selago densiflora, Senecio coronatus, Vernonia oligocephala, Wahlenbergia undulata.*
Geophytic Herbs	*Gladiolus crasifolius, Haemanthus humilis* subsp. *hirsutus, Hypoxis rigidula, Ledebouria ovatifolia*
Succulent Herb	*Aloe ecklonis*
Low Shrubs	*Anthospermum rigidum* subsp. *pumilum, Seriphium plumosum*

Centres of Plant Endemism

The project area is not situated within any recognized centre of plant endemism (CPE) as defined by Van Wyk & Smith (2001). The project area is also not situated within the more recently described Lydenburg Centre of Plant Endemism (Lötter, 2019) or the Limpopo-Mpumalanga-Eswatini Escarpment region of endemism, an orographic entity that comprises the Mpumalanga escarpment and encompasses various smaller centres of plant endemism (Clark *et al.*, 2022).

Listed Threatened Ecosystems

Eastern Highveld Grassland (Gm 12) is currently categorized an Endangered ecosystem (Skowno, 2019) and is gazetted as an Endangered ecosystem in the 'Revised list of Terrestrial Ecosystems that are Threatened and in need of Protection' [November 2022 Schedule (Government Gazette no. 47526) of the NEM:BA (Act 10 of 2004)]. Eastern Highveld Grassland has been gazetted as Endangered under Criterion A3 as National land cover data show that Eastern Highveld Grassland has experienced extensive spatial declines of approximately 70% since 1750. The stated purpose of listing 'threatened ecosystems', is primarily to reduce the rate of ecosystem and species extinction. This includes preventing further degradation and loss of structure, function and composition of threatened ecosystems.

6.4.1.5.2 Vegetation Units of the Project Area

Four untransformed vegetation units that represent Natural Habitat as defined by the IFC (2012) were identified for the project area (Appendix 3 Map 11). The vegetation units selected here have been derived on the basis of structural and functional criteria. The term structure refers to various aspects of vegetation structure such as physiognomy, life-form composition, species composition, species dominance and stand structure (Kent & Coker, 1992). Functional criteria include aspects such a characteristic ecosystem processes, habitat characteristics, habitat suitability for certain threatened species and ecological status (e.g. primary vegetation of untransformed habitats versus secondary vegetation of transformed or severely degraded habitats). A brief description of the four vegetation units comprising Natural Habitat is provided below. A description of one transformed vegetation unit (Modified Habitat sensu IFC) which is regarded as 'Moderately Modified' in the Mpumalanga Biodiversity Sector Plan (MBSP 2014), namely Secondary Grassland of historically cultivated soils, is also provided below. A large proportion of the project area comprises habitats completely transformed by anthropogenic impacts such as current cultivation, infrastructure (homesteads, excavations, railway lines, roads etc) and plantations and invasive stands of alien trees. These areas, referred to as 'Heavily Modified' in the MBSP (2014) and are not described below.

Untransformed Grassland

The extent of this vegetation unit is approximately 702.1 ha (or 14.3% of the project area), the second largest surface area covered by any of the Natural Habitat vegetation units identified within the project area.

This vegetation unit comprises untransformed terrestrial or mesophytic grassland on flat to gently undulating terrain, but also includes a few small, isolated patches of sheet rock habitats with associated shallow to skeletal soils, as well as patches of transitional grassland dominated by terrestrial/mesophytic species but with some hygrophilous floristic elements, on moist or even possibly 'intermittently' (sensu Ollis *et al.*, 2013) saturated soils ['temporary zone' sensu DWAF (2005) wetland delineation manual] which form an ecotone between terrestrial and wetland habitats. Soils are mostly shallow to moderately deep light-brown to brown sandy loams.

The remaining areas of grassland comprising this vegetation unit are representative of untransformed Eastern Highveld Grassland, an Endangered vegetation type and gazetted 'threatened terrestrial ecosystem' (Mucina & Rutherford, 2006, Skowno *et al.* 2019) that historically covered the vast majority of the study area. The vast majority of the original extent of this vegetation type, both within the project area and its surrounds, has been completely transformed by cultivation, and to a lesser extent mining, linear infrastructure and alien trees. The remaining untransformed grassland is fragmented into isolated, remnant patches, mostly in places where elevated soil moisture or shallow and/or rocky soils preclude viable cultivation. The remaining area of untransformed grassland within the project area is utilized as grazing on commercial farmland.

In terms of physiognomy, the vegetation comprising this unit can be described as Short Closed Grassland (Edwards, 1983), though there is some variation, in terms of both physiognomy and floristic composition, in accordance with habitat characteristics such as soil type, soil moisture, rockiness, position on the landscape and gradient. The majority of the remnant patches of untransformed grassland comprising this unit are still in good condition. However, moderate veld condition deterioration as a result of the exclusion of fire (leading to moribund vegetation), heavy grazing and possible historical overgrazing by livestock is evident in places. Vegetation canopy cover is generally between 90% and 96%, but may be as low as 70% on shallow sandy soils overlying ferricrete and localized patches of sandstone sheetrock and associated skeletal soils have lower vegetation cover.

Sandstone Scarp Shrubland

The extent of this vegetation unit is approximately 102.2 ha (or 2.1% of the project area), the second smallest surface area covered by any of the Natural Habitat vegetation units identified within the project area. This vegetation unit is restricted to low sandstone cliffs, boulder outcrops, scree slopes and extensive sheetrock habitat associated with sandstone scarps situated mostly at lower elevations along valley-bottom wetlands. The largest area of sandstone scarp habitat within the project area, with scarps up to 50m in height and a very high habitat heterogeneity and species richness, is situated between Sites 46 and 113 along the valley-bottom wetland tributary of the Vaalwaterspruit on the Farm Vaalbank.

The plant communities comprising this vegetation unit are markedly distinct, in terms of both physiognomy and floristic composition, from those comprising the other Natural Habitats identified for the study area. The vegetation is highly species rich (α-diversity), and the Beta diversity (β-diversity), which is the 'rate of change in species composition across habitats or among communities' is also extremely high. This high botanical diversity is attributable to very high microhabitat diversity caused by marked gradients in habitat characteristics such as slope aspect and gradient, shading, moisture regimes, soil depth and rockiness and vegetation structure (e.g. species composition and dominance and physiognomy) varies greatly in accordance to such habitat gradients.

The highest species richness is found in Shrubland on scree slopes directly below cliffs where clumps of shrubs alternate with boulders and grassland in more open patches.

This vegetation unit comprises mostly of a mosaic of small patches of Pteridium Closed Herbland, Open to Closed Shrubland, dense Low Thicket (grading to small patches of Short Thicket) and rocky Closed Grassland (sensu Edwards, 1983) with high richness of forb species. Also included in this unit are distinct Open Grassland to Low Open Shrubland communities associated with sandstone sheetrock habitats occurring directly above the sandstone scarps. Such sheetrock communities are relatively extensive within this unit and provide the most important habitat for the threatened plant *Khadia carolinensis* (Vulnerable) which was recorded at six localities within this unit.

Valley-bottom & seep wetlands

The extent of this vegetation unit is approximately 1 077.2 ha (or 21.7% of the project area), the largest surface area cover by any of the Natural Habitat vegetation units identified within the project area. Comprises largely of hygrophytic and hydrophytic grass and/or sedge dominated vegetation of channeled and un-channeled valley-bottom wetlands. Also includes continuous adjacent seeps with seasonally saturated soils ['seasonal zone' sensu DWAF (2005) and Ollis *et al.*, 2013] and, further upslope, 'intermittently' (sensu Ollis *et al.*, 2013) saturated soils of the 'temporary zone' (DWAF, 2005) which forms and ecotone between terrestrial and wetland habitats which are clearly differentiated by vegetation physiognomy and species composition and dominance. The catchment divide between the Vaalwaterspruit and Boesmanspruit Quartenary Catchments (both art of the Komati River Catchment) runs from south to north through the north-eastern parts of the portion of the Project Area comprising the Farm Vaalbank. The largest valley-bottom wetland systems present in the study area are a tributary of the Vaalwaterspruit which flows from the south-east boundary of the Farm Vaalbank to the north-west through the project area, and a tributary of the Boesmanspruit which flows from north to south through the Farm Roodebloem.

Pan wetland

This unit comprises a single, large endorheic pan, situated on the north-eastern boundary of the Farm Vaalbank. Th pan has a surface area of approximately 55.7 ha, and therefore has the smallest extent of any of the Natural Habitat units identified for the project area. In accordance with the wetland classification system of Ollis *et al.* (2013), the pan, or 'depression wetland', is an 'endorheic pan' (water exits by means of evaporation and infiltration only). As is the case for the vast majority of the endorheic pans on the Highveld, the pan is likely to be at least moderately saline. In accordance with the zonal classification for 'lentic waterbodies provided by Wetzel (1983), pan habitats include a more or less permanently inundated central area (infralittoral zone) which, based on historical Google Earth Pro aerial imagery is small (less than 3ha) for the shallow pan in the project area, the seasonally or periodically inundated area (eulittoral zone) which comprises the vast majority of the pan's surface area and the directly adjacent, supralittoral zone which often is influence by moisture from the pan but is never inundated and grades indistinguishably to hill slopes seeps within the pan basin.

Secondary Grassland

Secondary Grassland represents a Moderately Modified habitat (sensu MBSP 2014) unit and covers a larger surface area within the project area than any of the four identified Natural Habitat vegetation units. This unit comprises secondary grassland of historically cultivated or scoured soils, most of which are marginal agricultural soils that are either too shallow or, more frequently, to wet for cultivation and have consequently been have been abandoned for cultivation. Species dominance and species composition vary in accordance with habitat characteristics (e.g. soil type, position in landscape and soil moisture regime) and elapsed time since ploughing, as well as subsequent management regimes (e.g. grazing and burning).

The vegetation unit includes grassland communities on soils where more than approximately five years have elapsed since ploughing and the vegetation is dominated by pioneer grasses and sedges (on hydromorphic soils) indicative of severe disturbance. Species richness is low compared with that of untransformed or primary grassland communities.

6.4.1.5.3 Species Richness

A total of 550 plant species and infraspecific taxa were recorded within the 4 956ha Kranspan MRA Extension project area during fieldwork, 484 of which are indigenous taxa, and 66 (12.0%) of which are naturalised aliens. Of the 66 recorded alien species, 17 are listed as declared invasive species in the AIS Regulations.

Of the 484 indigenous species recorded within the project area, 194 (or 40.1%) are not included in the BODATSA list of species (based on herbarium records) historically recorded from the quarter degree grids within which the study area is situated (2629BB and 2630AA). This figure in part reflects the under-collection of herbarium specimens within the grids 2629BB and 2630AA, but is also considered to be a strong indication of the high plant species richness of the remaining Natural Habitat of the project area. Of the 194 species not included in the BODATSA species list for the grids 2629BB and 2630AA, 94 were recorded within the Sandstone Scarp Shrubland vegetation unit which occupies only 102.2ha (or 2.1%) of the project area, and 46 of these 94 species were recorded exclusively from this unit. These figures are an indication of the extreme importance of the Sandstone Scarp Shrubland vegetation unit, in terms of botanical biodiversity conservation, within the project area.

The plant families that contribute most to the species richness of the project area are the Poaceae (89 species including 7 aliens), Asteraceae (87 species including 18 aliens), Cyperaceae (42 species including 2 aliens), Fabaceae (40 species including 3 aliens) and Scrophulariaceae (15 species including no aliens).

6.4.1.5.4 Plant Species of Conservation Concern

According to the 2020 SANBI Species Environmental Assessment Guideline, the screening tool report includes lists of bird, mammal, reptile, amphibian, invertebrate and plant Species of Conservation Concern (SCC) known or expected to occur on the proposed development footprint. Some of these SCC are sensitive to illegal harvesting thus such species have had their names obscured and are listed as: sensitive plant unique number/sensitive animal unique number. The actual name of the sensitive species may not appear in the final EIA Report or in any of the specialist reports released into the public domain. It should be referred to as a sensitive plant or animal and its IUCN extinction risk category should be included (e.g. Critically Endangered sensitive plant). The actual list of plant SCC obtained from SANBI will be provided only to DMRE in the Final EIA Report.

It is important to note that the screening tool does not currently contain species that are NT or DD, as these do not trigger the necessity for a specialist study according to the Terrestrial Animal/Plant Species Protocols. Nevertheless, these species are considered to be SCC and specialists are required to evaluate their presence and interaction with the proposed project and its activities. Specifically, the presence of NT species must be evaluated to allow determination of conservation importance (CI), which informs the site ecological importance (SEI) of a project’s areas of influence.

Species of Conservation Concern (SCC) (Raimondo *et al.*, 2009) include threatened (Critically Endangered, Vulnerable and Endangered), Near Threatened, Data Deficient (DDD), Rare and Critically Rare species as listed in the Red list of South African plants (http://redlist.sanbi.org).

Eleven plant SCC have either been historically recorded from the within the two quarter degree grid squares within which the study area is situated (2629AA and 2629BB) or have been modelled as potentially occurring within these quarter degree grids by SANBI and are listed in the Screening Tool report for the project Area. All eleven of these species are listed in Table 6-12 below. Two of the species listed in Table 6-12 were confirmed to occur within the project area during fieldwork, namely Sensitive Species 1200 and *Khadia carolinensis*. The locations of these plant SCC can be referred to in Appendix 3 Map 5.

TABLE 6-12: POTENTIAL PLANT SPECIES OF CONSERVATION CONCERN

NO.	SPECIES	FAMILY	IDENTIFIED IN DEA SCREENING TOOL REPORT	RED DATA STATUS	HABITAT
1	*Sensitive plant species 1200*		X	EN	Grassland, Karoo Sandstone, above 1600 m. Possibly associated with edges of pans (http://redlist.sanbi.org, downloaded May 2019). In the authors experience of having recorded this species at three localities, this species is associated with moist terrestrial grassland hygrophilous grassland on the margins marsh vegetation of valley-bottom and seep wetlands.
2	*Sensitive plant species 1201*		X	VU	Known only from a small area (EOO 400 km^2) of the hilly, upper Mpumalanga escarpment between Dullstroom and Belfast. Grows in heavy clay soils on dolerite outcrops in grassland.
3	*Sensitive plant species 41*		X	VU	In marshy or vlei habitats in high altitude grassland that remain wet throughout the year or dry out for only brief periods. Flowering in Spring before the grass flora has grown. A rare and localised species occurring from Dullstroom to Wakkerstroom. Only one record for this species (collected by the author at Spitskop Coliery in 2009) within a 15 km radius of the project area in the last 100 years (http://posa.sanbi.org, accessed 03/03/2022).
4	*Sensitive plant species 691*		X	VU	Found in Mpumalanga, North-West and Gauteng, in full sun in moist areas in grassland, usually in areas with an undulating topography. On hillslope seeps, vleis and banks of the upper reaches of streams. In the authors experience occurs predominantly on black, hydromorphic clay soils in areas that are periodically inundated. The nearest historical locality for this species in situated more than 50 kms SSE of the project area and was recorded in 1936.
5	*Miraglossum davyi*	Apocynaceae	X	VU	Grassland on sand or heavy black loam. EOO<15 000 km² and known from five locations but suspected to occur at one or two more. Not historically recorded from the grids 2629BB or 2630AA.
6	*Aspidoglossum xanthosphaerum*	Apocynaceae	X	VU	Currently known from 18 specimens and approximately 12 localities (http://posa.sanbi.org and pers. com. P. Bester of SANBI), in south-eastern Mpumalanga and northern KZN around Ermelo, Carolina, Breyten (6 records), Wakkerstroom and Utrecht. According to Raimondo *et al*. (2009), recorded in 'montane grassland at marshy sites up to an altitude of 2000m'. The author has however recorded the species from two localities (Wonderfontein and Breyten), both in untransformed mesophytic grassland, and the view that it is predominately a species of mesophytic grassland is supported by P. Bester.
7	*Pachycarpus suaveolens*	Apocynaceae	X	VU	Short or annually burnt grasslands, 1400-2000 masl. A very rare species known from only 8 localities and not historically recorded within the grids 2629BB and 2630AA. Nearest known historical locality to project area is near Ermelo, but this locality is based on an herbarium specimen collected more than a century ago (http://posa.sanbi.org, accessed 03/03/2022).
8	*Khadia carolinensis*	Aizoaceae	X	VU	Well drained sandy loam amongst low rocky outcrops, or at the edge of sandstone sheets in undulating Highveld grassland. 1700m.
9	*Asclepias dissona*	Apocynaceae	-	CR (PE)	Damp grassland. Confirmed in 2630AA (Boesmanspruit 9IT) by all other historical records from eNtokozweni, Dullstroom and Weimarshoek more than 60 km to the north of the project area. Last recorded in 1932 and possible extinct.
10	*Kniphofia triangularis*	Asphodelaceae	-	Rare	Amongst quartzitic rocks in montane grassland.

NO.	SPECIES	FAMILY	IDENTIFIED IN DEA SCREENING TOOL REPORT	RED DATA STATUS	HABITAT
					According to the MTPA database recorded from one locality in the grid 2630AA, but this locality is from near Slaaihoek in the high-lying, high-rainfall parts of the Mpumalanga escarpment.
11	*Lessertia phillipsiana*	Fabaceae	-	DD	A widespread but very poorly known species for which there is no published habitat description (Von Staden, 2016) and known from only 6 localities, all within the Highveld region region (http://posa.sanbi.org, accessed 03/03/2022). Plants recorded by the author at two sites in the Ogies district, both sites in the seasonally or periodically flooded zones of endorheic pans that were dry at the time of the surveys and show signs of being moderately saline. Plants recorded by the author at Wonderfontein likewise occurred only in seasonally or periodically inundated zones of three large endorheic, saline pans, on largely bare clays in the company of Chenopodium glaucum or in species poor *Cynodon transvaalensis* dominated 'lawn' communities.

DD = Data Deficient
NT = Near Threatened
VU = Vulnerable
EN = Endangered
CR (PE) = Critically Endangered (Presumed Extinct)

Two other SCC not recorded during fieldwork but which are extremely difficult to detect due to their small size (*Aspidoglossum xanthosphaerum*) or occurrence in habitat that remains flooded for protracted periods (*Lessertia phillipsiana*), are thought to have a Moderate to High likelihood of occurring within the project area.

One location of Sensitive Species 1200 was recorded on site and this species is currently categorised as a threatened species (Endangered A2c), has a small 'Extent of Occurrence' (estimated here as likely to be less than 2 000 km^2), an Area of Occupancy (AOO) of only 4.15k m^2 (SANBI, 2020) and is seemingly known from only seven extant localities/subpopulations.

Khadia carolinensis was recorded at 12 sites representing seven localities or colonies but is considered likely that additional localities occur in the extensive widely disturbed patches of sheetrock habitats present in the project area. *Khadia carolinensis* is currently categorised as a threatened species (Vulnerable A3c), which has a relatively restricted 'Extent of Occurrence' comprising localities overlying Karoo Sandstone that are mostly threatened by mining.

6.4.1.5.5 Endemic Species

The project area is not situated within any recognized centre of plant endemism (CPE) as defined by Van Wyk & Smith (2001). The project area is also not situated within the more recently described Lydenburg Centre of Plant Endemism (Lötter, 2019) or the Limpopo-Mpumalanga-Eswatini Escarpment region of endemism, an orographic entity that comprises the Mpumalanga escarpment and encompasses various centres of plant endemism (Clark *et al.*, 2022). A few fairly range restricted species that are endemic to Mpumalanga are however known to occur within the quarter-degree grids within which the project area is situated and two such Mpumalanga endemics were recorded during fieldwork, namely the two threatened species *Khadia carolinensis* and 'Sensitive Species 1200'.

6.4.1.5.6 Protected Species

None of the 47 tree species listed in Schedule A of the National Forests Act (Act 84 of 1998, as amended on the 23rd of September 2010) occurs within the project area or its immediate surrounds. No species listed in the • National Environmental Management: Biodiversity Act (Act 10 of 2004, as amended on the 16th of April 2013) were recorded within the project area or are considered likely to occur within the project area or its immediate surrounds.

A number of plant species occurring in Mpumalanga Province are not considered to be threatened or listed as being SCC but are protected under Schedules 11 and 12 of the Mpumalanga Nature Conservation Act (Act 10 of 1998). Twenty-eight species recorded within the study area are protected plants for which, under Schedule 11 of the Mpumalanga Nature Conservation Act (Act no. 10 of 1998), a permit has to be obtained prior to their removal. These twenty-eight protected species are listed in Table 6-13 together with vegetation units in which they have been recorded and those in which they are considered likely to occur.

TABLE 6-13: LIST OF PLANT SPECIES RECORDED WITHIN THE PROJECT AREA WHICH ARE PROTECTED UNDER SCHEDULE 11 OF THE MPUMALANGA NATURE CONSERVATION ACT (NO.10 OF 1998)

SPECIES	FAMILY	UNTRANSFORMED GRASSLAND	SANDSTONE SCARP SHRUBLAND	VALLEY-BOTTOM & SEEP WETLANDS	PAN WETLAND	SECONDARY GRASSLAND
Aloe ecklonis	Asphodelaceae	X				
Aloe welwitschii	Asphodelaceae	X				
Boophone disticha	Amaryllidaceae	X				
Brunsvigia radulosa	Amaryllidaceae	X				

SPECIES	FAMILY	UNTRANSFORMED GRASSLAND	SANDSTONE SCARP SHRUBLAND	VALLEY-BOTTOM & SEEP WETLANDS	PAN WETLAND	SECONDARY GRASSLAND
Ceropegia meyerii	Asclepiadaceae		X			
Corycium dracomontanum	Orchidaceae	X		X		
Corycium nigrescens	Orchidaceae	X		X		
Cyrtanthus breviflorus	Amaryllidaceae			X		
Dioscorea cf. *quartiniana*	Dioscoreaceae	X				
Disa versicolor	Orchidaceae			X		
Disperis micrantha	Orchidaceae		X			
Erica drakensbergensis	Orchidaceae	X		X		
Eucomis autumnalis subsp. *clavata*	Hyacinthaceae	X	X	X		
Eulophia foliosa	Orchidaceae			X		
Eulophia hians var. *hians*	Orchidaceae	X		X		
Gladiolus crassifolius	Iridaceae	X				
Gladiolus dalenii	Iridaceae		X			
Gladiolus ecklonii	Iridaceae					
Gladiolus papilio	Iridaceae			X		
Gladiolus permeabilis	Iridaceae	X				
Haemanthus humilis subsp. *hirsutus*	Amaryllidaceae		X			
Habenaria epipactidea	Orchidaceae	X				
Habinaria filicornis	Orchidaceae			X		
Habenaria sp 1	Orchidaceae			X		
Satyrium longicauda var. *longicauda*	Orchidaceae			X		
Satyrium parviflorum	Orchidaceae			X		
Watsonia pulchra	Iridaceae	X				
Zantedeschia aethiopica	Araceae			X		

The damaging or destruction of plant species that are Protected in terms of the National Forest Act (Act 84 of 1998), NEM:BA (Act 10 of 2004, as amended on the 16th of April 2013), or the Mpumalanga Nature Conservation Act (No.10 of 1998) during any future development should be avoided wherever possible, and a permit for the removal or destruction of any such protected plant must be obtained from the provincial authorities (Permitting Office of the MTPA) prior to development. It is recommended that where untransformed Natural Habitat is to be affected by infrastructure footprints, Protected plant species are rescued and placed in a nursery or donated to a research institute (e.g. SANBI botanical gardens) prior to development, rather than simply being destroyed. Where feasible, viable subpopulations of such species should also be translocated to transformed (including rehabilitation areas) or untransformed areas within the project area which provide potentially suitable habitats, but such translocations will have to be carried out in a manner that ensures that no ecological degradation of the host habitat occurs, and will have to be evaluated by a botanist for each species and each potential translocation area.

6.4.1.5.7 Alien Species

During the fieldwork, a total of 550 plant species and infraspecific taxa were recorded within the 4 956ha Kranspan MRA Extension project area, 66 (or 12.0%) of which are naturalised aliens. Of the 66 recorded alien species, 17 are declared alien invasive plant species in terms of the Regulations on Alien and Invasive Species (AIS Regulations) (Table 6-14). The AIS Regulations are defined in the National Environmental Management:

Biodiversity Act (Act 10 of 2014), published in the Government Gazette No. 37886, Notice 599 of 1 August 2014. In terms of the AIS Regulation declared alien invasive plant species (as listed in Notice 3 of the Act) must be eradicated or controlled by the landowner using methods that are appropriate for each species and cause the least harm to surrounding biodiversity.

TABLE 6-14: LIST OF NATURALISED ALIEN SPECIES RECORDED WITHIN THE PROJECT AREA THAT ARE DECLARED ALIEN INVASIVE PLANT SPECIES IN TERMS OF THE AIS REGULATIONS

SPECIES	AIS REGULATIONS CATEGORY	UNTRANSFORMED GRASSLAND	SANDSTONE SCARP SHRUBLAND	VALLEY-BOTTOM & SEEP WETLANDS	PAN WETLAND	SECONDARY GRASSLAND	HIGHLY MODIFIED HABITAT
Acacia dealbata	2	X	X	X		X	X
Acacia mearnsii	2	X	X			X	X
Agrimonia procera	1b		X	X			X
Ailanths altissima	1b						X
Campuloclinium macrocephalum	1b	X		X			
Cirsium vulagare	1b		X	X	X	X	X
Eucalyptus camaldulensis	1b						X
Ipomoea purpurea	1b						X
Nasturium officinale	2			X			
Pennisetum clandestinum	1b (in Protected Areas and wetlands)			X		X	X
Phytolacca octandra	1b						X
Pinus cf. *elliotii*	1b						X
Pyracantha angustifolia	1b	X	X	X			
Solanum elaeagnifolium	1b	X				X	X
Solanum sisymbrifolium	1b	X	X			X	X
Verbena bonariensis	1b		X	X	X	X	X
Verbena rigida	1b	X				X	X

6.4.1.5.8 Protected Areas

The aim of the National Environmental Management: Protected Areas Act (Act No. 57 of 2003) is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural seascapes. The purpose of a Protected Environment is amongst others to protect a specific ecosystem outside a special nature reserve world heritage site or nature reserve and also to ensure the use of the natural resources in the area is sustainable.

Three protected areas occur more than 5 km away to the east of the proposed Kranspan Mining Right Extension (Appendix 3 Map 13):

- Rentia Kritzinger Private Nature Reserve occurs approximately 7 km away;
- St Louis Private Nature Reserve occurs approximately 8.3 km away; and
- Chrissiesmeer Protected Environment occurs approximately 6.9 km away.

Priority Focus Areas for protected area expansion (NPAES) occur in patches throughout the project area and coincide largely with the Natural Habitat vegetation units of High Ecological Importance mapped for the project area. The area (centered around vegetation survey site 107a) of Sandstone Scarp directly to the north of the tributary of the Vaalwaterspruit on the Farm Vaalbank and large, contiguous adjacent areas of Untransformed Grassland and Valley-bottom and seep wetlands are considered to comprise the most conservation worthy and possible viable potential Protected Area within the Project Area. No proposed project infrastructure is located within the core of this roughly 350ha area.

6.4.1.5.9 Mpumalanga Biodiversity Sector Plan (MBSP)

The 2014 MBSP is a spatial tool with land-use guidelines that forms part of a broader set of national biodiversity planning tools and initiatives that are provided for in national legislation and policy. It comprises a set of maps of biodiversity priority areas accompanied by contextual information and land-use guidelines that make the most recent and best quality biodiversity information available for use in land-use and development planning, environmental assessment and regulation, and natural resource management.

The MBSP terrestrial map includes five categories: Protected Areas, Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs), Other Natural Areas and Modified (heavily and moderately) (Table 6-15). The proposed footprint of the Kranspan Mining Right Extension falls within a CBA and ESA (Appendix 3 Map 12).

TABLE 6-15: MPUMALANGA BIODIVERSITY SECTOR PLAN (MBSP 2014) CATEGORIES

MBSP BIODIVERSITY CATEGORY	DESCRIPTION OF WHAT IS INCLUDED (ECOSYSTEMS, SPECIES AND PROCESSES)	PRIMARY OBJECTIVE OF THE BIODIVERSITY CATEGORY	PERMISSIBLE LAND-USES THAT ARE UNLIKELY TO COMPROMISE THE BIODIVERSITY OBJECTIVE
Protected Areas – National Parks & Nature Reserves	Protected Areas are formally protected by law and recognised in terms of the Protected Areas Act, including contract protected areas declared through the biodiversity stewardship programme. 'National Parks and Nature Reserves' is one of three subcategories and includes formally proclaimed national Parks, nature Reserves, Special nature Reserve, and Forest nature Reserves.	Areas that are meeting biodiversity targets and therefore must be kept in a natural state, with a management plan focused on maintaining or improving the state of biodiversity.	All operational aspects of managing these areas must be subject to their main purpose, which is to protect and maintain biodiversity and ecological integrity, and should be governed by a formally approved management plan and land-use activities that support the primary function of these areas as primary sites for biodiversity conservation. The management plan must identify allowable activities, which should be consistent at least with the CBA Irreplaceable category.
CBA Irreplaceable	Areas that are 80-100% irreplaceable for meeting biodiversity conservation targets; or Critical Linkages; or Critically Endangered ecosystems	Maintain in a natural state with no loss of ecosystems, functionality or species; no flexibility in land-use options.	- Conservation / stewardship
CBA Optimal	Areas that are optimally located as part of the most efficient solution to meet biodiversity targets.	Maintain in a natural state with no loss of ecosystems, functionality or species; some flexibility in land-use options.	- Conservation / stewardship - Low impact tourism
Other Natural Areas	Natural areas which are not identified as CBAs or ESAs but which provide a range of ecosystem services from their ecological infrastructure.	Minimise habitat and species loss through strategic landscape planning, and ensure basic ecosystem functionality	All land-uses are either 'Permissible', or 'Permissible under certain conditions'.
Heavily Modified	Transformed areas, where biodiversity and ecological function have been lost to the point that they are not worth	Manage the land use in a biodiversity-friendly manner aiming to maximise ecological functionality.	Almost all land-uses are 'Permissible', with the exception of quarrying / opencast mining and underground mining, which are

MBSP BIODIVERSITY CATEGORY	DESCRIPTION OF WHAT IS INCLUDED (ECOSYSTEMS, SPECIES AND PROCESSES)	PRIMARY OBJECTIVE OF THE BIODIVERSITY CATEGORY	PERMISSIBLE LAND-USES THAT ARE UNLIKELY TO COMPROMISE THE BIODIVERSITY OBJECTIVE
	considering for conservation at all.		either 'Permissible', or 'Permissible under certain conditions'.
Moderately Modified – old lands	Areas which were modified within the last 80 years but now abandoned, including old mines and old cultivated lands.	Stabilise and manage to restore ecological functionality, particularly soil carbon and water-related functionality.	Almost all land-uses are 'Permissible', with the exception of quarrying / opencast mining and underground mining, which are either 'Permissible', or 'Permissible under certain conditions'.

Large parts of the project area comprise areas mapped in the MBSP (2014) as CBA – Irreplaceable and these areas comprise largely of Natural Habitat (Untransformed Grassland, Sandstone Scarp, Valley-bottom and seep wetland and Pan wetlands) here categorized as being of High Ecological Importance. Subpopulations of two threatened plant species and various threatened animal species have been confirmed to occur in these areas of Natural Habitat of High Ecological Importance. Approximately 1893.4 Ha of CBA Irreplaceable occurs within the proposed extension area.

Parts of the project area comprise areas mapped in the MBSP (2014) as CBA – Optimal and these areas comprise largely of Natural Habitat (Untransformed Grassland, Sandstone Scarp, Valley-bottom and seep wetland and Pan wetlands) here categorized as being of High Ecological Importance. Subpopulations of one threatened plant species (khadia carolinensis and various threatened animal species have been confirmed to occur in these areas of Natural Habitat of High Ecological Importance. Approximately 330.5 Ha of CBA Optimal occurs within the proposed extension area.

Approximately 60ha in the north-eastern corner of the project area (north-eastern corner of the Farm Roodebloem) comprises an ESA: Landscape corridor, which is seemingly intended to enhance connectivity between areas of CBA-Irreplacable within the project area and the connected area of CBA – Irreplacable directly to the north of the project area.

6.4.1.6 Terrestrial Ecology – Fauna

6.4.1.6.1 Mammals

The Virtual Museum of African Mammals (MammalMAP) for QDS 2629BB and 2630AA as well as the DEA National Screening Tool were used to identify the mammal species that occur within the project area. The sensitive/threatened mammal species from this list is provided in Table 6-16.

TABLE 6-16: POTENTIAL MAMMAL SPECIES OF CONSERVATION CONCERN

NO.	SPECIES	COMMON NAME	IDENTIFIED IN DEA SCREENING TOOL REPORT	IDENTIFIED IN QDS 2629BB AND 2630AA (MAMMALMAP)	RED DATA STATUS
1	*Leptailurus serval*	Serval		X	NT
2	*Atelerix frontalis*	Southern African Hedgehog		X	NT
3	*Chrysospalax villosus*	Rough-haired Golden Mole	X		VU
4	*Amblysomus septentrionalis*	Highveld Golden Mole		X	NT
5	*Crocidura maquassiensis*	Maquassie Musk Shrew	X		VU
6	*Hydrictis maculicollis*	Spotted-necked Otter	X		VU
7	*Parahyaena brunnea*	Brown Hyaena		X	NT
8	*Redunca fulvorufula*	Mountain Reedbuck		X	EN
9	*Ourebia ourebi ourebi*	Oribi	X	X	EN

NT = Near Threatened

VU = Vulnerable
EN = Endangered

Four mammal SCC were recorded on site, and two of these species were recorded for the first time (not previously recorded for QDS 2629BB and 2630AA or in the Screening Tool Report). These two species were the Cape Clawless Otter (*Aonyx capensis*) and the Vlei Rat (*Otomys auratus*), which are both classified as Near Threatened. The other two threatened spcies recorded were the Near Threatened Serval (*Leptailurus serval*) and the Endangered Mountain Reedbuck (*Redunca fulvorufula*). The locations of these SCC can be referred to in Appendix 3 Map 5.

Many mammal species in Mpumalanga are regarded as protected under Schedules 1 (Specially Protected), 2 (Protected), 3 (Ordinary Game) or 4 (Protected Wild Animals) of the Mpumalanga Nature Conservation Act (No. 10 of 1998). The following mammal species recorded on site that are listed as Protected Game (in terms of Schedule 2) include: the Mountain Reedbuck (*Redunca fulvorufula*), Southern Reedbuck (*Redunca arundinum*), Steenbok (*Raphicerus campestris*) and Cape Clawless Otter (*Aonyx capensis*). The following three mammal species recorded on site that are listed as Protected species in the Threatened or Protected Species (TOPS) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) as published in Government Notice 255 of 2015 include: Serval (*Leptailurus serval*), Cape Fox (*Vulpes chama*) and Southern Reedbuck (*Redunca arundinum*).

Thus, even though the Southern Reedbuck (*Redunca arundinum*) is not a threatened species, it is protected under Schedule 2 of the Mpumalanga Nature Conservation Act (Act No. 10 of 1998) and in terms of the TOPS list of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004). Due to scarcity of Reedbuck within the western and central parts of the Mpumalanga Highveld, which closely coincides with coal mining activities, a high risk of genetic isolation of individuals within this subpopulation and of the subpopulation as a whole, the Southern Reedbuck is considered an important species within the project area and is worthy of protection and conservation measures where the aim is to maintain the long-term genetic viability of the subpopulation occurring within the study area and its surrounds.

6.4.1.6.2 Herpetofauna

The Virtual Museum Reptile Atlas of Southern Africa (ReptileMAP) and Frog Atlas of Southern Africa (FrogMAP) were used to identify the reptile and amphibian species that occur within the project area.

Seven species of amphibians/frogs were recorded and all have a Red List Category of Least Concern, of which Delalande's River Frog (*Amietia delalandii*) (endemic species) and the Common Caco (*Cacosternum boettgeri*) were dominant.

Very few reptile species were observed within the study area, with most of the expected species restricted to habitat with a high spatial heterogeneity such as the sandstone scarps. Typical species observed include species such as the widespread Cape Skink (*Trachylepis capensis*) and Speckled Rock Skink (*Trachylepis punctatissima*), while the Rinkhals (*Hemachatus haemachatus*) was observed from the untransformed grassland unit.

No herpetofauna of conservation concern were recorded or are known to be present according to historical records (ReptileMap and FrogMap). There are also no herpetofauna species listed as protected or regulated by the TOPS Regulations. However, it is worth mentioning that the sandstone scarps and associated rocky grassland provide suitable habitat for the Near Threatened Coppery Grass Lizard (*Chamaesaura aenea*) even though this species has not yet been recorded from the project area.

6.4.1.6.3 Avifauna

The online database of the Southern African Bird Atlas Project (SABAP2) was used to identify the endemic and threatened bird species in the study area, as well as the DEA National Screening Tool Report (Table 6-17). The global IUCN Red List of threatened species (IUCN, 2023) and a regional conservation assessment by Taylor *et al.* (2015) was used for the most current conservation status of each avifaunal species of conservation concern.

TABLE 6-17: POTENTIAL BIRD SPECIES OF CONSERVATION CONCERN

NO.	SPECIES	COMMON NAME	IDENTIFIED IN DEA SCREENING TOOL REPORT	IDENTIFIED IN QDS 2629BB AND 2630AA (SABAP2)	RED DATA STATUS
1	*Tyto capensis*	African Grass Owl	X	X	VU
2	*Geronticus calvus*	Southern Bald Ibis	X	X	VU
3	*Hydroprogne caspia*	Caspian Tern	X		Least Concern
4	*Eupodotis senegalensis*	White-bellied Bustard/Korhaan	X		Least Concern
5	*Circus ranivorus*	African Marsh-harrier	X	X	EN
6	*Oxyura maccoa*	Maccoa Duck		X	EN
7	*Sagittarius serpentarius*	Secretarybird		X	EN
8	*Eupodotis caerulescens*	Blue Bustard/Korhaan		X	NT
9	*Falco biarmicus*	Lanner Falcon		X	VU
10	*Glareola nordmanni*	Black-winged Pratincole		X	NT
11	*Neotis denhami*	Denham's Bustard		X	VU
12	*Phoeniconaias minor*	Lesser Flamingo		X	NT
13	*Phoenicopterus roseus*	Greater Flamingo		X	NT
14	*Polemaetus bellicosus*	Martial Eagle		X	EN

NT = Near Threatened
VU = Vulnerable
EN = Endangered

Three bird SCC were recorded on site, namely the globally Near Threatened Blue Korhaan (*Eupodotis caerulescens*), regionally Vulnerable African Grass-owl (*Tyto capensis*) and the regionally Vulnerable Denham's Bustard (*Neotis denhami*). An active African Grass-owl roosting site was located within *Imperata cylindrica* grassland on Vaalbank. At least another 16 sites on the project area were identified as optimal breeding and roosting habitat for the African Grass-owl. The locations of these SCC can be referred to in Appendix 3 Map 5.

Most of the bird species in the Mpumalanga Province are regarded as protected under Schedules 2 (Protected), 3 (Ordinary Game) or 5 (Provision of Section 33 apply – permits for relocation or transport) of the Mpumalanga Nature Conservation Act (No. 10 of 1998). The Denham's Bustard (*Neotis denhami*), White-breasted Cormorant (*Phalacrocorax lucidus*), Grey-headed Gull (*Chroicocephalus cirrocephalus*) and the potentially occurring Southern Bald Ibis (*Geronticus calvus*) and flamingo species are listed in the TOPS of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) as published in Government Notice 255 of 2015.

Important Bird and Biodiversity Areas (IBAs) are sites of global significance for bird conservation, identified nationally through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria. The criteria are based on the presence of threatened species, assemblages of restricted-range and biome-restricted species, and large concentrations of congregatory species, referred to collectively as IBA 'trigger' species. The BirdLife Partnership has established the Important Bird and Biodiversity Areas Programme, which aims to identify, monitor and protect a global network of sites for the conservation of the world's birds, other wildlife and ecosystem values.

The proposed footprint of the Kranspan Mining Right Extension falls within the Amersfoort-Bethal-Carolina IBA (Appendix 3 Map 14). The key species within this IBA is the globally threatened Botha's Lark. Other globally threatened species are Blue Crane, Southern Bald Ibis, Black Harrier, Blue Korhaan, Black-winged Pratincole, Secretarybird, Martial and Denham's Bustard (Marnewick *et al.* 2015). The Chrissie Pans IBA occurs directly south east of the proposed site (Appendix 3 Map 14). Globally threatened species are Southern Bald Ibis, Wattled Crane, Blue Crane, Secretarybird, Lesser Flamingo, Blue Korhaan, Black-winged Pratincole, Chestnut-banded Plover, Grey Crowned Crane and Denham's Bustard (Marnewick *et al.* 2015).

6.4.1.7 Terrestrial Ecology – Biodiversity

6.4.1.7.1 Important Ecological Processes and Ecological Connectivity

The largest valley-bottom wetland systems present in the study area are a tributary of the Vaalwaterspruit which flows from the south-east boundary of the Farm Vaalbank to the north-west through the project area, and a tributary of the Boesmanspruit which flows from north to south through the Farm Roodebloem. These valley-bottom wetlands and contiguous adjacent areas of untransformed grass and sandstone scarp shrubland are mapped almost entirely as CBA: Irreplaceable in the MBSP, with smaller areas mapped as CBA: Optimal, and comprise the two most important 'biological corridors' within the project area. The prosed project infrastructure will not sever either corridor but will encroach marginally on them and isolate them laterally and cause an increase in 'edge effects' thereby potentially effecting various aspects of ecosystem functioning. In addition to these CBA corridors, the MBSP shows an area of approximately 51.7 ha in the north-eastern corner of the project area as an ESA: Landscape Corridor, which is intended to enhance connectivity between areas of CBA: Irreplaceable within the project area and the contiguous area of CBA: Irreplaceable directly to the north of the project area. None of the proposed project infrastructure is situated within this ESA.

The sandstone scarp shrubland, valley bottom and seep wetlands and contiguous adjacent areas of untransformed grassland show a high ecological connectivity with habitat units of similar structure located adjacent to the project area. These units, in particular the scarps were found to be important habitat for *Redunca* species (reedbuck) and contain nearly 70% of the predicted endemic bird species in the project area. It also contains a unique avifaunal composition, which are restricted to the scarps, and therefore contributed towards the local biodiversity in the area. The wetlands are linear in configuration which function as important dispersal corridors for mammal taxa and important daily flyways for waterbird species commuting between roosting and foraging habitat. More importantly, these wetland and scarp corridors form critical important ecological "links" with CBAs identified by the MBSP. The importance of these "links" will facilitate animal dispersal and to maintain genetic cohesion between sub-populations of species which may become displaced during the proposed mining activities. The sandstone scarps on the Farm Vaalbank (between Sites 46 and 113 as per Appendix 4 of the specialist report) along the large valley-bottom wetland (tributary of the Vaalwaterspruit) represent the best developed and biodiverse sandstone scarps recorded by the authors in the Breyten-Carolina region of Mpumalanga Highveld over decades of conducting surveys in this region. This area of 50m tall sandstone scarp constitutes a refuge area for many species (area of suitable habitat in a matric of unsuitable habitat) within the project area and its immediate surrounds. The vegetation is highly species rich (α-diversity), and the Beta diversity (β-diversity), which is the 'rate of change in species composition across habitats or among communities' is also extremely high.

In addition, the endorheic pan wetland, is also important from a functional and dynamic perspective at the landscape level since it forms part of an "inter-connected" system or "stepping stones" of pans within the catchment (e.g. Kranspan and Grootpan), meaning that environmental conditions at these pans (e.g. water levels, salinity, food availability, availability of shoreline habitat) are constantly changing. Therefore, none of the pans within the catchment are similar to each other, thereby providing a continuous supply of resources for waterbirds, a safe refuge and nesting habitat for waterbird species, and when some of the smaller pans turn dry, the pan wetland is likely to attract large numbers of waterfowl. The pan is also predicted to be a foraging refuge for flamingos during dry periods. Furthermore, the pan floor, which could not be surveyed during fieldwork as a result of inundation, provides suitable habitat for pan endemic plant species including the *Lessertia phillipsiana* (DDD), a species which is considered likely to be present and is currently undergoing a conservation status assessment which is likely to lead to its listing as a threatened species.

6.4.1.7.2 Site Ecological Importance

The 2014 MBSP was compiled at a provincial scale and it is therefore important that any project area should be subject to a site-specific ecological assessment using relevant methodology and fieldwork of appropriate intensity/duration. Such site-specific analysis does not however replace the MBSP, which assigns biodiversity importance to the project area within the context of the entire province, but rather assesses the Ecological

Importance of the project area and the nature of the potential impacts associated with the project. The Ecological Importance (EI) of each vegetation unit/habitat was assessed using the methodology Provided in the "Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa" (SANBI, 2020). The assessed EI of each vegetation unit identified within the project area is presented in Table 6-18 and the spatial extent of vegetation unit/habitat is mapped in Appendix 3 Map 15.

TABLE 6-18: ECOLOGICAL IMPORTANCE OF THE VEGETATION UNITS / HABITATS

VEGETATION UNIT	Untransformed Grassland	Sandstone Scarp Shrubland	Valley-bottom & seeps	Pan wetland	Secondary Grassland	Heavily Modified Habitat*
	High	High	High	High	Low	Very Low
MAMMALIAN FAUNA	Medium	High	High	Medium	Low	Very Low
AVIFAUNA	High	High	High	High	Low	Very Low
HERPETOFAUNA	Low	Medium	Medium	Medium	Low	Very Low
INTENGRATED ECOLOGICAL IMPORTANCE	High	High	High	High	Low	Very Low

*Heavily Modified Habitat includes infrastructure (homesteads, roads, quarries, etc), plantations and stands of alien trees, and currently cultivated areas.

The four untransformed vegetation units that represent Natural Habitat, namely Untransformed Grassland, Sandstone Scarp Shrubland, Valley-bottom & Seep wetland and Pan wetland, together comprise 39.3% (or 1 945.3ha) of the project area, and these areas of Natural Habitat are almost entirely mapped as CBAs in the 2014 MBSP. These four identified Natural Habitat vegetation units are discussed below and are of High Ecological Sensitivity and represent the areas where ecological impacts will be most significant.

The Untransformed Grassland vegetation unit was assessed as having a High EI as a result of the fact that is representative of threatened (Endangered) national vegetation type and a threatened (Endangered) ecosystem, the confirmed occurrence of a VU plant species (*Khadia carolinensis*), the moderate to high likelihood of the occurrence of another VU plant species, high functional integrity and low resilience. This vegetation unit was also assessed as having High EI in terms of avifaunal habitat as the result of the confirmed occurrence of one VU and one Near Threatened bird species and the high likelihood of one EN and one VU bird species regularly utilizing this habitat as non-breeding foraging visitors.

The Sandstone Scarp Shrubland vegetation unit was assessed as having a High EI as a result of the fact that is representative of a spatially restricted habitat comprising part of threatened (Endangered) national vegetation type and a threatened (Endangered) ecosystem, the confirmed occurrence of a VU plant species (*Khadia carolinensis*), the moderate to high likelihood of the occurrence of another VU plant species, high functional integrity and low resilience. The high functional integrity of this unit is attributable to the fact that it comprises the largest, contiguous and species rich areas of sandstone scarp habitat recorded by the authors in the Breyten-Carolina region of the Mpumalanga Highveld, constitutes an important refuge area (area of suitable habitat in a matric of unsuitable habitat) for many plant communities and plant and animal species within the project area and its immediate surrounds and, together with the adjacent Valley-bottom and Seep wetlands, functions as a critically important dispersal corridor and flyway for mammal and bird species. This vegetation unit was also assessed as having High EI in terms of avifaunal and mammal assemblages as the result of the confirmed occurrence of one EN mammal species (Mountain Reedbuck) which is largely restricted to and dependent on this habitat within the project area and its immediate surrounds, and one VU bird species.

The Valley-bottom & Seep wetlands vegetation unit was assessed as having a High EI as a result of the fact that is embedded within a threatened (Endangered) national vegetation type and a threatened (Endangered) ecosystem of which it forms an integral component, the confirmed occurrence of an EN plant species (Sensitive Species 1200) which is entirely restricted to this habitat and lends high conservation importance to this vegetation unit, the moderate likelihood of the occurrence of another VU plant species, high functional integrity and moderate resilience. The high functional integrity of this unit is in part attributable to the fact that, together with the adjacent Sandstone Scarp Shrubland, it functions as a critically important dispersal corridor and flyway for mammal and bird species. This habitat was also assessed as having High EI in terms of avifaunal and mammal assemblages as the result of the confirmed occurrence of one VU bird species and which is restricted to and dependent on this habitat within the project area and its immediate surrounds, and three Near Threatened mammal species.

The Pan wetland vegetation unit was assessed as having a High EI as a result of the fact that is embedded within a threatened (Endangered) national vegetation type and a threatened (Endangered) ecosystem and represents a highly spatially restricted habitat for plants and animals, the moderate to high likelihood of the occurrence of DDD plant species which is a pan endemic and highly likely to be categorized as threatened in the immediate future, high functional integrity and low resilience. This vegetation unit was also assessed as having High EI in terms of avifaunal habitat as the result of the high likelihood of at least two Near Threatened bird species regularly utilizing this habitat as non-breeding foraging visitors.

The transformed habitat or Modified Habitat which comprises approximately 60.7% of the project area has been assessed as being of Low or Very Low EI. Secondary Grassland, which comprises secondary vegetation of habitats historically transformed by ploughing (Modified Habitat) and is categorized as a 'Moderately Modified' in the MBSP, has been assigned an integrated EI of Low as a result of its low biodiversity importance and significant (medium) resilience. Habitats completely transformed by anthropogenic impacts such as current cultivation, infrastructure (homesteads, excavations, railway lines, roads etc) and plantations and invasive stands of alien trees are referred to as 'Heavily Modified' in the MBSP and these transformed habitats have very low biodiversity importance for flora and fauna and high receptor resilience, resulting in an integrated EI of Very Low.

6.4.1.8 Surface Water

A Hydrology Study was undertaken by Peens and Associates (2022) and a Surface Water Ecosystems Assessment was undertaken by Enviross (2023). A description of the receiving environment was extracted from the reports and is provided below, refer to the studies in Appendix 8.

6.4.1.8.1 Catchment Description

The proposed mining right extension area is situated in the X11A and X11B quaternary sub-catchments of the Komati River Drainage Region (Figure 6-10). The Nooitgedacht Dam is the major reserving water body of the X11A and X11B quaternary sub-catchments that might be impacted by the proposed mine.

The mean annual rainfall/ precipitation (MAP) of quaternary sub-catchment X11B is 714 mm and the mean annual runoff (MAR) is 44 mm, with a catchment area of 597 km^2 and its Nett MAR is 26.2 million m^3 per annum. The MAP of quaternary sub-catchment X11A is 682 mm and the MAR is 35 mm, with a catchment area of 672 km^2 and its Nett MAR is 23.7 million m^3 per annum.

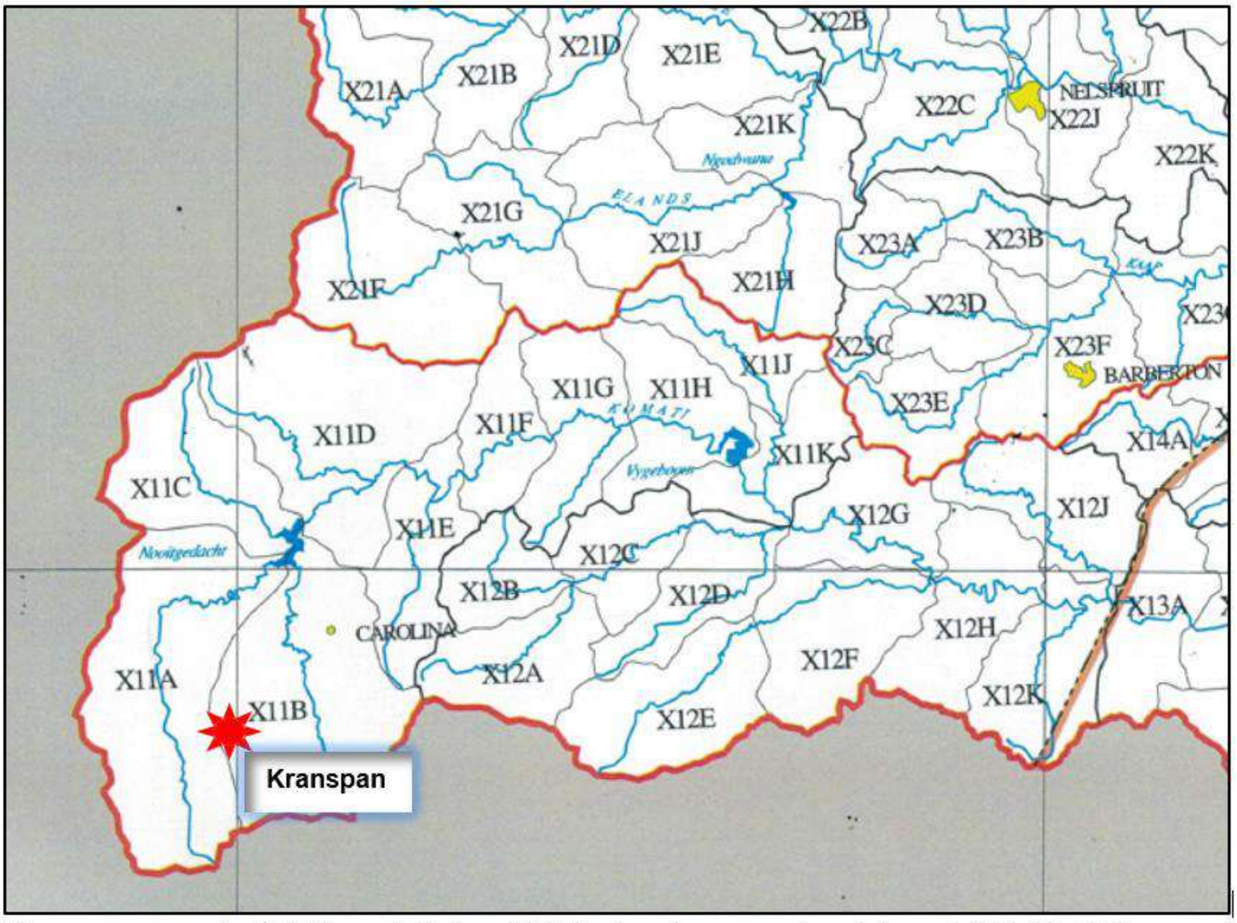


FIGURE 6-10: QUATERNARY SUB-CATCHMENT X11B

The proposed mining right extension area occurs within the Boesmanspruit and the Vaalwaterspruit catchments (Figure 6-11). Both the Boesmanspruit and the Vaalwaterspruit are tributaries of the Nooitgedacht Dam and the Komati River. Four pans are located within the proposed mining right extension area (Figure 6-11) of which three have no outflow and their catchment areas can therefore be classified as endorheic areas that do not contribute to the runoff towards Nooitgedacht Dam.

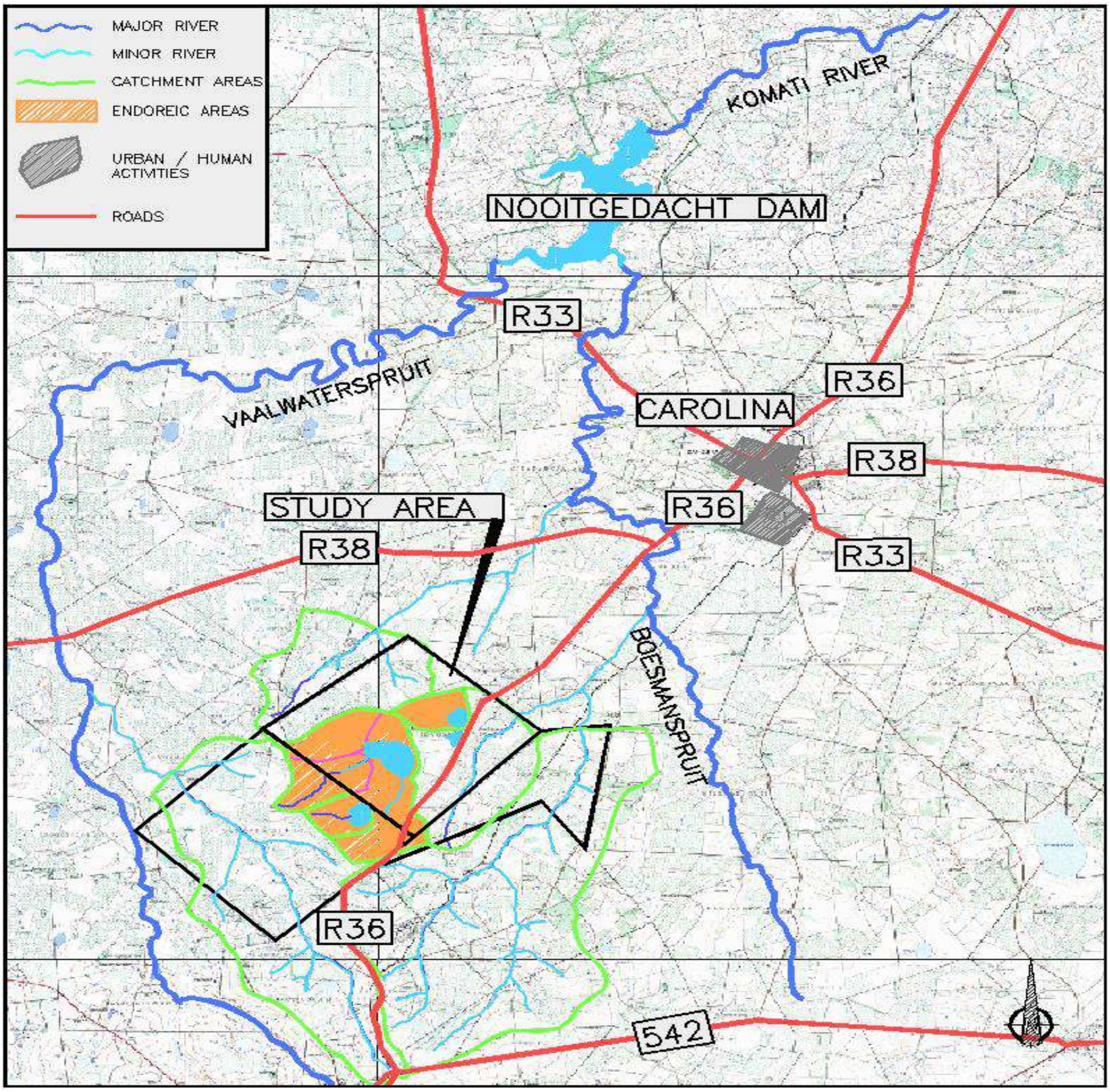


FIGURE 6-11: MAJOR RIVERS AND RECEIVING WATER BODIES

The proposed mining right extension area consists of both endorheic areas and non-endorheic areas. Nodes S1, S2 and S6 are accumulation points of such endorheic areas, node S3 acts as an attenuation system with only extreme flood events discharging into the catchment of node S4 (Figure 6-12).

However, the discharge from S3 will never contribute to the flood peaks of S4 as the response times of the catchments will not synchronise with the same storm events. The locations for nodes S4, S5, S7 and S8 were selected to obtain the minimum catchment area of each stream that will be affected by the proposed mining right extension area (Table 6-19). The catchment areas mainly consist of grass lands and cultivated fields with predominantly flat slopes. The overburden soils are moderate to deep sandy loam and are classified as permeable soils.

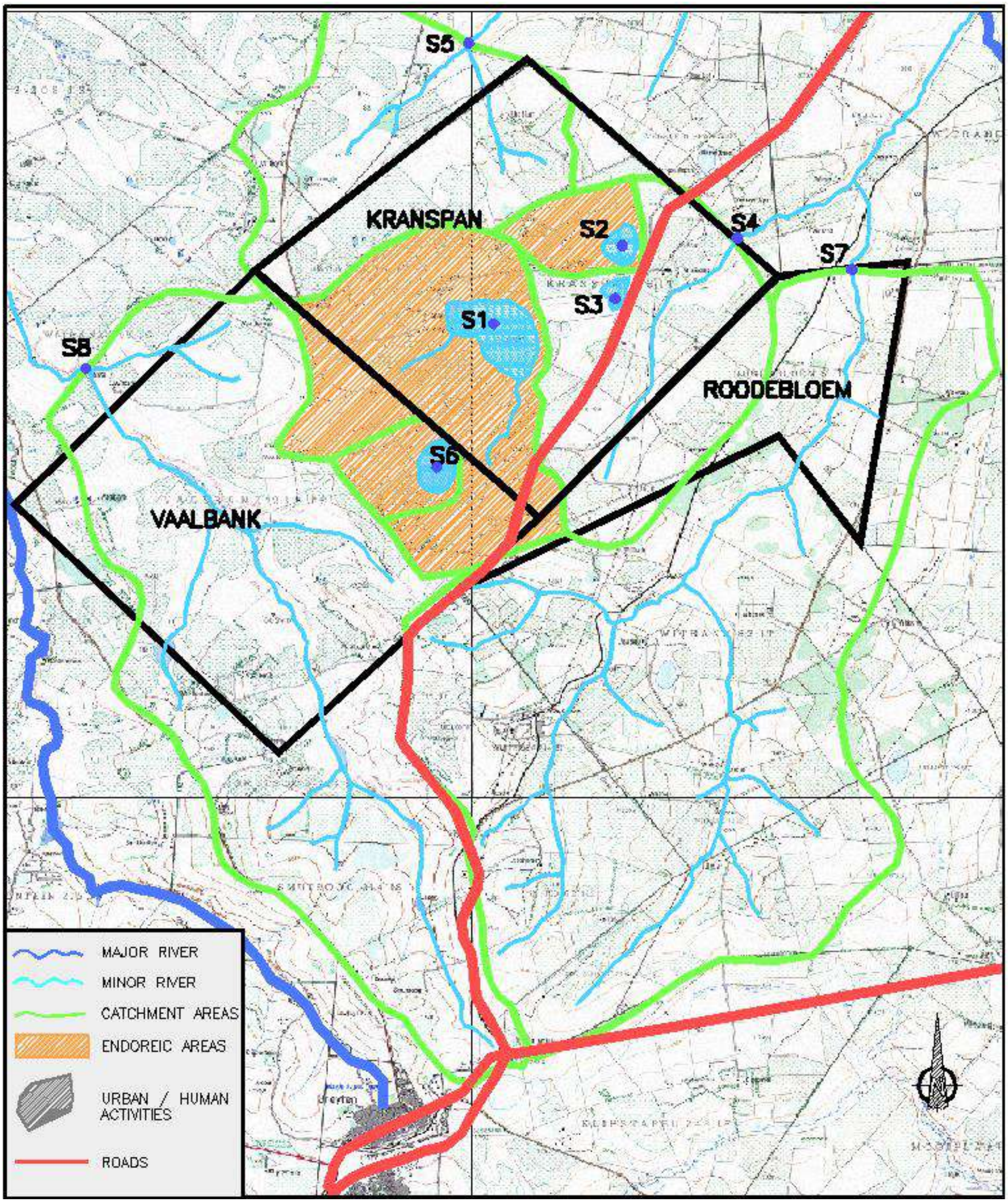


FIGURE 6-12: SUB-CATCHMENTS AND NODES

TABLE 6-19: SUMMARY OF WATERCOURSE CATCHMENTS ON SITE

Node Name	Effective Catchment Area (km^2)	Stream Length (Km)	10-85 Method Avg. Slope (1 :.....)	Overland Flow Length (Km)	Overland Avg. Slope (1: .....)
S1	15.490	3.62	49.35	-	-
S2	2.485	-	-	1.77	32.18
S3	2.222	-	-	3.37	134.77
S4	11.86	5.74	107.64	-	-
S5	16.49	4.62	86.66	-	-
S6	2.22	1.21	30.25	-	-
S7	63.21	13.14	240.41	-	-
S8	44.81	13.62	134.41	-	-

Note: where no defined water course or stream is present in the catchment area the longest overland flow length and slope is determined to calculate the response time of the catchment.

6.4.1.8.2 Surface Water Resources - Hydrology

Rainfall

The closest rainfall station to the proposed mining right extension area is the South African Weather Station 0480267W – Kranspan which is located on the south-western boundary of the proposed mining right extension area, 2 km south-west of the node S1. The mean annual rainfall for South African Weather Station 0480267W – Kranspan is 698mm based on 44 years of data.

Evaporation (S – Pan)

There are no weather stations with evaporation data in the vicinity of the proposed mining right extension area, hence the recommended values in the Water Research Commission's "Surface Water Resources of South Africa 1990 Manual" Volume 1 were used. All the sub-catchments in the proposed mining right extension area are situated in quaternary sub-catchments X11A and X11B with a Mean Annual Evaporation (MAE) of 1 450 mm.

Runoff

There is no river flow gauging station in neither the Boesmanspruit nor Vaalwaterspruit in the vicinity of the proposed mining right extension area. Further, no gauging station could be located with sufficient data that can be used as a representation of this catchment area. In the absence of representative data, the recommended values in the Water Research Commission's "Surface Water Resources of South Africa 1990 Manual" Volume 1 were used.

The mean annual rainfall for the proposed mining right extension area is 698 mm. The rainfall / runoff response number for this quaternary sub-catchment is 8, relating to a mean annual runoff (MAR) of 37 mm runoff depth.

TABLE 6-20: MEAN ANNUAL RUNOFF OVER PROPOSED MINING RIGHT EXTENSION AREA

Catchment Name	Catchment Size (km^2)	MAR (m^3/a)	Comment
S1	15.490	573 130	Does not contribute to the mean annual runoff for the Boesmanspruit.
S2	2.485	91 945	
S3	2.222	82 214	
S4	11.86	438 820	Contributes to Boesmanspruit
S5	16.49	610 130	Contributes to Boesmanspruit
S6	2.22	82 140	Does not contribute
S7	63.21	2 338 770	Contributes to Boesmanspruit
S8	44.81	1 657 970	Contributes to Vaalwaterspruit
TOTAL	158.79	5 045 690	Total excludes S1, S2, S3 & S6

6.4.1.8.3 Flood Hydrology

Table 6-21 summarises the peak flows and flood volumes for the range recurrence intervals.

6.4.1.8.4 Drainage Density

The drainage density is the total stream and river lengths in a particular catchment divided by the total catchment area. The density of the drainage system will directly influence the proportion of the precipitation that will contribute to direct runoff.

The proposed mining right extension area's drainage density is therefore 0.53 km/km^2.

TABLE 6-21: FLOOD PEAKS AND VOLUMES FOR WATERCOURSES IN THE PROPOSED MINING RIGHT EXTENSION AREA

Catchment Name		Recurrence Interval						
		1:2	1:5	1:10	1:20	1:50	1:100	1:200
S1	Flood Peak (m^3/s)	32.7	58.9	81.3	107.1	141.5	171.6	194.3
	Flood Volume (10^3 m^3)	141.6	255.0	351.9	463.6	612.6	742.9	841.1
S2	Flood Peak (m^3/s)	4.0	7.2	10.0	13.0	17.2	20.9	23.7
	Flood Volume (10^3 m^3)	25.1	45.1	62.6	81.4	107.7	130.9	148.5
S3	Flood Peak (m^3/s)	2.3	4.2	5.8	7.6	10.1	12.2	13.8
	Flood Volume (10^3 m^3)	27.1	49.4	68.3	89.5	118.9	143.6	162.5
S4	Flood Peak (m^3/s)	14.2	25.5	35.5	46.4	61.4	74.4	84.3
	Flood Volume (10^3 m^3)	118.1	212.1	295.2	385.9	510.6	618.7	701.0
S5	Flood Peak (m^3/s)	23.7	42.6	59.2	77.4	102.4	124.2	140.6
	Flood Volume (10^3 m^3)	153.6	276.0	383.6	501.6	663.6	804.8	911.0
S6	Flood Peak (m^3/s)	7.8	14.1	19.5	25.6	33.8	41.0	46.4
	Flood Volume (10^3 m^3)	12.0	21.7	30.0	39.4	52.0	63.1	71.4
S7	Flood Peak (m^3/s)	41.3	74.3	103.2	135.0	178.5	216.4	245.0
	Flood Volume (10^3 m^3)	888	1 597	2 218	2 901	3 836	4 651	5 266

6.4.1.8.5 Surface Water Ecosystems

The Surface Water Ecosystems Assessment undertaken by Enviross (2023) identified several surface water features within the proposed Kranspan Mining Right Extension site (Appendix 3 Map 16).

The region is characterised by well-established and developed valley bottom wetland units that interchange between a channelled and unchannelled watercourse. All these valley bottom units are supplemented by hillslope seepage zones with varying spatial extents. The site is located within the upper reaches of the catchment area and therefore valleyhead seep zones that develop into valley-bottom wetland units that then feed into the main wetland complex are common. Hillslope seepages are not always directly linked to the main watercourse and some isolated features do occur. These tend to also incorporate temporary seepage zones areas and therefore no isolated seepage zones were indicated in the delineation mapping. Depression-type wetland units are also common, but many have been artificially manipulated to increase the capacity and period that they support persistent open surface waters. Being a well-established agricultural area, instream impoundments to support agricultural activities are common, but many of the earth dam walls have breached. Larger impoundments still do occur. Perpetual sediment transport to the impoundments through surface water runoff that gets deposited within the impoundments has resulted in these impoundments becoming relatively shallow, and aquatic and marginal wetland vegetation has become established in the shallower peripheral zones. These relatively large areas, together with expansive valley bottom and hillslope seep wetlands that support natural to near-natural vegetation structures support a high level of biodiversity – many of which are wetland dependent species.

There is an underlying bedrock layer that supports a perched water table relatively close to the surface. This is especially noteworthy within the wetland seep zones associated with the rocky ridge areas that tend to run parallel to the established watercourses. This bedrock very often supports bench-type wetland units, which is most noticeable at the crests of hilltops and watershed zones that gives the impression that the hilltop wetland units supply water to both sides of the watershed.

Wetland habitat units are regarded as well-established and developed within the area, with underlying soil and geological features that support a high water table and a relatively large ground-surface water interchange, which has led to soil characteristics that indicate that the majority of the area was historically established wetland areas. Land use that has led to unnatural channelling of valley-bottom wetlands that decreases landscape water retention periods, catchment management practices, as well as cyclic climatic changes are all contributing factors that have induced the overall reduction of the functional areas of the wetland units. Hydromorphic soils reminiscent of historical wetland zones therefore tend to indicate larger expanses than what are considered functional and active wetland zones, but which cannot be considered part of the wetland complex any longer.

The proposed development does have an association with wetland habitat units and therefore mandatory and legislated conservation buffer zones are applicable. The wetland units perform vital functions within the landscape and should be regarded as being ecologically sensitive features. Conservation of this habitat unit forms an integral part of the conservation of the surface water resources throughout the catchment area in terms of quality and quantity. The proposed development is also regarded as being of a relatively high impact to the wetland units associated with it. The wetlands that are regarded as high priority (high value) features that support the main watercourses and incorporate the network of the most well-developed valley bottom wetland units are rated as Priority 1 units. In addition, the more prominent seepage zone wetlands that support the hydrological functioning of these units are also categorised as Priority 1 units. Priority 1 wetland units have been designated a 100 m buffer zone. Priority 2 and Priority 3 wetland units are those wetland features that provide a supportive function to more sensitive Priority 1 units in terms of vegetation structures, seepage zones and overall ecological functionality (including wetland-dependent biodiversity support) to a greater and lesser extent, are designated buffer zones of 50 m and 30 m, respectively. Priority 4 wetland units are units that have suffered degradation, are poorly developed wetland units, and are not thought to provide significant supporting ecological value to the more established and sensitive priority 1 to 3 wetland units. No buffer zones have been designated to these units. The buffer zones are indicated in Appendix 3 Map 16, which takes this priority rating into collective consideration.

The WETLAND-IHI was applied to the wetland units associated with the survey area that include a valley bottom linear unit and which were relevant to the survey area. Due to the largely homogenous land use throughout the catchment area and the similar pressures and drivers of ecological change experienced by the wetland units, there is little variation in scores and ratings within the units themselves. The overall average Present Ecological State (PES) of the wetland units throughout the whole survey area calculates to within a C range. Variations do occur due to differences in vegetation cover, proximity to formal agriculture and transformation due to mining (where the water quality would be more prone to deleterious effects of agrochemicals and other contaminants), erosion features and proximity to and number of impoundments. These variations account for the scores ranging between B/C and D categories.

An informal fish survey was undertaken and results highlight the important role that the smaller tributary streams play in providing suitable breeding and refuge habitat for fish. A relatively high number of tadpoles were also included in the capture efforts as they are also susceptible to the effects of electrofishing. Positive identification of the tadpoles did not form part of the scope of the survey.

Eight water samples were collected during the field survey and sent to an accredited laboratory for analysis. The electrical conductivity (EC) of the samples all tended to be relatively high throughout the sample area, which can be expected from a catchment area with the land use being dominated by agriculture and mining. One site (Site 8 showed the lowest EC values, which is most likely due to the associated wetland seep zones (the source of the water to the watercourse) not being associated with the same geological features as those associated with the other sites. Springs upwelling from groundwater tended to show relatively high EC values, with the KSP New site being located a little distance downstream of a high volume spring that feeds water into the main watercourse. Sample sites 1, KSP_new, 4 and KSP_DS are along the same watercourse, with the sequence of upstream to downstream being in that order. The first three sites from upstream to downstream show in increasing trend in EC values, which then reduces at the downstream site. As no mining activities take place along this watercourse, it is assumed that the high EC values are a product of the underlying geology and soils that contribute to the high salt concentrations. The lowered values recorded at the downstream site could be the result of dilution factors feeding into the watercourse with water from different underlying geological features.

Another component that warrants further discussion is the sulphate concentrations. Sulphates may be rendered toxic to aquatic organisms under certain conditions. Under hypoxic conditions, bacteria break down sulphates to extract the oxygen molecules, with the by-product being hydrogen sulphide gas, which can be toxic to aquatic organisms. Zinc was indicated in the water samples, but cadmium was not. Sulphates also can also synergistically combine with other elements such as cadmium and zinc, with the resultant metal sulphates being acutely toxic to fish. Pyrite crystals often occur in sedimentary rock and constitutes a source of sulphates in the ground water. This is typical of coal-bearing deposits, so increased sulphates in the groundwater and springs that feed groundwater onto the surface can be expected. The opencast mining and the resultant rock stockpiles will unearth sulphur-bearing minerals (mostly in the form of iron sulphides), which will then be exposed to atmospheric oxygen, moisture (rainfall) and bacterial action that promotes the formation of sulphuric acid. This sulphuric acid dissolves heavy metals from mined materials and forms an acidic pH solution with elevated concentrations of arsenic, cadmium, lead, copper, etc. This solution can infiltrate into the ground water but can also be transported to surface water ecosystems via stormwater runoff. This process is generalised under the term Acid Mine Drainage (AMD), which is regarded as one of the most significant sources of pollution to both ground and surface waters.

E. coli was also noted within the samples. Samples KSP_1 and KSP_13 showed greatest concentrations of cells. Both these samples are from watercourses that flow into the survey area and therefore represent contamination that originates from outside of the area. The only source of *E. coli* is from untreated human sewerage. The low concentrations tend to imply minor contamination sources such as informal ablutions near to watercourses, or similar. As *E. coli* presents as a human health risk, it is recommended that this be included in the water quality parameters tested for as part of the water quality monitoring.

6.4.1.9 Groundwater

A Geohydrological (groundwater) specialist study was undertaken by ILEH (2023). The complete report with the baseline information and impact assessment results is provided in Appendix 8. A summary of the report is provided hereunder.

6.4.1.9.1 Hydrocensus

A hydrocensus was conducted across the proposed Kranspan mining right extension area during July 2022. The hydrocensus focussed on identifying existing private boreholes and private groundwater use and to enhance the knowledge of the aquifers present.

19 sites were identified during the 2022 hydrocensus, including 17 boreholes and 2 springs. The 2 springs are used for domestic and animal use. The one (strong flowing) spring (KRS7) was identified as an old underground mining decanting point. Groundwater use is summarised as follows:

- 6 of the 17 boreholes are in use:
  - 3 boreholes fitted with a submersible pump;
  - 2 boreholes are fitted with a windpump;
  - 1 borehole fitted with a handpump;
- 4 boreholes are equipped, but not in use – old mono- and windpumps; and
- 3 open boreholes are used for groundwater monitoring, by nearby mines; and
- 4 open boreholes, not in use.

Groundwater level measurements were possible in 13 of the 2022 hydrocensus boreholes and in 16 of the 2019 hydrocensus. Pumping equipment blocked the remaining boreholes visited. 11 groundwater samples were collected for water quality analysis during the hydrocensus.

Based on communication with the landowners the springs in the area are seasonal, with the exception of KRS7 and KRS8 that flow throughout the year. The springs serve as water supply to livestock and wildlife in the area. KRS7 is the most prominent feature identified during the 2022 hydrocensus, based on flow rate. During the hydrocensus the discharge rate was +10,000 L/hr, but red staining was evident on the rocks and streambed. As mentioned, this was identified as a decant point associated with the old Union underground mine workings.

Detailed information in terms of borehole construction and yields are not available for the identified private boreholes. The information provided by landowners suggest low borehole yields for most of the project area.

6.4.1.9.2 Geophysical Survey

A ground geophysical investigation was conducted to identify geological structures, which could act as preferential groundwater flow paths and potentially good water yielding aquifers. The geophysical survey has been used in conjunction with the available remote sensing images and geological maps. The two north-south striking lineaments indicated on the published geological map were the main targets. Others included the dolerite sill and potential deep weathered zones across the study area, plus the old underground mine decant point.

The geophysical investigation was conducted during October 2022. The following techniques were applied:

- EM 34–3 electromagnetic (EM) system, with a coil spacing of 20 m, and a station spacing of 10 m; and
- Magnetic survey.

6.4.1.9.3 Drilling Programme

Based on the geophysical survey results and an understanding of the local geology, 3 suitable drilling positions for groundwater characterisation purposes were identified. The percussion drilling programme was carried out during November 2022 by WJ Water Drilling. Two groundwater characterisation and monitoring boreholes were drilled at each of the three target areas. The first borehole was drilled to a depth of 50 m below surface, with the aim of characterising and monitoring the deeper fractured aquifer. The second borehole was drilled 20 m deep, with the aim of monitoring the shallow weathered aquifer and possible connection between the deeper fractured aquifer and the shallow weathered aquifer in the area. The borehole construction details are as follows:

- Deep boreholes (50 m) – diameter of the solid steel casing is 170 millimetres (mm) from surface to 20 m below surface. Beyond this depth the diameter of the borehole is 165 mm.
- Shallow boreholes (20 m) – drill diameter is 215 mm with 165 mm steel casing installed over the full depth of the borehole. The bottom 12 m is perforated.

Data collected includes the recording of geological formations at 1 metre intervals, water strike depths, the cumulative final blow yield and final rest water level. A summary of the 2022 drilling programme is presented in Table 3 of the specialist report.

The depth of weathering in the boreholes vary between 6 and 27m in the monitoring boreholes. The monitoring boreholes produced blow yields of between zero (thus dry) and 1 500 L/h, which is equivalent to 0.42l/s. In general, borehole yields throughout the project area are low. Most of the groundwater strikes are associated with the shallow weathered aquifer, varying between 10 to 15m below surface. The weathered and fractured sandstone and the fractured dolerite yielded more water. The coal seams, deeper fractured formations and the geological contacts only intersected seepage.

6.4.1.9.4 Aquifer Testing

Following completion of the drilling programme, an aquifer test programme was initiated to determine the hydrogeological characteristics of the local aquifers. The following information was obtained from the tests:

- Borehole drawdown and recovery characteristics;
- Aquifer hydraulic parameters: Transmissivity (T) defined as the product of the average hydraulic conductivity (K) and the saturated aquifer thickness. It is a measure of the rate of flow under a unit hydraulic gradient through a cross-section of unit width over the whole saturated thickness of the aquifer. The unit of measurement is m2/day; and
- Characterisation of aquifer flow boundaries such as low permeable, no-flow or recharge boundaries. No-flow or low permeable boundaries refer to a lower transmissive structure (e.g., fracture with a lower conductance or low permeable dyke) or aquifer boundary (limit of aquifer – no-flow boundary) that results in an increase in groundwater drawdown during borehole abstraction. Recharge boundaries relate often to leakage from surface water bodies.

The aquifer testing was completed during December 2022, as follows:

- 12-hour constant drawdown test on 2 new boreholes:
  - KPGW09S (VAGW-01 s), which was dewatered within 30 minutes
  - KPGW11S (ROGW-03 s)
- Slug test were completed on the following boreholes as a result of low blow yields:
  - KPGW09D (VAGW-01 d)
  - KPGW10 (VAGW-02)

- KPGW11D (ROGW -03 d)

A summary of the test programme is given in Table 4 of the specialist report.

The recovery of the groundwater level after abstraction is a good indicator of the aquifer's transmissivity, recharge and the borehole's potential yield. The recovery data (for the tested boreholes) indicate that the recovery is slow and that full recovery (100%) is often not achieved within the predetermined testing timeframe. The aquifers intercepted were all shallow (first 15 m below surface).

The low borehole yields, fast water level drawdown and slow recovery observed during the aquifer testing indicate low transmissivity (T) aquifers, with low recharge. The average T-values calculated from the test data range between 0.3 and 2.1 m2/d. The highest T-value (2.1 m2/d) was observed at the boreholes on Roodebloem, which targets fractured dolerite. The slug tests yielded hydraulic conductivity values of approximately 0.09 to 0.3 m/d.

Two main aquifers are typically found in the Karoo sediments of the Ermelo Coal Field. These are a shallow weathered aquifer and a deeper fractured rock aquifer. The aquifers fall in a moderate vulnerable category, which means they are vulnerable to some pollutants in the long-term when these are continuously discharged or leached. Overall, the aquifers presented are ranked with a medium susceptibility to the impacts of pollutants. Based on the information above, as well as the methodology described by Parsons (1995), the aquifer protection classification is rated as medium. This is due to the fact that groundwater is often the only water resource available to farmers and that groundwater can been impacted by regional mining activities.

6.4.1.9.5 Groundwater Potential Contaminants

Of the available dataset, the decant point sampled at the historical Union Colliery can be used to approximate the impact coal mining on groundwater quality. This decant point was sampled during the 2022 hydrocensus. It is shown that sulphate is the most dominant anion, while sodium is the most dominant cation. TDS concentrations of this sample exceeded 1500 mg/l, with sulphate concentrations of around 900 mg/l. The most dominant metals include strontium and manganese. Elevated manganese concentrations were also recorded in some of the monitoring boreholes.

The results of the geochemical leach tests completed on rock samples were used to evaluate potential contaminants associated with the project. These tests suggests that sulphate is the most significant anion and iron the most significant metal. The groundwater impact assessment will be undertaken at the hand of sulphate, which is a well-established indicator element for the impact of coal mining on groundwater quality.

6.4.1.9.6 Geochemical Characterisation and Waste Classification

Samples of overburden / waste rock material were obtained from exploration holes within the proposed mining right extension area. Composite samples were carefully selected to ensure that they are representative of the potential surface stockpiles. These were subjected to Acid Base Accounting (ABA) analysis and static testing.

The results of the analyses confirmed that the acid generating potential was low for the majority of the samples. The test results were included in the impact assessment and used to inform the waste classification and engineering design.

The results from the characterisation will be used to:

- Classify and characterize the waste according to the NEM:WA Classification and Assessment Regulations, 2013 and the Regulations regarding the Planning and Management of Residue Stockpiles and Residue Deposits, 2015. This will provide input into the lining requirements for the various surface facilities (ROM stockpiles and overburden stockpiles); and

- Determine the long-term quality of seepage from the surface stockpiles and the mining areas. These concentrations will be used in the numerical flow and contaminant transport models as source or starting concentrations of potential pollutants such as sulphate or nitrate from the stockpiles and mining areas.

6.4.1.9.7 Groundwater Quality

Six groundwater and surface seepage samples were collected during the 2022 hydrocensus. Groundwater samples were also collected from the six monitoring boreholes during the 2022 aquifer testing programme. The water samples were submitted to a South African National Accreditation System (SANAS) accredited laboratory (Aquatico), for analysis. Samples were collected from boreholes across the project area to ensure a good indication of ambient groundwater qualities.

The results are discussed in the specialist report. It is noted that the results indicate that the concentrations of most of the trace elements are below laboratory detection limits. The results of the chemical analyses show that the groundwater quality in the hydrocensus and monitoring boreholes generally comply with the SANS241:2015 Drinking Water Standards. The exceptions are hardness, iron and manganese.

6.4.1.10 Air Quality

An Air Quality Impact Assessment (AQIA) was undertaken by Airshed Planning Professionals (2022). A description of the receiving environment was extracted from the report and is provided below, refer to the study in Appendix 8.

6.4.1.10.1 Air Quality Sensitive Receptors

Air Quality Sensitive Receptors (AQSRs) primarily refer to places where people reside; however, it may also refer to other sensitive environments that may adversely be affected by air pollutants.

Prior to dispersion modelling, 24 receptors were identified in the vicinity of the Project (within the 25-by-22 km modelling domain). Sensitive receptors include residential areas, informal housing and farmsteads (Figure 6-13). In addition, coordinates were provided by ABS Africa for 18 receptors currently located onsite. Of these, only 5 receptors are located in areas that do not fall within the surface infrastructure footprint: a, e, f, o and p (Figure 6-13).

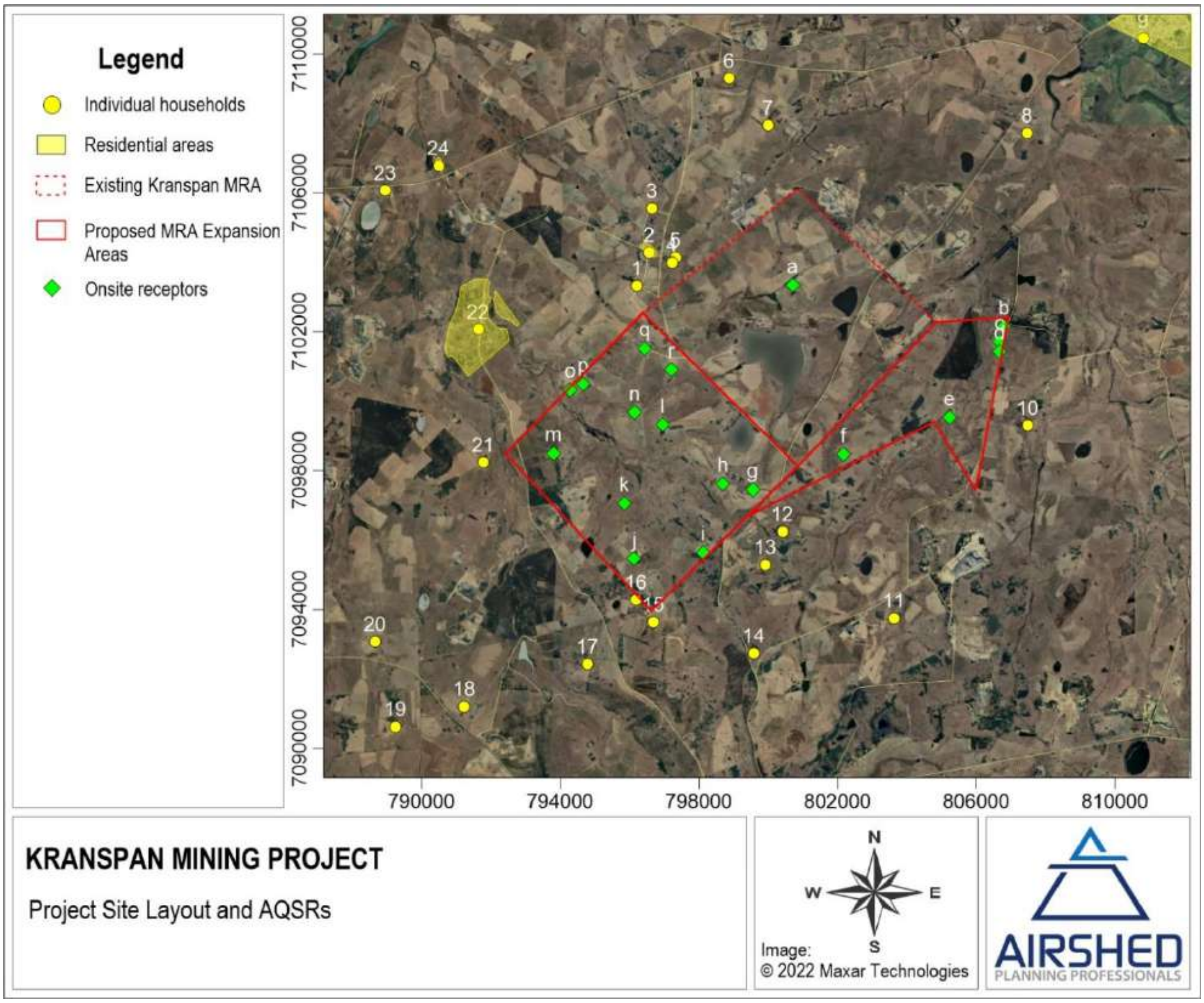


FIGURE 6-13: LOCATION OF AIR QUALITY SENSITIVE RECEPTORS

6.4.1.10.2 Existing Sources of Emissions near the Project Site

Power generation, mining activities, farming and residential land-uses occur in the region. These land-uses contribute to baseline pollutant concentrations via emissions from coal-fired power stations, vehicle tailpipe emissions, household fuel combustion, biomass burning and various fugitive dust sources. Long-range transport of particulates, emitted from remote tall stacks and from large-scale biomass burning in countries to the north of South Africa, has been found to contribute to background fine particulate concentrations within the South African boundary (Andreae, *et al.*, 1996; Garstang, Tyson, Swap, & Edwards, 1996; Piketh, Annegarn, & Kneen, 1996).

Power Generation

Operational power stations, in relation to the Project Site, are further west – Hendrina Power Station and Komati Power Station, at distances of 40 km and 50 km respectively; to the south (Camden Power Station, some 48 km away); and to the northwest (Arnot Power Station, 30 km away). The main emissions from such electricity generation operations are carbon dioxide (CO2), SO2, NOx and ash (PM). Fly-ash particles emitted comprise various trace elements such as arsenic, chromium, cadmium, lead, manganese, nickel, vanadium and zinc. Small quantities of volatile organic compounds are also released from such operations.

Mining Operations

Fugitive emissions from open cast and underground mining operations mainly comprise of land clearing operations (i.e. scraping, dozing and excavating), materials handling operations (i.e. tipping, off-loading and loading, conveyor transfer points), vehicle entrainment from haul roads, wind erosion from open areas, drilling and blasting. These activities mainly result in particulates and dust emissions, with small amounts of oxides of nitrogen (NOx), carbon monoxide (CO), SO2, methane and CO2 being released during blasting operations. There are two known operational mines adjacent to the proposed Project, namely Northern Coal Mine and Msobo Coal Mine (previously known as Verkeerdepan Mine). Tselentis Colliery is located approximately 7.5 km to the south.

Agricultural operations

Agriculture is a land-use within the area surrounding the site. Particulate matter is the main pollutant of concern from agricultural activities as particulate emissions are deriving from windblown dust, burning crop residue, and dust entrainment as a result of vehicles travelling along dirt roads. In addition, pollen grains, mould spores and plant and insect parts from agricultural activities all contribute to the particulate load. Should chemicals be used for crop spraying, they would typically result in odoriferous emissions. Crop residue burning is an additional source of particulate emissions and other toxins.

Miscellaneous Fugitive Dust Sources

Fugitive PM emissions are generated through entrainment from local paved and unpaved roads, and erosion of open or sparsely vegetated areas. The extent of particulate emissions from the main roads will depend on the number of vehicles using the roads and the silt loading on the roadways. Major paved roads in the area include the R36 main road to Carolina/Breyten. The extent, nature and duration of road-use activity and the moisture and silt content of soils are required to be known in order to quantify fugitive emissions from this source. The quantity of windblown dust is similarly a function of the wind speed, the extent of exposed areas and the moisture and silt content of such areas.

Vehicle Tailpipe Emissions

Air pollution from vehicle emissions may be grouped into primary and secondary pollutants. Primary pollutants are those emitted directly into the atmosphere, and secondary, those pollutants formed in the atmosphere as a result of chemical reactions, such as hydrolysis, oxidation, or photochemical reactions. Notable primary pollutants emitted by vehicles include CO_2, CO, hydrocarbons (HCs), SO_2, NOx, DPM and Pb. Secondary pollutants include: NO_2, photochemical oxidants (e.g. ozone), HCs, sulphur acid, sulphates, nitric acid, nitric acid and nitrate aerosols. Hydrocarbons emitted include benzene, 1.2-butadiene, aldehydes and polycyclic aromatic hydrocarbons (PAH). Benzene represents an aromatic HC present in petrol, with 85% to 90% of benzene emissions emanating from the exhaust and the remainder from evaporative losses. Vehicle tailpipe emissions are localised sources and unlikely to impact far-field.

Both small and heavy private and industrial vehicles travelling along the R36 (public) road as well as unpaved public and private roads, are notable sources of vehicle tailpipe emissions.

Household Fuel Burning

Domestic households are known to have the potential to be one the most significant sources that contribute to poor air quality within residential areas. Individual households are low volume emitters, but their cumulative impact is significant. It is likely that households within the local communities or settlements utilize coal, paraffin and/or wood for cooking and/or space heating (mainly during winter) purposes. Pollutants arising from the combustion of wood include respirable particulates, CO and SO_2 with trace amounts of polycyclic aromatic hydrocarbons (PAHs), in particular benzo(a)pyrene and formaldehyde. Particulate emissions from wood burning have been found to contain about 50% elemental carbon and about 50% condensed hydrocarbons.

Coal is relatively inexpensive in the Mpumalanga region and is easily accessible due to the proximity of the region to coal mines and the well-developed coal merchant industry. Coal burning emits a large amount of gaseous and particulate pollutants including SO_2, heavy metals, PM including heavy metals and inorganic ash, CO, PAHs (recognized carcinogens), NO_2 and various toxins. The main pollutants emitted from the combustion of paraffin are NO_2, particulates, CO and PAHs.

6.4.1.10.3 Modelled Ambient Air Pollutant Concentrations

The Project is located <u>outside</u> the Highveld Priority Area (HPA), this can be seen in Figure 6-14 (proposed site falls outside the demarcated areas). Therefore the modelled PM_{10} predictions and PM_{10} hotspots, as provided in the HPA Air Quality Management Plan (AQMP), are not relevant to this study.

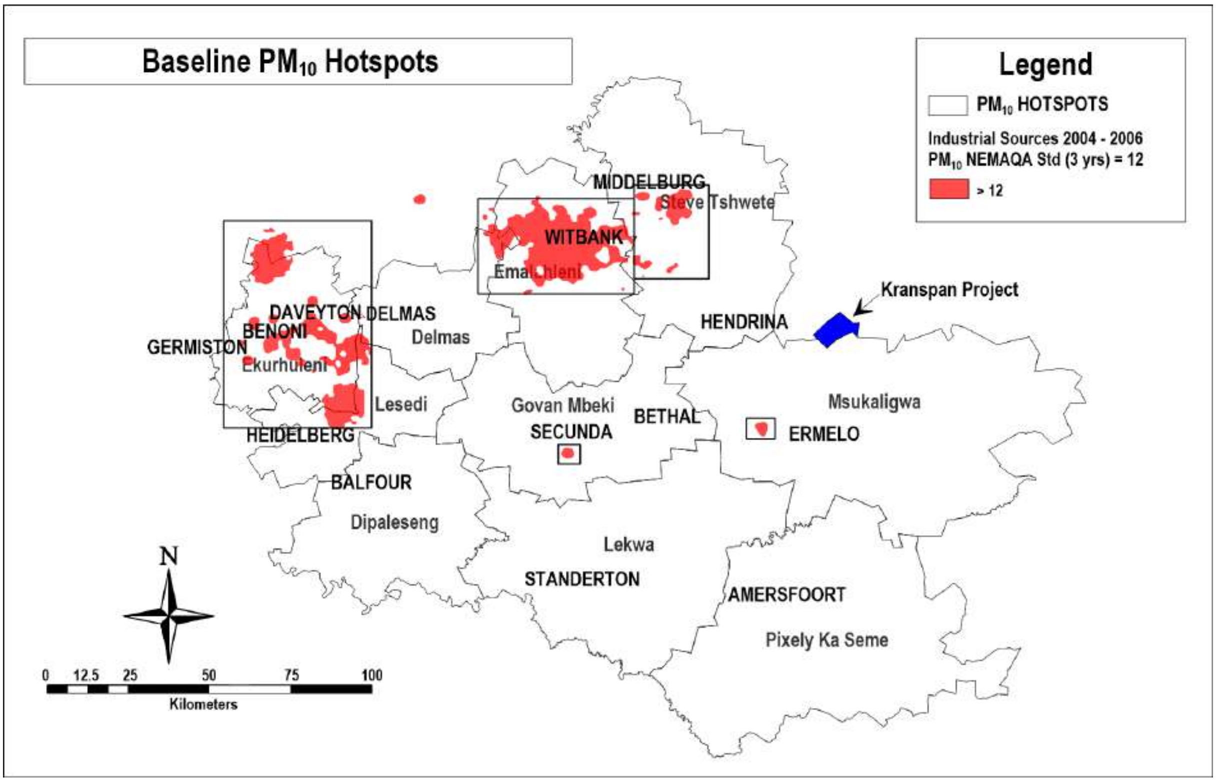


FIGURE 6-14: HIGHVELD PRIORITY AREA BOUNDARY

6.4.1.10.4 Monitored Ambient Concentrations

The DFFE monitoring network has ambient monitoring stations to measure the ambient air quality within the Highveld Priority Area. The ambient monitoring stations are located at Ermelo, Hendrina, Middelburg, Secunda, and Witbank. The closest monitoring station to the Project is Hendrina (~24 km west).

The measured PM_{10} and $PM_{2.5}$ daily ground level concentrations from the Hendrina monitoring station for the period January 2021 to December 2021 are provided in Figure 6-15 and Figure 6-16 respectively (data obtained from SAAQIS website). The data availability was 68% and 52% for the PM_{10} and $PM_{2.5}$ datasets respectively.

The measured PM_{10} and $PM_{2.5}$ concentrations exceed the respective daily NAAQS's mainly during the winter period. The annual average concentration was calculated from the daily concentrations over the measuring period and was estimated to be 36 μg/m³ for PM_{10} and 12 μg/m³ for $PM_{2.5}$ respectively. It should be noted that the Hendrina monitoring station, which would be measuring local and far-afield emission sources, may not be representative of the background PM_{10} and $PM_{2.5}$ concentrations at the Project site.

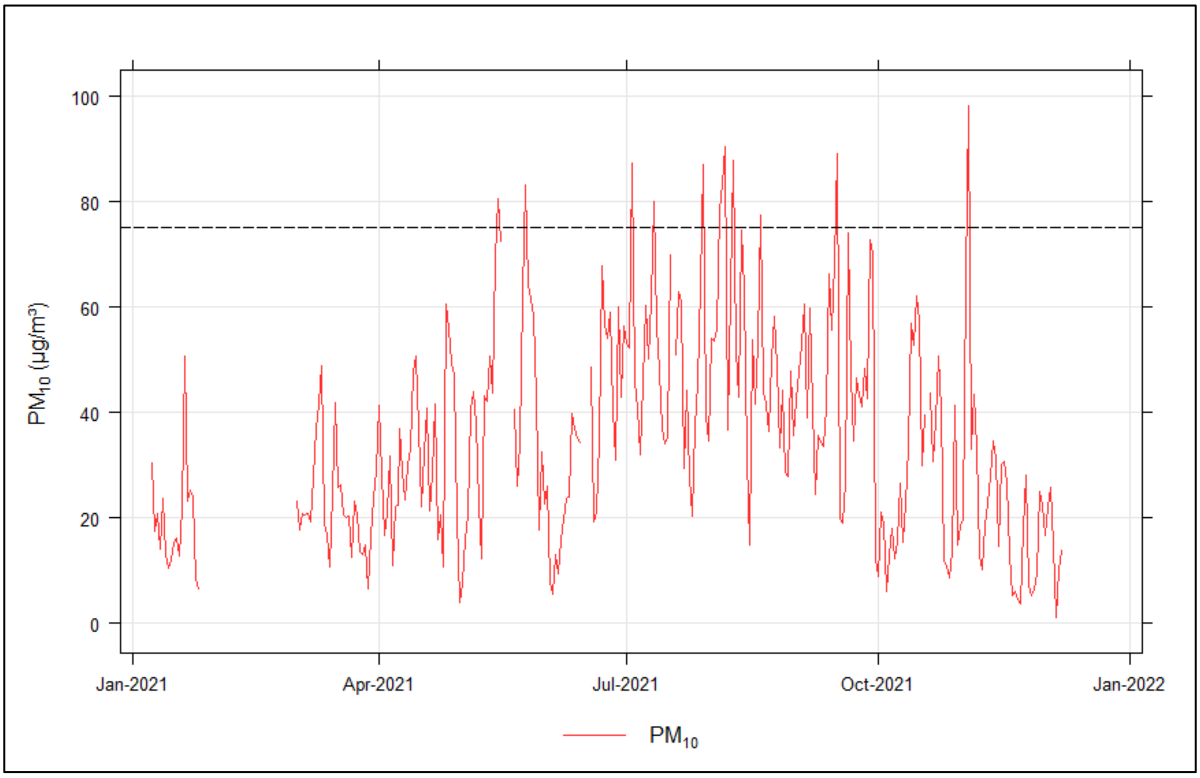


FIGURE 6-15: OBSERVED DAILY AVERAGE PM_{10} CONCENTRATIONS FOR JAN 2021 TO DEC 2021

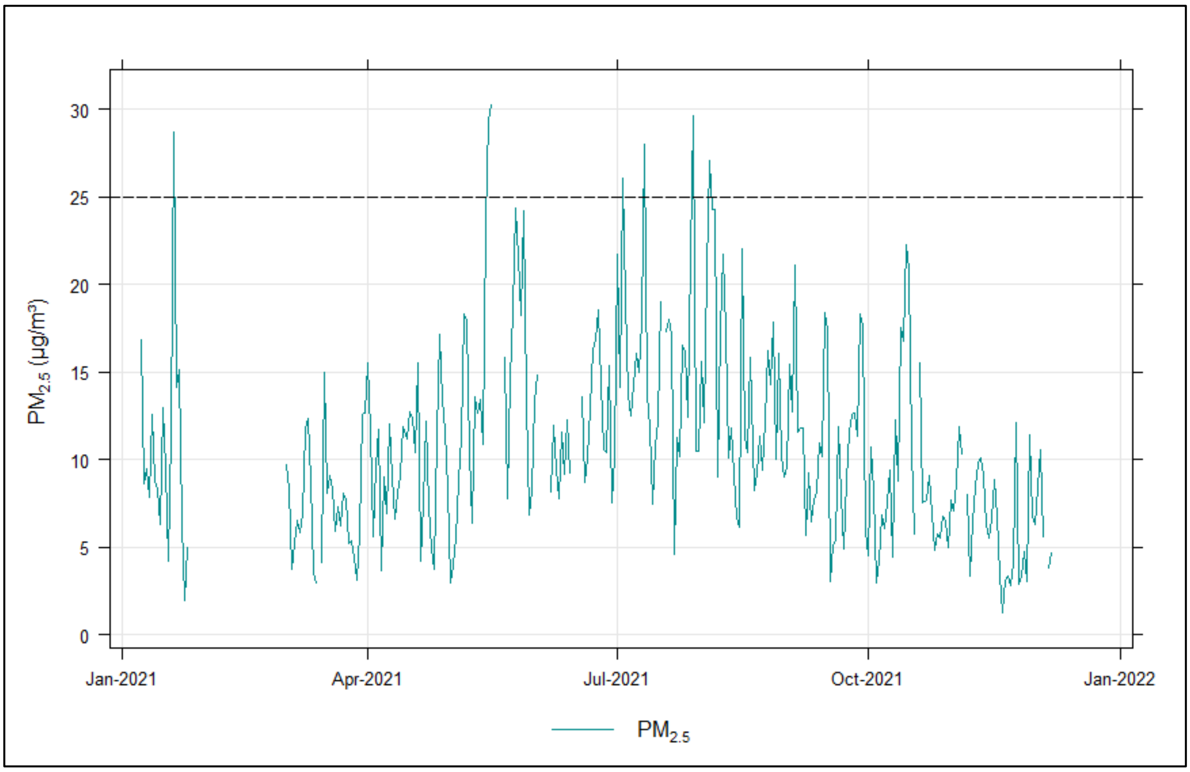


FIGURE 6-16: OBSERVED DAILY AVERAGE $PM_{2.5}$ CONCENTRATIONS FOR JAN 2021 TO DEC 2021

The daily 99th percentiles for PM_{10} exceed the limit value (75 µg/m³) at Hendrina station for 4% of the time during the 1-year period (Figure 6-17), whereas the daily 99th percentiles for $PM_{2.5}$ exceed the post-2030 limit value (25 µg/m³) at Hendrina station for 3% of the time during the same period (Figure 6-18).

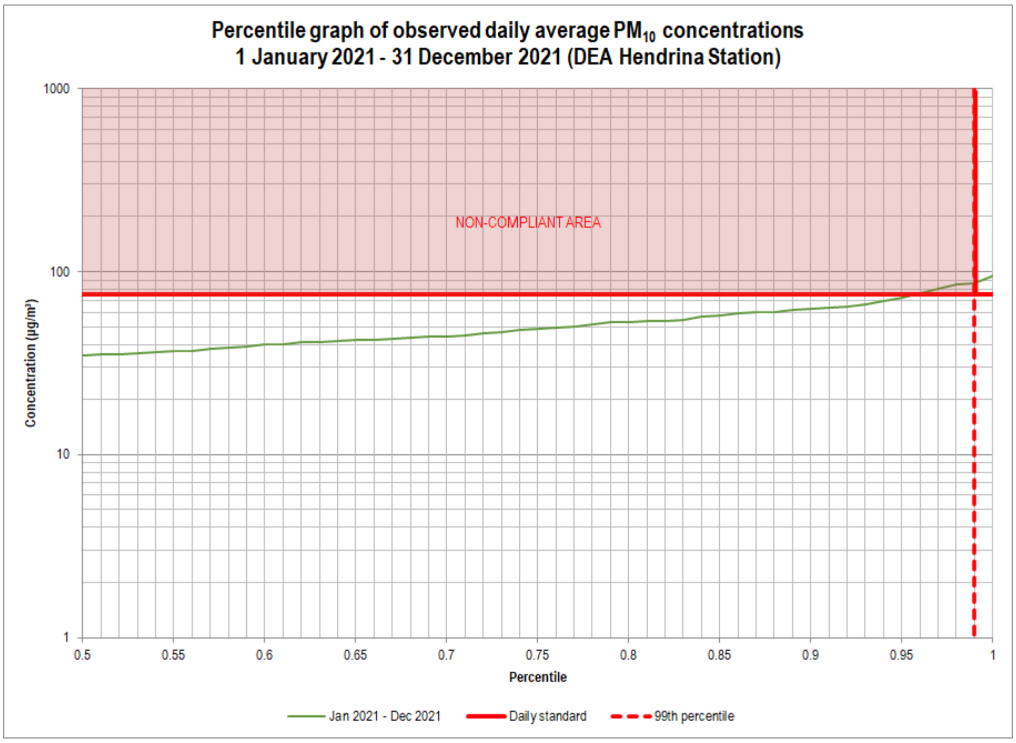


FIGURE 6-17: PERCENTILE GRAPH OF OBSERVED DAILY AVERAGE PM_{10} CONCENTRATIONS

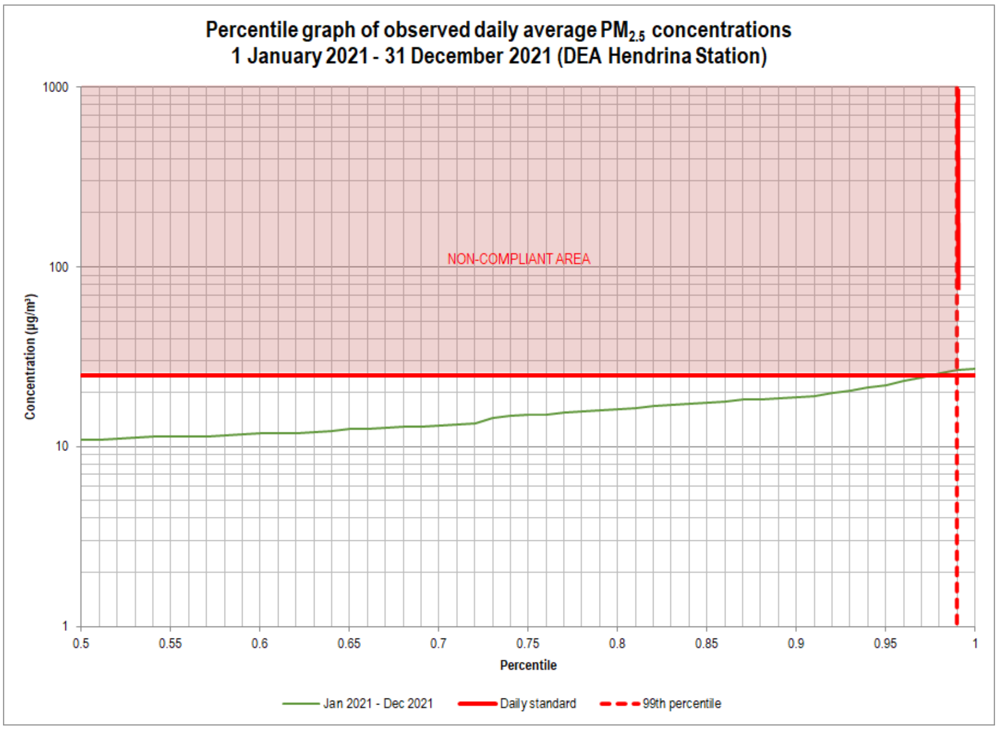


FIGURE 6-18: PERCENTILE GRAPH OF OBSERVED DAILY AVERAGE $PM_{2.5}$ CONCENTRATIONS

An analysis of the hourly observed PM_{10} concentrations at Hendrina was completed, in which the concentration values were categorised into wind speed and direction bins for different concentrations, and visualised in the form of polar plots, where the centre of the polar plot refers to the location of the monitoring station. Polar plots provide an indication of the directional contribution as well as the dependence of concentrations on wind speed (Carslaw and Ropkins, 2012; Carslaw, 2013).

Whereas the directional display is fairly obvious, i.e. when higher concentrations are shown to occur in a certain sector, it is understood that most of the high concentrations occur when winds blow from that sector. When the high concentration pattern is more symmetrical around the centre of the plot, it is an indication that the contributions are near-equally distributed.

Particulate concentrations recorded at the DFFE Hendrina monitoring station show high concentrations from nearby sources to the west-northwest and northwest (Komati and Hendrina Power Stations respectively) at wind speeds below 4 m/s (Figure 6-19). Sources in the north-easterly and south-easterly sectors contribute the lowest concentrations. Higher PM_{10} concentrations under high wind speed conditions (> 4 m/s) to the northwest and southeast indicate wind-dependent sources.

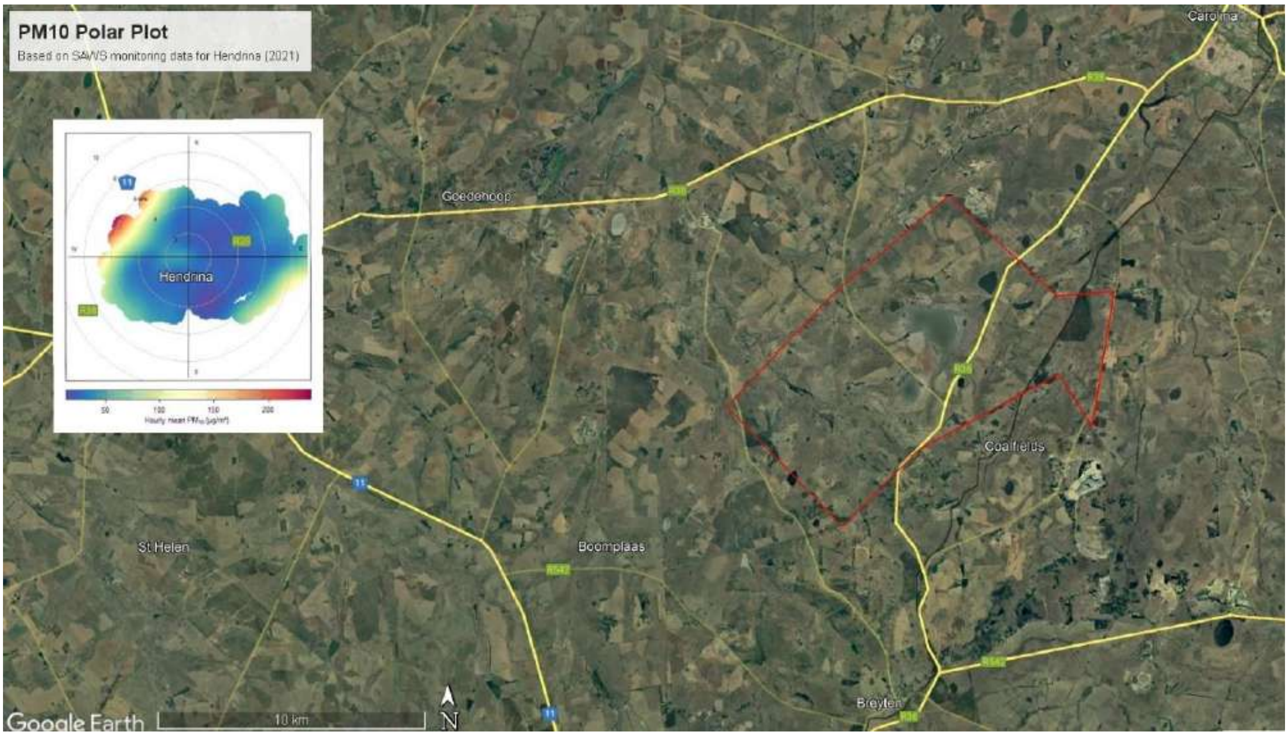


FIGURE 6-19: POLAR PLOT OF HOURLY MEAN PM_{10} CONCENTRATION OBSERVATIONS (JANUARY 2021 – DECEMBER 2021)

6.4.1.11 Environmental Noise

An environmental Noise Impact Assessment (NIA) was undertaken by Airshed Planning Professionals (2022). A description of the receiving environment was extracted from the report and is provided below, refer to the study in Appendix 8.

This section provides details of the receiving acoustic environment which is described in terms of:

- Local NSRs;
- The local environmental noise propagation and attenuation potential; and
- Current noise levels and the existing acoustic climate.

6.4.1.11.1 Noise Sensitive Receptors

Noise sensitive receptors generally include places of residence and areas where members of the public may be affected by noise generated by mining, processing and transport activities.

The impact of an intruding industrial/mining noise on the environment rarely extends over more than 5 km from the source. Noise sensitive receptors within 5 km of the project (indicated in Figure 6-20), include individual homesteads and small informal settlements.

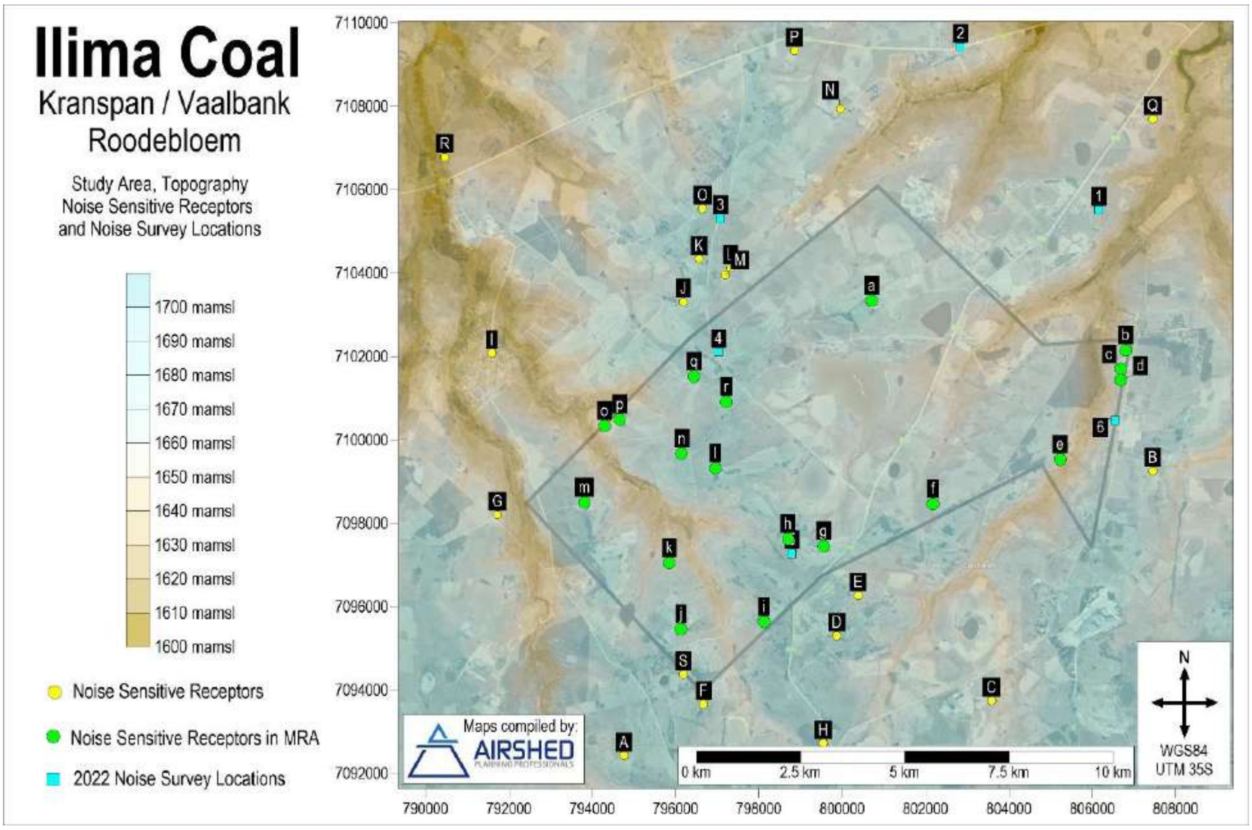


FIGURE 6-20: NOISE SENSITIVE RECEPTORS AND BASELINE NOISE SURVEY LOCATIONS

6.4.1.11.2 Baseline Noise Survey and Results

Day-and night-time noise measurements were conducted on 02 and 04 August 2022 at the six locations shown in Figure 6-20. Survey sites were selected taking into consideration the location of proposed activities, NSRs, accessibility and safety. The acoustic climate at NSRs is currently affected by mines activities, vehicle traffic, domesticated animals as well as natural noises such as birds and insects.

Day-Time Sampling

During the day weather conditions were partly cloudy and sunny, with temperatures between 20.1°C and 24.7°C. Slight to medium wind conditions with wind speeds between 0.1 and 4.2 m/s mostly from the east to southerly directions, prevailed.

Logged broadband time series results are shown graphically for each of the sampling sites in Figure 6-21 and Figure 6-22. Peaks in sound pressure levels at the Site 2 sampling location, located to the north of Kranspan, were higher than those recorded at the other sites due to the vehicles passing along the R38 (vehicles to and from Carolina) road. Sound pressure levels at this location (site 2) were much more variable than at other sites where there was little human activity.

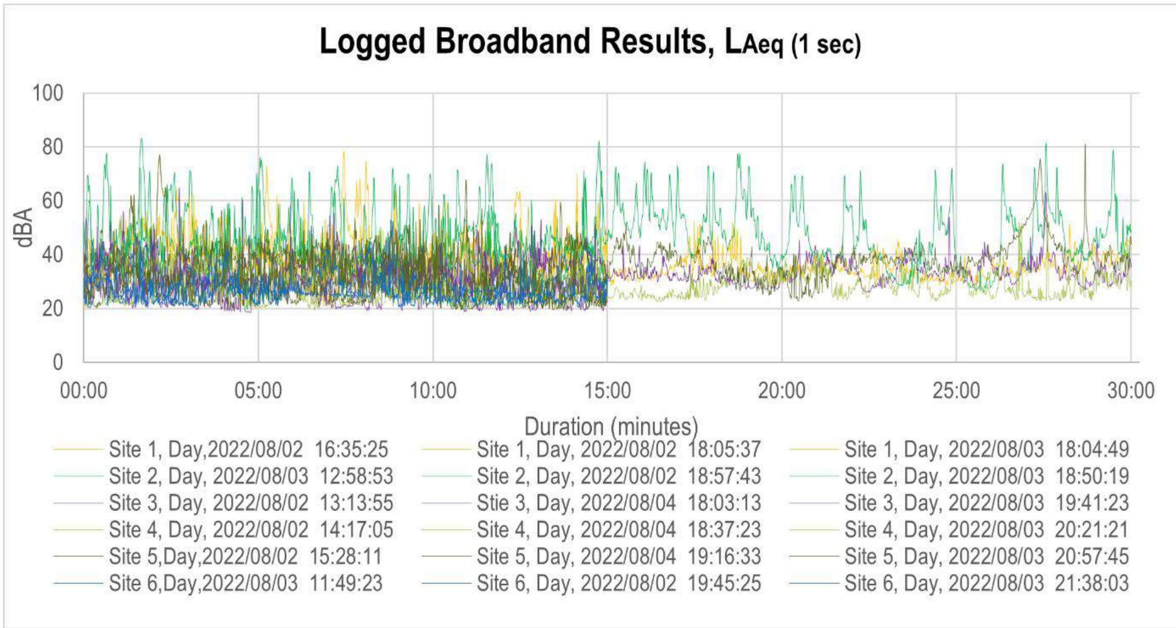


FIGURE 6-21: LOGGED BROADBAND TIME SERIES RESULTS

The day-time broadband survey results can be summarised as follows:

- Measurements indicate day-time ambient noise levels that are influenced by occasional noisy incidents such as vehicles and dogs barking;
- LAeq's ranged between 38.4 dBA and 61.0 dBA (Figure 6-22) which is considered typical of rural to urban areas with major roads according to SANS 10103; and
- The noise level day-time guideline of 55 dBA for residential areas (Figure 6-22) was exceeded at Location Site 2 (61.0 dBA) because of vehicle traffic on the R38 road.

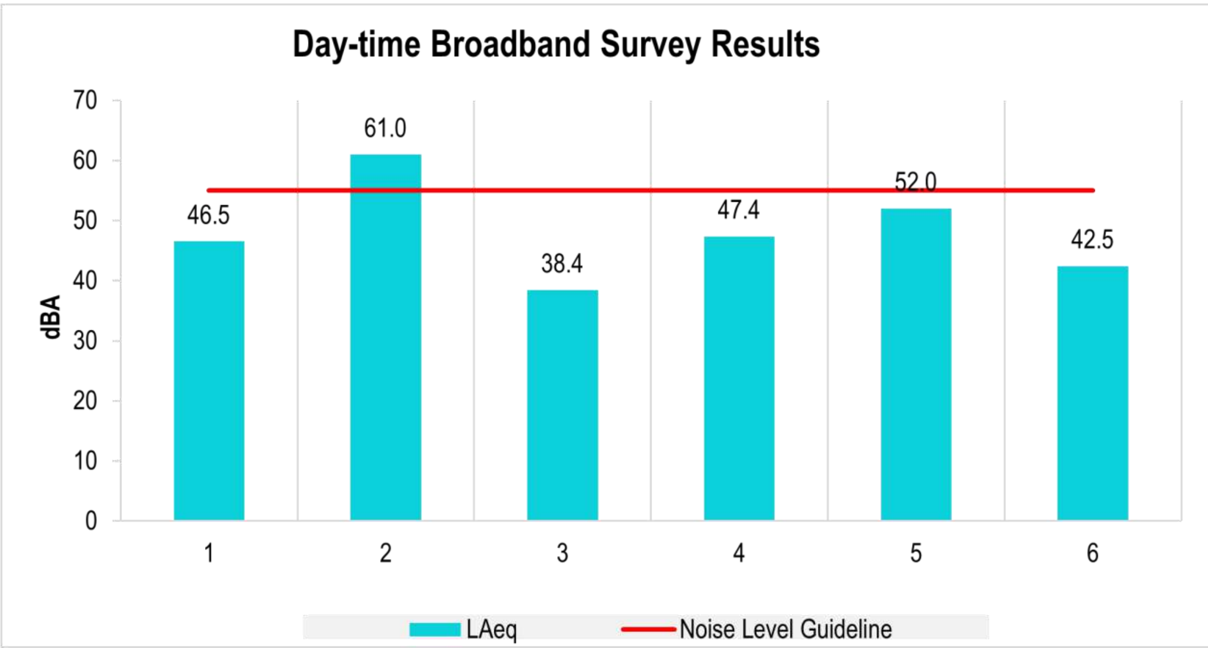


FIGURE 6-22: DAY-TIME BROADBAND SURVEY RESULTS

Night-Time Sampling

Night-time noise measurements were conducted at all six sites as shown in Figure 4. At night, the weather conditions were partly cloudy with temperatures between 17.4ºC and 21.4ºC. Slight wind conditions prevailed with wind speeds between 0 m/s to 1.9m/s mostly from the south to southeast directions.

Logged broadband time series results are shown for each of the sampling locations in Figure 6-23 and Figure 6-24. Recorded sound levels at Site 2 were higher due to occasional vehicle traffic on the R38 road. Sounds levels at Site 1, Site 4, Site 5 and Site 6 were lower during the night, typical of rural locations during the night, while noise levels at Site 3 were slightly higher due to the presence of dogs barking from a nearby farmhouse. The passing of vehicles and the presence of insects can be seen on the logged broadband time series graphs in Figure 8. In the absence of these incidents, the night-time LAeq reduces to ±35 dBA (Figure 6-23). Average sound pressure levels during the night at all sampling locations were approximately 5 dBA to 15 dBA lower than sound pressure levels during the day, contributing incidents in noise levels peaks were mainly caused by sounds made by inserts, occasional vehicles, and dogs barking.

The night-time broadband survey results can be summarised as follows:

- Measurements indicate night-time ambient noise levels that are comparatively quiet but influenced by occasional noisy incidents such as insects, dogs, occasional and vehicle passing;
- On-site LAeq's ranged between 28.4. dBA to 54.6, dBA (Figure 6-24); and
- All recorded LAeq's were below and in compliance with noise level guidelines for residential (45dBA) receptors, except Site 2 (54.6 dBA) and Site 3 (47.1 dBA) which marginally exceeded the noise level guidelines due to high vehicle activity and barking dogs, respectively.

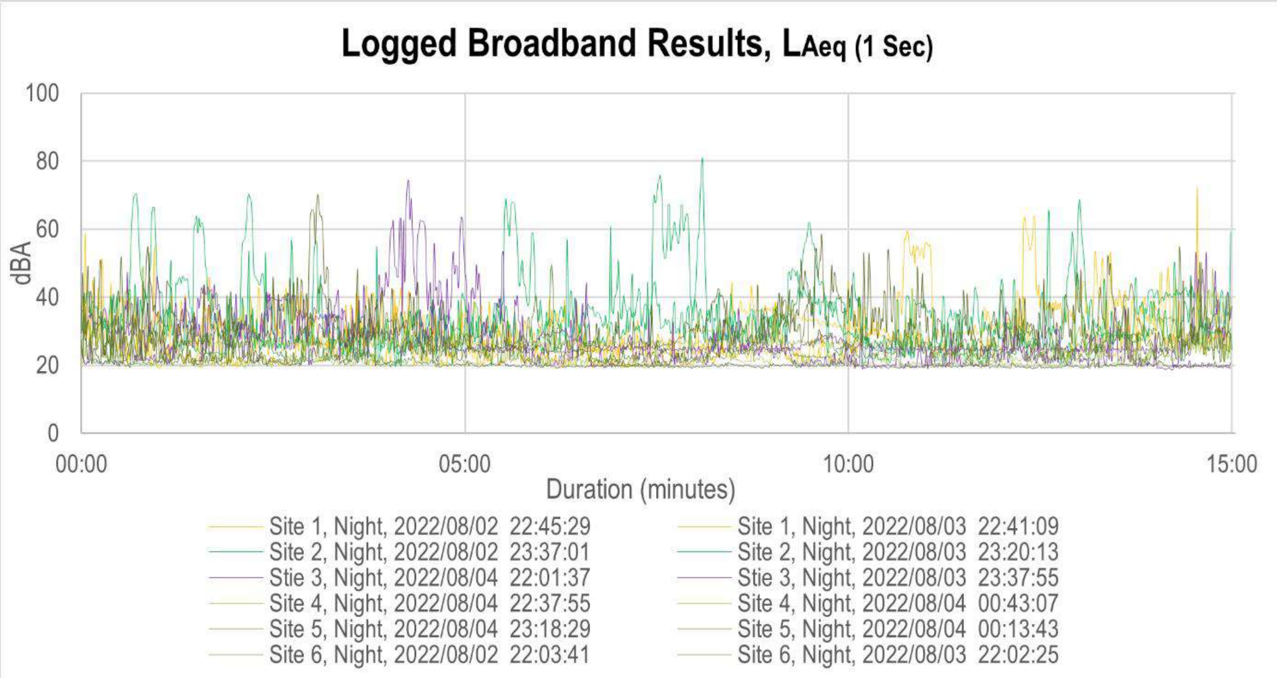


FIGURE 6-23: NIGHT-TIME BROADBAND SURVEY RESULTS

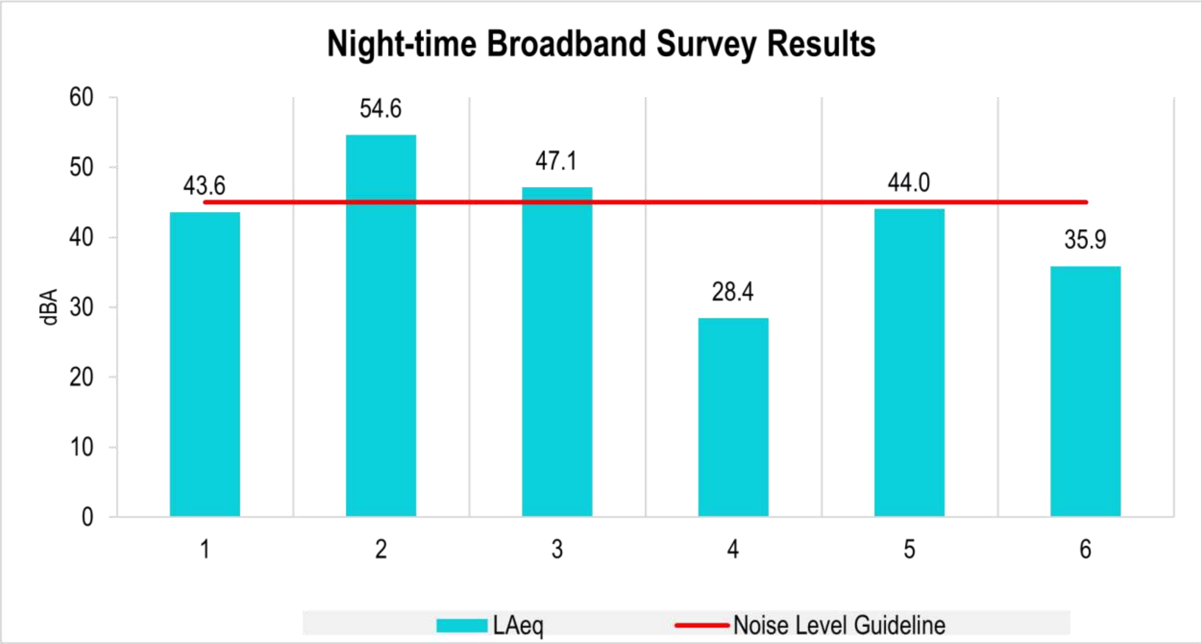


FIGURE 6-24: NIGHT-TIME BROADBAND SURVEY RESULTS

6.4.1.12 Heritage Resources

A Heritage Impact Assessment (HIA) was undertaken by Beyond Heritage (2022). A background study of the project area and a description of the receiving environment was extracted from the report and is provided below, refer to the study in Appendix 8.

6.4.1.12.1 Stone Age

The Stone Age is divided in Earlier; Middle and Later Stone Age and refers to the earliest people of South Africa who mainly relied on stone for their tools.

Very few Early Stone Age (ESA) sites are on record for Mpumalanga and no sites dating to this period are expected for the study area. An example in Mpumalanga is Maleoskop on the farm Rietkloof where ESA tools have been found. This is one of only a handful of such sites in Mpumalanga.

The Middle Stone Age (MSA) has not been extensively studied in Mpumalanga but evidence of this period has been excavated at Bushman Rock Shelter, a well-known site on the farm Klipfonteinhoek in the Ohrigstad district. This cave was excavated twice in the 1960's by Louw and later by Eloff. The MSA layers show that the cave was repeatedly visited over a long period. Lower layers have been dated to over 40 000 BP (Before Present) while the top layers date to approximately 27 000 BP (Esterhuizen & Smith in Delius, 2007; Bergh, 1998). Some isolated finds were recorded close to Witbank as well by Huffman (1999) on the farm Rietfontein.

The Later phases of the Stone Age (LSA) began at around 20 000 years BP. This period was marked by numerous technological innovations and social transformations within these early hunter-gatherer societies. These people may be regarded as the first modern inhabitants of Mpumalanga, known as the San or Bushmen. They were a nomadic people who lived together in small family groups and relied on hunting and gathering of food for survival. Evidence of their existence is to be found in numerous rock shelters throughout the Eastern Mpumalanga where some of their rock paintings are still visible. A number of these shelters have been documented throughout the Province (Bornman, 1995; Schoonraad in Barnard, 1975; Delius, 2007). These include areas such as Witbank, Ermelo, Barberton, Nelspruit, White River, Lydenburg and Ohrigstad.

Three LSA sites are on record in the greater area. The sites are Welgelegen Skuiling close to Ermelo, Chrissiesmeer (also known for rock art) and lastly Groenvlei close to Carolina, this area is also known for rock art (Bergh 1999).

6.4.1.12.2 Iron Age

The Iron Age as a whole represents the spread of Bantu speaking people and includes both the pre-Historic and Historic periods. It can be divided into three distinct periods:

- The Early Iron Age: Most of the first millennium AD.
- The Middle Iron Age: 10th to 13th centuries AD
- The Late Iron Age: 14th century to the colonial period.

The Iron Age is characterised by the ability of these early people to manipulate and work iron ore into implements that assisted them in creating a favourable environment to make a better living. No Early Iron Age sites are on record in the greater region. Around 220 Late Iron Age stone walled sites are on record to the east of the study area (Bergh 1999) and is also associated with numerous pre-difaqane and difaqane wars that took place during the last quarter of the 18th century and during the first three decades of the 19th century. The sites are located close to Bethal. The study area was most probably inhabited by the Phuting group (Berg 1999). Around the study area the Phuting moved south due to the Ndebele migration (Difaqane). These wars led to the displacement of large numbers of Tswana clans on the Highveld where Mzilikazi's Ndebele caused chaos and havoc.

Late Iron Age settlements are characterised by extensive dry stonewalls and dates back to the 17th century. Late Iron Age communities who contributed to this stone walled architecture were the Sotho, Pedi, Ndebele and Swazi. The stone building tradition that these indigenous groups established many decades before the first colonial settlers arrived, may have influenced the colonial farmers to utilize these same resources as building material for the first farmsteads which arose on the Eastern Highveld (Pistorius 2006).

6.4.1.12.3 Anglo-Boer War

The Witkloof Monument stands testament to an interesting battle that took place in the larger area namely the battle of Leliefontein. According to the map (Figure 6-25) from J.S. Bergh, (red), Geskiedenisatlas van Suid-Afrika, Die vier noordelike provinsies, p. 54, there were two concentration camps located to the north of the study area close to Belfast. These sites will not be impacted by the development.

6.4.1.12.4 Heritage Resources

The Project area is characterised by agricultural activities and has been extensively cultivated. The area has been used for agricultural purposes from prior to the 1960's (Van der Walt 2018) and evidence of historical occupation of the area was recorded in the form of historical buildings and burial sites. Indicators of previous occupation of the study area include archaeological sites such as a shelter, Stone Age artefacts and potential rock art (Van der Walt, 2019).

Heritage resources recorded in a previous study (van der Walt 2019) as well as the features recorded during the current study are detailed in Appendix 3 Map 17. The types of heritage resources found during the study include built environment features (such as structures and farmsteads) and burial sites (graves, cemeteries and stone cairns). No archaeological sites were found on the proposed MRA extension area. Examples of the heritage resources found on site are illustrated in Figure 6-26.

FIGURE 6-25: CONCENTRATION CAMPS REPRESENTED BY RED DOTS AND RAILWAY STATIONS WITH GREY SQUARES (BERGH 1999)

FIGURE 6-26: EXAMPLES OF HERITAGE RESOURCES ON SITE

6.4.1.12.5 Cultural Landscape

The study area is rural in character surrounded by agricultural and mining developments and although it is not a significant cultural landscape the proposed mining can have a negative impact on the sense of place. From a heritage point of view the area has been extensively disturbed through years of cultivation and this would have impacted on heritage resources if any ever occurred in these areas. Visual impacts to scenic routes and sense of place are also considered to be low due to the existing developments in the area.

6.4.1.12.6 Palaeontological Heritage

According to the SAHRA Palaeontological map the study area is of very high palaeontological significance (Figure 6-27) and this aspect was addressed in The Palaeontological Impact Assessment (PIA) undertaken by Bamford (2022). The study found that the proposed sites lie entirely on potentially very highly sensitive rocks of the Vryheid Formation (Ecca Group, Karoo Supergroup) that could preserve impressions of fossil plants of the *Glossopteris* flora. The site visit and walk through by the palaeontologist confirmed that there are NO FOSSIL PLANTS of the Glossopteris flora present on the surface. The area is flat and open with secondary grassland or glades of invasive trees. Most of the area has been cultivated previously. It is unknown if there are fossils below the ground surface, therefore, a Fossil Chance Find Protocol has been added to the EMPr.

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 6-27: SAHRA PALAEONTOLOGICAL SENSITIVITY MAP

6.4.1.13 *Visual Aesthetics*

A Visual Impact Assessment (VIA) was undertaken by ABS Africa (2023). A background study of the project area and a description of the receiving environment was extracted from the report and is provided below, refer to the study in Appendix 8.

Visual receptors are defined as "Individuals, groups or communities who are subject to the visual influence" (Oberholzer, 2005). There are two types of visual receptors namely static and dynamic. Static visual receptors refer to views from fixed locations such as communities which are scattered throughout the region. Static visual receptors can be sub-grouped into 3 categories namely:

- Existing infrastructure – There are several existing mining areas. These facilities are seen as less significant as they themselves are a visual disturbance;
- Tourists - Tourists are regarded as visual receptors of exceptionally high sensitivity. Their attention is focused towards the landscape which they essentially utilize for enjoyment purposes and appreciation of the quality of the landscape. In the case of this project, tourists are not likely, to visit this area owing to lack of tourist facilities, and would therefore not be considered as a major receptor. Available accommodation in town is used for work overnight; and
- Communities/Villages- Rural households are present throughout the study area. Rural communities would be visually exposed to new mining infrastructure, and although they are familiar with other mining activities in the area, it would disturb the existing sense of place to some degree. Refer to Appendix 3 Map 18 for the identified visual receptors.

Dynamic visual receptors refer to motorists. Motorists are generally classified as visual receptors of low sensitivity due to their momentary views and experience of the proposed development. Under normal conditions, views from a moving vehicle are dynamic as the visual relationship between the activities is constantly changing as well as the visual relationship between the activity and the landscape in which they are seen. The view cone for motorists, particularly drivers, is generally narrower than for static viewers. Motorists will therefore show low levels of sensitivity as their attention is focused on the road and their exposure to roadside objects is brief. The R36 between Carolina and Breyten would be the main dynamic visual receptor.

FIGURE 6-28: TYPICAL RURAL HOMESTEAD

FIGURE 6-29: MOTORISTS DRIVING ALONG R36

Central to the concept of sense of place is that the landscape requires uniqueness and distinctiveness. The primary informant of these qualities is the spatial form and character of the natural landscape taken together with the cultural transformations and traditions associated with the historic use and habitation of the area.

Historically this area was used as hunting ground by the San people, people (as showed in their rock paintings located in the wider area), grazing by the Swazi people and afterwards by European settlers as grazing on the marginal soils and cultivation on the deeper soils. This farming character is however not unique to the area and occurs throughout the Highveld region. Historical coal mining is widespread in the area, albeit on a smaller scale than modern coal mining in the area. Such sites exist on both Roodebloem and Vaalbank. The heritage specialist report found historical farm homesteads and ruins as well as graves.

The surrounding area, as well as the project area itself, is already heavily impacted with modern mining activities (Kranspan Coal Mine, Msobo Coal Mine, Tselentis Coal Mine, Northern Coal Mine and SG Coal Mine). The area is characterised by coal mining for decades. The transformed agricultural fields also have an impact on scenic value to a lesser extent. Of scenic value is the pan on Vaalbank that is visible from the R36 and is frequented by flamingos in season (Figure 6-29).

6.4.1.14 Socio-Economic Environment[6]

6.4.1.14.1 Chief Albert Luthuli Local Municipality

The proposed Mining Right Extension project is located within Ward 21 of the Chief Albert Luthuli Local Municipality, Gert Sibande District Municipality, within the Mpumalanga Province (Figure 6-30).

Chief Albert Luthuli is rated a Medium Capacity Municipality, which comprises of 5 formally declared towns, namely Carolina, Emanzana, Elukwatini, Empuluzi/Mayflower and Eklulindeni. The administrative head office of the municipality is situated in Carolina, with a satellite office at each of the other towns.

The Demographics and Socio-Economic Profile for Ward 21 of the Chief Albert Luthuli Local Municipality were sourced from Statistics South Africa Census Data (2011) and the Community Survey 2016 (wazimap.co.za) to provide a summary of the key statistics of the municipality (Table 6-22).

6.4.1.14.2 Population

The Ward has a population of 8 095 people. The major forces that drive population growth in the area are fertility, mortality, migration, HIV prevalence and access to Anti Retro Virals.

The most dominant population group in the Ward are Black African individuals, who represent 80.3% of the total population in the Ward. White and Indian/Asian population groups comprise around 18.4% and 0.7% of the population respectively. The dominant languages in Chief Albert Luthuli Local Municipality are Siswati and IsiZulu. IsiZulu is the most widely spoken language in the Ward (35.3%).

6.4.1.14.3 Educational Facilities and Education

A total of 111 schools can be found in Chief Albert Luthuli Municipality, 48 of which are Secondary institutes.

Within the Ward, 19.7% of the population has not attended any type of a schooling system, while 13.9% have some primary school education. Around 26.9% of the population have Grade 12 (Matric) compared to 32.8% in the Mpumalanga Province. Only 26.9% of the population have and a 4.9% have graduated with either undergrad or post-grad. The nearest school to the site is situated immediately west of the western boundary of the proposed Mining Right Extension area. The land on which the school is built is owned by Ilima.

[6] There is a general lack of recent published demographic and other socio-economic data for the area. Except where noted, the information in this section has been summarised from Statistics South Africa Census Data (2011) and Community Survey (2016) from Wazimap.

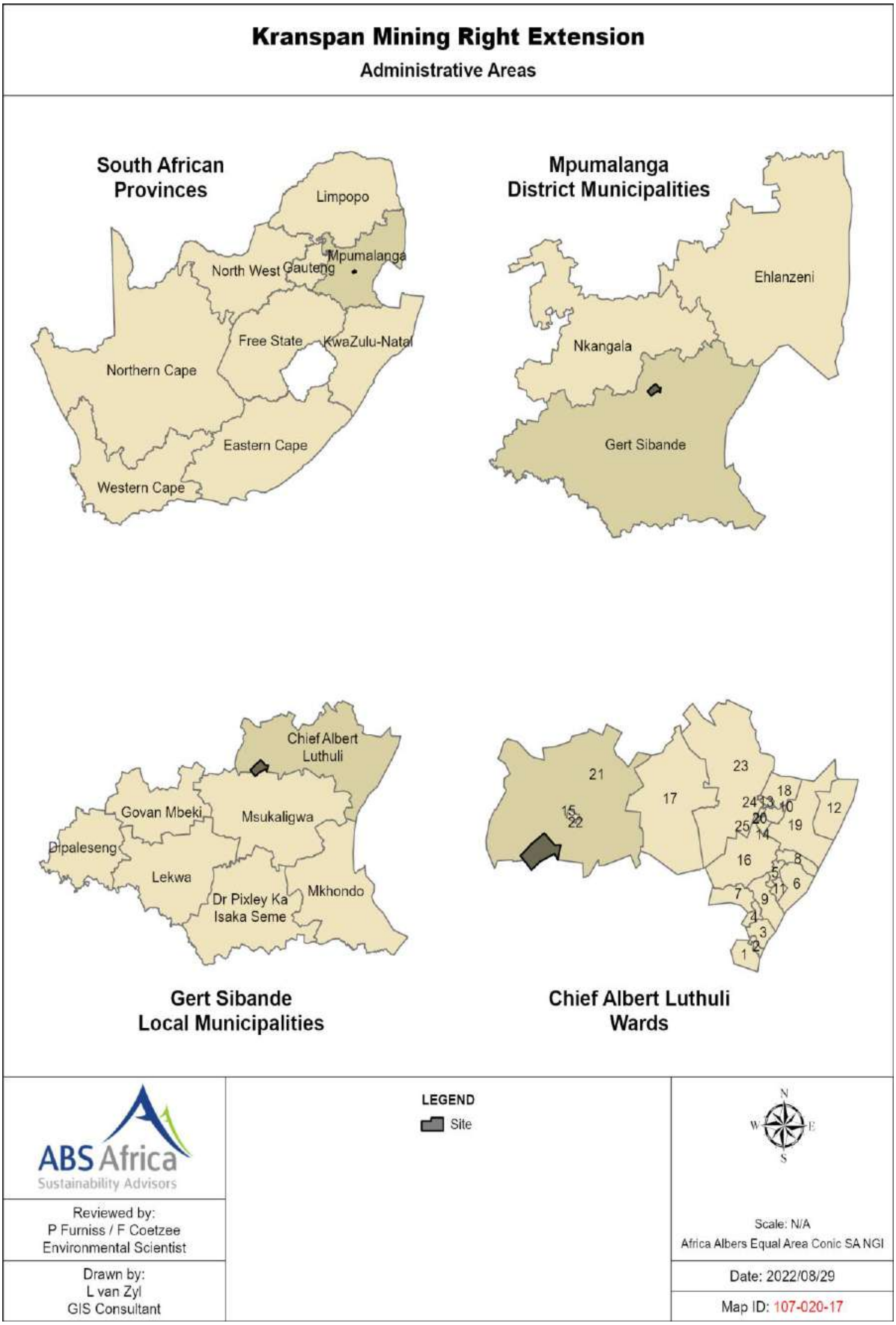


FIGURE 6-30: ADMINISTRATIVE AREAS

TABLE 6-22: KEY STATISTICS OF CHIEF ALBERT LUTHULI LOCAL MUNICIPALITY

KEY STATISTICS	NUMERICAL VALUE
Total population	8 095
Age: Under 18	34%
Age: 18 - 64	57%
Age: 65 and over	9%
Gender: Male	52%
Gender: Female	48%
Home language: IsiZulu	35.3%
Home language: Afrikaans	17.7%
Home language: English	2.9%
Unemployment rate	8%
No schooling	19.7%
Some secondary education	26.5%
Matric	26.9%
Number of Households	2170
Households owned and fully paid off	25%
Households occupied rent-free	39%
Female headed households	27%
Formal dwellings	63.1%
Average annual income	R30 000
Population using borehole water	34.4%
Population using water from service provider	29.7%
Access to flush or chemical toilets	51%
No access to toilets	7.4%
Refuse disposal: own dump	51.7%
Refuse removal: service provider (regularly)	24.1%

Source: Statistics South Africa Census Data (2011) and the Community Survey 2016 (wazimap.co.za)

6.4.1.14.4 Access to Water, Sewage and Solid Waste Services

Piped water is accessed by about 29.7% of the Wards population and about 51% of the municipal population have access to flush or chemical toilets. About 24.1% of the population have access to a regular refuse collection service.

6.4.1.14.5 Housing

Within the Ward, 63.1% of households live in formal units, 19.5% live in traditional housing units and 8.4% live in shacks. Approximately 24.7% of the Wards average household is owned and fully paid off. 38.8% of households are occupied rent-free. Female headed households is about 27.4%. The main goods found in households in the Ward include cellphones and radios.

6.4.1.14.6 Public Safety and Security

The Municipality has one fully-fledged fire station in Carolina, and a satellite fire station in Elukwatini, as well as an operational fire engine and three rescue vehicles.

6.4.1.14.7 Community Health and Health Facilities

Health services are provided by clinics and hospitals in both urban and rural areas. There are a total of 21 clinics in the Chief Albert Luthuli Municipal area, grouped into two clusters: the Northern Cluster from Diepdale to Carolina (10) and Southern Cluster from Hartebeeskop to Badplaas (11).

In addition, there are two Level 1 Hospitals (Carolina Hospital and Embhuleni Hospital), which receive patients referred from the clinics and provides outpatient services as well.

Mpumalanga is one of the three Provinces with the highest infection rates of HIV / AID"s. Latest statistics for the Province reveal an increase in the District infection rate. HIV prevalence rate of pregnant women was 43.2% in 2011 - increasing between 2001 & 2011. HIV prevalence rate excluding pregnant women was 21.6% (2011) - decreasing trend.

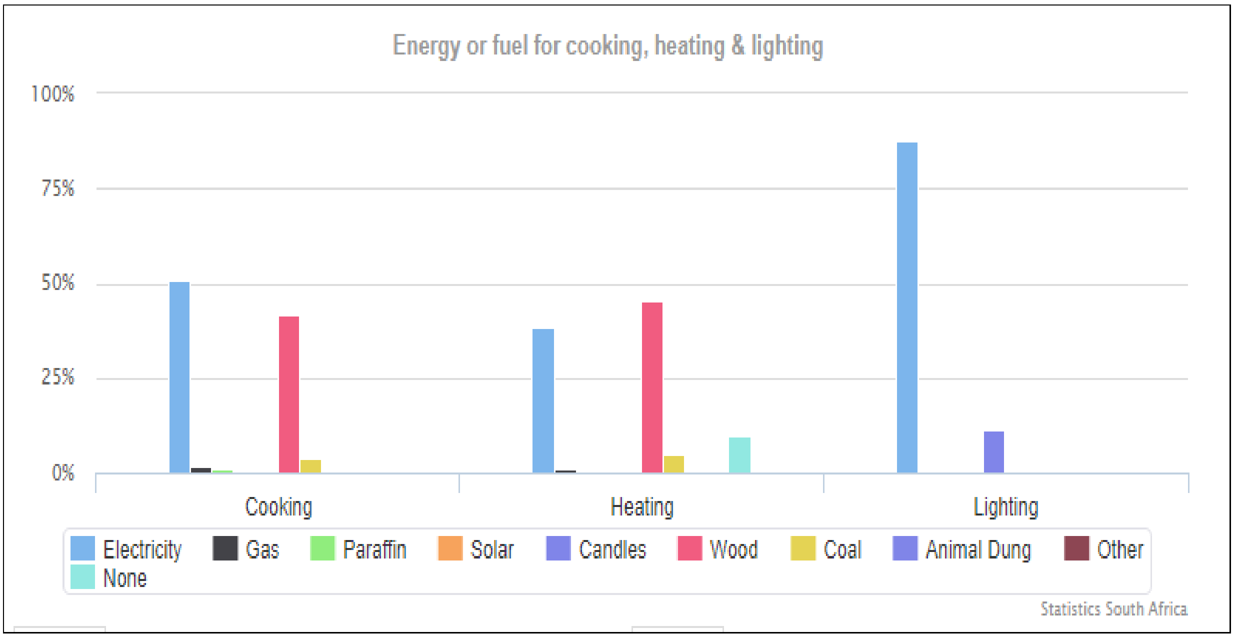
The municipality is responsible for the provision of graves to the communities for burials and maintenance of 6 municipal cemeteries. They are at Emanzana, Carolina, Ekulindeni, Elukwatini, Mayflower and Silobela. Other areas are falling within the tribal authority and are using the tribal cemeteries, which are spread throughout the villages at times.

6.4.1.14.8 Electricity and Energy

Around 87.5% of household dwellings found in Chief Albert Luthuli Local Municipality have access to electricity. The Municipality is licensed to distribute electricity in Carolina, Silobela and part of Emanzana only. Eskom is licensed for the bulk supply and reticulation in the former Ekulindeni, Elukwatini and Empuluzi TLC areas. Electrification of households in the rural areas, the informal settlements and parts of Silobela Township is a compelling necessity.

As shown in Figure 6-31, the majority of the population in the municipality have access to electricity, which is used primarily for cooking, heating and lighting. The proportion of households within the municipality that use electricity for lighting has increased from 50.9% in 2001 to approximately 87.5% in 2011.

Although relatively expensive, paraffin and gas are used for cooking and heating in some places. Households using electricity as a source of energy for cooking in 2011 is 50.8%.



Source: Statistics South Africa Census Data (2011)

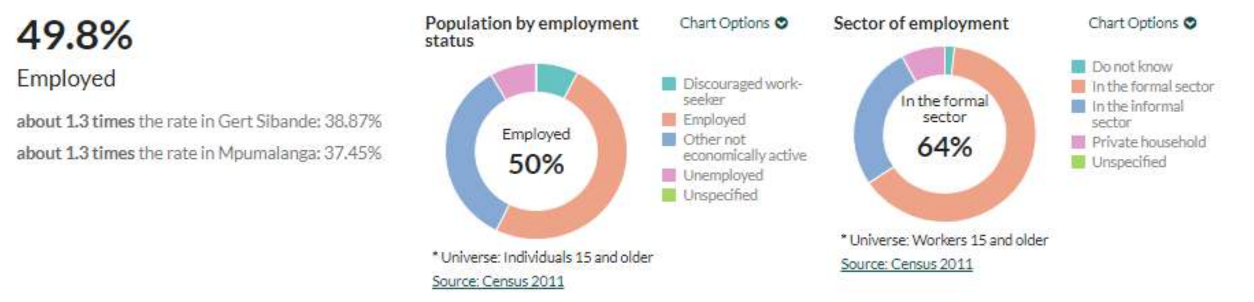
FIGURE 6-31: SUMMARY OF ENERGY OR FUEL FOR COOKING, HEATING & LIGHTING

6.4.1.14.9 Employment

Within the Ward, 8.3% of the 5 100 economically active individuals (i.e. those who are employed or unemployed but looking for work) are unemployed.49.8% of these individuals are employed (Figure 6-32).

The average household income is approximately R 30 000. Obtaining any form of income generating employment within the Ward has become increasingly difficult in recent years. This is attributed to Covid-19 as well as the lack of education, resulting in the uneducated experiencing the high incidences of poverty.

In terms of the Covid-19, the Chief Albert Luthuli Local Municipality IDP (2022-2027) reported that the net provincial job losses in the in the period 1 April 2020 to December 2020 were almost 44 200. Mining was one of the sectors where job losses were of concern.



Population by employment status (Table OFFICIALEMPLOYMENTSTATUS) Explore and download this data

Column	Albert Luthuli Ward 21 (83001021)		Gert Sibande		Mpumalanga	
Discouraged work-seeker	7.5%	382	5.3%	35,518	5.8%	150,844
Employed	49.8%	2,539	38.9%	259,129	37.5%	969,771
Other not economically active	34.5%	1,757	39.4%	262,387	39.4%	1,020,806
Unemployed	8.3%	422	16.5%	109,658	17.3%	448,126
Unspecified	0%	0	0%	0	0%	0

Hide data

Source: Statistics South Africa (2011)

FIGURE 6-32: SUMMARY OF EMPLOYMENT

6.4.1.14.10 Economy

The Chief Albert Luthuli Local Municipality IDP (2022-2027) identifies the Carolina area as an area of mixed farming and small-scale coal mining. The IDP also identifies mining as a pivotal sector in the municipality. Chief Albert Luthuli's contribution to the Mpumalanga economy in 2020 was 2.5% (seventh smallest economy in the province).

Average annual economic growth rate for Chief Albert Luthuli was 2.4% p.a. over the period 1996 to 2020. For the period 2015-2020 the economy contracted by 0.5% p.a. in line with the weak economic climate in the country. Estimated contraction in 2020 of between -5% & -6% due to the COVID-19 lockdown. Construction, transport, manufacturing and trade & tourism most severely affected. Expected growth of about 4% in 2021 from a low base, as the country emerges from lockdown and the economy discovers its niche under the new normal. The estimated average annual GDP growth for Chief Albert Luthuli between 2020 and 2025 is relatively low at 1.4% per annum.

In 2020, the size of the economy was estimated at almost R9.8 billion in current prices; community services, mining, trade (including tourism) and finance were the largest industries in the economy of Chief Albert Luthuli. Together these four industries contributed almost three quarters to the local economy, while industries such as mining, agriculture, as well as tourism enjoyed comparative advantage.

6.4.1.14.11 Local Community

The proposed Kranspan Mine extension area falls over several properties of Farms Vaalbank 212 IS and Roodebloem 51 IT (Appendix 3 Map 4). Some of the properties consist of vacant land, however, most properties contain farmsteads where people either live or work. Refer to Appendix 3 Map 19 for the identified Sensitive Receptors within the proposed MRA extension area, as identified in the Social Impact Assessment (Appendix 8). The SRs include places of residence (houses and farmsteads), structures/buildings used for farming practices and areas where members of the public may be affected by blasting, visual disturbances, noise, dust emissions, traffic, temporary loss of their land or jobs, or even potential relocation. These SRs as well as several SRs that occur adjacent to the proposed MRA extension area may be impacted by the proposed mining activities if they fall within the zone of influence (i.e. such as blasting activities which may result in induced vibration, air blast, fly rock and fumes).

The area is mostly used for agricultural purposes (such as crop cultivation) or as grazing land for livestock. Historical mining has occurred on some of the properties on Farm Vaalbank 212 IS and on a small portion of Farm Roodebloem 51 IT. The Ezindongeni primary school, located on land owned by Ilima and part of the current Kranspan MRA, is non-operational.

At this stage, it is unclear if inhabitants within the MRA will be relocated. Thus, the potential impacts on these SRs from the proposed mining activities (such as blasting, noise, dust and sense of place) were assessed in the following Specialist Reports (refer to Appendix 8):

- Blasting Impact Study;
- Noise Impact Assessment;
- Air Quality Impact Assessment;
- Visual Impact Assessment; and
- Social Impact Assessment.

6.4.2 DESCRIPTION OF THE CURRENT LAND USES

6.4.2.1 Existing Surface Land Uses

Existing land uses over the Kranspan MRA extension (Farm Vaalbank 212 IS and Farm Roodebloem 51 IT) include the following:

- Vacant land (Figure 6-33);
- Cultivated fields, comprising of predominantly maize (Figure 6-34);
- Farm roads and agricultural infrastructure (Figure 6-35 and Figure 6-36);
- Cattle farming and grazing land (Figure 6-37 and Figure 6-38);
- Ezindongeni Primary School (Figure 6-39);
- Farmsteads (Figure 6-40); and
- Historical mined land (Figure 6-41).

Historically the area has been utilised for intensive commercial cultivation of annual crops and grazing of livestock with a significant amount of coal mining in close proximity. Historical mining has occurred on some of the properties on Farm Vaalbank 212 IS and on a small portion of Farm Roodebloem 51 IT.

Parts of the land proposed for the mining operation and the beneficiation facilities is existing farmland that has been zoned as such and is already extensively transformed by these activities.

There are no registered land claims applicable to the Farm Roodebloem 51 IT, however, there is a registered land claim on RE of Vaalbank 212 IS. The claim status on this land claim has been gazetted and the registered landowner is the Siyathuthuka Communal Property Association.

FIGURE 6-33: VACANT LAND

FIGURE 6-34: CULTIVATED FIELDS (MAIZE)

FIGURE 6-35: FARM ROAD

FIGURE 6-36: WATER TANK

FIGURE 6-37: CATTLE FARMING

FIGURE 6-38: GRAZING LAND

FIGURE 6-39: EZINDONGENI PRIMARY SCHOOL

FIGURE 6-40: FARMSTEADS

FIGURE 6-41: HISTORICAL MINED LAND WITHIN THE PROPOSED EXTENSION AREA

6.4.2.2 Surrounding Land Uses

Surrounding land uses include the following:

- R36 Main Road to Carolina / Breyten;
- Unnamed gravel roads;
- Mining activities (Figure 6-42, Figure 6-43 and Figure 6-44) from Kranspan Coal Mine, Msobo Coal Mine, Tselentis Coal Mine, Northern Coal Mine and SG Coal Mine;
- Railway tracks (Figure 6-45);
- Agriculture; and
- Farmsteads.

FIGURE 6-42: ADJACENT MINING ACTIVITIES

FIGURE 6-43: MINING AREA SIGNAGE

FIGURE 6-44: DUST FROM BLASTING

FIGURE 6-45: RAILWAY TRACKS

6.4.3 DESCRIPTION OF SPECIFIC ENVIRONMENTAL FEATURES AND INFRASTRUCTURE ON THE SITE

The following specific environmental features and existing infrastructure on the site have been identified:

TABLE 6-23: ENVIRONMENTAL FEATURES AND INFRASTRUCTURE IDENTIFIED ON SITE

TERRESTRIAL BIODIVERSITY	
Terrestrial Biodiversity	Some areas of the site fall within a CBA and ESA, which provide habitats for threatened plant species. Important vegetation units have been identified within the site.
Flora and Fauna	Several plant and animal species of conservation importance occur within the site.
SURFACE WATER	
Wetlands	The site contains several important wetland systems.
HERITAGE RESOURCES	
Built Environment	Several structures and farmsteads of heritage importance occur within the site.
Burial Sites	Graves, cemeteries and stone cairns of heritage importance occur within the site.
SOCIO-ECONOMIC	
Sensitive Receptors	Places of residence (houses and farmsteads) as well structures/buildings used for farming practices occur within the site.
INFRASTRUCTURE	
R36 Road	The road runs through the site in a north to south direction from Carolina to Breyten.
Railway	A 20 tonne/axle railway line runs from Belfast in the north, to Ermelo in the south. This rail line passes through Farm Roodebloem 51 IT.
Powerlines	Several powerlines run through the site.

6.4.4 ENVIRONMENTAL AND CURRENT LAND USE MAP

A map showing the land uses as well as the environmental features and existing infrastructure, as discussed in Section 6.4.2 and 6.4.3 above, is provided in Appendix 3 Map 20 and Appendix 3 Map 21, respectively.

6.5 IMPACTS AND RISKS IDENTIFIED INCLUDING THE NATURE, SIGNIFICANCE, CONSEQUENCE, EXTENT, DURATION AND PROBABILITY OF THE IMPACTS

This section provides a list of the potential impacts that have been identified by the activities described in the initial site layout. This section also indicates the extent to which the potential impacts can be reversed, the extent to which they may cause irreplaceable loss of resources, and if they can be avoided, managed or mitigated. Section 7 focuses on the impacts on the final site layout.

Table 6-24 provides the identified aspects from the baseline environment (Section 6.4) within which the potential environmental impacts have been assessed. This section focuses on the pertinent impacts and risks that could potentially be caused by the proposed Kranspan mine extension project during all phases of the project on the initial layout plan (Table 6-25, Table 6-26 and Table 6-27). The potential impacts listed in this section were identified through an appraisal of the project's description, listed activities, the receiving environment, specialist study findings and consultations with relevant stakeholders.

TABLE 6-24: ASPECTS IDENTIFIED FOR THE PROJECT

<table>
<tr><th>NO.</th><th colspan="3">ASPECTS</th></tr>
<tr><td>1</td><td colspan="3">Climate</td></tr>
<tr><td>2</td><td colspan="3">Topography</td></tr>
<tr><td>3</td><td colspan="3">Geology</td></tr>
<tr><td>4</td><td colspan="3">Soils and Agricultural Land Capability</td></tr>
<tr><td>5</td><td colspan="3">Hydropedology</td></tr>
<tr><td>6</td><td colspan="3">Terrestrial Ecology – Flora</td></tr>
<tr><td>7</td><td colspan="3">Terrestrial Ecology – Fauna</td></tr>
<tr><td>8</td><td colspan="3">Surface Water Ecosystems</td></tr>
<tr><td>9</td><td colspan="3">Groundwater</td></tr>
<tr><td>10</td><td colspan="3">Air Quality</td></tr>
<tr><td>11</td><td colspan="3">Noise</td></tr>
<tr><td>12</td><td colspan="3">Heritage Resources</td></tr>
<tr><td>13</td><td colspan="3">Palaeontological Resources</td></tr>
<tr><td>14</td><td colspan="3">Visual Aesthetics</td></tr>
<tr><td rowspan="15">15</td><td rowspan="15">Socio-economic</td><td colspan="2">a. Coal Production for Electricity Generation</td></tr>
<tr><td colspan="2">b. Economic Growth</td></tr>
<tr><td colspan="2">c. Employment Opportunities</td></tr>
<tr><td colspan="2">d. Skills Development and Education Opportunities</td></tr>
<tr><td colspan="2">e. Local Economic Development</td></tr>
<tr><td colspan="2">f. Government Revenue and Royalties</td></tr>
<tr><td colspan="2">g. Change in Land Use</td></tr>
<tr><td colspan="2">h. Population Influx</td></tr>
<tr><td colspan="2">i. Security Risks</td></tr>
<tr><td rowspan="2">j. Mine Health and Safety</td><td>i. General</td></tr>
<tr><td>ii. Spontaneous Combustion of Coal</td></tr>
<tr><td rowspan="3">k. Community Health and Safety</td><td>i. Diseases</td></tr>
<tr><td>ii. Traffic and Road Safety</td></tr>
<tr><td>iii. Blasting</td></tr>
<tr><td colspan="2">l. Mine Closure</td></tr>
</table>

6.5.1 Construction Phase

TABLE 6-25: POTENTIAL IMPACTS ON THE INITIAL LAYOUT PLAN (CONSTRUCTION PHASE)

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
1	Topography	Site clearing, levelling and cut and fill construction activities	Change in topography of the area which could have impacts on the sense of place and visual aesthetics as well as potentially result in the interception of natural runoff.	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
2	Geology	Site clearing and infrastructure siting	Underlying geology will be affected in that mineral resources will be lost.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
3	Soils and Agricultural Land Capability	Ancillary infrastructure (Offices and Workshops)	The construction phase for the proposed contractor's yards, office areas and haul roads will lead to compaction and erosion of soil resources due to altered surface dynamics, the presence of hardened surfaces and general degradation of soil resources, which could result in the loss of land capability.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		Stockpiling	During construction, stockpiles will lead to compaction and erosion of soil resources due to altered surface dynamics, the increased volume of traffic (dump trucks in specific) and general degradation of soil resources, which could result in the loss of land capability.	Low-Medium			
		Opencast mining	The construction phase for the proposed opencast mining activities will lead to compaction and erosion of soil resources due to increased traffic, stripping activities and the general degradation of soil	High			

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			resources, which could result in the loss of land capability.				
4	Hydropedology	Compaction and surface sealing activities	Increased erosion and sedimentation due to increase overland flow on the environment.	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
			Increased overland flow will result in decreased infiltration and therefore less lateral flow at the soil bedrock/interface or return flow from groundwater.	Medium-High			
5	Terrestrial Ecology – Flora	Clearance of vegetation from construction activities	Loss of Natural Habitat (untransformed habitat) of High Ecological Importance: The proposed infrastructure footprint includes a total of 545.9 ha of Natural Habitat with High Ecological Importance and these areas which will be lost comprise mostly of Untransformed Grassland (337.1ha) and Valley-bottom & Seep wetlands (199.5ha) but also include smaller areas of Sandstone Scarp Shrubland (9.3 ha).	High	No	Yes	Yes, impact can be managed and mitigated.
			Loss of Plant Species of Conservation Concern (SCC): Two plant SCC were confirmed to occur within the project area during fieldwork, namely Sensitive Species 1200 and *Khadia carolinensis*. In addition, two other SCC not recorded during fieldwork but which are extremely difficult to detect due to their small size (*Aspidoglossum xanthosphaerum*) or occurrence in habitat that remains flooded for protracted periods	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			(*Lessertia phillipsiana*), are thought to have a Moderate to High likelihood of occurring within the project area.				
			Introduction and Proliferation of Alien Invasive Plant Species: Construction activities will provide transformed habitat ideal for the establishment and proliferation of alien invasive plant species. These concentrations of alien plants in areas disturbed by mining will provide a source of seeds and other propagules which are likely to are likely to be dispersed by mining activities and natural dispersal agents (e.g. wind and water dispersal). Highly aggressive alien invaders and habitat transformers are highly likely to colonise the verges of haul roads and access roads throughout the project area from where they are likely to spread into adjacent areas of Untransformed Habitats of high Ecological Importance.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		Influx of labourers and contractors	Illegal Utilisation of Plant Resources: The highly species rich Natural Habitats of the project area contain numerous plant species that are popular medicinal plants (e.g. *Boophone disticha* and *Eucomis autumnalis*) which are likely to be targeted by any illegal medicinal plant harvesters entering the project area. The influx of labourers and contractors could result in an	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			increase in the illegal harvesting of medicinal plants. Furthermore, mines often practice lax access control in the parts of their extensive properties that are not being actively utilised for mining activities leading to an increase in illegal medicinal plant harvesting relative to that which occurs on private farmland.				
6	Terrestrial Ecology – Fauna	Clearance of vegetation from construction activities	Displacement and Loss of Habitat for Faunal Species: The proposed open cast mining and associated activities will result in the clearing and loss of Natural Habitat. Approximately 545.9 ha of Natural Habitat (comprising vegetation units with High Ecological Importance) is expected to be lost due to mining activities. Areas which will be lost comprise mostly of Untransformed Grassland (337.1ha) and Valley-bottom & Seep wetlands (199.5ha) and smaller areas of Sandstone Scarp Shrubland (9.3 ha).	High	No	Yes	Yes, impact can be managed and mitigated.
			Disruption of Ecological Connectivity and Faunal Dispersal: The open cast mining activities and mine expansion proposed for the project area will aggravate habitat fragmentation and the disruption of natural ecological corridors in the area, thereby impeding the dispersal of faunal species as well as the potential for re-colonisation and recruitment of fauna to	High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			the project area during rehabilitation. It is especially sub-populations of medium to large mammal species such as Mountain Reedbuck and Southern Reedbuck that are at risk of becoming fragmented if natural connectivity is disrupted and when the surface area of natural corridors is reduced to the point that these animals can no longer disperse across the project area.				
		Influx of labourers and contractors	Illegal Utilisation of Faunal Resources: The presence of a large labour force within the project area during mining activities will increase the risk of illegal utilisation of fauna resources, such as hunting and snaring of antelope, small mammals and birds. It is assumed that labour force will be accommodated in nearby towns and not on site, which would lower this risk of hunting and poaching considerably. In addition, the project may also result in increased utilisation of natural resources due to potential human encroachment and accessibility to the project area owing to people seeking jobs. This could result in the establishment of illegal settlements on areas consisting of natural habitat on the project area where active mining is absent.	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
7	Surface Water Ecosystems	➲ Clearing and grubbing of vegetation ➲ Site perimeter fencing and internal fencing of different sections of the mine ➲ Removal and stockpiling of topsoil ➲ Delivery and storage of vehicles, equipment, machinery, and materials ➲ Construction of access roads, platforms, and drainage structures ➲ Construction of process plant infrastructure and installation of required equipment and machinery ➲ Construction of the main mine administration complex	Destruction of sensitive habitat: Destruction of wetland units during all construction phase activities due to heavy machinery and indiscriminate habitat destruction.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			Destruction of sensitive habitat: Wetland vegetation alteration following disturbances that will enhance exotic vegetation encroachment.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			Fragmentation of linear surface water habitat: Fragmentation of interconnected wetland units (watercourses) that would otherwise offer migratory corridors.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			Soil erosion that impacts watercourses and wetland habitat: All construction phase activities that result in soil destabilisation.	High	No	Yes	Yes, impact can be managed and mitigated.
			Water quality: All construction phase and operations phase activities associated with water contamination	High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
		➲ Installation of power and water supply infrastructure					
8	Groundwater	Storage of hazardous substances for construction activities	Potential contamination of groundwater quality from accidental spillages of hazardous substances stored on site.	Very Low	No	Yes	Yes, impact can be managed and mitigated.
9	Air Quality	Construction activities such as topsoil removal, material loading and hauling, stockpiling, grading, bulldozing, as well as metal and concrete works for the establishment of infrastructure	The main pollutant of concern from construction operations is particulate matter, including PM_{10}, $PM_{2.5}$ and TSP. PM_{10} and $PM_{2.5}$ concentrations are associated with potential health impacts due to the size of the particulates being small enough to be inhaled. Nuisance effects are caused by the TSP fraction (20 μm to 75 μm in diameter) resulting in soiling of materials and visibility reductions. Thus the impact on air quality is the elevated PM_{10} and $PM_{2.5}$ concentrations and elevated dustfall levels	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
10	Noise	All construction activities	Elevated Noise Levels	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
11	Heritage Resources	Construction phase activities resulting in disturbance of surfaces and/or sub-surfaces	May destroy, damage, alter, or remove structures of heritage importance	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			May destroy, damage, alter, or remove ruins of heritage importance	Low	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			May destroy, damage, alter, or remove stone cairns of heritage importance	Low	No	Yes	Yes, impact can be managed and mitigated.
			May destroy, damage, alter, or remove burial sites of heritage importance	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
12	Palaeontological Resources	All construction activities	May destroy, damage, alter, or remove resources of palaeontological importance	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
13	Visual Aesthetics	All construction activities	Visual disturbance of the sense of place	High	No	Yes	Yes, impact can be managed and mitigated.
14	Socio-economic	All activities involving employment and procurement of goods and services	Employment Opportunities: The project has the potential to create employment opportunities for local communities	High (+)	Positive impact should be enhanced.		
			Skills Development and Education Opportunities: The project has the potential to provide increased availability and opportunity for a wide range of skills development and job training	Medium-High (+)	Positive impact should be enhanced.		
			Local Economic Development: Procurement of local goods and services by the mine, employees and contractors will stimulate local business and create opportunities for entrepreneurship. In addition, implementation of the agreed LED projects committed to in the SLP will have a significant positive impact for the broader community	Medium-High (+)	Positive impact should be enhanced.		
		All construction activities	Government Revenue and Royalties: Payment of dividends, royalties, corporate	Low-Medium (+)	Positive impact should be enhanced.		

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			tax, and income tax should also improve the financial capacity of the government to improve community infrastructure and service delivery				
			Change in Land Use resulting in loss of agricultural land and loss of jobs	High	No	Yes	Yes, impact can be managed and mitigated.
		All activities involving employment and procurement of goods and services	Population Influx: The social and economic pressures of population growth will continue as additional people move to the area to find employment and require accommodation and access to community services	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
			Security Risks: Increased levels of crime may be experienced in the area as a result of the influx of people seeking employment. Contact crimes may result in injuries and in severe cases, fatalities	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		All construction activities	Mine Health and Safety – General: Minor, major and fatal injuries from potential mine health and safety incidents. In addition, the mine will store and handle various hazardous substances including explosives	High	No	Yes	Yes, impact can be managed and mitigated.
		Movement of man and materials	Community Health and Safety – Diseases: The incidence of HIV/AIDS and other STDs could increase as a result of in-migration of workers seeking employment. Outbreaks of TB can be facilitated by crowded housing conditions and therefore	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			pose a risk for both employees and community members				
			Community Health and Safety – Traffic and Road Safety: The project will result in an increase in traffic volume on the R36, including heavy vehicles like ADTs. Traffic and congestion on local public roads will increase. In summary, safety risks to vehicles and pedestrians will be increased. This may negatively influence traffic flows, accelerate degradation of the road surface and possibly result in a greater likelihood of collision incidents	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

6.5.2 Operation Phase

TABLE 6-26: POTENTIAL IMPACTS ON THE INITIAL LAYOUT PLAN (OPERATIONAL PHASE)

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
1	Climate	Equipment and vehicles used during mining activities	Greenhouse Gas Emissions.	Low	No	Yes	Yes, impact can be managed and mitigated.
2	Topography	Blasting activities and mining of opencast pits	Change in topography of the area which could have impacts on the sense of place and visual aesthetics as well as potentially intercepting natural runoff.	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
3	Geology	Blasting activities and excavations required for all mine infrastructure and the opencast pits	Underlying geology will be affected in that mineral resources will be lost.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
4	Soils and Agricultural Land Capability	Ancillary infrastructure (Offices and Workshops)	The operational phase for the proposed contractor's yard, office areas and haul roads will lead to compaction and erosion of soil resources due to altered surface dynamics, increased traffic, foot movement and the general presence of foundations, which could result in the loss of land capability.	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
		Stockpiling	During operation, stockpiling will lead to compaction and erosion of soil resources due to the sheer weight of the stockpiles, the slope of the stockpiles which will induce overland flow and increased traffic which could result in the loss of land capability.	Low-Medium			
		Opencast mining	Opencast mining activities will involve soil stripping activities which will lead to the removal of soil resources together with	High			

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			bedrock, which will result in the loss of land capability to some extent.				
5	Hydropedology	Opencast mining activities	Open cast areas will intercept lateral flow paths and remove connectivity between recharge zones and lateral flow zones. Alteration of this flow path will likely change the wetland water regimes negatively	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
6	Terrestrial Ecology – Flora	Opencast mining activities	Loss of Natural Habitat (untransformed habitat) of High Ecological Importance: The proposed infrastructure footprint includes a total of 545.9 ha of Natural Habitat with High Ecological Importance and these areas which will be lost comprise mostly of Untransformed Grassland (337.1ha) and Valley-bottom & Seep wetlands (199.5ha) but also include smaller areas of Sandstone Scarp Shrubland (9.3 ha).	High	No	Yes	Yes, impact can be managed and mitigated.
			Loss of Plant Species of Conservation Concern (SCC): Two plant SCC were confirmed to occur within the project area during fieldwork, namely Sensitive Species 1200 and *Khadia carolinensis*. In addition, two other SCC not recorded during fieldwork but which are extremely difficult to detect due to their small size (*Aspidoglossum xanthosphaerum*) or occurrence in habitat that remains flooded for protracted periods (*Lessertia phillipsiana*), are thought to have	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			a Moderate to High likelihood of occurring within the project area.				
			Introduction and Proliferation of Alien Invasive Plant Species: Construction activities will provide transformed habitat ideal for the establishment and proliferation of alien invasive plant species. These concentrations of alien plants in areas disturbed by mining will provide a source of seeds and other propagules which are likely to are likely to be dispersed by mining activities and natural dispersal agents (e.g. wind and water dispersal). Highly aggressive alien invaders and habitat transformers are highly likely to colonise the verges of haul roads and access roads throughout the project area from where they are likely to spread into adjacent areas of Untransformed Habitats of high Ecological Importance.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		Influx of labourers and contractors	Illegal Utilisation of Plant Resources: The highly species rich Natural Habitats of the project area contain numerous plant species that are popular medicinal plants (e.g. *Boophone disticha* and *Eucomis autumnalis*) which are likely to be targeted by any illegal medicinal plant harvesters entering the project area. The influx of labourers and contractors could result in an increase in the illegal harvesting of	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			medicinal plants. Furthermore, mines often practice lax access control in the parts of their extensive properties that are not being actively utilised for mining activities leading to an increase in illegal medicinal plant harvesting relative to that which occurs on private farmland.				
7	Terrestrial Ecology – Fauna	Opencast mining activities	Displacement and Loss of Habitat for Faunal Species: The proposed open cast mining and associated activities will result in the clearing and loss of Natural Habitat. Approximately 545.9 ha of Natural Habitat (comprising vegetation units with High Ecological Importance) is expected to be lost due to mining activities. Areas which will be lost comprise mostly of Untransformed Grassland (337.1ha) and Valley-bottom & Seep wetlands (199.5ha) and smaller areas of Sandstone Scarp Shrubland (9.3 ha).	High	No	Yes	Yes, impact can be managed and mitigated.
			Disruption of Ecological Connectivity and Faunal Dispersal: The open cast mining activities and mine expansion proposed for the project area will aggravate habitat fragmentation and the disruption of natural ecological corridors in the area, thereby impeding the dispersal of faunal species as well as the potential for re-colonisation and recruitment of fauna to the project area during rehabilitation. It is	High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			especially sub-populations of medium to large mammal species such as Mountain Reedbuck and Southern Reedbuck that are at risk of becoming fragmented if natural connectivity is disrupted and when the surface area of natural corridors is reduced to the point that these animals can no longer disperse across the project area.				
		Influx of labourers and contractors	Illegal Utilisation of Faunal Resources: The presence of a large labour force within the project area during mining activities will increase the risk of illegal utilisation of fauna resources, such as hunting and snaring of antelope, small mammals and birds. It is assumed that labour force will be accommodated in nearby towns and not on site, which would lower this risk of hunting and poaching considerably. In addition, the project may also result in increased utilisation of natural resources due to potential human encroachment and accessibility to the project area owing to people seeking jobs. This could result in the establishment of illegal settlements on areas consisting of natural habitat on the project area where active mining is absent.	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
8	Surface Water Ecosystems	➲ Clearing and grubbing of vegetation	Destruction of sensitive habitat: Destruction of wetland units during all construction phase activities due to heavy machinery and indiscriminate habitat destruction.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
		➲ Dewatering ➲ Open-cast mining of various pits through a combination of excavation and blasting ➲ Construction and operation of the soil and overburden stockpiles ➲ Hauling of raw materials to the process plant ➲ Management of clean and dirty water runoff from stormwater systems, wash bays, etc ➲ Raw materials processing at the process plant ➲ Concurrent rehabilitation of exposed areas (as is practicable) ➲ Delivery and storage of vehicles, equipment,	Destruction of sensitive habitat: Wetland vegetation alteration following disturbances that will enhance exotic vegetation encroachment.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			Fragmentation of linear surface water habitat: Fragmentation of interconnected wetland units (watercourses) that would otherwise offer migratory corridors.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			Soil erosion that impacts watercourses and wetland habitat: All construction phase activities that result in soil destabilisation.	High	No	Yes	Yes, impact can be managed and mitigated.
			Impact to the hydrological functioning of wetlands: Excavation of deep opencast pits near to wetland habitat that will deviate lateral inter soil flow patterns into the pits that would otherwise sustain wetland units, leading to loss of water source for the wetland and subsequent loss of the unit.	High	No	Yes	Yes, impact can be managed and mitigated.
			Water quality degradation: Impacts to wetland units during the operations phase from runoff pollution, siltation, habitat smothering and vegetation alteration.	High	No	Yes	Yes, impact can be managed and mitigated.
			Water quality: All construction phase and operations phase activities associated with water contamination	High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
		machinery, and materials					
9	Groundwater	Mine dewatering and opencast mining activities	Groundwater availability - The rate of groundwater seepage could be influenced by: ➲ The extent of mining: groundwater seepage rates will increase for larger and mining areas. ➲ Depth of mining: groundwater seepage rates to shallower mining areas are expected to be higher compared to deeper mining areas where the water-bearing fractures are expected to be tighter. ➲ The intersection of water-bearing features: the three main lineaments are expected to increase the groundwater seepage volumes if and when intersected during mining.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		Opencast mining activities	Impacts on private groundwater users: ➲ Boreholes located within the opencast mining areas would be destroyed during operation. ➲ Boreholes not located within the planned opencast mining areas (but are located close enough to all planned mining activities that groundwater levels could be lowered	High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			by more than 5m during the operational phase) could be significantly affected by mine dewatering. It is likely that this would result in a significant reduction in borehole performance. ➲ Boreholes that fall within the zone of influence (where groundwater levels in these boreholes are not expected to be lowered by more than 2m during mining) are not likely to be significantly impacted.				
		Opencast mining activities	Shallow weathered aquifer, wetlands and springs: ➲ Wetlands could be affected or destroyed by the lowering of groundwater levels during mining, as they will not function optimally in these areas and may be permanently lost due to a decrease in groundwater availability as a result of mine dewatering. It is likely that the wetlands associated with the Kranspan would be most significantly affected during mining. Mining in this area is deeper as the pits target the E Seam. The lowering of groundwater levels is therefore likely to be more significant. Mining on the farm Vaalbank will be shallower as the B	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			and C Seams will be targeted. In this area, the impact on wetlands will be restricted to areas closer to the pits. ➲ It is further likely that spring flow will be negatively affected during mining. Six springs were identified during the hydrocensus. One spring is associated with Pit 7 and would be affected during Year 5 – 10 of mining. Three of these springs are located near Pit 17 and would be affected during Year 15 – 20 of mining.				
		Mine dewatering	Contamination of groundwater quality	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
10	Air Quality	Operation activities such materials handling, bulldozing, drilling, blasting, vehicle entrainment on unpaved surfaces, crushing and screening, windblown dust from overburden dumps and coal stockpiles	Elevated PM_{10} and $PM_{2.5}$ concentrations	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			Elevated Dustfall Levels	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
11	Noise	Blasting, mining operations, haulage	Elevated Noise Levels	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
12	Palaeontological Resources	Opencast mining	May destroy, damage, alter, or remove resources of palaeontological importance	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
13	Visual Aesthetics	All mining activities	Visual disturbance of the sense of place	High	No	Yes	Yes, impact can be managed and mitigated.
14	Socio-economic	All mining activities	Coal Production for Electricity Generation: The coal mining activities enable electricity generation by the coal fired power stations in the Gert Sibande District Municipality	Very High (+)	Positive impact should be enhanced.		
			Economic Growth: The processing of the mined products for electricity generation contributes immensely to the economy of the country	Very High (+)	Positive impact should be enhanced.		
		All activities involving employment and procurement of goods and services	Employment Opportunities: The project has the potential to create employment opportunities for local communities	High (+)	Positive impact should be enhanced.		
			Skills Development and Education Opportunities: The project has the potential to provide increased availability and opportunity for a wide range of skills development and job training	Medium-High (+)	Positive impact should be enhanced.		
			Local Economic Development: Procurement of local goods and services by the mine, employees and contractors will stimulate local business and create opportunities for entrepreneurship. In addition, implementation of the agreed LED projects committed to in the SLP will have a significant positive impact for the broader community	Medium-High (+)	Positive impact should be enhanced.		
		All mining activities	Government Revenue and Royalties: Payment of dividends, royalties, corporate tax, and income tax should also improve	Low-Medium (+)	Positive impact should be enhanced.		

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			the financial capacity of the government to improve community infrastructure and service delivery				
			Change in Land Use resulting in loss of agricultural land and loss of jobs	High	No	Yes	Yes, impact can be managed and mitigated.
		All activities involving employment and procurement of goods and services	Population Influx: The social and economic pressures of population growth will continue as additional people move to the area to find employment and require accommodation and access to community services	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
			Security Risks: Increased levels of crime may be experienced in the area as a result of the influx of people seeking employment. Contact crimes may result in injuries and in severe cases, fatalities	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		All mining activities	Mine Health and Safety – General: Minor, major and fatal injuries from potential mine health and safety incidents. In addition, the mine will store and handle various hazardous substances including explosives.	High	No	Yes	Yes, impact can be managed and mitigated.
		Opencast mining and stockpiling	Mine Health and Safety - Spontaneous Combustion of Coal: Combustion can occur during opencast mining and stockpiling of coal which can damage infrastructure and result in staff injuries	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		Movement of man and materials	Community Health and Safety – Diseases: The incidence of HIV/AIDS and other STDs could increase as a result of in-migration	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			of workers seeking employment. Outbreaks of TB can be facilitated by crowded housing conditions and therefore pose a risk for both employees and community members				
			Community Health and Safety – Traffic and Road Safety: The project will result in an increase in traffic volume on the R36, including heavy vehicles like ADTs. Traffic and congestion on local public roads will increase. In summary, safety risks to vehicles and pedestrians will be increased. This may negatively influence traffic flows, accelerate degradation of the road surface and possibly result in a greater likelihood of collision incidents	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		Overburden and midburden blasting with blasting hole depths between 20 and 30m	Blasting – Ground Vibration: Blast-induced ground vibration resulting in high irritation to neighbours closer than 1200 m from blasting	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		Overburden and midburden blasting with blasting hole depths between 10 and 20m		Low	No	Yes	Yes, impact can be managed and mitigated.
		Overburden and midburden blasting with blasting depths between 5 and 11m	Blasting – Ground Vibration: Blast-induced ground vibration resulting in high irritation to neighbours closer than 500 m from blasting	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			Blasting – Ground Vibration: Blast-induced ground vibration resulting in high irritation	Low	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			to neighbours farther than 500 m from blasting				
		Overburden and midburden blasting with blasting depths between 20 and 30m	Blasting – Ground Vibration: Blast Induced vibration causing damage to wells which may result in loss of water	Low	No	Yes	Yes, impact can be managed and mitigated.
			Blasting – Ground Vibration: Blast Induced vibration causing damage to road surfaces and earth dams	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
		All blasting activities	Blasting – Fly Rock: Damage to structures or injury to people closer than 1000 m caused by fly rock	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		All blasting, but particularly presplit and coal blasting	Blasting – Air Blast: Damage to structures or complaints from neighbours caused by high air blast	High	No	Yes	Yes, impact can be managed and mitigated.
		All blasting activities	Blasting – Dissolved Nitrates: Water Pollution from Dissolved Nitrates	High	No	Yes	Yes, impact can be managed and mitigated.
		All blasting activities	Blasting – Dust and Fumes: Dust and fumes generated by blasting affecting health and wellbeing of surrounding neighbours	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		All blasting activities	Blasting – Ground Vibration Heritage Sites and Graves: Damage to ruins, graves and heritage sites caused by vibration	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			Blasting – Fly Rock Heritage Sites and Graves: Damage to ruins, graves and heritage sites caused by fly rock	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

6.5.3 DECOMMISSIONING AND CLOSURE PHASE (INCLUDING REHABILITATION)

TABLE 6-27: POTENTIAL IMPACTS ON THE INITIAL LAYOUT PLAN (DECOMMISSIONING AND CLOSURE PHASE)

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
1	Topography	Rehabilitation	Topography will be (as far as practically possible) restored to that of the pre-mining state, and must be free draining.	Medium-High (+)	Positive impact should be enhanced.		
2	Soils and Agricultural Land Capability	Ancillary infrastructure (Offices and Workshops)	The decommissioning phase for the proposed contractor's yard (office areas and haul roads) will lead to compaction and erosion of soil resources predominantly due to increased traffic, demolition of buildings and other infrastructure etc. which could result in the loss of land capability.	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
		Stockpiling	The decommissioning phase for the proposed stockpiles will lead to compaction and erosion of soil resources predominantly due to increased traffic which could result in the loss of land capability.	Low-Medium			
		Opencast mining	The decommissioning phase for the proposed open cast mining areas will lead to compaction and erosion of soil resources predominantly due to increased traffic relating to backfilling activities, which could result in the loss of land capability.	Medium-High			
3	Terrestrial Ecology – Flora	Construction activities during decommissioning and closure will provide transformed habitat ideal for the establishment and proliferation of alien invasive plant species	Introduction and Proliferation of Alien Invasive Plant Species: Construction activities will provide transformed habitat ideal for the establishment and proliferation of alien invasive plant species. These concentrations of alien plants in areas disturbed by mining	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			will provide a source of seeds and other propagules which are likely to are likely to be dispersed by mining activities and natural dispersal agents (e.g. wind and water dispersal). Highly aggressive alien invaders and habitat transformers are highly likely to colonise the verges of haul roads and access roads throughout the project area from where they are likely to spread into adjacent areas of Untransformed Habitats of high Ecological Importance.				
5	Surface Water Ecosystems	➲ Dismantling and removal of all identified above-ground infrastructure ➲ Rehabilitation of the open-cast pits and overburden stockpiles; and placement of topsoil and re-vegetation of exposed areas	Destruction of sensitive habitat: Wetland vegetation alteration following disturbances that will enhance exotic vegetation encroachment.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			Soil erosion that impacts watercourses and wetland habitat: All construction phase activities that result in soil destabilisation.	High	No	Yes	Yes, impact can be managed and mitigated.
			Water quality: All construction phase and operations phase activities associated with water contamination	High	No	Yes	Yes, impact can be managed and mitigated.
6	Groundwater	Decant from pits	Rate of groundwater level recovery once mining is completed and risk of decant	High	No	Yes	Yes, impact can be managed and mitigated.
		Spread of contamination from the opencast mining areas	Long-term zone of impact on groundwater quality	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
7	Air Quality	Decommissioning activities such as demolition and stripping away of structures and facilities, windblown dust from stockpiles and exposed areas, and degradation of roads resulting in exposed areas surfaces	Elevated PM_{10} and $PM_{2.5}$ Concentrations and dustfall	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
8	Noise	All closure activities	Elevated Noise Levels	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
9	Visual Aesthetics	Rehabilitation	Visual improvement of the sense of place	Medium-High (+)	Positive impact should be enhanced.		
10	Socio-economic	All activities involving employment and procurement of goods and services	Employment Opportunities: The project has the potential to create employment opportunities for local communities, both during mine rehabilitation and for the post-mining land-use activities	High (+)	Positive impact should be enhanced.		
			Skills Development and Education Opportunities: The project has the potential to provide increased availability and opportunity for a wide range of skills development and job training, both for the mine rehabilitation work and the post-mining land-use activities	Medium-High (+)	Positive impact should be enhanced.		
			Local Economic Development: Procurement of local goods and services by the mine and post-mining landuse activities, employees and contractors will stimulate local business and create	Medium-High (+)	Positive impact should be enhanced.		

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			opportunities for entrepreneurship. In addition, implementation of the agreed LED projects committed to in the SLP will have a significant positive impact for the broader community				
		All closure activities	Mine Health and Safety – General: Minor, major and fatal injuries from potential mine health and safety incidents. In addition, the mine will store and handle various hazardous substances including explosives	High	No	Yes	Yes, impact can be managed and mitigated.
		Movement of man and materials	Community Health and Safety – Diseases: The incidence of HIV/AIDS and other STDs could increase as a result of in-migration of workers seeking employment. Outbreaks of TB can be facilitated by crowded housing conditions and therefore pose a risk for both employees and community members	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			Community Health and Safety – Traffic and Road Safety: The project will result in an increase in traffic volume on the R36, including heavy vehicles like ADTs. Traffic and congestion on local public roads will increase. In summary, safety risks to vehicles and pedestrians will be increased. This may negatively influence traffic flows, accelerate degradation of the road surface and possibly result in a greater likelihood of collision incidents	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
		Mine Closure	Mine Closure and Associated Effects on the Local Economy: Decommissioning and closure of the mine will have a negative impact on those employed, the families they support and the businesses which provide services to the mine. Mine closure involves significant downscaling and retrenchment of the workforce executed in different periods often involving reshuffling or elimination of workforce positions as well as reduction in the procurement of goods and services	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

6.5.4 CUMULATIVE IMPACTS

A cumulative impact, in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities. Cumulative impacts can be identified by combining the potential environmental implications of the overall Kranspan Mining Right Extension Project with the impacts of projects and activities that have occurred in the past, are currently occurring, or are proposed in the future within the project area.

Potential impacts that result as cumulative effects that will be added to by the proposed Kranspan Mine Extension project that have been identified are summarised in Table 6-28 below.

TABLE 6-28: POTENTIAL CUMULATIVE IMPACTS

NO.	ASPECT	POTENTIAL IMPACT
1	Climate	Contribute to Greenhouse Gas Emissions.
2	Topography	The topography of the area has already been affected by mining and related infrastructure. The proposed project will add to these impacts.
3	Geology	Unlikely to have a cumulative impact.
4	Soils and Agricultural Land Capability	Existing impacts on the soil resources in the area include water abstraction, farm roads, powerlines, overgrazed agricultural lands, erosion, mining; and vegetation removal. The impact on soil is irreplaceable because natural soil layers are stripped and mined, and land capability as well as the agricultural potential are impacted on. Mining and associated activities impacting the soil resources include changes to the chemical properties of the soil. The cumulative impacts may, therefore, have a significant effect on the soil resources therefore impacting the land capability and agricultural potential of the area. Contaminated soils will directly impact the water quality and quantity as well as the vegetation and land capability of the area.
5	Hydropedology	Existing developments (especially mining) within and around the project area have contributed to losses of water resources including wetlands and rivers systems. Vegetation has been altered due to crop cultivation and cattle grazing which in turn has led to overgrazing, as well as the contamination of water resources from the surrounding developments, have contributed to the physical impacts on the watercourses in the area such as erosion and sedimentation. The mining activities within the catchment have led to losses in wetland areas that may have facilitated increased water flow and quantity of pollutants flowing into the water resources. Vegetation alteration and surface flow may have led to the onset of erosion in the wetland areas, and this may be worsened further by the proposed mining activities. Mining may disturb the hydrological patterns further which could in turn lead to large scale desiccation of wetland areas and the direct loss of some of the wetland areas because of water flow being cut off.
6	Terrestrial Ecology – Flora	Loss of CBA and ESA will negatively contribute to the impacts on important ecological processes and ecological connectivity at a provincial scale. Loss of sensitive habitat results in loss of more SCC.
7	Terrestrial Ecology – Fauna	Loss of fauna that are at risk of becoming fragmented if natural connectivity is disrupted and natural corridors are reduced. Other development in the area also limits where these animals can disperse across the project area.
8	Surface Water	Destruction of sensitive habitat: Wetland vegetation alteration following disturbances that will enhance exotic vegetation encroachment. Soil erosion that impacts watercourses and wetland habitat: All construction phase activities that result in soil destabilisation. Water quality: Contamination of surface water will impact the integrity of all surface water resources and will reach further downstream to the greater aquatic system.
9	Groundwater	Cumulative impact of mine dewatering: The rate of groundwater seepage may be high when new ground is broken, but may reduce as the aquifers around the mining

NO.	ASPECT	POTENTIAL IMPACT
		areas are dewatered. Groundwater levels will also start to recover in areas where pits are backfilled and rehabilitated, thus affecting groundwater flow gradients and seepage rates. The cumulative impact of historical mining at Union Colliery: Available groundwater level measurements suggest that groundwater levels are lowered by 10 – 20m above the old workings from which decant is currently taking place. The cumulative zone of influence on groundwater availability is presented in the groundwater study and represents the maximum expected impact at the end of the Ilima operational phase of mining.
10	Air Quality	Dust generated as a result of this project (from earthworks, use of haul roads and other gravel roads, stockpiles, material crushing, etc.) will add to the impacts on air quality.
11	Noise	Noise from other mines in the vicinity of the Kranspan Mine Extension could contribute to elevated noise levels.
12	Heritage Resources	In the case of this project, impacts can be mitigated to an acceptable level. However, this and other projects in the area can have a negative impact on heritage sites in the area where these sites have been destroyed unknowingly.
13	Palaeontological Resources	
14	Visual Aesthetics	The visual landscape has already been impacted on by the development of mining in the area. The project would contribute to the negative cumulative effect of mining activities on the scenic values of the landscape.
15	Socio-economic	Population influx from the presence of mining activities in the area may result in housing backlog and / or growth of informal settlements. This may also affect the demand for goods and services, and put constraints on supply because of pressure on resources.
		Increased risks associated with road traffic accidents between humans, livestock and crop farming and mining vehicles. In some cases, this could lead to fatalities.
		Accumulation of dissolved nitrates in the water system by blasting causing an increase in algal and weed growth in waterways.
		Dust and fumes are a risk to health of people within a zone of 2 to 3 km from blasting.
		Vibration and fly rock may cause damage to structures and graves.
		Economic dependency on surrounding mines in this area will negatively impact local, regional, and national economies with decommissioning and mine closure.

6.6 METHODOLOGY USED IN DETERMINING AND RANKING THE NATURE, SIGNIFICANCE, CONSEQUENCES, EXTENT, DURATION AND PROBABILITY OF POTENTIAL ENVIRONMENTAL IMPACTS AND RISKS

6.6.1 OVERVIEW

The impact assessment methodology comprised of a risk-based impact matrix in which the outcomes, impacts and residual risk of the project activities was determined as follows:

- Step 1: Identify and describe the impact in terms of its nature (negative or positive) and type (direct or indirect);
- Step 2: Assess the impact severity (including reversibility and the potential for irreplaceable loss of resources), impact duration and impact spatial scale (extent);
- Step 3: Assign an impact consequence rating;
- Step 4: Assess the impact probability;
- Step 5: Assign the impact significance rating;
- Step 6: Identify measures and controls by which the impact can be avoided, managed or mitigated; and
- Step: Repeat the impact assessment on the assumption that the mitigation measures are applied and assign the residual impact (post mitigation) significance rating.

The purpose of the impact assessment was not to identify every possible risk and impact which the proposed project activities may have on the receiving environment. Rather, the assessment was focused on identifying and assessing the most material impacts, commensurate with the nature of the project activity and the characteristics of the receiving environment.

All impacts were assessed in the following phases:

- Construction;
- Operation; and
- Decommissioning and Closure.

The various impact rating criteria used and how they were applied are described in the section that follows.

6.6.2 APPLICATION OF IMPACT RATING CRITERIA

The first phase of impact assessment is the identification of the various project activities which may impact upon the identified environmental and social categories.

The identification of significant project activities is supported by the identification of the various receiving environmental receptors and resources. These receptors and resources allow for an understanding of the impact pathways and assessment of the sensitivity of the receiving environment to change.

The significance of the impact is then assessed by rating each variable numerically, according to defined criteria as provided in Table 6-29. The purpose of the significance rating of the identified impacts is to develop a clear understanding of the influences and processes associated with each impact.

The severity, spatial scope and duration of the impact together comprise the consequence of the impact; and when summed can obtain a maximum value of 15. The frequency of the activity and the frequency of the impact together comprise the likelihood of the impact and can obtain a maximum value of 10.

The values for likelihood and consequence of the impact are then read from a significance rating matrix as shown in Table 6-30 and Table 6-31.

The model outcome of the impacts is then assessed in terms of impact certainty and consideration of available information. The NEMA Precautionary Principle is applied in instances of uncertainty or lack of information by increasing assigned ratings or adjusting final model outcomes. In certain instances, where a variable or outcome requires rational adjustment due to model limitations, the model outcomes are adjusted. Arguments and descriptions for such adjustments, as well as arguments for each specific impact assessments are presented in the text and encapsulated in the assessment summary table linked to each impact discussion.

The assessment of impacts is done initially for the scenario where no mitigation measures are implemented. Mitigation measures are then identified and considered for each impact and the analysis repeated in order to determine the significance of the residual impacts (the impact remaining after the mitigation measure has been implemented).

TABLE 6-29: CRITERIA FOR ASSESSING THE SIGNIFICANCE OF IMPACTS

Severity of impact	**Rating**	
Insignificant / non-harmful / non-beneficial	1	Consequence
Small / potentially harmful / potentially beneficial	2	
Significant / slightly harmful / slightly beneficial	3	
Great / harmful / beneficial	4	
Disastrous / extremely harmful / extremely beneficial	5	
Spatial scope of impact	**Rating**	
Activity specific	1	
Area specific	2	
Whole project site / local area	3	
Regional	4	
National/International	5	
Duration of impact	**Rating**	
One day to one month	1	
One month to one year	2	
One year to ten years	3	
Life of operation	4	
Post closure / permanent	5	
Frequency of activity / Duration of aspect	**Rating**	Likelihood
Annually or less / low	1	
6 monthly / temporary	2	
Monthly / infrequent	3	
Weekly / life of operation / regularly / likely	4	
Daily / permanent / high	5	
Frequency of impact	**Rating**	
Almost never / almost impossible	1	
Very seldom / highly unlikely	2	
Infrequent / unlikely / seldom	3	
Often / regularly / likely / possible	4	
Daily / highly likely / definitely	5	

Activity: *a distinct process or task undertaken by an organisation for which a responsibility can be assigned.*
Environmental aspect: *an element of an organisation's activities, products or services which can interact with the environment.*
Environmental impacts: *consequences of these aspects on environmental resources or receptors.*
Receptors: *comprise, but are not limited to people or man-made structures.*
Resources: *include components of the biophysical environment.*
Frequency of activity: *refers to how often the proposed activity will take place.*
Frequency of impact: *refers to the frequency with which a stressor will impact on the receptor.*
Severity: *refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.*
Spatial scope: *refers to the geographical scale of the impact.*
Duration: *refers to the length of time over which the stressor will cause a change in the resource or receptor.*

TABLE 6-30: SIGNIFICANCE RATING MATRIX

	CONSEQUENCE (SEVERITY + SPATIAL SCOPE + DURATION)														
LIKELIHOOD (FREQUENCY OF ACTIVITY + FREQUENCY OF IMPACT)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

TABLE 6-31: POSITIVE/NEGATIVE MITIGATION RATINGS

COLOUR CODE	SIGNIFICANCE RATING	VALUE	NEGATIVE IMPACT MANAGEMENT RECOMMENDATION	POSITIVE IMPACT MANAGEMENT RECOMMENDATION
	Very High	126-150	Improve current management	Maintain current management
	High	101-125	Improve current management	Maintain current management
	Medium-High	76-100	Improve current management	Maintain current management
	Low-Medium	51-75	Maintain current management	Improve current management
	Low	26-50	Maintain current management	Improve current management
	Very Low	1-25	Maintain current management	Improve current management

6.7 THE POSITIVE AND NEGATIVE IMPACTS THAT THE PROPOSED ACTIVITY AND ALTERNATIVES WILL HAVE ON THE ENVIRONMENT AND THE COMMUNITY THAT MAY BE AFFECTED

This section requires a discussion in terms of the advantages and disadvantages of the initial site layout plan compared to the amended final site layout plan to accommodate concerns raised by affected parties or findings from specialist studies.

As discussed in Section 6.1 of the report, only layout alternatives were considered in the EIA Report. The environmental sensitivity plan, informed by the findings of the specialist studies, resulted in several changes to the initial site layout plan, and Table 6-2 summarises these changes.

The positive and negative impacts for the proposed (final) layout plan compared to the initial layout plan are provided below.

TABLE 6-32: POSITIVE AND NEGATIVE LAYOUT IMPACT COMPARISON

NO.	ASPECT	INITIAL LAYOUT (ALTERNATIVE)	POSITIVE OR NEGATIVE CHANGE	PROPOSED FINAL LAYOUT (PREFERRED OPTION)
1	Climate	Impact on climate the same for both layout options.		
2	Topography	Impact on topography the same for both layout options.		
3	Geology	Underlying geology will be affected in that mineral resources will be lost.	Positive	Approximately 550 000 tons of reserve (10% of the reserve on Portion RE of Farm Roodebloem 51 IT) will be sterlised (unable to be mined).
4	Soils and Agricultural Land Capability	Impact on soils and agricultural land capability the same for both layout options.		
5	Hydropedology	Increased erosion and sedimentation due to increased overland flow on the environment. Increased overland flow will result in decreased infiltration and therefore less lateral flow at the soil bedrock/ interface or return flow from groundwater. Open cast areas will intercept lateral flow paths and remove connectivity between recharge zones and lateral flow zones. Alteration of this flow path will likely change the wetland water regimes negatively.	Positive	Less wetlands and their respective buffer zones are impacted on with this option and thus less overall impacts on hydropedology compared to the initial layout plan.
6	Terrestrial Ecology – Flora	Loss of an endangered plant SCC (Sensitive Species 1200).	Positive	The recommended habitat buffer (approximately 26Ha in size) by the biodiversity specialist for the endangered plant SCC (Sensitive Species 1200) is avoided in order to conserve and protect the plant species *in situ*.
		Loss of CBA and ESA.	Positive	Less CBA (Irreplaceable), CBA (Optimal) and ESA to be removed/cleared with this option.
		Loss of high and moderate sensitive vegetation such as untransformed grassland,	Positive	Less sensitive vegetation to be removed/cleared with this option.

NO.	ASPECT	INITIAL LAYOUT (ALTERNATIVE)	POSITIVE OR NEGATIVE CHANGE	PROPOSED FINAL LAYOUT (PREFERRED OPTION)
		sandstone scarp shrubland, wetlands and secondary vegetation.		
7	Terrestrial Ecology – Fauna	Loss of fauna species of conservation concern as well the respective habitats for these species.	Positive	Avoidance of some locations of fauna species of conservation concern such as the African Grass-owl (*Tyto capensis*), classified as Vulnerable, as well as suitable roosting and breeding habitat for this species.
8	Surface Water	Loss of wetland systems with high sensitivity priority ratings.	Positive	Less encroachment on wetlands and their respective buffer zones with this option.
9	Groundwater	Impact on groundwater the same for both layout options.		
10	Air Quality	Elevated emissions	Positive	Less sensitive receptors impacted on with this option.
11	Noise	Elevated noise levels	Positive	Less sensitive receptors impacted on with this option.
12	Heritage Resources	Loss of structures, ruins, stone cairns and burial sites of heritage importance.	Positive	Avoidance of burial site C105 (a small informal burial site with ~31 graves) as well as structure C106 (a modern farmstead site). In addition, all graves/burial sites will be avoided with a 100m buffer during the LoM.
13	Palaeontological Resources	Impact on palaeontological resources the same for both layout options.		
14	Visual Aesthetics	Impact on visual aesthetics the same for both layout options.		
15	Socio-economic: Coal Production for Electricity Generation and Economic Growth	The coal mining activities enable electricity generation by the coal fired power stations in the Gert Sibande District Municipality. The processing of the mined products for electricity generation contributes immensely to the economy of the country.	Negative	Approximately 550 000 tons of reserve (10% of the reserve on Portion RE of Farm Roodebloem 51 IT) will not be mined in order to avoid ecologically environmental sensitive areas. This has a negative impact from a socio-economic point of view.
	Socio-economic: Change in Land Use – Loss of Agricultural Land	Change in Land Use resulting in loss of agricultural land and loss of jobs	Positive	Less land on Farm Roodebloem 51 IT to be mined and thus there will be less loss of agricultural land with this option.
	Socio-economic	Sensitive receptors (such as places of residence, structures/buildings used for farming practices and areas with members of the public) will be affected by blasting, noise or dust emissions generated by mining, processing and transport activities.	Positive	Less sensitive receptors impacted on with this option.
		The impact on all other socio-economic aspects are the same for both layout options.		

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

The mitigation hierarchy is being applied throughout the Scoping and EIA process. The mitigation hierarchy is an approach to mitigation planning and can be summarised into the following steps:

- Avoidance;
- Minimisation;
- Restoration; and
- Offsets.

The mitigation measures are summarised in Table 6-33 and are also described in the EMPr (Part B of the EIA Report).

TABLE 6-33: PROPOSED MITIGATION MEASURES

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
1	Climate	Equipment and vehicles used during mining activities	Operation	➲ Climate change management includes both mitigation and adaptation. The main aim of mitigation is to stabilise or reduce GHG concentrations as a result of anthropogenic activities. This is achievable by lessening sources (emissions) and/or enhancing sinks through human intervention. ➲ One way to keep GHG emissions to a minimum would be to ensure there is minimal fuel use, this can be achieved by ensuring the vehicles and equipment is maintained through an effective inspection and maintenance program. A measure of reducing the project's impact is to limit the removal of vegetation and to ensure that as much as possible revegetation occurs and possibly even the addition of vegetation surrounding the project area.	Low	Low
2	Topography	Site clearing, levelling and cut and fill construction activities, blasting activities and mining of opencast pits	Construction and Operation	➲ Limit all project activities to the development footprint to minimise the extent of the possible impacts. All areas outside of the project footprint must be regarded as no-go areas. ➲ Stormwater management measures must be implemented as per the IWWMP to avoid flooding due to changes in the local topography and drainage systems within the Project area.	Low-Medium	Low
		Rehabilitation activities	Rehabilitation	➲ Rehabilitation soon after mining of an area as well as dust suppression can reduce the negative visual impact of the project; and ➲ Concurrent rehabilitation with indigenous species and vegetative screening measures must be adopted.	Medium-High (+)	Medium-High (+)
3	Geology	Site clearing, infrastructure siting,	Construction and Operation	➲ Local geology and exploration results were considered in the siting of surface infrastructure;	Medium-High	Very Low

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
		blasting activities and excavations required for all mine infrastructure and the opencast pits		➲ Limit all project activities to the development footprint to minimise the extent of the possible impacts. All areas outside of the project footprint must be regarded as No-go areas; and ➲ Pit wall stability will be reviewed through an on-going monitoring programme and as part of the mine closure planning process.		
4	Soils and Agricultural Land Capability	Ancillary infrastructure (Offices and Workshops)	Construction	➲ Ensure proper storm water management designs are in place; ➲ If any erosion occurs, corrective actions (contour berms) must be taken to minimize any further erosion from taking place. Topsoil should be sourced and replaced and shaped to reduce the recurrence of erosion; ➲ Only the designated access routes are to be used to reduce any unnecessary compaction. Compacted areas are to be ripped to loosen the soil structure. ➲ The topsoil should be stripped by means of an excavator bucket, and loaded onto dump trucks. Topsoil is to be stripped when the soil is dry, as to reduce compaction. The handling of the stripped topsoil will be minimized to ensure the soil's structure does not deteriorate significantly. Compaction of the removed topsoil must be avoided by prohibiting traffic on stockpiles; ➲ The subsoil approximately 0.3 – 0.8 m thick will then be stripped and stockpiled separately;	Medium-High	Low-Medium
			Operation		Low-Medium	Low
			Decommissioning (Including Rehabilitation)		Low-Medium	Low
		Stockpiling	Construction		Low-Medium	Low
			Operation		Medium-High	Low-Medium
			Decommissioning (Including Rehabilitation)		Low-Medium	Low

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
		Opencast mining	Construction	➲ Stockpiles must be kept to a maximum height of 12 m if space allows. Soil can be stockpiled to a height of 20m where it is absolutely necessary, keeping the 20m footprint as small as possible. ➲ The stockpiles will be vegetated (details contained in rehabilitation plan) in order to reduce the risk of erosion, prevent weed growth and to reinstitute the ecological processes within the soil; ➲ Prevent any spills from occurring. Machines must be parked within hard park areas and must be checked daily for fluid leaks. If a spill occurs, it is to be cleaned up immediately and reported to the appropriate authorities. All vehicles are to be serviced in a correctly bunded area or at an off-site location. Leaking vehicles will have drip trays place under them where the leak is occurring; ➲ A soil fertility and post-mining land capability assessment must be done to address any compaction or fertility issues that may arise from the stockpiling (Post-rehabilitation);	High	Medium-High
			Operation		High	Medium-High

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
			Decommissioning (Including Rehabilitation)	➲ Implement land rehabilitation measures as defined in rehabilitation report; ➲ After the completion of the project the area is to be cleared of all infrastructure. The foundations to be removed. Compacted areas are to be ripped to loosen the soil structure and vegetation cover re-instated; ➲ Topsoil to be replaced for rehabilitation purposes; ➲ The rehabilitated area must be assessed once a year for compaction, fertility, and erosion; and ➲ Annual soil sampling post rehabilitation is applicable to arable post closure land uses, and not applicable to grazing land. Soil sampling at this stage must be informed by the level of vegetation cover established during the rehabilitation phase.	Medium-High	Medium-High
5	Hydropedology	Compaction and surface sealing activities	Construction	➲ Attenuation ponds and subsurface drains should form an integral part of stormwater plans to reduce overland flow from paved areas and allow water that runs off from roofs to settle and re-infiltrate	Low-Medium	Low
		Compaction and surface sealing activities and opencast mining activities	Construction and Operation	➲ Development footprint should adhere to the buffer zones around all wetlands. This will enable water to infiltrate and feed laterally into the wetlands. Application of good quality water which accumulates in pits on areas downslope of pit to maintain saturation at the soil/bedrock interface of Interflow (soil/bedrock) soils.	Medium-High	Low
6	Terrestrial Ecology – Flora	Clearance of vegetation from construction activities	Pre-Construction, Construction and Operational	➲ The only viable option within the Mitigation Hierarchy for the impact on CBAs in the project area is Avoidance. While the loss of 125.7ha of areas classified as CBA: Optimal could potentially be mitigated by offsets, this would require the	High	Medium-High

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
		Opencast mining activities Influx of labourers and contractors		conduction of a focused, larger scale study. The loss of 713.1 ha of areas classified as CBA: Irreplaceable cannot be mitigated through the offset mitigation option and can only be mitigated through Avoidance. ➲ Design opencast areas and other infrastructure footprints to exclude areas of Natural Habitat with High EI situated within areas identified as CBA: Irreplaceable in the MBSP. Particular emphasis should be placed on ensuring that the opencast pit situated in the north western part of the Farm Roodebloem around the recommended 26ha buffer zone for Sensitive Species 1200 does not isolate the buffer zone form contiguous areas of CBA: Irreplaceable situated to the north of the project area. All project infrastructure should be placed within Modified Habitats with Low or Very Low EI. ➲ Design opencast areas and other infrastructure footprints to exclude areas of Natural Habitat with High EI situated within areas identified as CBA: Optimal in the MBSP. Where any infrastructure remains located within areas of CBA: Optimal, this impact should be mitigated by the formal protection of offset areas identified within the project area and/or its immediate surrounds by an appropriate specialist assessment. ➲ Vegetation clearance should be entirely restricted to areas within the infrastructure footprints that have received Environmental Authorisation. The mine should institute an internal permitting procedure (issuing of a 'permit to clear') administered by the mines Environmental Division to control and manage vegetation clearance. Where it is possible to relocate Protected plant species occurring within areas		

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				permitted by the Environmental Division for clearing, permits for the relocation of protected plant species should be applied for from the relevant provincial authority and included in the 'permit to clear' procedure. ➲ All parts of the Project Area that are not lost as a result of the construction of Authorised mining infrastructure should be managed for optimal biodiversity in accordance with a site-specific Biodiversity Management Plan (BMP). ➲ A 'veld management plan' should be developed and implemented for all parts of the project area that are not situated within infrastructure footprints as part of the BMP. ➲ In order to limit the severity and frequency of impacts on Natural Habitat resulting from elevated dust emissions, a detailed dust suppression plan should be developed for the mine and the strict implementation of this plan should be regularly audited.		
				➲ In order to protect the subpopulation of Sensitive species 1200 recorded within the project area, a minimum buffer zone of 26ha was recommended by the specialist and this buffer was accommodated in the final revision of the mine plan provided by the project proponent. The adequacy of the minimal 200m buffer should be verified in the field prior to construction by a wetland specialist with input from a geo-hydrologist if necessary and this recommendation should be included in the EMP for the project. It must be emphasised that the recommended ca. 26ha preliminary buffer is a 'minimal buffer' within which no mining infrastructure	Medium-High	Low-Medium

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				should be located and no mining related activities should occur. Furthermore, it is crucial that the 26ha buffer should not be isolated by mining activities and that ecological connectivity should be maintained by establishing an effective ecological corridor, to the west of the railway line that links the 26ha buffer to the currently contiguous area of CBA: Irreplaceable situated directly to the north of the buffer area and extending to the north of the project area. Detailed management recommendation for the 26ha buffer should be included in the recommended BMP for the project area; preliminary management recommendations include: ○ The stand of the alien invasive tree *Acacia dealbata** situated within the 26ha buffer should be eradicated prior to construction of the opencast pit and all other occurring alien invasive plants should be controlled on an ongoing basis. ○ A stringent dust control programme should be implemented for the opencast area directly adjacent to the buffer. ○ All blast rock that lands in the buffer area should be removed immediately		

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				following each blasting event using hand labour. o The entire buffer area should be subject to light grazing and burning at appropriate intervals. o Access to the buffer should be strictly controlled and all vehicles entering the area must be authorised and supervised by the mines Environmental Department. o The Sensitive species 1200 subpopulation and its habitat should be monitored annually by a botanist using simple methods such as plant counts, fixed point photography and, when necessary, monitoring of vegetation cover and species composition within a limited number of sampling quadrats. ➲ In order to protect the two subpopulations of *K. carolinensis* recorded within the project area, a minimum buffer of 200m around the maximum extent of each colony should be implemented. It must be emphasized that the recommended buffers are 'minimal buffers' within which no mining infrastructure should be located and no mining related activities should occur. Furthermore, it is		

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				crucial that the colonies and their buffers should not be isolated by mining activities and that ecological connectivity should be maintained between the various colonies or recorded localities as is the case for the current mine plan. It is recommended that research institutions (e.g. SANBI's Walter Sisulu National Botanical Garden) should be afforded and opportunity to rescue some of the *Khadia carolinensis* plants comprising the colony at Site 58a, which is situated within the footprint of an opencast area, for research purposes prior to construction. The recorded *Khadia carolinensis* subpopulations and their habitat should be monitored annually by a botanist using simple methods such as plant counts, fixed point photography and, when necessary, monitoring of vegetation cover and species composition within a limited number of sampling quadrats. Detailed management recommendation management of the recorded *Khadia carolinensis* should be included in the recommended BMP for the project area. ➲ Any authorised development within any of the four Natural Habitat recorded within the project area should be should be preceded by a thorough search for threatened plant species within the footprint of the development, and in immediately adjacent areas, prior to construction Such searches ('walk-over' surveys) should be conducted by a botanist at the appropriate time of year which coincides with the flowering times of potentially occurring SCC. In the event that any SCC are confirmed, appropriate in situ and / or ex situ conservation measures should be developed in consultation with the relevant		

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				conservation authorities. This recommendation should be incorporated into the EMP for the mine. ➲ In order to confirm the presence or absence of additional SCC within the project area, and provide a more comprehensive species list that forms a sound basis for site-specific biodiversity management, an additional botanical survey which incorporates seasonal coverage should be conducted for the project area as part of the development of the recommended Biodiversity Management Plan for the mine. This survey should place emphasis on searching potentially suitable habitat for the two SCC that are considered to have a moderate to high likelihood of occurring within the project area, namely *Aspidoglossum xanthosphaerum* (VU) and *Lessertia phillipsiana* (DDD).		
			Pre-Construction, Construction Operational and Closure	➲ The mine should develop and implement a site-specific integrated Alien Plant Control Programme (as per the AIS Regulations), which identifies the species that pose the greatest threat, in terms of habitat transformation, to Natural Habitat within the project area, and considers all appropriate chemical, mechanical, biological and cultural control methods for the alien species listed in Appendix 1 of the specialist report. Emphasis should be placed on controlling the 17 declared alien invasive species listed in Appendix 1 of the specialist report and in particular the five alien invasive habitat transformers identified as posing the greatest threat to the Natural Habitats and indigenous vegetation of the project area and its immediate surrounds, namely *Acacia dealbata**, *Acacia mearnsii**, *Campuloclinium*	Medium-High	Low-Medium

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				macrocephalum, Pyracantha angustifolia** and *Richardia brasiliensis**. ➲ A team of appropriately equipped and trained should be appointed to conduct continuous alien plant control at the 'priority control sites' identified in the Alien Plant Control Programme. This team should work under the auspices of the mines Environmental Division, which should be tasked with supervising and thoroughly documenting all alien plant control activities. ➲ Where planting of trees and shrubs around mine offices, workshops and processing facilities is deemed necessary, only trees and shrubs indigenous to the study area and its immediate surrounds should be planted, and these should be grown from locally obtained seeds or other propagules. No trees, alien or indigenous, should be planted anywhere within the Natural Habitats of the project area. The alien invasive grass *Pennisetum clandestinum** (Kikuyu) should not be used for the establishment of lawns at mine premises.		
			Pre-Construction, Construction and Operational	➲ Access by mine personnel and trespasses to all parts of the project area comprising Natural Habitat should be strictly controlled. Access control should be achieved by the erection of a five-strand cattle fence that is permeable to wildlife around the perimeter of the project area, regular signage prohibiting access and regular patrols by mine security personnel. Security personnel tasked with patrolling areas of Natural Habitat should receive basic training in the following aspects:	Low-Medium	Low

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				○ Prevention of illegal plant harvesting and animal poaching. ○ Location of sensitive Natural Habitats and buffer areas for SCC that should form the focus of patrol efforts. ○ Basic environmental sensitivities of the areas they are tasked with patrolling (e.g. areas where vehicle access is prohibited). ○ Procedures for reporting any incidents of illegal access, plant harvesting, poaching and environmental incidents such as accidental fires and pollution spills. ➲ The damaging or destruction of plant species that are Protected in terms the Mpumalanga Nature Conservation Act (No.10 of 1998) during any future development should be avoided wherever possible, and a permit for the removal or destruction of any such protected plant must be obtained from the provincial authorities (Permitting Office of the MTPA) prior to development. It is recommended that where untransformed Natural Habitat is to be affected by an infrastructure footprints. Protected plant species should be rescued and placed in a nursery or donated to a research institute (e.g. SANBI botanical gardens) prior to development, rather than simply being destroyed. Where feasible, viable subpopulations of		

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				such species should also be translocated to transformed (including rehabilitation areas) or untransformed areas within the project area which provide potentially suitable habitats, but such translocations will have to be carried out in a manner that ensures that no ecological degradation of the host habitat occurs, and will have to be evaluated by a botanist for each species and each potential translocation area.		
7	Terrestrial Ecology – Fauna	Clearance of vegetation from construction activities Opencast mining activities Influx of labourers and contractors	Construction and Operational	➲ The direct loss of habitat and subsequent loss and displacement of faunal species of conservation concern can only be significantly mitigated through the application of the Avoidance option of the Mitigation Hierarchy. ➲ Develop and implement a Biodiversity Management Plan with the objective of managing all remaining Natural Habitat through conservative grazing, fire management and continual eradication of alien plant species. ➲ If any faunal species of conservation concern (as indicated in this report) are recorded during the construction/mining phase, the ECO should be informed, and should then issue instructions for its capture, translocation and safe release into suitable habitat within the project area with the relevant permits obtained from the relevant authority if necessary. ➲ All domestic waste generated (if present) during construction and mining operations should be removed from the project area as soon as possible and be disposed of at an authorised landfill to reduce the risk of colonisation by feral mammals, scavengers	High	Medium-High

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				or competitively superior indigenous bird species (e.g. Pied Crows). ➲ Personnel and staff should be advised by means of environmental awareness training on the biodiversity importance of the area. The intentional killing of any faunal species (in particular invertebrates, reptiles and snakes) should be avoided by means of awareness programmes presented to the labour force. The labour force should be made aware of conservation issues pertaining to the taxa occurring on the project area.		
				➲ Ensure that construction and mining activities do not extend beyond the authorised infrastructure footprints onto adjacent natural habitat in order to provide displaced fauna the opportunity to disperse into suitable habitat (although potential dispersal by small animals is highly limited). ➲ It is recommended that prior to commencement of fencing and construction it is ensured that the no large mammal species, especially reedbuck are trapped within any area fenced with security fencing. ➲ All Natural Habitat which is not part of actively mined areas must be fenced with standard 5-strand cattle fencing and not diamond mesh security fencing that will prevent the movement of Reedbuck and other fauna. The relevant conservation scientists of the MTPA should also be approached in order to ascertain the conservation importance of the subpopulations of Mountain Reedbuck and Common Reedbuck that utilise the project area and determine whether further conservation measures are necessary. Such measures may include monitoring,	High	Medium-High

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				collaboration with surrounding landowners to prevent poaching and ensuring the availability of large and contiguous areas of suitable habitat. ➲ The practice of excavating trenches around the project area as a form of access control should be prohibited as such trenches act as lethal 'pitfall traps' and barriers to dispersal of mammals, reptiles and amphibians and are regarded as an unnecessary and severe impact to such fauna occurring within the project area and its immediate surrounds.		
				➲ Contractors should be accommodated off-site (i.e. not within the project area), reducing the risk of poaching and persecution of fauna. ➲ Labour supervisors and SHE officials should monitor the activities of labourers when working away from infrastructure in Natural Habitat. ➲ Personnel and staff should be advised by means of environmental awareness training on the biodiversity importance of the area. The intentional killing of any faunal species (in particular invertebrates, reptiles and snakes) should be avoided by means of awareness programmes presented to the labour force. The labour force should be made aware of conservation issues pertaining to the taxa occurring on the project area. ➲ Regular monitoring of the project area, especially areas of natural habitat where active mining activities are absent, is advised to identify areas where illegal settlement may occur. If any illegal erecting of housing occurs, the mine's public liaising officer	Low-Medium	Low

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				should immediately advice on a resolution, which may involve a re-location strategy.		
8	Surface Water Ecosystems	Destruction of wetland units during all construction phase activities due to heavy machinery and indiscriminate habitat destruction.	Construction and Operation	➲ Vegetation and extent of groundcover plays an important role in preserving wetland functionality. It binds soils to protect from erosion, reduces the scouring potential of runoff water through the reduction of velocity and energy dissipation and also provides the micro-habitat and refuge for supporting a greater array of wetland-dependent biodiversity. Indiscriminate destruction of vegetation layers from wetland areas that fall outside of the ultimate infrastructure footprint should be avoided. It is recommended that the buffer zones be fenced off within applicable areas to avoid indiscriminate habitat destruction and treated as "no-go" areas. This includes using these areas for soil stockpiling, equipment storage, fuelling areas, etc. ➲ Erosion and sedimentation must be managed as an ongoing concern throughout all the phases of the development activities. This includes protection of stockpiled soils, rock dumps and other stored materials. Stormwater management must ensure erosion protection at the outfall points into the receiving environment. There are multiple impoundments along most of the watercourses within the survey area that already act as sediment traps. Before an engineering solution to sediment management is sought, it is recommended that a monitoring plan be developed to determine the level of functionality that these impoundments already offer as the various phases of the proposed mining development progress.	Medium-High	Medium-High
		Wetland vegetation alteration following disturbances that will enhance exotic vegetation encroachment.			Medium-High	Very Low
		Fragmentation of interconnected wetland units (watercourses) that would otherwise offer migratory corridors.			Medium-High	Very Low

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				➲ A management strategy should be in place for the encroachment of opportunistic alien vegetation.		
		Excavation of deep opencast pits near to wetland habitat that will deviate lateral inter soil flow patterns into the pits that would otherwise sustain wetland units, leading to loss of water source for the wetland and subsequent loss of the unit.	Operation	➲ The water that seeps into the pit that requires decanting could be pumped to an attenuation feature that then releases the water back into the wetland unit. This would depend on the quality of the water, which may require a level of processing prior to it being released. The attenuation feature should be engineered to ensure that the outfall does not induce erosion of the watercourse. Depending on the elemental content of the water, the wetland itself could be utilised as a biological filter and management tool to ensure suitable water quality for the downstream wetlands, aquatic habitats, and other water users. Intact ecological integrity of the wetland units located downstream of decanting sites is vital to the successful implementation of a water management scheme such as this.	High	Medium-High
		All construction phase activities that result in soil destabilisation.	All	➲ Any soil that is removed for trenching purposes must be stored in their respective layers and returned to the excavation in reverse order. The soils must be stored outside of the wetland and buffer zones in order not to smother established wetland vegetation. ➲ Adequate site reinstatement must be implemented to abate the formation of erosion through modification of the surface water hydrology. Silt traps and fencing should be used in areas of steeper topography (if applicable). ➲ The movement of heavy machinery within wetland zones should be limited to only single access roadways. Upon completion of the construction phase, this roadway should be ripped and/or disk	High	Very Low

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				ploughed to loosen the compacted soils and to allow for the establishment of vegetation within the affected areas, which should be a mixture of veld grasses typical of the surrounding area within similar habitat units. ➲ Indiscriminate habitat destruction should be avoided and the construction footprint, including service and support areas should be kept to a minimum.		
		Impacts to wetland units during the operations phase from runoff pollution, siltation, habitat smothering and vegetation alteration.	Operation	➲ Possible sources of contamination include hydrocarbons (from poorly designed and managed fuelling stations and/or workshop and maintenance areas) and runoff water from processing areas, and these should be kept separate from clean water runoff with a suitable stormwater management system, and general surface water runoff should be treated prior to release into the environment.	High	Low-Medium
		All construction phase and operations phase activities associated with water contamination	All	➲ Erosion management to prevent water quality degradation. ➲ Onsite sewerage treatment and/or management to avoid contamination of the surface water ecosystems. Untreated sewerage contamination of the surface water ecosystems could occur due to poorly designed sewerage treatment systems, treatment systems where processing capacity is exceeded, poorly maintained infrastructure leading to water-borne effluent leaks prior to processing, sewerage spills during (for example) septic tank pumping, and informal ablutions near watercourses. Careful attention to sewerage treatment and sewerage systems will reduce the risk of contamination of the resource.	High	Low-Medium

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				➲ During decanting, the pit water must be routinely tested at an accredited laboratory to develop an appropriate management strategy to treat the water to within target water quality standards prior to release. Routine monitoring and testing of the water will also determine whether treatment is, in fact, required prior to release.		
9	Groundwater	Storage of hazardous substances for construction activities	Construction	➲ Design and build all PCDs before any mining activities commence. ➲ Implement and maintain a groundwater monitoring programme in mine and private boreholes situated in the zones of influence identified for the mining areas. ➲ Implement sound house-keeping measures to prevent and clean spills, address leaks and undertake regular inspections. Ensure that the record-keeping procedure is in place and that instructions given are carried out. ➲ Measure rainfall daily on site.	Very Low	Very Low
		Mine dewatering and opencast mining activities affecting groundwater availability	Operation	➲ Ilima will enter into negotiations with existing groundwater users to identify suitable alternatives, should monitoring information indicate that private groundwater use is negatively affected by mining activities. ➲ Negotiations must be entered into with the owners of private boreholes that will be destroyed during opencast mining. ➲ A dedicated groundwater monitoring programme must be implemented in all private boreholes within the delineated zone of influence. This monitoring programme must include groundwater level and quality measurements. Should monitoring	Medium-High	Low-Medium

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				information indicate adverse impacts, Ilima must enter into negotiations with the affected landowners to negotiate alternative water supply options of equivalent quantity and quality. ➲ Feedback must be provided to owners of boreholes within the affected zones regarding progress made with mining activities, rehabilitation and the outcome of monitoring programmes on a quarterly basis when groundwater monitoring will take place to ensure that they are informed of aspects of mining that may be of significance. ➲ The volume of water pumped from underground and the pits to surface during the operational phase must be recorded. This information must be used to update the impact assessment presented in this report, as necessary. ➲ If water-bearing structures are intersected during mining that contribute significant volumes of seepage to the pits and underground workings, they must be characterised and quantified. The risk and timing of decant must be re-assessed taking this information into consideration. ➲ Should mining activities on the Farm Vaalbank extend to the C-Seam workings in the historical Union Colliery underground workings, provision must be made to dewater and contain additional underground water in the mine's dirty water management system. The impact assessment must be updated at least a year prior to mining into the old underground workings to ensure that sufficient planning can be made to address potential cumulative impacts. Specific focus must be placed on		

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				the perceived increased volume of extraneous water that will have to be contained as well as the increased risk of decant from the affected pits. ➲ Surface rehabilitation measures must be designed to minimise the risk of decant. In order to do so, concurrent rehabilitation of the opencast pits must be maintained throughout the life of mining. ➲ Groundwater levels must be monitored on a monthly basis in the dedicated monitoring boreholes. This information together with daily on-site rainfall measurements must be used to improve the understanding of the rate of recharge as well as of aquifer parameters like storage coefficients and specific yield. ➲ The numerical model used in this assessment should be updated, verified and re-calibrated on a regular basis as monitoring information becomes available. ➲ The final model must be prepared at least five years prior to mine closure to ensure that predictions of long-term impacts are undertaken with the highest possible level of confidence.		
		Destroying of private boreholes during opencast mining	Operation	➲ Maintain the groundwater monitoring programme in mine and private boreholes located. ➲ Ilima will enter into negotiations with existing groundwater users to identify suitable alternatives, should monitoring information indicate that private groundwater use is negatively affected by mining activities.	High	Low-Medium

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				➲ Negotiations must be entered into with the owners of private boreholes that will be destroyed during opencast mining. ➲ A dedicated groundwater monitoring programme must be implemented in all private boreholes within the delineated zone of influence. This monitoring programme must include groundwater level and quality measurements. Should monitoring information indicate adverse impacts, Ilima must enter into negotiations with the affected landowners to negotiate alternative water supply options of equivalent quantity and quality. ➲ Feedback must be provided to owners of boreholes within the affected zones regarding progress made with mining activities, rehabilitation and the outcome of monitoring programmes on a quarterly basis when groundwater monitoring will take place to ensure that they are informed of aspects of mining that may be of significance. ➲ Replace groundwater monitoring boreholes that may be destroyed during mining. ➲ Measure rainfall daily on site. ➲ Record all groundwater-related complaints and deal with each complaint within the agreed upon timeframe.		
		Opencast mining activities affecting wetlands and springs	Operation	➲ Implement and maintain concurrent rehabilitation to reduce the duration of impacts and allow recovery of wetlands/springs.	Low-Medium	Low
		Mine dewatering and spread of	Operation and Post-closure	➲ Complete regular inspections of PCDs, specifically noting incidences of overflow and leakage. If the	Medium-High	Low-Medium

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
		contamination from the opencast mining areas affecting groundwater quality		latter is identified, measures must be taken to rectify non-compliances immediately. ➲ Maintain sound house-keeping measures to prevent spills and leaks. ➲ Dedicated monitoring boreholes must be maintained in the three lineaments that transect the mining area. If any of the current boreholes drilled into these structures are destroyed during mining, they must be replaced. ➲ Surface infrastructure, like the wash plant, must be positioned off the lineaments. Prior to the establishment of these areas, a geophysical survey must be completed to pin-point the faults. ➲ Measures developed during the 2019 study to manage the impact of discard must be implemented and maintained at the Kranspan mining area (iLEH, 2019). ➲ A monitoring programme must be implemented to establish underground water quality during the life of operations. This information must be used to update the long-term impact of mining on groundwater quality presented in this report. ➲ Updated contaminant transport simulations must be undertaken once this information is available in order to improve the confidence levels in long-term predictions. These simulations must be completed at least five years prior to mine closure to ensure that effective measures are developed to manage long-term impacts. Post Closure Management Plan:		

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				➲ All rehabilitation must be completed during the decommissioning phase. In terms of groundwater, the rehabilitation must focus on containing dirty water and leachate, preventing the ingress of clean runoff and rainfall to the mining area and avoid ponding over rehabilitated areas. ➲ The groundwater monitoring programme must be maintained for a period of at least two years after mine closure in both mine monitoring and private boreholes. This information must be used to confirm the impact of rehabilitation at mine closure. ➲ At the end of the two-year monitoring programme, the post-closure groundwater impact assessment must be re-evaluated and adjusted, as necessary, based on the results of the monitoring programme. ➲ Once the monitoring data and the re-assessment of post-closure groundwater impacts are available, Ilima must discuss these with the authorities and determine the need of additional monitoring through consultation. ➲ All seepage from the current and planned new mining areas must be contained to avoid decant into the catchment. ➲ All seepage from the mining areas and potential decant must be contained in PCDs that meet the requirements of GN704. ➲ All pits must be backfilled and rehabilitated as part of concurrent mining.		
		Decant from pits	Post-closure	➲ If water-bearing structures, specifically the regional faults, are intersected during mining that contribute significant volumes of seepage to the pits and	High	Low

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				underground workings, they must be characterised and quantified. The risk and timing of decant must be re-assessed taking this information into consideration. ➲ Based on kinetic leach tests completed for the Kranspan Mine (refer to Appendix 8), leachate from the mining area is not expected to significantly acidify and decant is therefore expected to be of moderate quality. If monitoring of the decant indicates that the quality is not suitable for release to the environment, provision must be made to contain all decant to avoid negative impacts on surface water, soil and wetlands. ➲ Surface rehabilitation measures must be designed to minimise the risk of decant. Opencast mining areas and box cuts must be backfilled, shaped and made free draining to limit the rate of recharge of rainwater to the absolute minimum. ➲ A decant interception system must be implemented to collect decant water and divert this to a containment facility. Where feasible, it is recommended that horizontal drains are installed at the decant locations to capture, control and divert decant to the designated dirty water containment facility. It is recommended that a PCD or a number of PCDs are used for this purpose. A qualified professional must complete a water balance for the PCDs to confirm that these will be sufficient in size to contain all decant post closure. ➲ Visual inspections along pit perimeters must be undertaken on a monthly basis. If any additional decant is recorded, the decant interception system		

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				must be adjusted to ensure that all decant is captured and stored. ➲ Decant quality must be monitored on a monthly basis until closure. ➲ Measures must be taken during the operational phase of mining to contain all decant anticipated. In areas where significant decant may take place, PCDs must not be rehabilitated at closure but must be prepared, re-sized if necessary and used to contain decant post closure. Based on the available dataset, the following pits are expected to result in significant decant if not managed well: ○ Pit 1 ○ Pit 5 ○ Pit 10 ○ Pit 11 ○ Pit 16 ○ Pit 19 ○ Pit 20 ○ Pit 22 ○ Pit 23 ➲ The risk of decant associated with other pits not listed above must be evaluated during the operational phase as additional monitoring information becomes available. Based on this information, appropriate post-closure decant management measures must be implemented during the rehabilitation phase.		

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				➲ The PCDs must be sized to take decant volumes into consideration and cutoff trenches and berms must be put in place to divert decant to the PCDs. The planning and possible re-sizing of PCDs must be completed prior to mine closure. ➲ Should mining activities on the Farm Vaalbank extend to the C-Seam workings in the historical Union Colliery underground workings, provision must be made to handle additional underground water in the mine's dirty water management system. Based on field observations, the additional volume of water from the historical underground workings that have to be handled can be up to 160 000 m^3/a. This volume of water is likely to impact on operational mine water management as well as decant volumes post closure. This additional decant volume can be used in the wash plant to avoid need for rehandling and storage. It is reported in literature (Steyn, 2019) that several areas of subsidence are associated with Union Colliery. Care should be taken to identify areas of subsidence and incorporate these into the mine plan for pits that will extend to the C Seam in the old workings. The areas of subsidence should also be considered when planning to manage decant from the mining areas. Pits that overly the historical Union Colliery underground workings are included below and it is noted that some of these pits are already highlighted as potential areas of significant decant potential: o Pit 16 o Pit 19 o Pit 21		

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				○ Pit 22 ○ Pit 23		
10	Air Quality	Construction activities such as topsoil removal, material loading and hauling, stockpiling, grading, bulldozing, as well as metal and concrete works for the establishment of infrastructure	Construction	➲ Air quality impacts during construction would be reduced through basic control measures such as limiting the speed of haul trucks; limit unnecessary travelling of vehicles on untreated roads; and to apply water sprays on regularly travelled, unpaved sections. ➲ The access road to the Project also needs to be kept clean to minimise carry-through of mud on to public roads.	Low-Medium	Low-Medium
		Operation activities such materials handling, bulldozing, drilling, blasting, vehicle entrainment on unpaved surfaces, crushing and screening, windblown dust from overburden dumps and coal stockpiles	Operation	Vehicle activity on unpaved roads: ➲ Regular water sprays and road binders on unpaved roads to ensure at least 90% control efficiency. ➲ Regular water sprays on unpaved inpit roads to ensure at least 75% control efficiency. ➲ Monthly physical inspection of road surface, daily visual observation of entrained dust emissions from unpaved road surfaces.	Medium-High	Low-Medium
				Drilling and Blasting: ➲ Controlled blasting techniques to be used to ensure minimal dust generation. ➲ Blasting only to be conducted on cloudless days, if possible. ➲ Addition of chemical surfactants to water sprays to lower water surface tension and increase binding properties.	Low-Medium	Low-Medium

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				➲ Drilling to be controlled through water sprays or vacuum packs Materials Handling: ➲ Increase in-pit material moisture content. ➲ Drop height from excavator into haul trucks to be kept at a minimum for coal and waste rock. ➲ Tipping onto ROM storage piles to be controlled through water sprays, should significant amounts of dust be generated. ➲ Keep material handled by dozers and wheeled loaders moist to achieve a control efficiency of 50%, especially during dry periods. ➲ Regular clean-up at loading areas. Wind Erosion: ➲ Water sprays at ROM stockpile can achieve 50% control efficiency. Increase in moisture content provides higher threshold friction velocity and ensures that particulates are not as easily entrained due to high surface winds. ➲ Reshape all disturbed areas to their natural contours. ➲ Cover disturbed areas with previously collected topsoil and replant native species. ➲ Rock cladding with larger pieces of waste rock is recommended to reduce wind erosion emissions from the overburden storage piles. ➲ Revegetation of overburden stockpile is recommended.		

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				Crushing: ➲ Water sprays at the crushers to achieve at least 50% control efficiency.		
		Decommissioning activities such as demolition and stripping away of structures and facilities, windblown dust from stockpiles and exposed areas, and degradation of roads resulting in exposed areas surfaces	Decommissioning	➲ Air quality impacts during decommissioning would be reduced through basic control measures such as limiting the speed of haul trucks; limit unnecessary travelling of vehicles on untreated roads; and to apply water sprays on regularly travelled, unpaved sections. ➲ The access road to the Project also needs to be kept clean to minimise carry-through of mud on to public roads.	Low-Medium	Low-Medium
11	Noise	Construction activities	Construction	➲ Equipment with lower sound power levels must be selected. Vendors should be required to guarantee optimised equipment design noise levels; ➲ Where possible, other non-routine noisy activities such as construction, decommissioning, start-up and maintenance, should be limited to day-time hours; ➲ All diesel-powered equipment and plant vehicles should be kept at a high level of maintenance. This should particularly include the regular inspection and, if necessary, replacement of intake and exhaust silencers. Any change in the noise emission characteristics of equipment should serve as trigger for withdrawing it for maintenance;	Low-Medium	Low-Medium

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
		Blasting, mining operations, haulage	Operation	➲ In managing noise specifically related to truck and vehicle traffic, efforts should be directed at: ➢ Minimising individual vehicle engine, transmission, and body noise/vibration. This is achieved through the implementation of an equipment maintenance program. ➢ Maintain road surface regularly to avoid corrugations, potholes etc. ➢ Avoid unnecessary idling times.	Medium-High	Low-Medium
		Decommissioning activities	Closure	➲ Minimising the need for trucks/equipment to reverse. This will reduce the frequency at which disturbing but necessary reverse warnings will occur. Alternatives to the traditional reverse 'beeper' alarm such as a 'self-adjusting' or 'smart' alarm could be considered. These alarms include a mechanism to detect the local noise level and automatically adjust the output of the alarm is so that it is 5 to 10 dB above the noise level near the moving equipment. Another alternative to the traditional reverse 'beeper' is the use of white-noise generators. This enables the listener to instantly locate where and what direction the sound is coming from. The broadband sound also gives workers wearing hearing protection devices (HPDs) and people with hearing difficulties a better chance of hearing the alarm. White-noise reverse alarms create a "ssh-ssh" sound which is gentle on the ear and dissipates quickly, meaning the alarm can only be heard in the danger zone; ➲ Limiting traffic to hours to between sunrise and sunset. This should include other non-routine noisy	Low-Medium	Low-Medium

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				activities such as construction, decommissioning, start-up and maintenance; ➲ A noise complaints register must be kept; ➲ Good public relations are essential at all stages of the project. Surrounding receptors should be informed about the sound generated by proposed project operations. Community involvement needs to continue throughout the project. The mine must implement a line of communication (i.e. a help line where complaints could be lodged). All potential sensitive receptors should be made aware of these contact numbers. The mine should maintain a commitment to the local community and respond to concerns in an expedient fashion; ➲ As the site or activity is in close proximity to NSRs, equipment and methods to be employed should be reviewed to ensure the quietest available technology is used. Equipment with lower sound power levels must be selected in such instances and vendors/contractors should be required to guarantee optimised equipment design noise levels; ➲ As far as is practically possible, source of significant noise should be enclosed. The extent of enclosure will depend on the nature of the machine and their ventilation requirements. Motors are examples of such equipment; ➲ Plant and equipment should be sited as far away from NSRs as possible. It is recommended that buffer zones be established and that noise generating activities be conducted no closer than 300 m from NSRs;		

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				➲ Machines used intermittently should be shut down between work periods or throttled down to a minimum and not left running unnecessarily. This will reduce noise and conserve energy; ➲ Plants or equipment from which noise generated is known to be particularly directional, should be orientated so that the noise is directed away from NSRs; ➲ Acoustic covers of engines should be kept closed when in use; ➲ Construction materials such as beams should be lowered and not dropped; ➲ Regular and effective maintenance of equipment are essential to noise control. Increases in equipment noise are often indicative of eminent mechanical failure. Also, sound reducing equipment/materials can lose effectiveness before failure and can be identified by visual inspection; ➲ If noise control at the source and the use of distance between source and receiver is not possible, screening methods must be considered. The careful placement of barriers such as screens or berms can significantly reduce noise impacts but may result in additional visual impacts. Although vegetation such as shrubs or trees may improve the visual impact of construction sites, it will not significantly reduce noise impacts and should not be considered as a control measure; ➲ Earth berms can be built to provide screening for large scale earth moving operations and can be landscaped to become permanent features once		

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				construction is completed. Care should be taken when constructing earth berms since it may become a significant source of dust; ➲ If efforts at controlling noise at the source and the installation of acoustic barriers fail, possible receptor based noise mitigation measures, such as double paned windows and insulated buildings should be considered. It should however first be confirmed through monitoring that the mining activities are the source of disturbance at the receptor locations before the onus falls on the mine to implement such measures at the receptor locations; ➲ Noise monitoring at sites where noise is or may become an issue is essential. It is recommended the bi-annual noise sampling be conducted at the closest sensitive receptors to the active areas at any given time; and ➲ In the event that noise related complaints are received short term (24-hour) ambient noise measurements should be conducted as part of investigating the complaints. The results of the measurements should be used to inform any follow up interventions. The investigation of complaints should include an investigation into equipment or machinery that likely result or resulted in noise levels annoying to the community. This could be achieved with source noise measurements.		
12	Heritage Resources	Construction phase activities resulting in disturbance of	Construction	➲ The preferable course of action is avoidance of the features to prevent impacts to the recorded sites. If this is not possible Phase 2 mitigation will be required which will require an assessment by a conservation	Low-Medium	Very Low

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
		surfaces and/or sub-surfaces		architect before a destruction permit can be applied for. ➲ The study area should be monitored by the ECO during construction to implementation the Chance Find Procedure for the project. ➲ Recorded heritage features should be indicated on development plans and construction crews should be made aware of expected resources and applicable mitigation measures.		
				➲ The study area should be monitored by the ECO during construction to implementation the Chance Find Procedure for the project as there is a risk of unmarked graves at these sites. ➲ Recorded heritage features should be indicated on development plans and construction crews should be made aware of expected resources and applicable mitigation measures.	Low	Low
				➲ Confirmation of the presence of graves at these features. If confirmed to be graves the cairns should be avoided with a 100m buffer zone and access for family members. ➲ Recorded heritage features should be indicated on development plans and construction crews should be made aware of expected resources and applicable mitigation measures.	Low	Low
				➲ Burial sites and stone cairns (that could potentially be graves until proven otherwise) should be avoided with a 100 m buffer zone. Access for the family members should be ensured.	Medium-High	Low

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				➲ Recorded heritage features should be indicated on development plans and construction crews should be made aware of expected resources and applicable mitigation measures.		
13	Palaeontological Resources	Construction activities and Opencast mining	Construction and Operation	➲ Monitoring Programme for Palaeontology – to commence once the excavations / drilling / mining activities begin. The following procedure is only required if fossils are seen on the surface and when drilling/excavations/mining commence: ➲ When excavations begin the rocks and discard must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (trace fossils, fossils of plants, insects, bone or coalified material) should be put aside in a suitably protected place. This way the project activities will not be interrupted. ➲ Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones (for example see Figure 10). This information will be built into the EMP's training and awareness plan and procedures. ➲ Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment. ➲ If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible. ➲ Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the	Low-Medium	Low

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits. ➲ If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils. ➲ If no fossils are found and the excavations and mining have finished then no further monitoring is required.		
14	Visual Aesthetics	Construction activities and opencast mining	Construction and Operation	➲ Mitigation measures are as follows: ➲ Structures that are required to be built from steel or concrete can be painted in a natural tone fitting with the surrounding environment; ➲ To reduce the potential of glare external surfaces of buildings and structures should be articulated or textured to create interplay of light and shade; ➲ During construction, access roads will require an effective dust suppression management program, such as regular wetting and/or the use of non-polluting chemicals that will retain moisture in the road surface; ➲ Where practicable, concurrent rehabilitation with indigenous species and vegetative screening measures, as opposed to a horticultural approach to landscaping should be adopted. It is not advisable to	High	Medium-High

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				plant more exotic trees, focus should rather be placed on greening of dumps and fast rehab of pits; and ➲ Shielding of night lights can greatly reduce the sky glow by ensuring that lights have proper shielding which ensures that light does not spill into the night sky. The direction of the main beam of all lights directed towards any potential observer should be at an angle smaller than 70°. Higher mounted lights allow lower main beam angles, which can assist in reducing glare.		
		Rehabilitation	Closure	Rehabilitation soon after mining of an area as well as dust suppression can reduce the negative visual impact of the project.	Medium to High (+)	Medium to High (+)
15	Socio-economic: Coal Production for Electricity Generation	All mining activities	Operational	No mitigation measures are proposed as this will be a positive impact.	Very High (+)	-
	Socio-economic: Economic Growth	All mining activities	Operational	No mitigation measures are proposed as this will be a positive impact.	Very High (+)	-
	Socio-economic: Employment Opportunities	All activities involving employment and procurement of goods and services	Pre-construction, Construction and Operational	➲ Measures proposed to enhance this positive impact include the development of an Employment Equity Plan by Ilima and to support the employment of labour from the local communities during the LoM. ➲ Local employment targets must include employment of youth and women from historically disadvantaged backgrounds. ➲ Prioritise employment and training of people living within the project area, especially for unskilled and semi-skilled positions. Ensure that employment opportunities and skills requirements are advertised locally. Communicate available employment opportunities and skills training and requirements with the local community to manage expectation.	High (+)	High (+)

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				➲ Ensure that the mine's Community Liaison Officer is informed of all project developments to facilitate on going and active engagement with stakeholders.		
	Socio-economic: Skills Development and Education Opportunities	All activities involving employment and procurement of goods and services	Construction, Operational and Decommissioning and Post Closure	➲ Measures proposed to enhance this positive impact include the implementation of the HRD programme, as described in the SLP, which is expected to result in skills transfer, career progression, re-skilling and improved levels of literacy for employees and in the wider community.	Medium-High (+)	High (+)
	Socio-economic: Local Economic Development	All activities involving employment and procurement of goods and services	All	➲ Implement and continuously update the SLP to ensure maximum benefits to the community. The SLP must align with the associated legislation and include intensive stakeholder consultations as prescribed in the law. ➲ Implementation of the agreed LED projects (Upgrade of Sports Facilities at Silobela Stadium Project and Expansion of Tibaya Farming Projects) committed to in the SLP will have a significant positive impact for the broader community.	Medium-High (+)	Medium-High (+)
	Socio-economic: Government Revenue and Royalties	All mining activities	Construction and Operational	No mitigation measures are proposed as this will be a positive impact.	Low-Medium (+)	-
	Socio-economic: Change in Land Use resulting in loss of agricultural land and loss of jobs	All mining activities	Construction, Operational and Decommissioning and Post Closure	➲ Should the mine extension be approved, Ilima must seek surface access agreement with the affected landowners. Ilima must develop a policy and framework outlining the procedures to be followed for land acquisition and lease agreements prior to any change of land use activity. ➲ Ilima will provide for farming to continue (where identified and following rehabilitation of pits). Land will be rehabilitated and returned to farmers post mining. Rehabilitation of the mined areas should take	High	Low-Medium

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				place as soon as possible to restore the land, for example to agriculture use. ➲ Ilima seeks to focus on the agricultural sector in terms of LED projects since the community of Carolina is largely dependent on this sector for its daily livelihood. Hence, the proposed LED Project for this SLP is an Expansion of Tibaya Farming Projects that were previously initiated and funded by the company in the other SLP. Ilima proposed to purchase additional farming land to sustain all the farming ventures that the company initiated and funded under Tibaya Farming Project (Pty) Ltd. Because of the additional farming land, it is logical for Ilima to expand these projects by adding more livestock, agricultural implements, and other farming facilities to ensure that they become more sustainable and create more jobs for the community of greater Carolina. ➲ Implement a written complaints and grievance procedure.		
	Socio-economic: Population Influx	All activities involving employment and procurement of goods and services	Pre-Construction, Construction and Operational	➲ These impacts can be mitigated through cooperative planning with the Local Municipality. An influx management plan must be developed in collaboration with the CALLM. The plan must identify responsibilities between the Applicant and the CALLM, for ensuring that access to municipal services such as public health, public safety, water, sanitation, power and affordable housing are available in the local area. ➲ Where possible, construction employees should be locally sourced as they will live with their families.	Low-Medium	Low-Medium

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				➲ Liaise with Local Government to ensure that expected population influx is considered in infrastructure development and spatial development planning. ➲ Ensure continuous consultation with local communities, farm landowners and government and promote partnerships to address illegal activities on-site and in the surrounds of the project area.		
	Socio-economic: Security Risks	All activities involving employment and procurement of goods and services	Pre-Construction, Construction and Operational	➲ Explore opportunities for collaboration with local police with regards to safety and security issues relating to project activities in general and any concerns about contractors. Implement security measures within the Kranspan MRA extension area. ➲ The Applicant must establish a community engagement forum comprising of representatives of, among others, the mine management, surrounding landowners / land users, community members, authorities, and local businesses. ➲ Implement a written complaints and grievance procedure.	Medium-High	Low-Medium
	Socio-economic: Mine Health and Safety – General	All mining activities	Pre-Construction, Construction and Operational	➲ Implement a comprehensive mine health and safety management programme and adhere to legislation governing mine health and safety requirements. ➲ There must be an emergency preparedness and response plan in place. ➲ Implement a written complaints and grievance procedure. ➲ Petrochemicals, oils, solvents, paints and other identified hazardous substances shall only be stored under controlled conditions. All hazardous materials will be stored in a secured, appointed area that is	High	Low

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				fenced and has restricted entry. All applicable emergency contact details shall be confirmed and displayed at various locations across the site. ➲ Speed limits for mine vehicles and personnel must be established.		
	Socio-economic: Mine Health and Safety – Spontaneous Combustion	Opencast mining and stockpiling	Operational	➲ A spontaneous combustion prevention plan must be compiled.	Medium-High	Low
	Socio-economic: Community Health and Safety - Diseases	Movement of man and materials	Pre-Construction, Construction and Operational	➲ Develop information, education and communication campaigns around diseases and health practices including sanitation and hygiene. ➲ Work closely with local health services in monitoring and addressing changes in levels of community health and wellbeing. ➲ Implement an HIV/AIDS awareness programme addressing factual health issues as well as behaviour change. ➲ There must be fencing of the mine area with access control in place preventing unauthorised access to the Kranspan mine. ➲ Implementation of a comprehensive mine health and safety programme. ➲ All hazardous materials will be stored in a secured, appointed area that is fenced and has restricted entry.	Medium-High	Low
	Socio-economic: Community Health and Safety – Traffic and Road Safety	Movement of man and materials	Pre-Construction, Construction and Operational	➲ Regional road maintenance is the responsibility of the relevant road authority while Ilima are responsible for internal mine road maintenance.	Medium to High	Low

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				➲ A monitoring system for ensuring safe use of trucks must be implemented.		
	Socio-economic: Blasting – Ground Vibration	Blasting activities	Operation	➲ There is a need to mitigate vibration when mining comes closer than 200 m from the R36 and closer than 1000 m from privately owned homes. Only one hole per delay (instance in time) may be fired to limit ground vibration to the required levels. This is achieved through effective timing designs and using initiation systems that accurately reflect the timing design. ➲ A baseline study of houses within 1000 m of blasting will be needed before blasting commences to determine the current condition of the buildings as a reference. The blasting to date from surrounding existing mines are unlikely to have caused damage, but houses naturally deteriorate with time, so there will be cracks and other damage that are not blasting related and need to be recorded. ➲ Routine air blast and ground vibration monitoring should be carried out near the closest private home to each blast. Occasional audits should be conducted on blasting practices and mitigation options reconsidered if monitoring shows that levels exceed applicable guidelines.	Medium-High	Low-Medium

<table>
<thead>
<tr><th rowspan="2">NO.</th><th rowspan="2">IMPACT</th><th rowspan="2">PROJECT ACTIVITY</th><th rowspan="2">PHASE OF IMPACT</th><th rowspan="2">MITIGATION MEASURES</th><th colspan="2">SIGNIFICANCE RATING</th></tr>
<tr><th>PRE-MITIGATION</th><th>POST-MITIGATION</th></tr>
</thead>
<tbody>
<tr><td rowspan="2"></td><td>Socio-economic: Blasting – Fly Rock</td><td rowspan="2">All blasting, but particularly presplit and coal blasting</td><td rowspan="2">Operation</td><td rowspan="2">

Air blast control will be important to meet the limit of 125 dB and to avoid complaints regarding the mine activities. At 125 dB limit, air blast will be controlled within the blast and will have low significance at distances beyond 100 m.
Air blast and related noise from blasting need to be controlled by providing adequate stemming in each blasthole as per an effective design. Stemming lengths should not be less than 20 hole-diameters, except in presplit holes. Strict control needs to be applied to prevent the occurrence of over-charged holes.
Stemming length control also applies to fly rock control.
Under-burdened faces are a major source of fly rock and air blast. Burden control on free faces must be applied and face profiling should be applied on faces that are oriented towards receptors that are closer than 1000 m from a blast. Effective burden control implies presplitting of all overburden and mid-burden blasts to create good quality vertical high walls.
As a normal procedure, it will be necessary to temporarily clear people to a safe distance (1000 m) from blasting activities. This control must also apply to people working in the opencast operations immediately adjacent to the mine.
In cases where roads or railway lines (R36 and the railway line to the Southeast of the mine) come within the zone of influence of fly rock from blasting, traffic

</td><td>Medium to High</td><td>Low</td></tr>
<tr><td>Socio-economic: Blasting – Air Blast</td><td>High</td><td>Low</td></tr>
</tbody>
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NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				must be stopped at a safe distance of a minimum of 1000 m during blasting operations. ➲ Pre-split blasting can generate very high air blast amplitudes. This should be controlled by firing presplit holes one at a time in sequence away from nearby receptors and in an upwind direction. ➲ Routine air blast and ground vibration monitoring should be carried out near the closest private home to each blast. Occasional audits should be conducted on blasting practices and mitigation options reconsidered if monitoring shows that levels exceed applicable guidelines.		
	Socio-economic: Blasting – Dissolved Nitrates	Blasting activities	Operation	➲ Only waterproof explosives should be used for blasting. Bulk emulsions and bulk emulsion blends are suitable, but explosives that can dissolve in water, such as ANFO should never be used. ➲ Sleep times (how long a blast stands after it is charged and before it is fired), should be limited to a maximum value depending on manufacturers recommendations. ➲ Any spillages of stored explosives, especially ammonium nitrate prill, must be controlled with adequate bunding and cleaned immediately after a spillage occurs.	High	Very Low
	Socio-economic: Blasting – Dust and Fumes	Blasting activities	Operation	➲ Should any nitrous oxide fumes be observed during a blast, blasting activity should be reviewed and the cause of the fumes identified and corrected if needed. Causes include poor charging practices, incorrect explosives formulation or holes that are too close together in softer formations.	Medium to High	Low

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
	Socio-economic: Blasting – Ground Vibration and Fly Rock: Heritage Sites and Graves	Blasting activities	Operation	Heritage sites (including graves): ➲ In several cases, there are heritage sites that will be located closer than 500 m from blasting. These structures are particularly sensitive to fly rock risk. For these structures, the following measures need to be taken in addition to the fly rock control measures outlined previously. 1. Stemming lengths must be increased to >25 hole-diameters. 2. For each blast, every heritage site within 500 m of a blast must be mapped before the blast and then checked after the blast. If there is any fly rock within 250 m of such site specialist advice must be obtained to curb the risk in future blasts. ➲ A video recording of each blast must be made to determine the effectiveness of the fly rock control Sites within the mining area: ➲ Ruins and graves are present within the proposed open cast area. The proposal is to leave remnant pillars around each of these sites that are 50 m in radius. Special care will be needed to minimise the risk of pillar displacement or damage during blasting around the pillar. This will require smaller diameter holes (reduced from 250 mm), long delays, and only one hole firing per delay when blasting closer than 100 m from the pillar. Specialist advice will be needed in working out the mining sequence around the pillars and in designing each blast closer than 100 m from the pillar edges to ensure no pillar displacement occurs and that vibration limits are met.	Medium to High	Low

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				Buildings and people closer than 500 m from blasting ➲ A few people and buildings will remain within the zone of influence of ground vibration and fly rock after the measures outlined above have been applied. For these cases, special additional mitigation measures will need to be applied which will most likely involve a reduced charge mass per hole. This can be achieved through drilling smaller diameter holes, multiple benching or firing decked charges in each hole. The method chosen must be guided by the mine's technical expertise or by obtaining specialist advice. ➲ An alternative will be for the mine to buy the properties that are within the zone of influence. ➲ There is an active operation on the northeastern corner of Roodebloem Farm that will end up being withing a few tens of metres of blasting during Years 10 to 15. Mitigation will require communicating blasting times and making sure the operation is cleared of people whenever blasting takes place. ➲ All non-mining people and animals must be evacuated when blasting is closer than 1000 m from them. ➲ The active operation on the northeastern corner of Roodebloem Farm must be cleared of people whenever blasting takes place.		
	Socio-economic: Mine Closure and Associated Effects on the Local Economy	Closure of the mine	Decommissioning and Post Closure	➲ The Project should encourage and invest in alternative livelihoods development so that at decommissioning and closure phases, the local area is not reliant exclusively on the Project for employment and economic opportunities. Thus by	Medium to High	Low-Medium

NO.	IMPACT	PROJECT ACTIVITY	PHASE OF IMPACT	MITIGATION MEASURES	SIGNIFICANCE RATING	
					PRE-MITIGATION	POST-MITIGATION
				reducing the dependence of the community on mining post closure through local economic development and skills development training. ➲ Plan, update and implement an integrated Mine Decommissioning, Rehabilitation, and Mine Closure Plan with associated Social Closure Planning five years prior to Mine Closure. ➲ Ilima will follow the procedures for downscaling and retrenchment as set out by the Department of Labour (DoL) and the Labour Relations Act. The impact of closure can be mitigated through the implementation of the measures in the SLP, including regular, consultative review of closure strategies and the portable skills / re-skilling programme. ➲ The final land uses are to be established in consultation with the community and local authorities.		

6.9 MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED

The site is primarily of interest because of the existing Kranspan mining operation taking place on the adjacent portion of land. The location of the mining and placement of associated infrastructure within the proposed mining right extension area is determined primarily by the location and extent of the coal seam which is being targeted and which has been defined through the prospecting activities. This application relates to the extension of the existing MRA to now include the additional portions of Farm Vaalbank 212 IS and Farm Roodebloem 51 IT.

Therefore, location alternatives were not considered as the site has been selected based on the availability of coal and proximity to the existing Kranspan Mine. The alternatives considered in this report include the design or layout alternatives and the "No-Go" alternative.

As described in Section 6.1, refinement of the location of mining and infrastructure placement was undertaken in response to the environmental sensitivity plan developed through the Scoping and EIR Process. The approach to the development and application of the environmental sensitivity plan is described in section 6.1.4.

6.10 STATEMENT MOTIVATING THE ALTERNATIVE DEVELOPMENT LOCATION WITHIN THE OVERALL SITE

The extension areas have been selected based on the availability of coal, access to mineral rights and proximity to the existing Kranspan Mine. No site alternatives were considered. However, layout alternatives were considered, this included amending the placement of the site infrastructure and opencast pits to take into consideration the findings of the environmental sensitive areas identified in the specialist studies.

The changes between the initial layout plan and the final layout plan are discussed in detail in Table 6-2, Table 6-3 and Table 6-32 in Section 6.1.3. The table below discusses the advantages and disadvantages of each layout plan to determine the Best Practicable Environmental Option (BPEO).

TABLE 6-34: LAYOUT ALTERNATIVES COMPARATIVE ANALYSIS

ASPECT	ADVANTAGE OR DISADVANTAGE	BPEO	
		INITIAL LAYOUT	FINAL LAYOUT
Climate	The change in level of impact on climate is negligible.	-	-
Topography	Advantage: As a result of the overall reduced layout footprint in the Final Layout, there would ultimately be less impacts on topography on Farm Roodebloem.	-	✓
Geology	Advantage: As a result of the overall reduced layout footprint in the Final Layout, approximately 550 000 tons of reserve (10% of the reserve on Portion RE of Farm Roodebloem 51 IT) will be sterlised (unable to be mined).	-	✓
Soils and Agricultural Land Capability	Advantage: As a result of the overall reduced layout footprint in the Final Layout, less soils and agricultural land would ultimately be impacted on Farm Roodebloem.	-	✓
Hydropedology	Advantage: As a result of the overall reduced layout footprint in the Final Layout, less wetlands and their respective buffer zones would be impacted on Farm Roodebloem and thus there would be fewer overall impacts on hydropedology.	-	✓
Terrestrial Ecology – Flora	Advantage:	-	

ASPECT	ADVANTAGE OR DISADVANTAGE	BPEO	
		INITIAL LAYOUT	FINAL LAYOUT
	The Final Layout incorporates the recommended habitat buffer (approximately 26Ha in size) by the biodiversity specialist for the endangered plant SCC (Sensitive Species 1200) on Farm Roodebloem in order to conserve and protect the plant species *in situ*.		
	Advantage: As a result of the overall reduced layout footprint in the Final Layout, less CBA (Irreplaceable) and CBA (Optimal) would be removed/cleared on Farm Roodebloem. The infrastructure overlap with all CBAs has been reduced from 878.8 Ha (initial layout) to 838.8 Ha (final layout), compared to the overall 2 224 Ha of CBA that occurs within the proposed extension area. All ESA has been avoided in the final layout (originally 37.8 Ha of ESA would have been lost).		✓
	Advantage: As a result of the overall reduced layout footprint in the Final Layout, less sensitive vegetation (untransformed grassland and sandstone scarp shrubland) would be removed/cleared on Farm Roodebloem. The infrastructure overlap with both sensitive vegetation habitats has been reduced from 370.2 Ha (initial layout) to 346.3 Ha (final layout).		
Terrestrial Ecology – Fauna	Advantage: The Final Layout avoids some locations of fauna species of conservation concern on Farm Roodebloem such as the African Grass-owl (*Tyto capensis*), classified as Vulnerable, as well as suitable roosting and breeding habitat for this species.	-	✓
Surface Water	Advantage: As a result of the overall reduced layout footprint in the Final Layout, there is overall less encroachment on wetlands and their respective buffer zones on Farm Roodebloem. The infrastructure overlap with all wetland units has been reduced from 388.5 Ha (initial layout) to 334.2 Ha (final layout).	-	✓
Groundwater	Advantage: As a result of the overall reduced layout footprint in the Final Layout, there would ultimately be less groundwater impacts on Farm Roodebloem.	-	✓
Air Quality Noise	Advantage: As a result of the overall reduced layout footprint in the Final Layout, less sensitive receptors would be impacted on Farm Roodebloem.	-	✓
Heritage Resources	Advantage: The Final Layout avoids burial site C105 (a small informal burial site with ~31 graves) as well as structure C106 (a modern farmstead site) on Farm Roodebloem.	-	✓

ASPECT	ADVANTAGE OR DISADVANTAGE	BPEO	
		INITIAL LAYOUT	FINAL LAYOUT
	Disadvantage: The Final Layout encroaches on heritage resource C005, a large informal cemetery on Farm Vaalbank. However, all graves/burial sites will be avoided with a 100m buffer during the LoM.	✓	-
Palaeontological Resources	Advantage: As a result of the overall reduced layout footprint in the Final Layout, there would ultimately be less chance of palaeontological impacts on Farm Roodebloem.	-	✓
Visual Aesthetics	Advantage: As a result of the overall reduced layout footprint in the Final Layout, there would ultimately be less visual impacts on Farm Roodebloem.	-	✓
Socio-economic:	Disadvantage: In terms of coal production for electricity generation and economic growth, the Final Layout will result in approximately 550 000 tons of reserve (10% of the reserve on Portion RE of Farm Roodebloem 51 IT) not being mined in order to avoid ecologically environmental sensitive areas. This results in a loss of sellable coal and less coal supply to the Eskom and export market.	✓	-
	Advantage: As a result of the overall reduced layout footprint in the Final Layout, less land on Farm Roodebloem 51 IT would be mined and thus there will be less loss of agricultural land.	-	✓
	Advantage: As a result of the overall reduced layout footprint in the Final Layout, less sensitive receptors would be impacted on Farm Roodebloem.	-	✓

The above table correlates to the findings in the comparative analysis summary of the environmental aspects in Table 6-3, which shows the outcome that the **Final Layout Plan** is the BPEO for the proposed Kranspan Mining Right Extension project. The application of the avoidance measure in the mitigation hierarchy has resulted in the Final Layout Plan which has reduced the extent of the impacts significantly.

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

This section requires an impact assessment on the Final Site Layout Plan.

Impacts were identified as follows:

- An appraisal of the project activities and components;
- Impacts associated with listed activities;
- An assessment of the receiving biophysical, social, economic and built environment;
- Findings from specialist reports;
- Issues highlighted by authorities; and
- Comments received during public participation from IAPs.

As discussed in Section 6.1 of the report, only layout alternatives were considered in the EIA Report. The environmental sensitivity plan resulted in several changes to the initial site layout plan, and Table 6-2 summarises these changes.

This section focuses on the pertinent impacts and risks that could potentially be caused by the proposed Kranspan mine extension project during all phases of the project on the final layout plan (Table 7-1, Table 7-2and Table 7-3).

A summary of the potential environmental impacts is provided below:

7.1 CONSTRUCTION PHASE

TABLE 7-1: POTENTIAL IMPACTS ON THE FINAL LAYOUT PLAN (CONSTRUCTION PHASE)

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
1	Topography	Site clearing, levelling and cut and fill construction activities	Change in topography of the area which could have impacts on the sense of place and visual aesthetics as well as potentially result in the interception of natural runoff.	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
2	Geology	Site clearing and infrastructure siting	Underlying geology will be affected in that mineral resources will be lost.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
3	Soils and Agricultural Land Capability	Ancillary infrastructure (Offices and Workshops)	The construction phase for the proposed contractor's yards, office areas and haul roads will lead to compaction and erosion of soil resources due to altered surface dynamics, the presence of hardened surfaces and general degradation of soil resources, which could result in the loss of land capability.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		Stockpiling	During construction, stockpiles will lead to compaction and erosion of soil resources due to altered surface dynamics, the increased volume of traffic (dump trucks in specific) and general degradation of soil resources, which could result in the loss of land capability.	Low-Medium			
		Opencast mining	The construction phase for the proposed opencast mining activities will lead to compaction and erosion of soil resources due to increased traffic, stripping activities	High			

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			and the general degradation of soil resources, which could result in the loss of land capability.				
4	Hydropedology	Compaction and surface sealing activities	Increased erosion and sedimentation due to increase overland flow on the environment.	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
			Increased overland flow will result in decreased infiltration and therefore less lateral flow at the soil bedrock/interface or return flow from groundwater.	Medium-High			
5	Terrestrial Ecology – Flora	Clearance of vegetation from construction activities	Loss of Natural Habitat (untransformed habitat) of High Ecological Importance: The proposed infrastructure footprint includes a total of 545.9 ha of Natural Habitat with High Ecological Importance and these areas which will be lost comprise mostly of Untransformed Grassland (337.1ha) and Valley-bottom & Seep wetlands (199.5ha) but also include smaller areas of Sandstone Scarp Shrubland (9.3 ha).	High	No	Yes	Yes, impact can be managed and mitigated.
			Loss of Plant Species of Conservation Concern (SCC): Two plant SCC were confirmed to occur within the project area during fieldwork, namely Sensitive Species 1200 and *Khadia carolinensis*. In addition, two other SCC not recorded during fieldwork but which are extremely difficult to detect due to their	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			small size (*Aspidoglossum xanthosphaerum*) or occurrence in habitat that remains flooded for protracted periods (*Lessertia phillipsiana*), are thought to have a Moderate to High likelihood of occurring within the project area.				
			Introduction and Proliferation of Alien Invasive Plant Species: Construction activities will provide transformed habitat ideal for the establishment and proliferation of alien invasive plant species. These concentrations of alien plants in areas disturbed by mining will provide a source of seeds and other propagules which are likely to are likely to be dispersed by mining activities and natural dispersal agents (e.g. wind and water dispersal). Highly aggressive alien invaders and habitat transformers are highly likely to colonise the verges of haul roads and access roads throughout the project area from where they are likely to spread into adjacent areas of Untransformed Habitats of high Ecological Importance.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		Influx of labourers and contractors	Illegal Utilisation of Plant Resources: The highly species rich Natural Habitats of the project area contain numerous plant species that are popular medicinal plants	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			(e.g. *Boophone disticha* and *Eucomis autumnalis*) which are likely to be targeted by any illegal medicinal plant harvesters entering the project area. The influx of labourers and contractors could result in an increase in the illegal harvesting of medicinal plants. Furthermore, mines often practice lax access control in the parts of their extensive properties that are not being actively utilised for mining activities leading to an increase in illegal medicinal plant harvesting relative to that which occurs on private farmland.				
6	Terrestrial Ecology – Fauna	Clearance of vegetation from construction activities	Displacement and Loss of Habitat for Faunal Species: The proposed open cast mining and associated activities will result in the clearing and loss of Natural Habitat. Approximately 545.9 ha of Natural Habitat (comprising vegetation units with High Ecological Importance) is expected to be lost due to mining activities. Areas which will be lost comprise mostly of Untransformed Grassland (337.1ha) and Valley-bottom & Seep wetlands (199.5ha) and smaller areas of Sandstone Scarp Shrubland (9.3 ha).	High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			Disruption of Ecological Connectivity and Faunal Dispersal: The open cast mining activities and mine expansion proposed for the project area will aggravate habitat fragmentation and the disruption of natural ecological corridors in the area, thereby impeding the dispersal of faunal species as well as the potential for re-colonisation and recruitment of fauna to the project area during rehabilitation. It is especially sub-populations of medium to large mammal species such as Mountain Reedbuck and Southern Reedbuck that are at risk of becoming fragmented if natural connectivity is disrupted and when the surface area of natural corridors is reduced to the point that these animals can no longer disperse across the project area.	High	No	Yes	Yes, impact can be managed and mitigated.
		Influx of labourers and contractors	Illegal Utilisation of Faunal Resources: The presence of a large labour force within the project area during mining activities will increase the risk of illegal utilisation of fauna resources, such as hunting and snaring of antelope, small mammals and birds. It is assumed that labour force will be accommodated in nearby towns and not on site, which would lower this risk of hunting and poaching considerably.	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			In addition, the project may also result in increased utilisation of natural resources due to potential human encroachment and accessibility to the project area owing to people seeking jobs. This could result in the establishment of illegal settlements on areas consisting of natural habitat on the project area where active mining is absent.				
7	Surface Water Ecosystems	➲ Clearing and grubbing of vegetation ➲ Site perimeter fencing and internal fencing of different sections of the mine ➲ Removal and stockpiling of topsoil ➲ Delivery and storage of vehicles, equipment, machinery, and materials ➲ Construction of access roads, platforms, and drainage structures	Destruction of sensitive habitat: Destruction of wetland units during all construction phase activities due to heavy machinery and indiscriminate habitat destruction.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			Destruction of sensitive habitat: Wetland vegetation alteration following disturbances that will enhance exotic vegetation encroachment.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			Fragmentation of linear surface water habitat: Fragmentation of interconnected wetland units (watercourses) that would otherwise offer migratory corridors.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
		➲ Construction of process plant infrastructure and installation of required equipment and machinery ➲ Construction of the main mine administration complex ➲ Installation of power and water supply infrastructure	Soil erosion that impacts watercourses and wetland habitat: All construction phase activities that result in soil destabilisation.	High	No	Yes	Yes, impact can be managed and mitigated.
			Water quality: All construction phase and operations phase activities associated with water contamination	High	No	Yes	Yes, impact can be managed and mitigated.
8	Groundwater	Storage of hazardous substances for construction activities	Potential contamination of groundwater quality from accidental spillages of hazardous substances stored on site.	Very Low	No	Yes	Yes, impact can be managed and mitigated.
9	Air Quality	Construction activities such as topsoil removal, material loading and hauling, stockpiling, grading, bulldozing, as well as metal and concrete works for the establishment of infrastructure	The main pollutant of concern from construction operations is particulate matter, including PM_{10}, $PM_{2.5}$ and TSP. PM_{10} and $PM_{2.5}$ concentrations are associated with potential health impacts due to the size of the particulates being small enough to be inhaled. Nuisance effects are caused by the TSP fraction (20 µm to 75 µm in diameter) resulting in soiling of materials and visibility reductions.	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			Thus the impact on air quality is the elevated PM_{10} and $PM_{2.5}$ concentrations and elevated dustfall levels				
10	Noise	All construction activities	Elevated Noise Levels	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
11	Heritage Resources	Construction phase activities resulting in disturbance of surfaces and/or sub-surfaces	May destroy, damage, alter, or remove structures of heritage importance	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			May destroy, damage, alter, or remove ruins of heritage importance	Low	No	Yes	Yes, impact can be managed and mitigated.
			May destroy, damage, alter, or remove stone cairns of heritage importance	Low	No	Yes	Yes, impact can be managed and mitigated.
			May destroy, damage, alter, or remove burial sites of heritage importance	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
12	Palaeontological Resources	All construction activities	May destroy, damage, alter, or remove resources of palaeontological importance	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
13	Visual Aesthetics	All construction activities	Visual disturbance of the sense of place	High	No	Yes	Yes, impact can be managed and mitigated.
14	Socio-economic	All activities involving employment and procurement of goods and services	Employment Opportunities: The project has the potential to create employment opportunities for local communities	High (+)	Positive impact should be enhanced.		
			Skills Development and Education Opportunities: The project has the	Medium-High (+)	Positive impact should be enhanced.		

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			potential to provide increased availability and opportunity for a wide range of skills development and job training				
			Local Economic Development: Procurement of local goods and services by the mine, employees and contractors will stimulate local business and create opportunities for entrepreneurship. In addition, implementation of the agreed LED projects committed to in the SLP will have a significant positive impact for the broader community	Medium-High (+)	Positive impact should be enhanced.		
		All construction activities	Government Revenue and Royalties: Payment of dividends, royalties, corporate tax, and income tax should also improve the financial capacity of the government to improve community infrastructure and service delivery	Low-Medium (+)	Positive impact should be enhanced.		
			Change in Land Use resulting in loss of agricultural land and loss of jobs	High	No	Yes	Yes, impact can be managed and mitigated.
		All activities involving employment and procurement of goods and services	Population Influx: The social and economic pressures of population growth will continue as additional people move to the area to find employment and require accommodation and access to community services	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			Security Risks: Increased levels of crime may be experienced in the area as a result of the influx of people seeking employment. Contact crimes may result in injuries and in severe cases, fatalities	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		All construction activities	Mine Health and Safety – General: Minor, major and fatal injuries from potential mine health and safety incidents. In addition, the mine will store and handle various hazardous substances including explosives	High	No	Yes	Yes, impact can be managed and mitigated.
		Movement of man and materials	Community Health and Safety – Diseases: The incidence of HIV/AIDS and other STDs could increase as a result of in-migration of workers seeking employment. Outbreaks of TB can be facilitated by crowded housing conditions and therefore pose a risk for both employees and community members	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			Community Health and Safety – Traffic and Road Safety: The project will result in an increase in traffic volume on the R36, including heavy vehicles like ADTs. Traffic and congestion on local public roads will increase. In summary, safety risks to vehicles and pedestrians will be increased. This may negatively influence traffic flows, accelerate degradation of the road surface	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			and possibly result in a greater likelihood of collision incidents				

7.2 OPERATION PHASE

TABLE 7-2: POTENTIAL IMPACTS ON THE FINAL LAYOUT PLAN (OPERATIONAL PHASE)

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
1	Climate	Equipment and vehicles used during mining activities	Greenhouse Gas Emissions.	Low	No	Yes	Yes, impact can be managed and mitigated.
2	Topography	Blasting activities and mining of opencast pits	Change in topography of the area which could have impacts on the sense of place and visual aesthetics as well as potentially intercepting natural runoff.	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
3	Geology	Blasting activities and excavations required for all mine infrastructure and the opencast pits	Underlying geology will be affected in that mineral resources will be lost.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
4	Soils and Agricultural Land Capability	Ancillary infrastructure (Offices and Workshops)	The operational phase for the proposed contractor's yard, office areas and haul roads will lead to compaction and erosion of soil resources due to altered surface dynamics, increased traffic, foot movement and the general presence of foundations, which could result in the loss of land capability.	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
		Stockpiling	During operation, stockpiling will lead to compaction and erosion of soil resources due to the sheer weight of the stockpiles, the slope of the stockpiles which will induce overland flow and increased traffic which could result in the loss of land capability.	Low-Medium			

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
		Opencast mining	Opencast mining activities will involve soil stripping activities which will lead to the removal of soil resources together with bedrock, which will result in the loss of land capability to some extent.	High			
5	Hydropedology	Opencast mining activities	Open cast areas will intercept lateral flow paths and remove connectivity between recharge zones and lateral flow zones. Alteration of this flow path will likely change the wetland water regimes negatively	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
6	Terrestrial Ecology – Flora	Opencast mining activities	Loss of Natural Habitat (untransformed habitat) of High Ecological Importance: The proposed infrastructure footprint includes a total of 545.9 ha of Natural Habitat with High Ecological Importance and these areas which will be lost comprise mostly of Untransformed Grassland (337.1ha) and Valley-bottom & Seep wetlands (199.5ha) but also include smaller areas of Sandstone Scarp Shrubland (9.3 ha).	High	No	Yes	Yes, impact can be managed and mitigated.
			Loss of Plant Species of Conservation Concern (SCC): Two plant SCC were confirmed to occur within the project area during fieldwork, namely Sensitive Species 1200 and *Khadia carolinensis*. In addition, two other SCC not recorded during fieldwork but which are extremely difficult to detect due to their	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			small size (*Aspidoglossum xanthosphaerum*) or occurrence in habitat that remains flooded for protracted periods (*Lessertia phillipsiana*), are thought to have a Moderate to High likelihood of occurring within the project area.				
			Introduction and Proliferation of Alien Invasive Plant Species: Construction activities will provide transformed habitat ideal for the establishment and proliferation of alien invasive plant species. These concentrations of alien plants in areas disturbed by mining will provide a source of seeds and other propagules which are likely to are likely to be dispersed by mining activities and natural dispersal agents (e.g. wind and water dispersal). Highly aggressive alien invaders and habitat transformers are highly likely to colonise the verges of haul roads and access roads throughout the project area from where they are likely to spread into adjacent areas of Untransformed Habitats of high Ecological Importance.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		Influx of labourers and contractors	Illegal Utilisation of Plant Resources: The highly species rich Natural Habitats of the project area contain numerous plant species that are popular medicinal plants	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			(e.g. *Boophone disticha* and *Eucomis autumnalis*) which are likely to be targeted by any illegal medicinal plant harvesters entering the project area. The influx of labourers and contractors could result in an increase in the illegal harvesting of medicinal plants. Furthermore, mines often practice lax access control in the parts of their extensive properties that are not being actively utilised for mining activities leading to an increase in illegal medicinal plant harvesting relative to that which occurs on private farmland.				
7	Terrestrial Ecology – Fauna	Opencast mining activities	Displacement and Loss of Habitat for Faunal Species: The proposed open cast mining and associated activities will result in the clearing and loss of Natural Habitat. Approximately 545.9 ha of Natural Habitat (comprising vegetation units with High Ecological Importance) is expected to be lost due to mining activities. Areas which will be lost comprise mostly of Untransformed Grassland (337.1ha) and Valley-bottom & Seep wetlands (199.5ha) and smaller areas of Sandstone Scarp Shrubland (9.3 ha).	High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			Disruption of Ecological Connectivity and Faunal Dispersal: The open cast mining activities and mine expansion proposed for the project area will aggravate habitat fragmentation and the disruption of natural ecological corridors in the area, thereby impeding the dispersal of faunal species as well as the potential for re-colonisation and recruitment of fauna to the project area during rehabilitation. It is especially sub-populations of medium to large mammal species such as Mountain Reedbuck and Southern Reedbuck that are at risk of becoming fragmented if natural connectivity is disrupted and when the surface area of natural corridors is reduced to the point that these animals can no longer disperse across the project area.	High	No	Yes	Yes, impact can be managed and mitigated.
		Influx of labourers and contractors	Illegal Utilisation of Faunal Resources: The presence of a large labour force within the project area during mining activities will increase the risk of illegal utilisation of fauna resources, such as hunting and snaring of antelope, small mammals and birds. It is assumed that labour force will be accommodated in nearby towns and not on site, which would lower this risk of hunting and poaching considerably.	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			In addition, the project may also result in increased utilisation of natural resources due to potential human encroachment and accessibility to the project area owing to people seeking jobs. This could result in the establishment of illegal settlements on areas consisting of natural habitat on the project area where active mining is absent.				
8	Surface Water Ecosystems	➲ Clearing and grubbing of vegetation ➲ Dewatering ➲ Open-cast mining of various pits through a combination of excavation and blasting ➲ Construction and operation of the soil and overburden stockpiles ➲ Hauling of raw materials to the process plant ➲ Management of clean and dirty water runoff	Destruction of sensitive habitat: Destruction of wetland units during all construction phase activities due to heavy machinery and indiscriminate habitat destruction.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			Destruction of sensitive habitat: Wetland vegetation alteration following disturbances that will enhance exotic vegetation encroachment.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			Fragmentation of linear surface water habitat: Fragmentation of interconnected wetland units (watercourses) that would otherwise offer migratory corridors.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			Soil erosion that impacts watercourses and wetland habitat: All construction phase activities that result in soil destabilisation.	High	No	Yes	Yes, impact can be managed and mitigated.
			Impact to the hydrological functioning of wetlands:	High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
		from stormwater systems, wash bays, etc ➲ Raw materials processing at the process plant ➲ Concurrent rehabilitation of exposed areas (as is practicable) ➲ Delivery and storage of vehicles, equipment, machinery, and materials	Excavation of deep opencast pits near to wetland habitat that will deviate lateral inter soil flow patterns into the pits that would otherwise sustain wetland units, leading to loss of water source for the wetland and subsequent loss of the unit.				
			Water quality degradation: Impacts to wetland units during the operations phase from runoff pollution, siltation, habitat smothering and vegetation alteration.	High	No	Yes	Yes, impact can be managed and mitigated.
			Water quality: All construction phase and operations phase activities associated with water contamination	High	No	Yes	Yes, impact can be managed and mitigated.
9	Groundwater	Mine dewatering and opencast mining activities	Groundwater availability - The rate of groundwater seepage could be influenced by: ➲ The extent of mining: groundwater seepage rates will increase for larger and mining areas. ➲ Depth of mining: groundwater seepage rates to shallower mining areas are expected to be higher compared to deeper mining areas	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			where the water-bearing fractures are expected to be tighter. ➲ The intersection of water-bearing features: the three main lineaments are expected to increase the groundwater seepage volumes if and when intersected during mining.				
		Opencast mining activities	Impacts on private groundwater users: ➲ Boreholes located within the opencast mining areas would be destroyed during operation. ➲ Boreholes not located within the planned opencast mining areas (but are located close enough to all planned mining activities that groundwater levels could be lowered by more than 5m during the operational phase) could be significantly affected by mine dewatering. It is likely that this would result in a significant reduction in borehole performance. ➲ Boreholes that fall within the zone of influence (where groundwater levels in these boreholes are not expected to be lowered by more than 2m	High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			during mining) are not likely to be significantly impacted.				
		Opencast mining activities	Shallow weathered aquifer, wetlands and springs: ➲ Wetlands could be affected or destroyed by the lowering of groundwater levels during mining, as they will not function optimally in these areas and may be permanently lost due to a decrease in groundwater availability as a result of mine dewatering. It is likely that the wetlands associated with the Kranspan would be most significantly affected during mining. Mining in this area is deeper as the pits target the E Seam. The lowering of groundwater levels is therefore likely to be more significant. Mining on the farm Vaalbank will be shallower as the B and C Seams will be targeted. In this area, the impact on wetlands will be restricted to areas closer to the pits. ➲ It is further likely that spring flow will be negatively affected during mining. Six springs were identified during the hydrocensus. One spring is associated with Pit 7 and would be affected	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			during Year 5 – 10 of mining. Three of these springs are located near Pit 17 and would be affected during Year 15 – 20 of mining.				
		Mine dewatering	Contamination of groundwater quality	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
10	Air Quality	Operation activities such materials handling, bulldozing, drilling, blasting, vehicle entrainment on unpaved surfaces, crushing and screening, windblown dust from overburden dumps and coal stockpiles	Elevated PM_{10} and $PM_{2.5}$ concentrations	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			Elevated Dustfall Levels	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
11	Noise	Blasting, mining operations, haulage	Elevated Noise Levels	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
12	Palaeontological Resources	Opencast mining	May destroy, damage, alter, or remove resources of palaeontological importance	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
13	Visual Aesthetics	All mining activities	Visual disturbance of the sense of place	High	No	Yes	Yes, impact can be managed and mitigated.
14	Socio-economic	All mining activities	Coal Production for Electricity Generation: The coal mining activities enable electricity generation by the coal fired power stations in the Gert Sibande District Municipality	Very High (+)	Positive impact should be enhanced.		

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			Economic Growth: The processing of the mined products for electricity generation contributes immensely to the economy of the country	Very High (+)	Positive impact should be enhanced.		
		All activities involving employment and procurement of goods and services	Employment Opportunities: The project has the potential to create employment opportunities for local communities	High (+)	Positive impact should be enhanced.		
			Skills Development and Education Opportunities: The project has the potential to provide increased availability and opportunity for a wide range of skills development and job training	Medium-High (+)	Positive impact should be enhanced.		
			Local Economic Development: Procurement of local goods and services by the mine, employees and contractors will stimulate local business and create opportunities for entrepreneurship. In addition, implementation of the agreed LED projects committed to in the SLP will have a significant positive impact for the broader community	Medium-High (+)	Positive impact should be enhanced.		
		All mining activities	Government Revenue and Royalties: Payment of dividends, royalties, corporate tax, and income tax should also improve the financial capacity of the government to improve community infrastructure and service delivery	Low-Medium (+)	Positive impact should be enhanced.		

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			Change in Land Use resulting in loss of agricultural land and loss of jobs	High	No	Yes	Yes, impact can be managed and mitigated.
		All activities involving employment and procurement of goods and services	Population Influx: The social and economic pressures of population growth will continue as additional people move to the area to find employment and require accommodation and access to community services	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
			Security Risks: Increased levels of crime may be experienced in the area as a result of the influx of people seeking employment. Contact crimes may result in injuries and in severe cases, fatalities	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		All mining activities	Mine Health and Safety – General: Minor, major and fatal injuries from potential mine health and safety incidents. In addition, the mine will store and handle various hazardous substances including explosives.	High	No	Yes	Yes, impact can be managed and mitigated.
		Opencast mining and stockpiling	Mine Health and Safety - Spontaneous Combustion of Coal: Combustion can occur during opencast mining and stockpiling of coal which can damage infrastructure and result in staff injuries	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		Movement of man and materials	Community Health and Safety – Diseases: The incidence of HIV/AIDS and other STDs could increase as a result of in-migration of workers seeking employment.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			Outbreaks of TB can be facilitated by crowded housing conditions and therefore pose a risk for both employees and community members				
			Community Health and Safety – Traffic and Road Safety: The project will result in an increase in traffic volume on the R36, including heavy vehicles like ADTs. Traffic and congestion on local public roads will increase. In summary, safety risks to vehicles and pedestrians will be increased. This may negatively influence traffic flows, accelerate degradation of the road surface and possibly result in a greater likelihood of collision incidents	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		Overburden and midburden blasting with blasting hole depths between 20 and 30m	Blasting – Ground Vibration: Blast-induced ground vibration resulting in high irritation to neighbours closer than 1200 m from blasting	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		Overburden and midburden blasting with blasting hole depths between 10 and 20m		Low	No	Yes	Yes, impact can be managed and mitigated.
		Overburden and midburden blasting with blasting depths between 5 and 11m	Blasting – Ground Vibration: Blast-induced ground vibration resulting in high irritation to neighbours closer than 500 m from blasting	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			Blasting – Ground Vibration: Blast-induced ground vibration resulting in high irritation to neighbours farther than 500 m from blasting	Low	No	Yes	Yes, impact can be managed and mitigated.
		Overburden and midburden blasting with blasting depths between 20 and 30m	Blasting – Ground Vibration: Blast Induced vibration causing damage to wells which may result in loss of water	Low	No	Yes	Yes, impact can be managed and mitigated.
			Blasting – Ground Vibration: Blast Induced vibration causing damage to road surfaces and earth dams	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
		All blasting activities	Blasting – Fly Rock: Damage to structures or injury to people closer than 1000 m caused by fly rock	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		All blasting, but particularly presplit and coal blasting	Blasting – Air Blast: Damage to structures or complaints from neighbours caused by high air blast	High	No	Yes	Yes, impact can be managed and mitigated.
		All blasting activities	Blasting – Dissolved Nitrates: Water Pollution from Dissolved Nitrates	High	No	Yes	Yes, impact can be managed and mitigated.
		All blasting activities	Blasting – Dust and Fumes: Dust and fumes generated by blasting affecting health and wellbeing of surrounding neighbours	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
		All blasting activities	Blasting – Ground Vibration Heritage Sites and Graves: Damage to ruins, graves and heritage sites caused by vibration	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			Blasting – Fly Rock Heritage Sites and Graves: Damage to ruins, graves and heritage sites caused by fly rock	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

7.3 DECOMMISSIONING AND CLOSURE PHASE (INCLUDING REHABILITATION)

TABLE 7-3: POTENTIAL IMPACTS ON THE FINAL LAYOUT PLAN (DECOMMISSIONING AND CLOSURE PHASE)

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
1	Topography	Rehabilitation	Topography will be (as far as practically possible) restored to that of the pre-mining state, and must be free draining.	Medium-High (+)	Positive impact should be enhanced.		
2	Soils and Agricultural Land Capability	Ancillary infrastructure (Offices and Workshops)	The decommissioning phase for the proposed contractor's yard (office areas and haul roads) will lead to compaction and erosion of soil resources predominantly due to increased traffic, demolition of buildings and other infrastructure etc. which could result in the loss of land capability.	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
		Stockpiling	The decommissioning phase for the proposed stockpiles will lead to compaction and erosion of soil resources predominantly due to increased traffic which could result in the loss of land capability.	Low-Medium			
		Opencast mining	The decommissioning phase for the proposed open cast mining areas will lead to compaction and erosion of soil resources predominantly due to increased traffic relating to backfilling activities, which could result in the loss of land capability.	Medium-High			
3	Terrestrial Ecology – Flora	Construction activities during decommissioning and closure will provide transformed habitat ideal for the establishment and	Introduction and Proliferation of Alien Invasive Plant Species: Construction activities will provide transformed habitat ideal for the establishment and proliferation of alien	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
		proliferation of alien invasive plant species	invasive plant species. These concentrations of alien plants in areas disturbed by mining will provide a source of seeds and other propagules which are likely to are likely to be dispersed by mining activities and natural dispersal agents (e.g. wind and water dispersal). Highly aggressive alien invaders and habitat transformers are highly likely to colonise the verges of haul roads and access roads throughout the project area from where they are likely to spread into adjacent areas of Untransformed Habitats of high Ecological Importance.				
5	Surface Water Ecosystems	➲ Dismantling and removal of all identified above-ground infrastructure ➲ Rehabilitation of the open-cast pits and overburden stockpiles; and placement of topsoil and re-vegetation of exposed areas	Destruction of sensitive habitat: Wetland vegetation alteration following disturbances that will enhance exotic vegetation encroachment.	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			Soil erosion that impacts watercourses and wetland habitat: All construction phase activities that result in soil destabilisation.	High	No	Yes	Yes, impact can be managed and mitigated.
			Water quality: All construction phase and operations phase activities associated with water contamination	High	No	Yes	Yes, impact can be managed and mitigated.
6	Groundwater	Decant from pits	Rate of groundwater level recovery once mining is completed and risk of decant	High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
		Spread of contamination from the opencast mining areas	Long-term zone of impact on groundwater quality	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
7	Air Quality	Decommissioning activities such as demolition and stripping away of structures and facilities, windblown dust from stockpiles and exposed areas, and degradation of roads resulting in exposed areas surfaces	Elevated PM_{10} and $PM_{2.5}$ Concentrations and dustfall	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
8	Noise	All closure activities	Elevated Noise Levels	Low-Medium	No	Yes	Yes, impact can be managed and mitigated.
9	Visual Aesthetics	Rehabilitation	Visual improvement of the sense of place	Medium-High (+)	Positive impact should be enhanced.		
10	Socio-economic	All activities involving employment and procurement of goods and services	Employment Opportunities: The project has the potential to create employment opportunities for local communities, both during mine rehabilitation and for the post-mining land-use activities	High (+)	Positive impact should be enhanced.		
			Skills Development and Education Opportunities: The project has the potential to provide increased availability and opportunity for a wide range of skills development and job training, both for the mine rehabilitation work and the post-mining land-use activities	Medium-High (+)	Positive impact should be enhanced.		

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			Local Economic Development: Procurement of local goods and services by the mine and post-mining landuse activities, employees and contractors will stimulate local business and create opportunities for entrepreneurship. In addition, implementation of the agreed LED projects committed to in the SLP will have a significant positive impact for the broader community	Medium-High (+)	Positive impact should be enhanced.		
		All closure activities	Mine Health and Safety – General: Minor, major and fatal injuries from potential mine health and safety incidents. In addition, the mine will store and handle various hazardous substances including explosives	High	No	Yes	Yes, impact can be managed and mitigated.
		Movement of man and materials	Community Health and Safety – Diseases: The incidence of HIV/AIDS and other STDs could increase as a result of in-migration of workers seeking employment. Outbreaks of TB can be facilitated by crowded housing conditions and therefore pose a risk for both employees and community members	Medium-High	No	Yes	Yes, impact can be managed and mitigated.
			Community Health and Safety – Traffic and Road Safety: The project will result in an increase in traffic volume on the R36, including heavy vehicles like ADTs. Traffic and congestion on local public roads will	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

NO.	ASPECT	PROJECT ACTIVITY	IMPACT	SIGNIFICANCE RATING (WITH NO MITIGATION)	CAN IMPACT BE REVERSED?	WILL IMPACT CAUSE IRREPLACEABLE LOSS OF RESOURCES?	CAN IMPACT BE AVOIDED, MANAGED OR MITIGATED?
			increase. In summary, safety risks to vehicles and pedestrians will be increased. This may negatively influence traffic flows, accelerate degradation of the road surface and possibly result in a greater likelihood of collision incidents				
		Mine Closure	Mine Closure and Associated Effects on the Local Economy: Decommissioning and closure of the mine will have a negative impact on those employed, the families they support and the businesses which provide services to the mine. Mine closure involves significant downscaling and retrenchment of the workforce executed in different periods often involving reshuffling or elimination of workforce positions as well as reduction in the procurement of goods and services	Medium-High	No	Yes	Yes, impact can be managed and mitigated.

8 ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK

This section must consider all the known typical impacts of each of the activities (including those that could or should have been identified by knowledgeable persons) and not only those that were raised by registered interested and affected parties). Refer to Table 8-1 for the impact assessment of each identified impact.

Refer to the detailed Impact Assessment is attached in Appendix 7.

TABLE 8-1: IMPACT ASSESSMENT

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
1	Equipment and vehicles used during mining activities	Greenhouse Gas Emissions	Climate	Operation	Low	➲ Climate change management includes both mitigation and adaptation. The main aim of mitigation is to stabilise or reduce GHG concentrations as a result of anthropogenic activities. This is achievable by lessening sources (emissions) and/or enhancing sinks through human intervention. ➲ One way to keep GHG emissions to a minimum would be to ensure there is minimal fuel use, this can be achieved by ensuring the vehicles and equipment is maintained through an effective inspection and maintenance program. A measure of reducing the project's impact is to limit the removal of vegetation and to ensure that as much as possible revegetation occurs and possibly even the addition of vegetation surrounding the project area.	Low
2	Site clearing, levelling and cut and fill construction activities, blasting activities and mining of opencast pits	Change in topography of the area which could have impacts on the sense of place and visual aesthetics as well as potentially intercepting natural runoff	Topography	Construction and Operation	Low-Medium	➲ Limit all project activities to the development footprint to minimise the extent of the possible impacts. All areas outside of the project footprint must be regarded as No-go areas. ➲ Stormwater management measures must be implemented as per the IWWMP to avoid flooding due to changes in the local topography and drainage systems within the Project area.	Low
	Rehabilitation activities	Topography will be (as far as practically possible) restored to that of the pre-mining state, and must be free draining		Rehabilitation	Medium-High	➲ Rehabilitation soon after mining of an area as well as dust suppression can reduce the negative visual impact of the project. ➲ Concurrent rehabilitation with indigenous species and vegetative screening measures must be adopted.	Medium-High
3	Site clearing, infrastructure siting, blasting activities and excavations	Underlying geology will be affected in that mineral resources will be lost	Geology	Construction and Operation	Medium-High	➲ Local geology and exploration results were considered in the siting of surface infrastructure; ➲ Limit all project activities to the development footprint to minimise the extent of the possible impacts. All areas	Very Low

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
	required for all mine infrastructure and the opencast pits					outside of the project footprint must be regarded as No-go areas; and ➲ Pit wall stability will be reviewed through an on-going monitoring programme and as part of the mine closure planning process.	
4	Ancillary infrastructure (Offices and Workshops)	The construction phase for the proposed contractor's yards, office areas and haul roads will lead to compaction and erosion of soil resources due to altered surface dynamics, the presence of hardened surfaces and general degradation of soil resources, which could result in the loss of land capability.	Soils and Agricultural Land Capability	Construction	Medium-High	➲ Ensure proper storm water management designs are in place; ➲ If any erosion occurs, corrective actions (contour berms) must be taken to minimize any further erosion from taking place. Topsoil should be sourced and replaced and shaped to reduce the recurrence of erosion; ➲ Only the designated access routes are to be used to reduce any unnecessary compaction. Compacted areas are to be ripped to loosen the soil structure. ➲ The topsoil should be stripped by means of an excavator bucket, and loaded onto dump trucks. Topsoil is to be stripped when the soil is dry, as to reduce compaction. The handling of the stripped topsoil will be minimized to ensure the soil's structure does not deteriorate significantly. Compaction of the removed topsoil must be avoided by prohibiting traffic on stockpiles; ➲ The subsoil approximately 0.3 – 0.8 m thick will then be stripped and stockpiled separately; ➲ Stockpiles must be kept to a maximum height of 12 m if space allows. Soil can be stockpiled to a height of 20m where it is absolutely necessary, keeping the 20m footprint as small as possible. ➲ The stockpiles will be vegetated (details contained in rehabilitation plan) in order to reduce the risk of	Low-Medium
		The operational phase for the proposed contractor's yard, office areas and haul roads will lead to compaction and erosion of soil resources due to altered surface dynamics, increased traffic, foot movement and the general presence of foundations, which could result in the loss of land capability.		Operation	Low-Medium		Low
		The decommissioning phase for the proposed contractor's yard (office areas and haul roads) will lead to compaction and		Decommissioning (Including Rehabilitation)	Low-Medium		Low

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
		erosion of soil resources predominantly due to increased traffic, demolition of buildings and other infrastructure etc. which could result in the loss of land capability.				erosion, prevent weed growth and to reinstitute the ecological processes within the soil; ➲ Prevent any spills from occurring. Machines must be parked within hard park areas and must be checked daily for fluid leaks. If a spill occurs, it is to be cleaned up immediately and reported to the appropriate authorities. All vehicles are to be serviced in a correctly bunded area or at an off-site location. Leaking vehicles will have drip trays place under them where the leak is occurring; ➲ A soil fertility and post-mining land capability assessment must be done to address any compaction or fertility issues that may arise from the stockpiling (Post-rehabilitation); ➲ Implement land rehabilitation measures as defined in rehabilitation report; ➲ After the completion of the project the area is to be cleared of all infrastructure. The foundations to be removed. Compacted areas are to be ripped to loosen the soil structure and vegetation cover re-instated; ➲ Topsoil to be replaced for rehabilitation purposes; ➲ The rehabilitated area must be assessed once a year for compaction, fertility, and erosion; and ➲ Annual soil sampling post rehabilitation is applicable to arable post closure land uses, and not applicable to grazing land. Soil sampling at this stage must be informed by the level of vegetation cover established during the rehabilitation phase.	
	Stockpiling	During construction, stockpiles will lead to compaction and erosion of soil resources due to altered surface dynamics, the increased volume of traffic (dump trucks in specific) and general degradation of soil resources, which could result in the loss of land capability.		Construction	Low-Medium		Low
		During operation, stockpiling will lead to compaction and erosion of soil resources due to the sheer weight of the stockpiles, the slope of the stockpiles which will induce overland flow and increased traffic which could result in the loss of land capability.		Operation	Medium-High		Low-Medium
		The decommissioning phase for the proposed stockpiles will lead to compaction and erosion of soil resources predominantly due to		Decommissioning (Including Rehabilitation)	Low-Medium		Low

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
		increased traffic which could result in the loss of land capability.					
	Opencast mining	The construction phase for the proposed opencast mining activities will lead to compaction and erosion of soil resources due to increased traffic, stripping activities and the general degradation of soil resources, which could result in the loss of land capability.		Construction	High		Medium-High
		Opencast mining activities will involve soil stripping activities which will lead to the removal of soil resources together with bedrock, which will result in the loss of land capability to some extent.		Operation	High		Medium-High
		The decommissioning phase for the proposed open cast mining areas will lead to compaction and erosion of soil resources predominantly due to increased traffic relating to backfilling activities, which could result in the loss of land capability.		Decommissioning (Including Rehabilitation)	Medium-High		Medium-High
5	Compaction and surface sealing activities	Increased erosion and sedimentation due to	Hydropedology	Construction	Low-Medium	➲ Attenuation ponds and subsurface drains should form an integral part of stormwater plans to reduce overland	Low

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
		increase overland flow on the environment				flow from paved areas and allow water that runs off from roofs to settle and re-infiltrate; and	
	Compaction and surface sealing activities and opencast mining activities	Increased overland flow will result in decreased infiltration and therefore less lateral flow at the soil bedrock/ interface or return flow from groundwater. Open cast areas will intercept lateral flow paths and remove connectivity between recharge zones and lateral flow zones. Alteration of this flow path will likely change the wetland water regimes negatively		Construction and Operation	Medium-High	➲ Development footprint should adhere the buffer zones around all wetlands. This will enable water to infiltration and feed laterally into the wetlands. Application of good quality water which accumulates in pits on areas downslope of pit to maintain saturation at the soil/bedrock interface of Interflow (soil/bedrock) soils.	Low
6	Clearance of vegetation from construction activities	Loss of Natural Habitat (untransformed habitat) of High Ecological Importance: The proposed infrastructure footprint includes a total of 545.9 ha of Natural Habitat with High Ecological Importance and these areas which will be lost comprise mostly of Untransformed Grassland (337.1ha) and Valley-bottom & Seep wetlands (199.5ha) but also include smaller areas of Sandstone Scarp Shrubland (9.3 ha).	Terrestrial Ecology – Flora	Construction	High	➲ The only viable option within the Mitigation Hierarchy for the impact on CBAs in the project area is Avoidance. While the loss of 125.7ha of areas classified as CBA: Optimal could potentially be mitigated by offsets, this would require the conduction of a focused, larger scale study. The loss of 713.1 ha of areas classified as CBA: Irreplaceable cannot be mitigated through the offset mitigation option and can only be mitigated through Avoidance. ➲ Design opencast areas and other infrastructure footprints to exclude areas of Natural Habitat with High EI situated within areas identified as CBA: Irreplaceable in the MBSP. Particular emphasis should be placed on ensuring that the opencast pit situated in the north western part of the Farm Roodebloem around the recommended 26ha buffer zone for Sensitive Species 1200 does not isolate the buffer zone form contiguous areas of CBA: Irreplaceable situated to the north of the	Medium-High

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						project area. All project infrastructure should be placed within Modified Habitats with Low or Very Low EI. ➲ Design opencast areas and other infrastructure footprints to exclude areas of Natural Habitat with High EI situated within areas identified as CBA: Optimal in the MBSP. Where any infrastructure remains located within areas of CBA: Optimal, this impact should be mitigated by the formal protection of offset areas identified within the project area and/or its immediate surrounds by an appropriate specialist assessment. ➲ Vegetation clearance should be entirely restricted to areas within the infrastructure footprints that have received Environmental Authorisation. The mine should institute an internal permitting procedure (issuing of a 'permit to clear') administered by the mines Environmental Division to control and manage vegetation clearance. Where it is possible to relocate Protected plant species occurring within areas permitted by the Environmental Division for clearing, permits for the relocation of protected plant species should be applied for from the relevant provincial authority and included in the 'permit to clear' procedure. ➲ All parts of the Project Area that are not lost as a result of the construction of Authorised mining infrastructure should be managed for optimal biodiversity in accordance with a site-specific Biodiversity Management Plan (BMP). ➲ A 'veld management plan' should be developed and implemented for all parts of the project area that are not situated within infrastructure footprints as part of the BMP. ➲ In order to limit the severity and frequency of impacts on Natural Habitat resulting from elevated dust emissions, a detailed dust suppression plan should be	

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						developed for the mine and the strict implementation of this plan should be regularly audited.	
		Loss of Plant Species of Conservation Concern (SCC): Two plant SCC were confirmed to occur within the project area during fieldwork, namely Sensitive Species 1200 and *Khadia carolinensis*. In addition, two other SCC not recorded during fieldwork but which are extremely difficult to detect due to their small size (*Aspidoglossum xanthosphaerum*) or occurrence in habitat that remains flooded for protracted periods (*Lessertia phillipsiana*), are thought to have a Moderate to High likelihood of occurring within the project area.			Medium-High	➲ In order to protect the subpopulation of Sensitive species 1200 recorded within the project area, a minimum buffer zone of 26ha was recommended by the specialist and this buffer was accommodated in the final revision of the mine plan provided by the project proponent. The adequacy of the minimal 200m buffer should be verified in the field prior to construction by a wetland specialist with input from a geo-hydrologist if necessary and this recommendation should be included in the EMP for the project. It must be emphasised that the recommended ca. 26ha preliminary buffer is a 'minimal buffer' within which no mining infrastructure should be located and no mining related activities should occur. Furthermore, it is crucial that the 26ha buffer should not be isolated by mining activities and that ecological connectivity should be maintained by establishing an effective ecological corridor, to the west of the railway line that links the 26ha buffer to the currently contiguous area of CBA: Irreplaceable situated directly to the north of the buffer area and extending to the north of the project area. Detailed management recommendation for the 26ha buffer should be included in the recommended BMP for the project area; preliminary management recommendations include: ○ The stand of the alien invasive tree *Acacia dealbata** situated within the 26ha buffer should be eradicated prior to construction of the opencast pit and all other occurring alien invasive	Low-Medium

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						plants should be controlled on an ongoing basis. ○ A stringent dust control programme should be implemented for the opencast area directly adjacent to the buffer. ○ All blast rock that lands in the buffer area should be removed immediately following each blasting event using hand labour. ○ The entire buffer area should be subject to light grazing and burning at appropriate intervals. ○ Access to the buffer should be strictly controlled and all vehicles entering the area must be authorised and supervised by the mines Environmental Department. ○ The Sensitive species 1200 subpopulation and its habitat should be monitored annually by a botanist using simple methods such as plant counts, fixed point photography and, when necessary, monitoring of vegetation cover and species composition within	

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						a limited number of sampling quadrats. ➲ In order to protect the two subpopulations of *K. carolinensis* recorded within the project area, a minimum buffer of 200m around the maximum extent of each colony should be implemented. It must be emphasized that the recommended buffers are 'minimal buffers' within which no mining infrastructure should be located and no mining related activities should occur. Furthermore, it is crucial that the colonies and their buffers should not be isolated by mining activities and that ecological connectivity should be maintained between the various colonies or recorded localities as is the case for the current mine plan. It is recommended that research institutions (e.g. SANBI's Walter Sisulu National Botanical Garden) should be afforded and opportunity to rescue some of the *Khadia carolinensis* plants comprising the colony at Site 58a, which is situated within the footprint of an opencast area, for research purposes prior to construction. The recorded *Khadia carolinensis* subpopulations and their habitat should be monitored annually by a botanist using simple methods such as plant counts, fixed point photography and, when necessary, monitoring of vegetation cover and species composition within a limited number of sampling quadrats. Detailed management recommendation management of the recorded *Khadia carolinensis* should be included in the recommended BMP for the project area. ➲ Any authorised development within any of the four Natural Habitat recorded within the project area should be should be preceded by a thorough search for threatened plant species within the footprint of the development, and in immediately adjacent areas, prior to construction Such searches ('walk-over' surveys) should be conducted by a botanist at the appropriate	

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						time of year which coincides with the flowering times of potentially occurring SCC. In the event that any SCC are confirmed, appropriate in situ and / or ex situ conservation measures should be developed in consultation with the relevant conservation authorities. This recommendation should be incorporated into the EMP for the mine. ➲ In order to confirm the presence or absence of additional SCC within the project area, and provide a more comprehensive species list that forms a sound basis for site-specific biodiversity management, an additional botanical survey which incorporates seasonal coverage should be conducted for the project area as part of the development of the recommended Biodiversity Management Plan for the mine. This survey should place emphasis on searching potentially suitable habitat for the two SCC that are considered to have a moderate to high likelihood of occurring within the project area, namely *Aspidoglossum xanthosphaerum* (VU) and *Lessertia phillipsiana* (DDD).	
	Opencast mining activities	Introduction and Proliferation of Alien Invasive Plant Species: Construction activities will provide transformed habitat ideal for the establishment and proliferation of alien invasive plant species. These concentrations of alien plants in areas disturbed by mining will provide a source of seeds and other propagules which are likely to are likely to be dispersed by		Operation	Medium-High	➲ The mine should develop and implement a site-specific integrated Alien Plant Control Programme (as per the AIS Regulations), which identifies the species that pose the greatest threat, in terms of habitat transformation, to Natural Habitat within the project area, and considers all appropriate chemical, mechanical, biological and cultural control methods for the alien species listed in Appendix 1 of the specialist report. Emphasis should be placed on controlling the 17 declared alien invasive species listed in Appendix 1 of the specialist report and in particular the five alien invasive habitat transformers identified as posing the greatest threat to the Natural Habitats and indigenous vegetation of the project area and its immediate surrounds, namely *Acacia dealbata*, Acacia mearnsii*,*	Low-Medium

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
		mining activities and natural dispersal agents (e.g. wind and water dispersal). Highly aggressive alien invaders and habitat transformers are highly likely to colonise the verges of haul roads and access roads throughout the project area from where they are likely to spread into adjacent areas of Untransformed Habitats of high Ecological Importance.				*Campuloclinium macrocephalum**, *Pyracantha angustifolia** and *Richardia brasiliensis**. ➲ A team of appropriately equipped and trained should be appointed to conduct continuous alien plant control at the 'priority control sites' identified in the Alien Plant Control Programme. This team should work under the auspices of the mines Environmental Division, which should be tasked with supervising and thoroughly documenting all alien plant control activities. ➲ Where planting of trees and shrubs around mine offices, workshops and processing facilities is deemed necessary, only trees and shrubs indigenous to the study area and its immediate surrounds should be planted, and these should be grown from locally obtained seeds or other propagules. No trees, alien or indigenous, should be planted anywhere within the Natural Habitats of the project area. The alien invasive grass *Pennisetum clandestinum** (Kikuyu) should not be used for the establishment of lawns at mine premises.	
	Influx of labourers and contractors	Illegal Utilisation of Plant Resources: The highly species rich Natural Habitats of the project area contain numerous plant species that are popular medicinal plants (e.g. Boophone disticha and Eucomis autumnalis) which are likely to be targeted by any illegal medicinal plant harvesters entering the project area. The influx of labourers and contractors could result in an increase		Construction and Operation	Low-Medium	➲ Access by mine personnel and trespasses to all parts of the project area comprising Natural Habitat should be strictly controlled. Access control should be achieved by the erection of a five-strand cattle fence that is permeable to wildlife around the perimeter of the project area, regular signage prohibiting access and regular patrols by mine security personnel. Security personnel tasked with patrolling areas of Natural Habitat should receive basic training in the following aspects: ○ Prevention of illegal plant harvesting and animal poaching. ○ Location of sensitive Natural Habitats and buffer	Low

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
		in the illegal harvesting of medicinal plants. Furthermore, mines often practice lax access control in the parts of their extensive properties that are not being actively utilised for mining activities leading to an increase in illegal medicinal plant harvesting relative to that which occurs on private farmland.				areas for SCC that should form the focus of patrol efforts. ○ Basic environmental sensitivities of the areas they are tasked with patrolling (e.g. areas where vehicle access is prohibited). ○ Procedures for reporting any incidents of illegal access, plant harvesting, poaching and environmental incidents such as accidental fires and pollution spills. ➲ The damaging or destruction of plant species that are Protected in terms the Mpumalanga Nature Conservation Act (No.10 of 1998) during any future development should be avoided wherever possible, and a permit for the removal or destruction of any such protected plant must be obtained from the provincial authorities (Permitting Office of the MTPA) prior to development. It is recommended that where untransformed Natural Habitat is to be affected by an infrastructure footprints. Protected plant species should be rescued and placed in a nursery or donated to a research institute (e.g. SANBI botanical gardens) prior to development, rather than simply being destroyed. Where feasible, viable subpopulations of such species should also be translocated to transformed (including rehabilitation areas) or untransformed areas within the project area which provide potentially suitable habitats, but such translocations will have to be carried out in a manner that ensures that no ecological degradation of the host	

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						habitat occurs, and will have to be evaluated by a botanist for each species and each potential translocation area.	
7	Clearance of vegetation from construction activities	Displacement and Loss of Habitat for Faunal Species: The proposed open cast mining and associated activities will result in the clearing and loss of Natural Habitat. Approximately 545.9 ha of Natural Habitat (comprising vegetation units with High Ecological Importance) is expected to be lost due to mining activities. Areas which will be lost comprise mostly of Untransformed Grassland (337.1ha) and Valley-bottom & Seep wetlands (199.5ha) and smaller areas of Sandstone Scarp Shrubland (9.3 ha).	Terrestrial Ecology – Fauna	Construction	High	➲ The direct loss of habitat and subsequent loss and displacement of faunal species of conservation concern can only be significantly mitigated through the application of the Avoidance option of the Mitigation Hierarchy. ➲ Develop and implement a Biodiversity Management Plan with the objective of managing all remaining Natural Habitat through conservative grazing, fire management and continual eradication of alien plant species. ➲ If any faunal species of conservation concern (as indicated in this report) are recorded during the construction/mining phase, the ECO should be informed, and should then issue instructions for its capture, translocation and safe release into suitable habitat within the project area with the relevant permits obtained from the relevant authority if necessary. ➲ All domestic waste generated (if present) during construction and mining operations should be removed from the project area as soon as possible and be disposed of at an authorised landfill to reduce the risk of colonisation by feral mammals, scavengers or competitively superior indigenous bird species (e.g. Pied Crows). ➲ Personnel and staff should be advised by means of environmental awareness training on the biodiversity importance of the area. The intentional killing of any faunal species (in particular invertebrates, reptiles and snakes) should be avoided by means of awareness programmes presented to the labour force. The labour	Medium-High

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						force should be made aware of conservation issues pertaining to the taxa occurring on the project area.	
	Opencast mining activities	Disruption of Ecological Connectivity and Faunal Dispersal: The open cast mining activities and mine expansion proposed for the project area will aggravate habitat fragmentation and the disruption of natural ecological corridors in the area, thereby impeding the dispersal of faunal species as well as the potential for re-colonisation and recruitment of fauna to the project area during rehabilitation. It is especially sub-populations of medium to large mammal species such as Mountain Reedbuck and Southern Reedbuck that are at risk of becoming fragmented if natural connectivity is disrupted and when the surface area of natural corridors is reduced to the point that these animals can no longer disperse across the project area.		Operation	High	➲ Ensure that construction and mining activities do not extend beyond the authorised infrastructure footprints onto adjacent natural habitat in order to provide displaced fauna the opportunity to disperse into suitable habitat (although potential dispersal by small animals is highly limited). ➲ It is recommended that prior to commencement of fencing and construction it is ensured that the no large mammal species, especially reedbuck are trapped within any area fenced with security fencing. ➲ All Natural Habitat which is not part of actively mined areas must be fenced with standard 5-strand cattle fencing and not diamond mesh security fencing that will prevent the movement of Reedbuck and other fauna. The relevant conservation scientists of the MTPA should also be approached in order to ascertain the conservation importance of the subpopulations of Mountain Reedbuck and Common Reedbuck that utilise the project area and determine whether further conservation measures are necessary. Such measures may include monitoring, collaboration with surrounding landowners to prevent poaching and ensuring the availability of large and contiguous areas of suitable habitat. ➲ The practice of excavating trenches around the project area as a form of access control should be prohibited as such trenches act as lethal 'pitfall traps' and barriers to dispersal of mammals, reptiles and amphibians and are regarded as an unnecessary and severe impact to such fauna occurring within the project area and its immediate surrounds.	Medium-High

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
	Influx of labourers and contractors	Illegal Utilisation of Faunal Resources: The presence of a large labour force within the project area during mining activities will increase the risk of illegal utilisation of fauna resources, such as hunting and snaring of antelope, small mammals and birds. It is assumed that labour force will be accommodated in nearby towns and not on site, which would lower this risk of hunting and poaching considerably. In addition, the project may also result in increased utilisation of natural resources due to potential human encroachment and accessibility to the project area owing to people seeking jobs. This could result in the establishment of illegal settlements on areas consisting of natural habitat on the project area where active mining is absent.		Construction and Operation	Low-Medium	➲ Contractors should be accommodated off-site (i.e. not within the project area), reducing the risk of poaching and persecution of fauna. ➲ Labour supervisors and SHE officials should monitor the activities of labourers when working away from infrastructure in Natural Habitat. ➲ Personnel and staff should be advised by means of environmental awareness training on the biodiversity importance of the area. The intentional killing of any faunal species (in particular invertebrates, reptiles and snakes) should be avoided by means of awareness programmes presented to the labour force. The labour force should be made aware of conservation issues pertaining to the taxa occurring on the project area. ➲ Regular monitoring of the project area, especially areas of natural habitat where active mining activities are absent, is advised to identify areas where illegal settlement may occur. If any illegal erecting of housing occurs, the mine's public liaising officer should immediately advice on a resolution, which may involve a re-location strategy.	Low
8	Destruction of wetland units during all construction phase activities	Destruction of sensitive habitat: Destruction of wetland units during all construction phase	Surface Water Ecosystems	Construction and Operation	Medium-High	➲ Vegetation and extent of groundcover plays an important role in preserving wetland functionality. It binds soils to protect from erosion, reduces the scouring potential of runoff water through the reduction of velocity and energy dissipation and also	Medium-High

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
	due to heavy machinery and indiscriminate habitat destruction.	activities due to heavy machinery and indiscriminate habitat destruction.				provides the micro-habitat and refuge for supporting a greater array of wetland-dependent biodiversity. Indiscriminate destruction of vegetation layers from wetland areas that fall outside of the ultimate infrastructure footprint should be avoided. It is recommended that the buffer zones be fenced off within applicable areas to avoid indiscriminate habitat destruction and treated as “no-go” areas. This includes using these areas for soil stockpiling, equipment storage, fuelling areas, etc. ➲ Erosion and sedimentation must be managed as an ongoing concern throughout all the phases of the development activities. This includes protection of stockpiled soils, rock dumps and other stored materials. Stormwater management must ensure erosion protection at the outfall points into the receiving environment. There are multiple impoundments along most of the watercourses within the survey area that already act as sediment traps. Before an engineering solution to sediment management is sought, it is recommended that a monitoring plan be developed to determine the level of functionality that these impoundments already offer as the various phases of the proposed mining development progress. ➲ A management strategy should be in place for the encroachment of opportunistic alien vegetation.	
	Wetland vegetation alteration following disturbances that will enhance exotic vegetation encroachment.	Destruction of sensitive habitat: Wetland vegetation alteration following disturbances that will enhance exotic vegetation encroachment.			Medium-High		Very Low
	Fragmentation of interconnected wetland units (watercourses) that would otherwise offer migratory corridors.	Fragmentation of linear surface water habitat: Fragmentation of interconnected wetland units (watercourses) that would otherwise offer migratory corridors.			Medium-High		Very Low
	Excavation of deep opencast pits near to wetland habitat that will deviate lateral inter soil flow patterns into the pits that would otherwise	Impact to the hydrological functioning of wetlands: Excavation of deep opencast pits near to wetland habitat that will deviate lateral inter soil flow patterns into the pits that would otherwise sustain wetland units,		Operation	High	➲ The water that seeps into the pit that requires decanting could be pumped to an attenuation feature that then releases the water back into the wetland unit. This would depend on the quality of the water, which may require a level of processing prior to it being released. The attenuation feature should be engineered to ensure that the outfall does not induce erosion of the watercourse. Depending on the elemental content of the water, the wetland itself could	Medium-High

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
	sustain wetland units, leading to loss of water source for the wetland and subsequent loss of the unit.	leading to loss of water source for the wetland and subsequent loss of the unit.				be utilised as a biological filter and management tool to ensure suitable water quality for the downstream wetlands, aquatic habitats, and other water users. Intact ecological integrity of the wetland units located downstream of decanting sites is vital to the successful implementation of a water management scheme such as this.	
	All construction phase activities that result in soil destabilisation.	Soil erosion that impacts watercourses and wetland habitat: All construction phase activities that result in soil destabilisation.		All	High	➲ Any soil that is removed for trenching purposes must be stored in their respective layers and returned to the excavation in reverse order. The soils must be stored outside of the wetland and buffer zones in order not to smother established wetland vegetation. ➲ Adequate site reinstatement must be implemented to abate the formation of erosion through modification of the surface water hydrology. Silt traps and fencing should be used in areas of steeper topography (if applicable). ➲ The movement of heavy machinery within wetland zones should be limited to only single access roadways. Upon completion of the construction phase, this roadway should be ripped and/or disk ploughed to loosen the compacted soils and to allow for the establishment of vegetation within the affected areas, which should be a mixture of veld grasses typical of the surrounding area within similar habitat units. ➲ Indiscriminate habitat destruction should be avoided and the construction footprint, including service and support areas should be kept to a minimum.	Very Low
	Impacts to wetland units during the operations phase from runoff pollution, siltation, habitat	Water quality degradation: Impacts to wetland units during the operations phase from runoff pollution, siltation, habitat smothering and vegetation alteration.		Operation	High	➲ Possible sources of contamination include hydrocarbons (from poorly designed and managed fuelling stations and/or workshop and maintenance areas) and runoff water from processing areas, and these should be kept separate from clean water runoff with a suitable stormwater management system, and	Low-Medium

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	smothering and vegetation alteration.					general surface water runoff should be treated prior to release into the environment.	
	All construction phase and operations phase activities associated with water contamination	Water quality: All construction phase and operations phase activities associated with water contamination		All	High	➲ Erosion management to prevent water quality degradation. ➲ Onsite sewerage treatment and/or management to avoid contamination of the surface water ecosystems. Untreated sewerage contamination of the surface water ecosystems could occur due to poorly designed sewerage treatment systems, treatment systems where processing capacity is exceeded, poorly maintained infrastructure leading to water-borne effluent leaks prior to processing, sewerage spills during (for example) septic tank pumping, and informal ablutions near watercourses. Careful attention to sewerage treatment and sewerage systems will reduce the risk of contamination of the resource. ➲ During decanting, the pit water must be routinely tested at an accredited laboratory to develop an appropriate management strategy to treat the water to within target water quality standards prior to release. Routine monitoring and testing of the water will also determine whether treatment is, in fact, required prior to release.	Low-Medium
9	Storage of hazardous substances for construction activities	Storage of hazardous substances for construction activities	Groundwater	Construction	Very Low	➲ Design and build all PCDs before any mining activities commence. ➲ Implement and maintain a groundwater monitoring programme in mine and private boreholes situated in the zones of influence identified for the mining areas. ➲ Implement sound house-keeping measures to prevent and clean spills, address leaks and undertake regular inspections. Ensure that the record-keeping procedure is in place and that instructions given are carried out. ➲ Measure rainfall daily on site.	Very Low

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
	Mine dewatering and opencast mining activities affecting groundwater availability	Groundwater availability - The rate of groundwater seepage could be influenced by: ➲ The extent of mining: groundwater seepage rates will increase for larger and mining areas. ➲ Depth of mining: groundwater seepage rates to shallower mining areas are expected to be higher compared to deeper mining areas where the water-bearing fractures are expected to be tighter. ➲ The intersection of water-bearing features: the three main lineaments are expected to increase the groundwater seepage volumes if and when intersected during mining.		Operation	Medium-High	➲ Ilima will enter into negotiations with existing groundwater users to identify suitable alternatives, should monitoring information indicate that private groundwater use is negatively affected by mining activities. ➲ Negotiations must be entered into with the owners of private boreholes that will be destroyed during opencast mining. ➲ A dedicated groundwater monitoring programme must be implemented in all private boreholes within the delineated zone of influence. This monitoring programme must include groundwater level and quality measurements. Should monitoring information indicate adverse impacts, Ilima must enter into negotiations with the affected landowners to negotiate alternative water supply options of equivalent quantity and quality. ➲ Feedback must be provided to owners of boreholes within the affected zones regarding progress made with mining activities, rehabilitation and the outcome of monitoring programmes on a quarterly basis when groundwater monitoring will take place to ensure that they are informed of aspects of mining that may be of significance. ➲ The volume of water pumped from underground and the pits to surface during the operational phase must be recorded. This information must be used to update the impact assessment presented in this report, as necessary. ➲ If water-bearing structures are intersected during mining that contribute significant volumes of seepage to the pits and underground workings, they must be characterised and quantified. The risk and timing of	Low-Medium

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						decant must be re-assessed taking this information into consideration. ➲ Should mining activities on the Farm Vaalbank extend to the C-Seam workings in the historical Union Colliery underground workings, provision must be made to dewater and contain additional underground water in the mine's dirty water management system. The impact assessment must be updated at least a year prior to mining into the old underground workings to ensure that sufficient planning can be made to address potential cumulative impacts. Specific focus must be placed on the perceived increased volume of extraneous water that will have to be contained as well as the increased risk of decant from the affected pits. ➲ Surface rehabilitation measures must be designed to minimise the risk of decant. In order to do so, concurrent rehabilitation of the opencast pits must be maintained throughout the life of mining. ➲ Groundwater levels must be monitored on a monthly basis in the dedicated monitoring boreholes. This information together with daily on-site rainfall measurements must be used to improve the understanding of the rate of recharge as well as of aquifer parameters like storage coefficients and specific yield. ➲ The numerical model used in this assessment should be updated, verified and re-calibrated on a regular basis as monitoring information becomes available. ➲ The final model must be prepared at least five years prior to mine closure to ensure that predictions of long-term impacts are undertaken with the highest possible level of confidence.	
	Destroying of private boreholes	Impacts on private groundwater users:		Operation	High	➲ Maintain the groundwater monitoring programme in mine and private boreholes located.	Low-Medium

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	during opencast mining	➲ Boreholes located within the opencast mining areas would be destroyed during operation. ➲ Boreholes not located within the planned opencast mining areas (but are located close enough to all planned mining activities that groundwater levels could be lowered by more than 5m during the operational phase) could be significantly affected by mine dewatering. It is likely that this would result in a significant reduction in borehole performance. ➲ Boreholes that fall within the zone of influence (where groundwater levels in these boreholes are not expected to be lowered by more than 2m during mining) are not likely to be				➲ Ilima will enter into negotiations with existing groundwater users to identify suitable alternatives, should monitoring information indicate that private groundwater use is negatively affected by mining activities. ➲ Negotiations must be entered into with the owners of private boreholes that will be destroyed during opencast mining. ➲ A dedicated groundwater monitoring programme must be implemented in all private boreholes within the delineated zone of influence. This monitoring programme must include groundwater level and quality measurements. Should monitoring information indicate adverse impacts, Ilima must enter into negotiations with the affected landowners to negotiate alternative water supply options of equivalent quantity and quality. ➲ Feedback must be provided to owners of boreholes within the affected zones regarding progress made with mining activities, rehabilitation and the outcome of monitoring programmes on a quarterly basis when groundwater monitoring will take place to ensure that they are informed of aspects of mining that may be of significance. ➲ Replace groundwater monitoring boreholes that may be destroyed during mining. ➲ Measure rainfall daily on site. ➲ Record all groundwater-related complaints and deal with each complaint within the agreed upon timeframe.	

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		significantly impacted.					
	Opencast mining activities affecting wetlands and springs	Shallow weathered aquifer, wetlands and springs: ➲ Wetlands could be affected or destroyed by the lowering of groundwater levels during mining, as they will not function optimally in these areas and may be permanently lost due to a decrease in groundwater availability as a result of mine dewatering. It is likely that the wetlands associated with the Kranspan would be most significantly affected during mining. Mining in this area is deeper as the pits target the E Seam. The lowering of groundwater levels is therefore likely to be more significant. Mining on the farm Vaalbank will be shallower as the B and C Seams will be targeted. In this		Operation	Low-Medium	Implement and maintain concurrent rehabilitation to reduce the duration of impacts and allow recovery of wetlands/springs.	Low

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		area, the impact on wetlands will be restricted to areas closer to the pits. ➲ It is further likely that spring flow will be negatively affected during mining. Six springs were identified during the hydrocensus. One spring is associated with Pit 7 and would be affected during Year 5 – 10 of mining. Three of these springs are located near Pit 17 and would be affected during Year 15 – 20 of mining.					
	Mine dewatering and spread of contamination from the opencast mining areas affecting groundwater quality	Contamination of groundwater quality and long-term zone of impact on groundwater quality		Operation and Post-closure	Medium-High	➲ Complete regular inspections of PCDs, specifically noting incidences of overflow and leakage. If the latter is identified, measures must be taken to rectify non-compliances immediately. ➲ Maintain sound house-keeping measures to prevent spills and leaks. ➲ Dedicated monitoring boreholes must be maintained in the three lineaments that transect the mining area. If any of the current boreholes drilled into these structures are destroyed during mining, they must be replaced. ➲ Surface infrastructure, like the wash plant, must be positioned off the lineaments. Prior to the	Low-Medium

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						establishment of these areas, a geophysical survey must be completed to pin-point the faults. ➲ Measures developed during the 2019 study to manage the impact of discard must be implemented and maintained at the Kranspan mining area (iLEH, 2019). ➲ A monitoring programme must be implemented to establish underground water quality during the life of operations. This information must be used to update the long-term impact of mining on groundwater quality presented in this report. ➲ Updated contaminant transport simulations must be undertaken once this information is available in order to improve the confidence levels in long-term predictions. These simulations must be completed at least five years prior to mine closure to ensure that effective measures are developed to manage long-term impacts. Post Closure Management Plan: ➲ All rehabilitation must be completed during the decommissioning phase. In terms of groundwater, the rehabilitation must focus on containing dirty water and leachate, preventing the ingress of clean runoff and rainfall to the mining area and avoid ponding over rehabilitated areas. ➲ The groundwater monitoring programme must be maintained for a period of at least two years after mine closure in both mine monitoring and private boreholes. This information must be used to confirm the impact of rehabilitation at mine closure. ➲ At the end of the two-year monitoring programme, the post-closure groundwater impact assessment must be re-evaluated and adjusted, as necessary, based on the results of the monitoring programme.	

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						• Once the monitoring data and the re-assessment of post-closure groundwater impacts are available, Ilima must discuss these with the authorities and determine the need of additional monitoring through consultation. • All seepage from the current and planned new mining areas must be contained to avoid decant into the catchment. • All seepage from the mining areas and potential decant must be contained in PCDs that meet the requirements of GN704. • All pits must be backfilled and rehabilitated as part of concurrent mining.	
	Decant from pits	Rate of groundwater level recovery once mining is completed and risk of decant		Post-closure	High	• If water-bearing structures, specifically the regional faults, are intersected during mining that contribute significant volumes of seepage to the pits and underground workings, they must be characterised and quantified. The risk and timing of decant must be re-assessed taking this information into consideration. • Based on kinetic leach tests completed for the Kranspan Mine (refer to Appendix 8), leachate from the mining area is not expected to significantly acidify and decant is therefore expected to be of moderate quality. If monitoring of the decant indicates that the quality is not suitable for release to the environment, provision must be made to contain all decant to avoid negative impacts on surface water, soil and wetlands. • Surface rehabilitation measures must be designed to minimise the risk of decant. Opencast mining areas and box cuts must be backfilled, shaped and made free draining to limit the rate of recharge of rainwater to the absolute minimum. • A decant interception system must be implemented to collect decant water and divert this to a containment	Low

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						facility. Where feasible, it is recommended that horizontal drains are installed at the decant locations to capture, control and divert decant to the designated dirty water containment facility. It is recommended that a PCD or a number of PCDs are used for this purpose. A qualified professional must complete a water balance for the PCDs to confirm that these will be sufficient in size to contain all decant post closure. ➲ Visual inspections along pit perimeters must be undertaken on a monthly basis. If any additional decant is recorded, the decant interception system must be adjusted to ensure that all decant is captured and stored. ➲ Decant quality must be monitored on a monthly basis until closure. ➲ Measures must be taken during the operational phase of mining to contain all decant anticipated. In areas where significant decant may take place, PCDs must not be rehabilitated at closure but must be prepared, re-sized if necessary and used to contain decant post closure. Based on the available dataset, the following pits are expected to result in significant decant if not managed well: ○ Pit 1 ○ Pit 5 ○ Pit 10 ○ Pit 11 ○ Pit 16 ○ Pit 19 ○ Pit 20 ○ Pit 22	

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						○ Pit 23 ➲ The risk of decant associated with other pits not listed above must be evaluated during the operational phase as additional monitoring information becomes available. Based on this information, appropriate post-closure decant management measures must be implemented during the rehabilitation phase. ➲ The PCDs must be sized to take decant volumes into consideration and cutoff trenches and berms must be put in place to divert decant to the PCDs. The planning and possible re-sizing of PCDs must be completed prior to mine closure. ➲ Should mining activities on the Farm Vaalbank extend to the C-Seam workings in the historical Union Colliery underground workings, provision must be made to handle additional underground water in the mine's dirty water management system. Based on field observations, the additional volume of water from the historical underground workings that have to be handled can be up to 160 000 m^3/a. This volume of water is likely to impact on operational mine water management as well as decant volumes post closure. This additional decant volume can be used in the wash plant to avoid need for rehandling and storage. It is reported in literature (Steyn, 2019) that several areas of subsidence are associated with Union Colliery. Care should be taken to identify areas of subsidence and incorporate these into the mine plan for pits that will extend to the C Seam in the old workings. The areas of subsidence should also be considered when planning to manage decant from the mining areas. Pits that overly the historical Union Colliery underground workings are included below and it is noted that some of these pits are already highlighted as potential areas of significant decant potential:	

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						○ Pit 16 ○ Pit 19 ○ Pit 21 ○ Pit 22 ○ Pit 23	
10	Construction activities such as topsoil removal, material loading and hauling, stockpiling, grading, bulldozing, as well as metal and concrete works for the establishment of infrastructure	The main pollutant of concern from construction operations is particulate matter, including PM_{10}, $PM_{2.5}$ and TSP. PM_{10} and $PM_{2.5}$ concentrations are associated with potential health impacts due to the size of the particulates being small enough to be inhaled. Nuisance effects are caused by the TSP fraction (20 μm to 75 μm in diameter) resulting in soiling of materials and visibility reductions. Thus the impact on air quality is the elevated PM_{10} and $PM_{2.5}$ concentrations and elevated dustfall levels	Air Quality	Construction	Low-Medium	➲ Air quality impacts during construction would be reduced through basic control measures such as limiting the speed of haul trucks; limit unnecessary travelling of vehicles on untreated roads; and to apply water sprays on regularly travelled, unpaved sections. ➲ The access road to the Project also needs to be kept clean to minimise carry-through of mud on to public roads.	Low-Medium

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
	Operation activities such materials handling, bulldozing, drilling, blasting, vehicle entrainment on unpaved surfaces, crushing and screening, windblown dust from overburden dumps and coal stockpiles	Elevated PM_{10} and $PM_{2.5}$ concentrations and elevated dustfall levels		Operation	Medium-High	Vehicle activity on unpaved roads: ➲ Regular water sprays and road binders on unpaved roads to ensure at least 90% control efficiency. ➲ Regular water sprays on unpaved inpit roads to ensure at least 75% control efficiency. ➲ Monthly physical inspection of road surface, daily visual observation of entrained dust emissions from unpaved road surfaces. Drilling and Blasting: ➲ Controlled blasting techniques to be used to ensure minimal dust generation. ➲ Blasting only to be conducted on cloudless days, if possible. ➲ Addition of chemical surfactants to water sprays to lower water surface tension and increase binding properties. ➲ Drilling to be controlled through water sprays or vacuum packs Materials Handling: ➲ Increase in-pit material moisture content.	Low-Medium

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
					Low-Medium	➲ Drop height from excavator into haul trucks to be kept at a minimum for coal and waste rock. ➲ Tipping onto ROM storage piles to be controlled through water sprays, should significant amounts of dust be generated. ➲ Keep material handled by dozers and wheeled loaders moist to achieve a control efficiency of 50%, especially during dry periods. ➲ Regular clean-up at loading areas. Wind Erosion: ➲ Water sprays at ROM stockpile can achieve 50% control efficiency. Increase in moisture content provides higher threshold friction velocity and ensures that particulates are not as easily entrained due to high surface winds. ➲ Reshape all disturbed areas to their natural contours. ➲ Cover disturbed areas with previously collected topsoil and replant native species. ➲ Rock cladding with larger pieces of waste rock is recommended to reduce wind erosion emissions from the overburden storage piles. ➲ Revegetation of overburden stockpile is recommended. Crushing: ➲ Water sprays at the crushers to achieve at least 50% control efficiency.	Low-Medium
	Decommissioning activities such as demolition and stripping away of structures and	Elevated PM_{10} and $PM_{2.5}$ concentrations and elevated dustfall levels		Decommissioning / Post Closure	Low-Medium	➲ Air quality impacts during decommissioning would be reduced through basic control measures such as limiting the speed of haul trucks; limit unnecessary travelling of vehicles on untreated roads; and to apply water sprays on regularly travelled, unpaved sections.	Low-Medium

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
	facilities, windblown dust from stockpiles and exposed areas, and degradation of roads resulting in exposed areas surfaces					➲ The access road to the Project also needs to be kept clean to minimise carry-through of mud on to public roads.	
11	Construction activities	Elevated Noise Levels	Noise	Construction	Low-Medium	➲ Equipment with lower sound power levels must be selected. Vendors should be required to guarantee optimised equipment design noise levels; ➲ Where possible, other non-routine noisy activities such as construction, decommissioning, start-up and maintenance, should be limited to day-time hours; ➲ All diesel-powered equipment and plant vehicles should be kept at a high level of maintenance. This should particularly include the regular inspection and, if necessary, replacement of intake and exhaust silencers. Any change in the noise emission characteristics of equipment should serve as trigger for withdrawing it for maintenance; ➲ In managing noise specifically related to truck and vehicle traffic, efforts should be directed at: ➲ Minimising individual vehicle engine, transmission, and body noise/vibration. This is achieved through the implementation of an equipment maintenance program. ➲ Maintain road surface regularly to avoid corrugations, potholes etc. ➲ Avoid unnecessary idling times. ➲ Minimising the need for trucks/equipment to reverse. This will reduce the frequency at which disturbing but necessary reverse warnings will occur. Alternatives to	Low-Medium
	Blasting, mining operations, haulage			Operation	Medium-High		Low-Medium
	Closure activities			Decommissioning / Post Closure	Low-Medium		Low-Medium

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						the traditional reverse 'beeper' alarm such as a 'self-adjusting' or 'smart' alarm could be considered. These alarms include a mechanism to detect the local noise level and automatically adjust the output of the alarm is so that it is 5 to 10 dB above the noise level near the moving equipment. Another alternative to the traditional reverse 'beeper' is the use of white-noise generators. This enables the listener to instantly locate where and what direction the sound is coming from. The broadband sound also gives workers wearing hearing protection devices (HPDs) and people with hearing difficulties a better chance of hearing the alarm. White-noise reverse alarms create a "ssh-ssh" sound which is gentle on the ear and dissipates quickly, meaning the alarm can only be heard in the danger zone; ➲ Limiting traffic to hours to between sunrise and sunset. This should include other non-routine noisy activities such as construction, decommissioning, start-up and maintenance; ➲ A noise complaints register must be kept; ➲ Good public relations are essential at all stages of the project. Surrounding receptors should be informed about the sound generated by proposed project operations. Community involvement needs to continue throughout the project. The mine must implement a line of communication (i.e. a help line where complaints could be lodged). All potential sensitive receptors should be made aware of these contact numbers. The mine should maintain a commitment to the local community and respond to concerns in an expedient fashion. ➲ As the site or activity is in close proximity to NSRs, equipment and methods to be employed should be reviewed to ensure the quietest available technology is	

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						used. Equipment with lower sound power levels must be selected in such instances and vendors/contractors should be required to guarantee optimised equipment design noise levels; ➲ As far as is practically possible, source of significant noise should be enclosed. The extent of enclosure will depend on the nature of the machine and their ventilation requirements. Motors are examples of such equipment; ➲ Plant and equipment should be sited as far away from NSRs as possible. It is recommended that buffer zones be established and that noise generating activities be conducted no closer than 300 m from NSRs; ➲ Machines used intermittently should be shut down between work periods or throttled down to a minimum and not left running unnecessarily. This will reduce noise and conserve energy; ➲ Plants or equipment from which noise generated is known to be particularly directional, should be orientated so that the noise is directed away from NSRs; ➲ Acoustic covers of engines should be kept closed when in use; ➲ Construction materials such as beams should be lowered and not dropped; ➲ Regular and effective maintenance of equipment are essential to noise control. Increases in equipment noise are often indicative of eminent mechanical failure. Also, sound reducing equipment/materials can lose effectiveness before failure and can be identified by visual inspection; ➲ If noise control at the source and the use of distance between source and receiver is not possible, screening	

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						methods must be considered. The careful placement of barriers such as screens or berms can significantly reduce noise impacts but may result in additional visual impacts. Although vegetation such as shrubs or trees may improve the visual impact of construction sites, it will not significantly reduce noise impacts and should not be considered as a control measure; ➲ Earth berms can be built to provide screening for large scale earth moving operations and can be landscaped to become permanent features once construction is completed. Care should be taken when constructing earth berms since it may become a significant source of dust; ➲ If efforts at controlling noise at the source and the installation of acoustic barriers fail, possible receptor based noise mitigation measures, such as double paned windows and insulated buildings should be considered. It should however first be confirmed through monitoring that the mining activities are the source of disturbance at the receptor locations before the onus falls on the mine to implement such measures at the receptor locations; ➲ Noise monitoring at sites where noise is or may become an issue is essential. It is recommended the bi-annual noise sampling be conducted at the closest sensitive receptors to the active areas at any given time; and ➲ In the event that noise related complaints are received short term (24-hour) ambient noise measurements should be conducted as part of investigating the complaints. The results of the measurements should be used to inform any follow up interventions. The investigation of complaints should include an investigation into equipment or machinery that likely result or resulted in noise levels annoying to the	

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						community. This could be achieved with source noise measurements.	
12	Construction phase activities resulting in disturbance of surfaces and/or sub-surfaces	May destroy, damage, alter, or remove structures of heritage importance	Heritage Resources	Construction	Low-Medium	➲ The preferable course of action is avoidance of the features to prevent impacts to the recorded sites. If this is not possible Phase 2 mitigation will be required which will require an assessment by a conservation architect before a destruction permit can be applied for. ➲ The study area should be monitored by the ECO during construction to implementation the Chance Find Procedure for the project. ➲ Recorded heritage features should be indicated on development plans and construction crews should be made aware of expected resources and applicable mitigation measures.	Very Low
		May destroy, damage, alter, or remove ruins of heritage importance			Low	➲ The study area should be monitored by the ECO during construction to implementation the Chance Find Procedure for the project as there is a risk of unmarked graves at these sites. ➲ Recorded heritage features should be indicated on development plans and construction crews should be made aware of expected resources and applicable mitigation measures.	Low
		May destroy, damage, alter, or remove stone cairns of heritage importance			Low	➲ Confirmation of the presence of graves at these features. If confirmed to be graves the cairns should be avoided with a 100m buffer zone and access for family members. ➲ Recorded heritage features should be indicated on development plans and construction crews should be made aware of expected resources and applicable mitigation measures.	Low
		May destroy, damage, alter, or remove burial			Medium-High	➲ Burial sites and stone cairns (that could potentially be graves until proven otherwise) should be avoided with	Low

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
		sites of heritage importance				a 100 m buffer zone. Access for the family members should be ensured; ➲ Recorded heritage features should be indicated on development plans and construction crews should be made aware of expected resources and applicable mitigation measures.	
13	Construction activities and Opencast mining	May destroy, damage, alter, or remove resources of palaeontological importance	Palaeontological Resources	Construction and Operation	Low-Medium	➲ According to the SAHRA Palaeontological sensitivity map the study area is of very high significance and was independently assessed. The study by Bamford (2022) concluded that it is extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary. There is a very small chance that fossils may occur below the ground surface in the shales of the Vryheid Formation so a Fossil Chance Find Protocol should be added to the EMPr.	Low
14	Construction activities and opencast mining	Visual disturbance of the sense of place	Visual Aesthetics	Construction and Operation	High	➲ Structures that are required to be built from steel or concrete can be painted in a natural tone fitting with the surrounding environment; ➲ To reduce the potential of glare external surfaces of buildings and structures should be articulated or textured to create interplay of light and shade; ➲ During construction, access roads will require an effective dust suppression management program, such as regular wetting and/or the use of non-polluting chemicals that will retain moisture in the road surface; ➲ Where practicable, concurrent rehabilitation with indigenous species and vegetative screening measures, as opposed to a horticultural approach to landscaping should be adopted. It is not advisable to plant more exotic trees, focus should rather be placed on greening of dumps and fast rehab of pits; and ➲ Shielding of night lights can greatly reduce the sky glow by ensuring that lights have proper shielding	Medium-High

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						which ensures that light does not spill into the night sky. The direction of the main beam of all lights directed towards any potential observer should be at an angle smaller than 70°. Higher mounted lights allow lower main beam angles, which can assist in reducing glare.	
	Rehabilitation activities	Visual improvement of the sense of place		Rehabilitation	Medium-High (+)	➲ Rehabilitation soon after mining of an area as well as dust suppression can reduce the negative visual impact of the project.	Medium-High (+)
15	All mining activities	Coal Production for Electricity Generation	Socio-economic	Operational	Very High (+)	No mitigation measures are proposed as this will be a positive impact.	-
	All mining activities	Economic Growth		Operational	Very High (+)	No mitigation measures are proposed as this will be a positive impact.	-
	All activities involving employment and procurement of goods and services	Employment Opportunities		Pre-construction, Construction and Operational	High (+)	➲ Measures proposed to enhance this positive impact include the development of an Employment Equity Plan by Ilima and to support the employment of labour from the local communities during the LoM. ➲ Local employment targets must include employment of youth and women from historically disadvantaged backgrounds. ➲ Prioritise employment and training of people living within the project area, especially for unskilled and semi-skilled positions. Ensure that employment opportunities and skills requirements are advertised locally. Communicate available employment opportunities and skills training and requirements with the local community to manage expectation. ➲ Ensure that the mine's Community Liaison Officer is informed of all project developments to facilitate on going and active engagement with stakeholders.	High (+)
	All activities involving employment and procurement of	Skills Development and Education Opportunities		Construction, Operational and Decommission	Medium-High (+)	➲ Measures proposed to enhance this positive impact include the implementation of the HRD programme, as described in the SLP, which is expected to result in skills transfer, career progression, re-skilling and improved	High (+)

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
	goods and services			ing and Post Closure		levels of literacy for employees and in the wider community.	
	All activities involving employment and procurement of goods and services	Local Economic Development		All	Medium-High (+)	➲ Implement and continuously update the SLP to ensure maximum benefits to the community. The SLP must align with the associated legislation and include intensive stakeholder consultations as prescribed in the law. ➲ Implementation of the agreed LED projects (Upgrade of Sports Facilities at Silobela Stadium Project and Expansion of Tibaya Farming Projects) committed to in the SLP will have a significant positive impact for the broader community.	Medium-High (+)
	All mining activities	Government Revenue and Royalties		Construction and Operational	Low-Medium (+)	No mitigation measures are proposed as this will be a positive impact.	-
	All mining activities	Change in Land Use resulting in loss of agricultural land and loss of jobs		Construction, Operational and Decommissioning and Post Closure	High	➲ Should the mine extension be approved, Ilima must seek surface access agreement with the affected landowners. Ilima must develop a policy and framework outlining the procedures to be followed for land acquisition and lease agreements prior to any change of land use activity. ➲ Ilima will provide for farming to continue (where identified and following rehabilitation of pits). Land will be rehabilitated and returned to farmers post mining. Rehabilitation of the mined areas should take place as soon as possible to restore the land, for example to agriculture use. ➲ Ilima seeks to focus on the agricultural sector in terms of LED projects since the community of Carolina is largely dependent on this sector for its daily livelihood. Hence, the proposed LED Project for this SLP is an Expansion of Tibaya Farming Projects that were previously initiated and funded by the company in the other SLP. Ilima proposed to purchase additional farming land to sustain all the farming ventures that the	Low-Medium

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						company initiated and funded under Tibaya Farming Project (Pty) Ltd. Because of the additional farming land, it is logical for Ilima to expand these projects by adding more livestock, agricultural implements, and other farming facilities to ensure that they become more sustainable and create more jobs for the community of greater Carolina. ➲ Implement a written complaints and grievance procedure.	
	All activities involving employment and procurement of goods and services	Population Influx		Pre-Construction, Construction and Operational	Low-Medium	➲ These impacts can be mitigated through cooperative planning with the Local Municipality. An influx management plan must be developed in collaboration with the CALLM. The plan must identify responsibilities between the Applicant and the CALLM, for ensuring that access to municipal services such as public health, public safety, water, sanitation, power and affordable housing are available in the local area. ➲ Where possible, construction employees should be locally sourced as they will live with their families. ➲ Liaise with Local Government to ensure that expected population influx is considered in infrastructure development and spatial development planning. ➲ Ensure continuous consultation with local communities, farm landowners and government and promote partnerships to address illegal activities on-site and in the surrounds of the project area.	Low-Medium
	All activities involving employment and procurement of goods and services	Security Risks		Pre-Construction, Construction and Operational	Medium-High	➲ Explore opportunities for collaboration with local police with regards to safety and security issues relating to project activities in general and any concerns about contractors. Implement security measures within the Kranspan MRA extension area. ➲ The Applicant must establish a community engagement forum comprising of representatives of,	Low-Medium

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						among others, the mine management, surrounding landowners / land users, community members, authorities, and local businesses. ➲ Implement a written complaints and grievance procedure.	
	All mining activities	Mine Health and Safety - General		Pre-Construction, Construction and Operational	High	➲ Implement a comprehensive mine health and safety management programme and adhere to legislation governing mine health and safety requirements. ➲ There must be an emergency preparedness and response plan in place. ➲ Implement a written complaints and grievance procedure. ➲ Petrochemicals, oils, solvents, paints and other identified hazardous substances shall only be stored under controlled conditions. All hazardous materials will be stored in a secured, appointed area that is fenced and has restricted entry. All applicable emergency contact details shall be confirmed and displayed at various locations across the site. ➲ Speed limits for mine vehicles and personnel must be established.	Low
	Opencast mining and stockpiling	Mine Health and Safety – Spontaneous Combustion can occur during opencast mining and stockpiling of coal which can damage infrastructure and result in staff injuries		Operation	Medium-High	➲ A spontaneous combustion prevention plan must be compiled.	Low
	Movement of man and materials	Community Health and Safety - Diseases		Pre-Construction, Construction and Operational	Medium-High	➲ Develop information, education and communication campaigns around diseases and health practices including sanitation and hygiene.	Low

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						➲ Work closely with local health services in monitoring and addressing changes in levels of community health and wellbeing. ➲ Implement an HIV/AIDS awareness programme addressing factual health issues as well as behaviour change. ➲ There must be fencing of the mine area with access control in place preventing unauthorised access to the Kranspan mine. ➲ Implementation of a comprehensive mine health and safety programme. ➲ All hazardous materials will be stored in a secured, appointed area that is fenced and has restricted entry.	
	Movement of man and materials	Community Health and Safety – Traffic and Road Safety		Construction, Operational and Decommissioning and Post Closure	Medium-High	➲ Regional road maintenance is the responsibility of the relevant road authority while Ilima are responsible for internal mine road maintenance. ➲ A monitoring system for ensuring safe use of trucks must be implemented.	Low
	Blasting activities	Blasting – Ground Vibration		Operation	Medium-High	➲ There is a need to mitigate vibration when mining comes closer than 200 m from the R36 and closer than 1000 m from privately owned homes. Only one hole per delay (instance in time) may be fired to limit ground vibration to the required levels. This is achieved through effective timing designs and using initiation systems that accurately reflect the timing design. ➲ A baseline study of houses within 1000 m of blasting will be needed before blasting commences to determine the current condition of the buildings as a reference. The blasting to date from surrounding existing mines are unlikely to have caused damage, but houses naturally deteriorate with time, so there will be	Low-Medium

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						cracks and other damage that are not blasting related and need to be recorded. ➲ Routine air blast and ground vibration monitoring should be carried out near the closest private home to each blast. Occasional audits should be conducted on blasting practices and mitigation options reconsidered if monitoring shows that levels exceed applicable guidelines.	
		Blasting – Fly Rock			Medium to High	➲ Air blast control will be important to meet the limit of 125 dB and to avoid complaints regarding the mine activities. At 125 dB limit, air blast will be controlled within the blast and will have low significance at distances beyond 100 m. ➲ Air blast and related noise from blasting need to be controlled by providing adequate stemming in each blasthole as per an effective design. Stemming lengths should not be less than 20 hole-diameters, except in presplit holes. Strict control needs to be applied to prevent the occurrence of over-charged holes. ➲ Stemming length control also applies to fly rock control. ➲ Under-burdened faces are a major source of fly rock and air blast. Burden control on free faces must be applied and face profiling should be applied on faces that are oriented towards receptors that are closer than 1000 m from a blast. Effective burden control implies presplitting of all overburden and mid-burden blasts to create good quality vertical high walls. ➲ As a normal procedure, it will be necessary to temporarily clear people to a safe distance (1000 m) from blasting activities. This control must also apply to people working in the opencast operations immediately adjacent to the mine.	Low
		Blasting – Air Blast			High		Low

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						➲ In cases where roads or railway lines (R36 and the railway line to the Southeast of the mine) come within the zone of influence of fly rock from blasting, traffic must be stopped at a safe distance of a minimum of 1000 m during blasting operations. ➲ Pre-split blasting can generate very high air blast amplitudes. This should be controlled by firing presplit holes one at a time in sequence away from nearby receptors and in an upwind direction. ➲ Routine air blast and ground vibration monitoring should be carried out near the closest private home to each blast. Occasional audits should be conducted on blasting practices and mitigation options reconsidered if monitoring shows that levels exceed applicable guidelines.	
		Blasting – Dissolved Nitrates			High	➲ Only waterproof explosives should be used for blasting. Bulk emulsions and bulk emulsion blends are suitable, but explosives that can dissolve in water, such as ANFO should never be used. ➲ Sleep times (how long a blast stands after it is charged and before it is fired), should be limited to a maximum value depending on manufacturers recommendations. ➲ Any spillages of stored explosives, especially ammonium nitrate prill, must be controlled with adequate bunding and cleaned immediately after a spillage occurs.	Very Low
		Blasting – Dust and Fumes			Medium to High	➲ Should any nitrous oxide fumes be observed during a blast, blasting activity should be reviewed and the cause of the fumes identified and corrected if needed. Causes include poor charging practices, incorrect explosives formulation or holes that are too close together in softer formations.	Low

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
		Blasting – Ground Vibration and Fly Rock: Heritage Sites and Graves			Medium to High	Heritage sites (including graves): ➲ In several cases, there are heritage sites that will be located closer than 500 m from blasting. These structures are particularly sensitive to fly rock risk. For these structures, the following measures need to be taken in addition to the fly rock control measures outlined previously. 1. Stemming lengths must be increased to >25 hole-diameters. 2. For each blast, every heritage site within 500 m of a blast must be mapped before the blast and then checked after the blast. If there is any fly rock within 250 m of such site specialist advice must be obtained to curb the risk in future blasts. ➲ A video recording of each blast must be made to determine the effectiveness of the fly rock control Sites within the mining area: ➲ Ruins and graves are present within the proposed open cast area. The proposal is to leave remnant pillars around each of these sites that are 50 m in radius. Special care will be needed to minimise the risk of pillar displacement or damage during blasting around the pillar. This will require smaller diameter holes (reduced from 250 mm), long delays, and only one hole firing per delay when blasting closer than 100 m from the pillar. Specialist advice will be needed in working out the mining sequence around the pillars and in designing each blast closer than 100 m from the pillar edges to ensure no pillar displacement occurs and that vibration limits are met. Buildings and people closer than 500 m from blasting ➲ A few people and buildings will remain within the zone of influence of ground vibration and fly rock after the	Low

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						measures outlined above have been applied. For these cases, special additional mitigation measures will need to be applied which will most likely involve a reduced charge mass per hole. This can be achieved through drilling smaller diameter holes, multiple benching or firing decked charges in each hole. The method chosen must be guided by the mine's technical expertise or by obtaining specialist advice. ➲ An alternative will be for the mine to buy the properties that are within the zone of influence. ➲ There is an active operation on the northeastern corner of Roodebloem Farm that will end up being withing a few tens of metres of blasting during Years 10 to 15. Mitigation will require communicating blasting times and making sure the operation is cleared of people whenever blasting takes place. ➲ All non-mining people and animals must be evacuated when blasting is closer than 1000 m from them. ➲ The active operation on the northeastern corner of Roodebloem Farm must be cleared of people whenever blasting takes place.	
	Closure of the mine	Mine Closure and Associated Effects on the Local Economy		Decommissioning and Post Closure	Medium-High	➲ The Project should encourage and invest in alternative livelihoods development so that at decommissioning and closure phases, the local area is not reliant exclusively on the Project for employment and economic opportunities. Thus by reducing the dependence of the community on mining post closure through local economic development and skills development training. ➲ Plan, update and implement an integrated Mine Decommissioning, Rehabilitation, and Mine Closure Plan with associated Social Closure Planning five years prior to Mine Closure.	Low-Medium

NO.	PROJECT ACTIVITY	IMPACT	ASPECT	PHASE	SIGNIFICANCE (IF NOT MITIGATED)	MITIGATION TYPE	SIGNIFICANCE (IF MITIGATED)
						➲ Ilima will follow the procedures for downscaling and retrenchment as set out by the Department of Labour (DoL) and the Labour Relations Act. The impact of closure can be mitigated through the implementation of the measures in the SLP, including regular, consultative review of closure strategies and the portable skills / re-skilling programme. ➲ The final land uses are to be established in consultation with the community and local authorities.	

9 SUMMARY OF SPECIALIST REPORTS

Several specialist studies were undertaken to inform the impact assessment. A summary of the description of the baseline environment from these studies has been integrated into Section 6.4.1 of the EIA Report. The findings of the impact assessment and key recommendations from the studies are summarised below in Table 9-1.

The complete specialist reports are provided in Appendix 8.

TABLE 9-1: MAIN RECOMMENDATIONS FROM THE SPECIALIST REPORTS

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
Soil and Agricultural Potential Assessment The Biodiversity Company (2022)	The land capability for the site consisted of Low, Moderate and High sensitive areas. The land potential for the site was found to have "Restricted" and "Very restricted" potential. The overall sensitivity of the site was categorised as "Moderate". The recommendations of the specialist are as follows: ➲ A rehabilitation plan focused on the ongoing rehabilitation and reseeding of stockpiles must be implemented; ➲ A post-closure rehabilitation plan must be compiled taking into consideration the pre-mining baseline conditions stipulated in this report; and ➲ The mitigation measures and monitoring requirements in the study must be implemented.	X	Section 6.8 Section 8 PART B EMPr
Hydropedological Assessment The Biodiversity Company (2022)	The landscape is dominated by Recharge soils on the crest and Interflow soils with morphological evidence of lateral flows occurring at the soil/bedrock interface in the lower midslope positions. Valley bottom soils are responsive hydromorphic soils due to long periods of saturation. The recommendations of the specialist are as follows: ➲ Attenuation ponds and subsurface drains should form an integral part of stormwater plans to reduce overland flow from paved areas and allow water that runs off from roofs to settle and re-infiltrate; ➲ Development footprint should adhere to the buffer zones around all wetlands. This will enable water to infiltrate and feed laterally into the wetlands. Application of good quality water which accumulates in pits on areas downslope of pit to maintain saturation at the soil/bedrock interface of Interflow (soil/bedrock) soils; and ➲ The dependence of the wetlands on groundwater was not evaluated in this study. This will be an important consideration to avoid drying out of the wetlands due to	X	Section 6.8 Section 8 PART B EMPr

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
	groundwater draw-down and should be assessed in the geohydrological specialist study.		
Terrestrial Biodiversity Assessment	Recommendations of the specialist: ➲ Loss of Natural Habitat (untransformed habitat) of High Ecological Importance: The only viable option within the Mitigation Hierarchy (Avoid, Minimise, Restore and Offset) for the impact on CBAs in the project area is Avoidance. Emphasis should be placed on ensuring that the opencast pit situated in the north western part of the Farm Roodebloem around the recommended 26ha buffer zone for Sensitive Species 1200 does not isolate the buffer zone form contiguous areas of CBA: Irreplaceable situated to the north of the project area. Where any infrastructure remains located within areas of CBA: Optimal, this impact should be mitigated by the formal protection of offset areas identified within the project area and/or its immediate surrounds by an appropriate specialist assessment. Vegetation clearance should be entirely restricted to areas within the infrastructure footprints that have received Environmental Authorisation. The mine should institute an internal permitting procedure (issuing of a 'permit to clear') administered by the mines Environmental Division to control and manage vegetation clearance. Where it is possible to relocate Protected plant species occurring within areas permitted by the Environmental Division for clearing, permits for the relocation of protected plant species should be applied for from the relevant provincial authority and included in the 'permit to clear' procedure. All parts of the Project Area that are not lost as a result of the construction of Authorised mining infrastructure should be managed for optimal biodiversity in accordance with a site-specific Biodiversity Management Plan (BMP). A 'veld management plan' should be developed and implemented for all parts of the project area that are not situated within infrastructure footprints as part of the BMP. In order to limit the severity and frequency of impacts on Natural Habitat resulting from elevated dust emissions, a detailed dust suppression plan should be developed for the mine and the strict implementation of this plan should be regularly audited.	X	Section 6.8 Section 8 PART B EMPr

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
	➲ Loss of Plant Species of Conservation Concern (SCC): In order to protect the subpopulation of Sensitive species 1200 recorded within the project area, a minimum buffer zone of 26ha was recommended by the specialist and this buffer was accommodated in the final revision of the mine plan provided by the project proponent. The adequacy of the minimal 200m buffer should be verified in the field prior to construction by a wetland specialist with input from a geo-hydrologist if necessary and this recommendation should be included in the EMP for the project. It must be emphasised that the recommended ca. 26ha preliminary buffer is a 'minimal buffer' within which no mining infrastructure should be located and no mining related activities should occur. Furthermore, it is crucial that the 26ha buffer should not be isolated by mining activities and that ecological connectivity should be maintained by establishing an effective ecological corridor, to the west of the railway line that links the 26ha buffer to the currently contiguous area of CBA: Irreplaceable situated directly to the north of the buffer area and extending to the north of the project area. In order to protect the two subpopulations of *K. carolinensis* recorded within the project area, a minimum buffer of 200m around the maximum extent of each colony should be implemented. It must be emphasized that the recommended buffers are 'minimal buffers' within which no mining infrastructure should be located and no mining related activities should occur. Furthermore, it is crucial that the colonies and their buffers should not be isolated by mining activities and that ecological connectivity should be maintained between the various colonies or recorded localities as is the case for the current mine plan. It is recommended that research institutions (e.g. SANBI's Walter Sisulu National Botanical Garden) should be afforded and opportunity to rescue some of the *Khadia carolinensis* plants comprising the colony at Site 58a, which is situated within the footprint of an opencast area, for research purposes prior to construction. The recorded *Khadia carolinensis* subpopulations and their habitat should be monitored annually by a botanist using simple methods such as plant counts, fixed point photography and, when necessary, monitoring of vegetation cover and species composition within a		

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	limited number of sampling quadrats. Detailed management recommendation management of the recorded *Khadia carolinensis* should be included in the recommended BMP for the project area. Any authorised development within any of the four Natural Habitat recorded within the project area should be should be preceded by a thorough search for threatened plant species within the footprint of the development, and in immediately adjacent areas, prior to construction Such searches ('walk-over' surveys) should be conducted by a botanist at the appropriate time of year which coincides with the flowering times of potentially occurring SCC. In the event that any SCC are confirmed, appropriate in situ and / or ex situ conservation measures should be developed in consultation with the relevant conservation authorities. In order to confirm the presence or absence of additional SCC within the project area, and provide a more comprehensive species list that forms a sound basis for site-specific biodiversity management, an additional botanical survey which incorporates seasonal coverage should be conducted for the project area as part of the development of the recommended Biodiversity Management Plan for the mine. This survey should place emphasis on searching potentially suitable habitat for the two SCC that are considered to have a moderate to high likelihood of occurring within the project area, namely *Aspidoglossum xanthosphaerum* (VU) and *Lessertia phillipsiana (*DDD). ➲ Introduction and Proliferation of Alien Invasive Plant Species: The mine should develop and implement a site-specific integrated Alien Plant Control Programme (as per the AIS Regulations), which identifies the species that pose the greatest threat, in terms of habitat transformation, to Natural Habitat within the project area, and considers all appropriate chemical, mechanical, biological and cultural control methods for the alien species listed in Appendix 1 of the specialist report. A team of appropriately equipped and trained should be appointed to conduct continuous alien plant control at the 'priority control sites' identified in the Alien Plant Control Programme. This team should work under the auspices of the mines Environmental Division, which should be tasked with supervising and thoroughly documenting all		

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	alien plant control activities. Where planting of trees and shrubs around mine offices, workshops and processing facilities is deemed necessary, only trees and shrubs indigenous to the study area and its immediate surrounds should be planted, and these should be grown from locally obtained seeds or other propagules. No trees, alien or indigenous, should be planted anywhere within the Natural Habitats of the project area. The alien invasive grass *Pennisetum clandestinum** (Kikuyu) should not be used for the establishment of lawns at mine premises. ➲ Illegal Utilisation of Plant Resources: Access by mine personnel and trespasses to all parts of the project area comprising Natural Habitat should be strictly controlled. Access control should be achieved by the erection of a five-strand cattle fence that is permeable to wildlife around the perimeter of the project area, regular signage prohibiting access and regular patrols by mine security personnel. The damaging or destruction of plant species that are Protected in terms the Mpumalanga Nature Conservation Act (No.10 of 1998) during any future development should be avoided wherever possible, and a permit for the removal or destruction of any such protected plant must be obtained from the provincial authorities (Permitting Office of the MTPA) prior to development. It is recommended that where untransformed Natural Habitat is to be affected by an infrastructure footprints, Protected plant species should be rescued and placed in a nursery or donated to a research institute (e.g. SANBI botanical gardens) prior to development, rather than simply being destroyed. Where feasible, viable subpopulations of such species should also be translocated to transformed (including rehabilitation areas) or untransformed areas within the project area which provide potentially suitable habitats, but such translocations will have to be carried out in a manner that ensures that no ecological degradation of the host habitat occurs, and will have to be evaluated by a botanist for each species and each potential translocation area. ➲ Displacement and Loss of Habitat for Faunal Species: Develop and implement a Biodiversity Management Plan with the objective of managing all remaining Natural		

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	Habitat through conservative grazing, fire management and continual eradication of alien plant species. If any faunal species of conservation concern (as indicated in this report) are recorded during the construction/mining phase, the ECO should be informed, and should then issue instructions for its capture, translocation and safe release into suitable habitat within the project area with the relevant permits obtained from the relevant authority if necessary. All domestic waste generated (if present) during construction and mining operations should be removed from the project area as soon as possible and be disposed of at an authorised landfill to reduce the risk of colonisation by feral mammals, scavengers or competitively superior indigenous bird species (e.g. Pied Crows). Personnel and staff should be advised by means of environmental awareness training on the biodiversity importance of the area. The intentional killing of any faunal species (in particular invertebrates, reptiles and snakes) should be avoided by means of awareness programmes presented to the labour force. The labour force should be made aware of conservation issues pertaining to the taxa occurring on the project area ➲ Disruption of Ecological Connectivity and Faunal Dispersal: Ensure that construction and mining activities do not extend beyond the authorised infrastructure footprints onto adjacent natural habitat in order to provide displaced fauna the opportunity to disperse into suitable habitat (although potential dispersal by small animals is highly limited). It is recommended that prior to commencement of fencing and construction it is ensured that the no large mammal species, especially reedbuck are trapped within any area fenced with security fencing. All Natural Habitat which is not part of actively mined areas must be fenced with standard 5-strand cattle fencing and not diamond mesh security fencing that will prevent the movement of Reedbuck and other fauna. The relevant conservation scientists of the MTPA should also be approached in order to ascertain the conservation importance of the subpopulations of Mountain Reedbuck and Common Reedbuck that utilise the project area and determine whether further conservation measures are necessary. Such measures may include monitoring, collaboration with surrounding landowners to prevent poaching		

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	and ensuring the availability of large and contiguous areas of suitable habitat. The practice of excavating trenches around the project area as a form of access control should be prohibited as such trenches act as lethal 'pitfall traps' and barriers to dispersal of mammals, reptiles and amphibians and are regarded as an unnecessary and severe impact to such fauna occurring within the project area and its immediate surrounds. ➲ Illegal Utilisation of Faunal Resources: Contractors should be accommodated off-site (i.e. not within the project area), reducing the risk of poaching and persecution of fauna. Labour supervisors and SHE officials should monitor the activities of labourers when working away from infrastructure in Natural Habitat. Personnel and staff should be advised by means of environmental awareness training on the biodiversity importance of the area. The intentional killing of any faunal species (in particular invertebrates, reptiles and snakes) should be avoided by means of awareness programmes presented to the labour force. The labour force should be made aware of conservation issues pertaining to the taxa occurring on the project area. Regular monitoring of the project area, especially areas of natural habitat where active mining activities are absent, is advised to identify areas where illegal settlement may occur. If any illegal erecting of housing occurs, the mine's public liaising officer should immediately advice on a resolution, which may involve a re-location strategy.		
Hydrological Report Peens and Associates (2022)	The recommended 100 year flood levels of the most significant pans on the site are as follows: ➲ "S1" = 1 654.90 masl ➲ "S2" = 1 654.66 masl ➲ "S3" = 1 651.80 masl ➲ "S6" = 1651.34 masl	N/A Report was used for the engineering designs	Section 6.8 Section 8 PART B EMPr

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Surface Water Ecosystems Assessment Enviross (2023)	➲ The presented infrastructure layout indicates that some wetland areas are required to be included within the mining area and therefore will be lost. Opencast mining excavations taking place in close proximity to wetland units will have an impact on hydrological components of those wetlands where water moving laterally through the subsurface soil layers will decant into the opencast pits rather than feeding the wetland units. This, depending on the severity, have a profound impact on the wetland units. In severe cases, the entire ecological functionality of the wetland unit could be lost. It is recommended that an appropriate specialist (hydropedologist or geohydrologist) ascertain the level of water loss to the wetland units should this take place. This impact could, however, be mitigated with the decant water being supplied directly back to the wetland unit if the quality of the decanted water meets the target water quality values. ➲ The significance of the ecological loss is dependent on the sensitivity as well as the present functionality of the wetland units. Ultimately, infrastructure layout planning that takes into consideration the wetland delineation mapping, associated conservation buffer zones, as well as the proposed mitigation measures, can greatly reduce the overall significance of the impacts to the wetland systems associated with the site. ➲ It should be noted that, to conserve the wetland ecological structures within the area, the wetland needs to be viewed as an interconnected larger system and the individual units should be managed as such. This includes keeping general habitat destruction and construction footprints to an absolute minimum within the terrestrial habitat as well. Conserving the habitat units will ultimately conserve the species communities that depend on it for survival. This can only be achieved by the efforts of the contractor during the construction phase and by strict management during the operations phase.	X	Section 6.8 Section 8 PART B EMPr
Geohydrological Impact Assessment	A comprehensive groundwater management plan was developed based on the outcome of the groundwater impact assessment. The objective of the management plan is to reduce	X	Section 6.8 Section 8

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iLEH (2023)	and/or eliminate adverse impacts on existing private groundwater users and watercourses downgradient of the mining area. The groundwater management plan includes the following components: ➲ An over-arching management plan focussed on good house-keeping measures at the mine. ➲ Measures to address impacts on groundwater availability. ➲ Measures to address impacts on groundwater quality. ➲ Measures to reduce the risk of decant ➲ An acid mine drainage management plan from a groundwater perspective ➲ Incorporation of the results of this study into the mine rehabilitation plan ➲ Post closure groundwater management measures The study was used to develop a comprehensive groundwater monitoring programme. This programme includes the existing mine monitoring boreholes, private boreholes within the zones of impact on groundwater availability and quality as well as private boreholes that fall within the identified zones of impact zones. The monitoring programme is geared to record water level and quality trends, to improve the understanding of the aquifer characteristics, to check the accuracy of predicted impacts, to trigger groundwater management actions in the event of adverse impacts recorded and to be used to improve mine management practices and procedures to protect groundwater. Should the monitoring triggering-response criteria presented in this report be exceeded, a specific action plan is prescribed to inform affected parties and remediate impacts.		PART B EMPr

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	Of significance to the Vaalbank mining area is the presence of historical underground workings associated with Union Colliery. One decant point associated with the historical mining area was identified and sampled as part of the study. Ilima plans to mine above the historical mining area. The outcome of this assessment however emphasises that should mining of the C Seam on the Farm Vaalbank extent into the historical Union Colliery workings, provision must be made to dewater and contain increased volumes of mine water during the operational phase and post closure as part of decant management. Based on the above, it is recommended that: ➲ The mine planning and design as well as the planning and implementation of the concurrent and final rehabilitation programme must consider the outcome of the geohydrological impact assessment. ➲ The groundwater management plan developed for the mining project is implemented and used to identify and minimise or eliminate impacts on groundwater. Specific focus must be placed on managing the impacts on existing private groundwater users. ➲ The groundwater monitoring plan presented in this report is implemented and maintained as detailed in the report. ➲ Ilima provide financial provision to implement and maintain the groundwater management and monitoring programme developed.		
Geochemical Characterisation and Waste Classification The Moss Group (2022)	The environmental risk associated with the material tested in the assessment can be considered low, both from an acid generating and metal mobilisation perspective. Only one of the 10 samples could be considered a risk from an acid generation perspective. The core log indicated that this layer was only 57 cm thick, so the total volume of higher risk material is likely to be insignificant. The nature of the material analysed during this phase is similar to that of samples previously characterised from the adjacent Kranspan site.	X	Section 6.8 Section 8 PART B EMPr

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	Based on the South African National Norms and Standards for the Assessment of Waste for Landfill Disposal, all samples would be classified as Type 3 Waste.		
Air Quality Impact Assessment Airshed (2022)	The impacts from the proposed project were assessed with respect to location of the closest sensitive receptors. The recommendations of the specialist are as follows: ➲ Air quality impacts during construction would be reduced through basic control measures such as limiting the speed of haul trucks; limit unnecessary travelling of vehicles on untreated roads; and to apply water sprays on regularly travelled, unpaved sections. ➲ The access road to the Project also needs to be kept clean to minimise carry-through of mud on to public roads. ➲ In controlling dust due to drilling operations, dust suppression must be fitted on drill rigs to achieve an emission reduction efficiency of 97%. ➲ For the control of vehicle entrained dust it is recommended that water (at an application rate >2 litre/m2/hour), be applied in addition to the application of road binders. Literature reports an emissions reduction efficiency of 75% for water sprays and 90% for road binders. ➲ In controlling dust from crushing and screening operations, it is recommended that water sprays be applied to keep the coal wet, to achieve a control efficiency of up to 50%. ➲ Mitigation of materials transfer points should be done using water sprays at the tip points. This should result in a 50% control efficiency. Regular clean-up at loading points is recommended. ➲ In minimizing windblown dust from stockpile areas, water sprays should be used to keep surface material moist. A mitigation efficiency of 50 % is anticipated.	X	Section 6.8 Section 8 PART B EMPr

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	➲ Continuous monitoring of dustfall must be conducted as part of the Project's air quality management plan. ➲ Relocation of the closest receptors on the southern boundary (i.e. AQSR16) before mining commences in that area, or changing of the mine plan to maintain a buffer zone of 500 m from opencast areas and 300 m from haul roads.		
Noise Impact Assessment Airshed (2022b)	The impacts from the proposed project were assessed with respect to location of the closest sensitive receptors. The recommendations of the specialist are as follows: ➲ Best practise noise control and mitigation measures should be implamented. ➲ A monitoring programme as per the requirements of the International Finance Corporation (IFC) and SANS 10103. ➲ It is recommended that buffer zones be established and that noise generating activities be conducted no closer than 300 m from NSRs.	X	Section 6.8 Section 8 PART B EMPr
Heritage Impact Assessment Beyond Heritage (2023)	Several heritage resources were found during the study, including built environment features (such as structures and farmsteads) and burial sites (graves, cemeteries and stone cairns). The recommendations of the specialist are as follows: ➲ All recorded heritage features should be indicated on development plans and construction crews and employees should be made aware of heritage features and the requirements for each type of heritage feature; ➲ Graves and cemeteries impacted on (KP 14, KP 18, C004, C010B, C010C, C014, C015B, C020, C027, C103 & C105) should be avoided with a 100m buffer zone (following the SAHRA Burial Grounds and Graves permitting policy 2020) and access for families	X	Section 6.8 Section 8 PART B EMPr

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	should be ensured. If this is not possible graves can be relocated adhering to all legal requirements; ➲ Stone cairns (KP19 & C102) that are of unknown purpose but could potentially be graves should be verified during the social consultation process and could require further testing like GPR and test excavations; ➲ Historical structures (C003, C006, C007, C010A, C015A, C016, C101) should be assessed by a conservation architect who will make suitable recommendations for mitigation, after which a destruction permit can be applied for from the relevant heritage authority; ➲ Ruins (KP 12, KP 13, KP 17, KP 21, KP 22, C001, C012, C013, C017, C024, C025) should be monitored during initial mining activities or construction as these could contain unmarked graves; ➲ The final layout must be subjected to a heritage walkdown prior to development; ➲ Development of a heritage site development plan that addresses access protocols for safe access to burial sites for family members; ➲ The presence of additional graves should be confirmed during the social consultation process; ➲ Implementation of Chance Find Procedure for the project; ➲ The study area should be monitored by the ECO during construction; and ➲ Approval of the project must be received by SAHRA.		
Palaeontological Impact Assessment Bamford (2022)	According to the SAHRA Palaeontological sensitivity map the study area is of very high significance and was independently assessed. The study by Bamford (2022) concluded that it is extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary. There is a very small chance that fossils may occur below the ground	X	Section 6.8 Section 8 PART B EMPr

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	surface in the shales of the Vryheid Formation so a Fossil Chance Find Protocol should be added to the EMPr.		
Social Impact Assessment ABS Africa (2023)	There are several SRs currently residing within the MRA whose current land-use activities are unlikely to be compatible with the intended mining activities. SRs that fall within the surface infrastructure footprint or opencast mining areas of the proposed Kranspan Mining Right extension area would need to be removed (either demolished or relocated) in order for any mining operations to be allowed to commence. This process could include the following: ➲ By agreement with Ilima, relocation of structures/houses within the landowners/occupiers property where no mining infrastructure and activities are planned; or ➲ Ilima purchase the affected landowners/occupiers property and demolish the affected structures or incorporate the structures into the mine infrastructure design to be used during operation of the mine. Where SRs will remain within the MRA boundary (or SRs that occur outside the MRA but within close proximity), it is recommended that the Regulations under the Mine Health and Safety Act (Act No. 29 of 1996) be adhered to during mining operations and that no opencast mining occur within 500m of these SRs due to potential blasting, noise and dust impacts on the SRs. The Applicant must establish a community engagement forum comprising of representatives of, among others, the mine management, surrounding landowners / land users, community members, authorities, and local business.	X	Section 6.8 Section 8 PART B EMPr

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	An annual report on the progress of implementation of the programmes and commitments made by the Applicant in the mine social and labour plan should be provided to the community engagement forum, steering committee and all other relevant stakeholders. The mitigation measures outlines in the SIA must be incorporated into the EMPr.		
Blasting Impact Study Rorke (2022)	The study assessed the impacts related to blasting induced vibration, air blast, fly rock and fumes have been evaluated. Their impact on structures, people, animals, graves, ruins and heritage sites are included in the study. A summary of the mitigation measures are as follows: ➲ There will be a medium high negative significance from blast induced ground vibration for the R36 road, and several people living within 1200 m of blasting. Mitigation is best achieved through blast specific timing designs and precise initiation systems that ensure only one hole fires per instant in time during a blast; ➲ Air blast and fly rock present a high negative significance and will need to be controlled by applying blast designs with stemming lengths that will effectively curb fly rock including controlled stemming application of the holes. Atmospheric conditions have a major impact on amplifying air blast in certain directions, but if effective stemming is applied and presplits are timed with short delays between each hole, air blast significance will be low, and amplification will be insignificant; ➲ The temporary removal of people and stopping of road/rail traffic will be necessary to a safe distance of a minimum of 1000 m from blasting activities at blasting time to achieve a low negative significance rating; and ➲ Heritage sites and graves within 150 m of blasting will experience a medium-high significance rating, but with mitigation measures the negative significance will drop to Low.	X	Section 6.8 Section 8 PART B EMPr

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Visual Impact Assessment ABS Africa (2023)	The visual exposure from the proposed Kranspan Mine Extension infrastructure is medium to high. Based on modelled information, it is concluded that little of the visual exposure will be screened out by the topography or vegetation. In terms of landscape integrity, the project blends into surroundings but is clearly visible. Rehabilitation soon after mining of an area as well as dust suppression can reduce the negative visual impact of the project. Landscape Integrity and Visual Absorption Capacity, would not change much, Visual Exposure can be reduced.	X	Section 6.8 Section 8 PART B EMPr
Mine Rehabilitation and Closure Plan ABS Africa (2023)	The estimate for rehabilitation and closure associated with the Kranspan Mine Extension Project was based on the measured works as per the design reports and proposed development of the mine. The Closure objectives were determine taking into consideration site observations, legislative requirements as well as best practice guidelines available for mining projects. The risk items to be addressed as part of the closure plan were based on a number of third-party reports and assessments, many of which are based on certain assumptions and limitations. These assumptions and limitations would need to be addressed during the operation phase of the mine and the closure objectives and risk assessment updated accordingly. This Closure Plan must ensure that the closure objectives are incorporated into the design, and that concurrent rehabilitation will be implemented whenever possible.	X	Section 6.8 Section 8 PART B EMPr

10 ENVIRONMENTAL IMPACT STATEMENT

10.1 SUMMARY OF THE KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

The extension areas have been selected based on the availability of coal, access to mineral rights and proximity to the existing Kranspan Mine. A comparative analysis of the layout alternatives was undertaken (Table 6-34) in order to determine that the Final Layout Plan is the BPEO for the proposed Kranspan Mining Right Extension project. The avoidance of environmental sensitive areas has resulted in the Final Layout Plan reducing the extent of the impacts on the environment significantly.

Key findings of the impact assessment for the proposed Kranspan Mining Right Extension are as follows:

- The need and desirability of the proposed development has been established;
- The proposed development has the potential to create significant employment and economic development opportunities for local communities during the construction and operational phases of the project;
- The mine SLP has provided costed plans for optimising local employment, skills development and a commitment to implementing local economic development projects, identified in collaboration with the CALLM;
- Impacts to ecologically sensitive habitat and surface and groundwater resources have been assessed to be the most significant potential impacts associated with the proposed development;
- The direct loss of sensitive vegetation (untransformed grassland and sandstone scarp shrubland) was assessed by the relevant specialists to be a high impact before mitigation with avoidance recommended as the primary mitigation measure. The high impact significance is due to the conservation value of these habitats and the CBA designation of some of these areas. The Biodiversity Study has noted that the impacted CBAs can only be sufficiently mitigated through avoidance;
- The final layout indicates that some wetland areas are required to be included within the mining area and therefore will be lost. Opencast mining excavations taking place in close proximity to wetland units will have an impact on hydrological components of those wetlands where water moving laterally through the subsurface soil layers will decant into the opencast pits rather than feeding the wetland units. This, depending on the severity, have a profound impact on the wetland units. In severe cases, the entire ecological functionality of the wetland unit could be lost;
- Heritage resources, including graves and cemeteries, will be impacted on. Measures to mitigate these impacts include avoidance with a 100m buffer zone (following the SAHRA Burial Grounds and Graves permitting policy 2020). If this is not possible graves must be relocated adhering to all legal requirements;
- There are several SRs currently residing within the MRA whose current land-use activities are unlikely to be compatible with the intended mining activities. SRs that fall within the surface infrastructure footprint or opencast mining areas would need to be removed (either demolished or relocated) in order for any mining operations to be allowed to commence.

10.2 FINAL SITE MAP

This section requires a map to be provided at an appropriate scale which superimposes the proposed overall activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers.

Refer to Appendix 3 Map 5 for the final site map.

10.3 SUMMARY OF THE POSITIVE AND NEGATIVE IMPLICATIONS AND RISKS OF THE PROPOSED ACTIVITY AND IDENTIFIED ALTERNATIVES

A summary of the positive and negative impacts and risks associated with the proposed development are provided below.

10.3.1 Positive Impacts

10.3.1.1 Topography

- During rehabilitation, topography will be (as far as practically possible) restored to that of the pre-mining state, and must be free draining

10.3.1.2 Visual Aesthetics

- Visual improvement of the sense of place during rehabilitation

10.3.1.3 Socio-economic

- Coal Production for Electricity Generation
- Economic Growth
- Employment Opportunities
- Skills Development and Education Opportunities
- Local Economic Development
- Government Revenue and Royalties

10.3.2 Negative Impacts

10.3.2.1 Climate

- Greenhouse Gas Emissions

10.3.2.2 Topography

- Change in topography of the area which could have impacts on the sense of place and visual aesthetics as well as potentially result in the interception of natural runoff

10.3.2.3 Geology

- Underlying geology will be affected in that mineral resources will be lost

10.3.2.4 Soils and Agricultural Land Capability

- Loss of Land Capability through erosion, soil degradation, compaction, increase in salinity, land contamination and loss of soil via aeolian processes

10.3.2.5 Hydropedology

- Increased erosion and sedimentation due to increase overland flow on the environment
- Increased overland flow will result in decreased infiltration and therefore less lateral flow at the soil bedrock/ interface or return flow from groundwater. Open cast areas will intercept lateral flow paths and remove connectivity between recharge zones and lateral flow zones. Alteration of this flow path will likely change the wetland water regimes negatively

10.3.2.6 Terrestrial Ecology – Flora

- Loss of Natural Habitat (untransformed habitat) of High Ecological Importance
- Loss of Plant Species of Conservation Concern (SCC)

- Introduction and Proliferation of Alien Invasive Plant Species
- Illegal Utilisation of Plant Resources

10.3.2.7 Terrestrial Ecology – Fauna

- Displacement and Loss of Habitat for Faunal Species
- Disruption of Ecological Connectivity and Faunal Dispersal
- Illegal Utilisation of Faunal Resources

10.3.2.8 Surface Water

- Destruction of sensitive wetland habitat features
- Soil erosion that impacts watercourses and wetland habitat
- Surface water quality

10.3.2.9 Groundwater

- Groundwater availability and rate of groundwater seepage
- Contamination of groundwater quality
- Impacts on the shallow weathered aquifer, wetlands and springs
- Groundwater users (destruction of private boreholes)
- Risk of decant

10.3.2.10 Air Quality

- Elevated PM_{10} and $PM_{2.5}$ Concentrations and Elevated Dust Fall Levels

10.3.2.11 Noise

- Elevated Noise Levels

10.3.2.12 Heritage Resources

- May destroy, damage, alter, or remove structures of heritage importance
- May destroy, damage, alter, or remove ruins of heritage importance
- May destroy, damage, alter, or remove stone cairns of heritage importance
- May destroy, damage, alter, or remove burial sites of heritage importance

10.3.2.13 Palaeontological Resources

- May destroy, damage, alter, or remove resources of palaeontological importance

10.3.2.14 Visual Aesthetics

- Visual disturbance of the sense of place

10.3.2.15 Socio-economic

- Change in Land Use – Loss of Agricultural Land
- Change in Land Use – Loss of Jobs
- Population Influx
- Security Risks
- Mine Health and Safety: General

- Mine Health and Safety: Spontaneous Combustion
- Community Health and Safety: Diseases
- Community Health and Safety: Traffic and Road Safety
- Community Health and Safety: Blasting
- Blast induced damage to road surfaces and earth dams;
- Damage to structures or injury to people closer than 1000 m from fly rock;
- Damage to structures or complaints from neighbours caused by high air blast;
- Water pollution from dissolved nitrates; and
- Fumes generated by blasting affecting health and wellbeing of surrounding neighbours.
- Mine Closure and Associated Effects on the Local Economy

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

Based on the assessment and where applicable, this section requires the recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development to be included in the EMPr as well as for inclusion as conditions of authorisation.

The key objectives of an EMPr are to set out the management and monitoring measures required to both minimise any potentially adverse environmental impacts and enhance the environmental benefits of the Project, and to ensure that responsibilities and appropriate resources are efficiently allocated to implement the plan.

The basis for the management measures which follow below comprise of the following:

- Management objectives - i.e. desired outcome of management measures for mitigating negative impacts and enhancing the positive impacts related to project activities and aspects (i.e. risk sources);
- Targets/outcomes - i.e. level of performance to accomplish management objectives; and
- Management actions - i.e. practical actions aimed at achieving management objectives and targets;
- Responsibilities; and
- Monitoring requirements.

The management objectives and outcomes will be achieved through the implementation of the management actions in the EMPr.

The aspects which are considered to be of most importance to the development, including the respective management objectives and outcomes for the impacts associated with these aspects are provided in Table 11-1.

TABLE 11-1: IMPACT MANAGEMENT OBJECTIVES AND OUTCOMES

NO.	ASPECT	MANAGEMENT OBJECTIVE	MANAGEMENT OUTCOME
1	Climate	➲ Reduce GHG sources	➲ Minimise GHG emissions from mining activities
2	Topography	➲ Manage visual disturbances as well as intercepted natural runoff	➲ Minimise extent of visual and runoff impacts ➲ Successful rehabilitation of disturbed areas

NO.	ASPECT	MANAGEMENT OBJECTIVE	MANAGEMENT OUTCOME
3	Geology	➲ Prevent loss of mineral resources	➲ Minimise area of mineral resources lost
4	Soils and Agricultural Land Capability	➲ Protect and manage topsoil and subsoil resources over the LoM ➲ Prevent the use of soil resources for any purpose other than rehabilitation ➲ Reinstate the soil profile in the same sequence in which it was removed ➲ Prevent the contamination of soil resources ➲ Managed response to the clean-up of accidental spillages and leaks	➲ Soil resources protected from contamination ➲ Successful rehabilitation of disturbed areas ➲ Accidental leaks and spillages responded to rapidly and all contamination remediated in accordance with legal requirements
5	Hydropedology	➲ Prevent erosion and sedimentation of terrestrial and wetland soils ➲ Prevent decreased infiltration and lateral flow at the soil bedrock/interface or return flow from groundwater by remaining outside of the recommended wetland buffers	➲ Reduce overland flow ➲ Do not remove the connectivity between recharge zones and lateral flow zones and prevent desiccation of wetland areas
6	Terrestrial Ecology - Flora	➲ The desired management objectives for areas categorised as CBA are that they should be maintained in a natural state with no further loss of ecosystems, functionality, or species ➲ Prevent loss of plant SCC ➲ Prevent proliferation of alien invasive plant species	➲ Avoid CBAs and ESAs ➲ Conservation of plant SCC ➲ Implementation of an Alien Plant Management Plan
7	Terrestrial Ecology - Fauna	➲ Maintain sensitive habitats and prevent loss of fauna SCC	➲ Avoid sensitive habitats and conserve fauna SCC
8	Surface Water	➲ Control the flow of storm water across the site ➲ Allow for clean and dirty stormwater separation ➲ Remain outside of the recommended wetland buffers	➲ Managed storm water flow ➲ Uncontrolled release of dirty stormwater or effluent from onsite activities prevented ➲ Wetland features not impacted upon by mine activities
9	Groundwater	➲ Surrounding land users unaffected by dewatering and other mine activities ➲ Managed response to the clean-up of accidental spillages and leaks ➲ Prevent the contamination of groundwater resources	➲ Implement a management plan aimed at reducing and/or eliminating adverse impacts on existing private groundwater users, wetlands, the pans, rivers and streams ➲ Good stakeholder relations with community members

NO.	ASPECT	MANAGEMENT OBJECTIVE	MANAGEMENT OUTCOME
		➲ Track and record the progress of implementation of all groundwater management measures ➲ Implement sufficient monitoring procedures to measure the effectiveness of groundwater management measures in both mine and private boreholes located within the delineated zones of influence ➲ Analyse the information obtained from all monitoring programmes against compliance targets to establish trends ➲ Should the trends indicate adverse impacts on groundwater levels and/or quality, implement suitable measures within the shortest possible time to remediate and/or eliminate such adverse impacts identified	➲ Groundwater resources protected from contamination ➲ Accidental leaks and spillages responded to rapidly and all contamination remediated in accordance with legal requirements
10	Air Quality	➲ Land users minimally affected by mining activities ➲ Control and minimise particulate and dust emissions to air ➲ Monitor dustfall over the LoM to ensure that any changes in dust fall rates are identified and investigated	➲ Good stakeholder relations with community members ➲ Air emissions from the development managed in accordance with legal requirements
11	Noise	➲ Prevent noise impacts from development activities at sensitive noise receptors ➲ Complaints which are received are properly investigated and responded to appropriately	➲ Good stakeholder relations with community members and authorities
12	Heritage Resources	➲ To have no adverse impact on the historical resources, structures and inheritance of the area ➲ To avoid damage to or destruction of previously unknown or excavated archaeological artefacts during construction ➲ The preservation and appropriate management of new findings should these be discovered during construction	➲ No heritage / palaeontological resources damaged or destroyed during construction activities
13	Palaeontology Resources		
14	Visual Aesthetics	➲ Minimise impacts to the aesthetics / visual quality	➲ No complaints regarding impacts to visual quality
15	Socio-economic	➲ Influx is managed in a planned and peaceful manner	➲ Community conflict avoided ➲ Employment from community

NO.	ASPECT	MANAGEMENT OBJECTIVE	MANAGEMENT OUTCOME
		➲ Support for the development by the local community is enhanced ➲ Maximise the local economic development potential of the development	➲ Local procurement ➲ Good stakeholder relations with community members and authorities
		➲ Prevent criminal activities on site ➲ Prevent occupational and community health and safety incidents ➲ Complaints which are received are properly investigated and responded to appropriately	➲ Secure and safe site ➲ Good stakeholder relations with community members and authorities
		➲ Prevent road safety incidents and limit disruptions to traffic flow ➲ Complaints which are received are properly investigated and responded to appropriately	➲ Damage to road surfaces minimised. ➲ No road accidents ➲ Good stakeholder relations with community members and authorities
		➲ Ensure no damage to infrastructure or heritage sites from blasting ➲ Complaints which are received are properly investigated and responded to appropriately	➲ Control blasting impacts ➲ Good stakeholder relations with community members and authorities
		➲ Adequate reinstatement and rehabilitation of mined areas	➲ Complete site clean-up ➲ Reinstate and rehabilitate areas disturbed by mining activities

12 FINAL PROPOSED ALTERNATIVES

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

An environmental sensitivity map was compiled from data provided by the applicant, various specialist studies and national datasets. The environmental sensitivity plan consisted of the following sensitivity classes: High sensitivity areas (No-Go areas), medium sensitivity areas, low sensitivity areas and transformed areas (no sensitivity). A comparative analysis summary of the environmental aspects between the two layout plans is provided in Table 6-3 which showed that the final site layout overlaps with less areas of sensitivity (high, medium and low) than the initial layout, while the overlap with transformed areas are almost the same, with a slight increase in the final layout. These are positive changes in terms of the environmental sensitivities identified.

A comparative analysis of the layout alternatives was undertaken (Table 6-34) in order to determine that the Final Layout Plan is the BPEO for the proposed Kranspan Mining Right Extension project. The avoidance of environmental sensitive areas has resulted in the Final Layout Plan reducing the extent of the impacts on the environment significantly.

13 ASPECTS FOR INCLUSION AS CONDITIONS OF AUTHORISATION

The EAP recommends the following conditions for the DMRE to consider for inclusion into the EA:

- The mitigation/enhancement measures contained in the specialist reports and EMPr must be adhered to;
- An ECO must be appointed to ensure all monitoring during the LoM is undertaken and that Ilima adheres to the EMPr. Monitoring must be undertaken as described in the monitoring programme;
- Chance Finds Procedure must be developed for the establishment phase in the event of accidental exposure of unidentified heritage or palaeontological resources;
- The closure cost assessment should be updated and submitted as per the legislative requirements;
- Environmental audits must be undertaken by an ECO as set out in conditions for authorisation and license conditions;
- The Rehabilitation Plan must be implemented concurrently;
- A WUL in terms of Section 21 of the NWA must be issued by the DWS prior to any activities taking place;
- Since geochemical characterisation test-work has completed at Roodebloem but yet to be conducted at Vaalbank, confirmation is required that the geochemical characterisation testwork undertaken on the samples from the Vaalbank Farm also present a low acid generating risk;
- A spontaneous combustion prevention plan must be compiled;
- An emergency preparedness and response plan must be developed by Ilima for the site.

The specialist studies and impact assessment have been based on the final (preferred) layout plan for the proposed MRA extension activities. Should there be any changes to the project description, footprint or site layout plan assessed, the adequacy and accuracy of the work may be affected, and additional studies may be required to assess the impacts of these proposed changes.

14 DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

Advisory on Business and Sustainability Africa (Pty) Ltd. (ABS Africa) has prepared this report specifically for Ilima Coal Company (Pty) Ltd. (Ilima). The contents of this report:

- Are based on the legal requirements for undertaking an Environmental Impact Assessment, as defined in the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the scope of services as defined within the contractual undertakings between Ilima and ABS Africa;
- Are specific to the intended development at the proposed site. The report shall not be used nor relied upon neither by any other party nor for any other purpose without the written consent of ABS Africa. ABS Africa accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report; and
- Reflect the best judgement of ABS Africa in light of the information available at the time of preparation. The analyses contained in this report has been developed from information provided by Ilima and other parties. This information is not within the control of ABS Africa and ABS Africa has not audited such information and makes no representations as to the validity or accuracy thereof.

In addition, it is noted that:

- The assessment has been based on the project description provided by the Applicant. Changes to this project description may influence the assessment and the mitigation measures in the EMPr;
- Where relevant, the impact assessment has placed reliance on the information and recommendations in the specialist studies completed for the Project. The assumptions, uncertainties and gaps applicable to each specialist study are provided in the respective specialist reports;
- It has been assumed that the respective specialists have ensured that the relevant quality control standards were applied with respect to sample collection, preparation and laboratory testing protocols, including equipment calibration; and
- The post-mitigation impact is based on the understanding that the Applicant will establish the financial and administrative framework necessary for the complete implementation of the mitigation measures outlined in the EMPr over the LoM.

This table below highlights the assumptions, uncertainties, limitations and knowledge gaps relevant to the assessment and mitigation measures of the various specialist reports undertaken.

TABLE 14-1: SPECIALIST REPORTS ASSUMPTIONS, UNCERTAINTIES, AND GAPS

SPECIALIST REPORT	ASSUMPTIONS, UNCERTAINTIES AND GAPS
Soil and Agricultural Potential Assessment The Biodiversity Company (2022)	The following limitations should be noted for the assessment: ➲ A soil stripping guideline is not part of this assessment; and ➲ The GPS used for water resource delineations is accurate to within five meters. Therefore, the wetland delineation plotted digitally may be offset by at least five meters to either side.
Hydropedological Assessment The Biodiversity Company (2022)	The following aspects were considered as limitations; ➲ Only the slopes and sub-basins affected by the proposed open cast mining area have been assessed; ➲ No surface impacts (i.e. haul roads, infrastructure, evaporation ponds, topsoil, overburden stockpiles etc) have been included into this report given the irrelevance of these components to a high level hydropedology assessment; ➲ It has been assumed that the open cast mining area provided to the consultant is correct; ➲ The GPS used for ground truthing is accurate to within five metres. Therefore, the wetland and the observation site's delineation plotted digitally may be offset by at up to five meters to either side; and ➲ Geohydrological modelling was not part of the hydropedological assessments.
Terrestrial Biodiversity Assessment	A total of sixteen days of field work and eighteen of data analysis, mapping and reporting were available for the completion of the terrestrial ecology assessment presented here, and fieldwork included surveys conducted in both October 2022 and January 2023. Due to time constraints inherent in a rapid ecological assessment such as that presented here and large size of the project area (4 956 ha) and the fact that almost 40% of the project area comprises Natural Habitat (untransformed habitat), the plant species list provided in Appendix 1 cannot be regarded as comprehensive. The compilation of a complete plant species list for an area the size of the project area in this region of the Mpumalanga Highveld requires surveys to include comprehensive seasonal coverage over a number of years. Based on the author's extensive experience in this region of the Highveld, the plant species list provided in Appendix 1 is likely to include approximately 85%

SPECIALIST REPORT	ASSUMPTIONS, UNCERTAINTIES AND GAPS
	of the plant species actually present within the study area, which provides an accurate indication of the floristic diversity of the project area and is regarded as an appropriate level of accuracy for the nature and objectives of this study. This limitation is also mitigated by the fact that particular emphasis was placed on searching for potentially occurring plant SCC and recommendations for the conduction additional floristic surveys which should be included in the EMP and conducted prior to construction, are provided in this report. In order to obtain a comprehensive understanding of the faunal communities in the project area, as well as the status of rare or threatened species in the area, faunal surveys should consider investigations at different time scales (across seasons/years) and through replication. However, the authors have conducted extensive faunal surveys on the Mpumalanga Highveld and based on this experience, the current survey is considered to be appropriate for the objectives of this study and is likely to include approximately 70 % - 75% of the vertebrate fauna richness that is expected to be present within the study area. Due to the large size of the area and time constraints, it was decided not to use standard small mammal trapping methods, such as live Sherman traps since the faunal specialists would have needed to check traplines early each morning, which would impose time restrictions to access key habitat types for bird species of conservation concern during the early mornings.
Hydrological Report Peens and Associates (2022)	None.
Surface Water Ecosystems Assessment Enviross (2023)	The conclusions to the overall perceived impacts have been based on a desktop survey that was reiterated by ground-truthing through field surveys of the area encompassing the proposed development. Comprehensive physical surveys for an area as large as the survey area are not always possible nor practical, which necessitates that a trend analysis of the correlation between the physical site conditions and what can be ascertained from the aerial imagery be used to delineate wetland conditions in some areas. Aerial imagery analysis therefore plays an integral part in wetland analyses within large areas. Vegetation structures and some floral species are mentioned within the report. This mention is purely for the purpose of delineating the wetland boundaries and is not meant as an account of the full species lists and ecological potential of the proposed development site and should not be taken as such. Detailed biodiversity accounts should be taken from the relevant specialist assessments.
Geohydrological Impact Assessment iLEH (2023)	The numerical modelling is based on the following assumptions: ➲ Aquifer parameters were inferred from the fieldwork programme completed as part of this study. Aquifer parameters used to construct the numerical model are presented in Table 9, based on the 2019 study (iLEH 2019a and b) as well as the 2022 dataset. Parameters that were assumed include aquifer storage coefficients, porosities and the rate of recharge. It is further assumed that the vertical permeability is 1/10th that of the horizontal permeability. ➲ The source characterisation used for the project was inferred from the existing dataset. The values that will be assigned during simulations are presented in Table 10. ➲ Only advective transport of contaminants was simulated. Assumptions made regarding advection, are discussed below. While it is acknowledged that attenuation will take place in the soils, there is currently insufficient information available to quantify the extent to which this takes place. As such, simulations are based on the

SPECIALIST REPORT	ASSUMPTIONS, UNCERTAINTIES AND GAPS
	precautionary principle and take the worst-case scenario into consideration. ➲ The extent of the numerical model is based on natural groundwater barriers, as discussed below. These include water divides as well as rivers and streams. The extent and timing of mining activities were obtained from information made available as part of the study. Details of this are discussed below. The uncertainties in the model include: ➲ Uncertainties regarding aquifer conditions within the project area: This understanding can be improved through the continuation of groundwater level and quality monitoring at the mine. The regional fault lines, the existing decant point and the impact of historical mining activities are of specific interest in this regard. It is noted that Ilima is in the process of completing additional fieldwork at the decant point associated with the historical Union Colliery underground workings. The outcome of this should be considered in future groundwater impact assessments. ➲ Uncertainties regarding borehole depth, construction and geology intersected: This information is not available for the hydrocensus boreholes. For this reason, it was assumed that all hydrocensus boreholes target the fractured rock aquifer. ➲ Uncertainties regarding the borehole elevations: The elevations of hydrocensus boreholes used during simulations were inferred from hand-held GPS measurements and inaccuracies may occur. It is however thought that the error in elevation will not exceed the calibration error of 5m. ➲ Mathematical modelling uncertainties: It is not possible with the available information to quantify the heterogeneity present in the aquifers simulated. For this reason, there are inherent uncertainties in the model. The level of confidence in the model can be improved with the incorporation of additional monitoring data. ➲ The uncertainties listed above can be reduced or eliminated through continuation of the groundwater monitoring programme at the mine. It can further be reduced by integrating the results of the groundwater monitoring programme proposed in this study. This information can be used to improve aquifer parameter estimation and model calibration.
Geochemical Characterisation and Waste Classification The Moss Group (2022)	The geochemical characterisation of the overburden / waste rock material has been based on the static leach testwork results. The impact assessment and associated mitigation measures have been based on these results. The assessment and mitigation measures should be updated if kinetic leach testwork is undertaken and results become available. These results were similar to the geochemical characterisation testwork undertaken on the samples from the Kranspan Farm. Given the similar geology and coal seam characteristics of the region, it is expected that drill core samples from the Vaalbank part of the extension area will indicate that this material will also present a low acid generating risk.
Air Quality Impact Assessment Airshed (2022)	The main assumptions, exclusions and limitations are summarised below: ➲ Meteorological data: no onsite meteorological data was available. Modelled WRF data for the study site was obtained for the period January 2019 – December 2021.

SPECIALIST REPORT	ASSUMPTIONS, UNCERTAINTIES AND GAPS
	➲ Operational hours for the processing plant were provided as 24 hours per day, 7 days a week. Operational hours for mining activities were given as 24 hours per day, 6 days a week. It was assumed that this information is correct. ➲ Emissions: • The quantification of sources of emission was for Project activities only. Background sources were not included. • Information required for the calculation of emissions from fugitive dust sources for the facility's operations were provided in the form of ROM tonnages and the strip ratio calculated from the previous Kranspan study's information. • Emissions were calculated for the worst-case scenario (Year 25-30) with opencast areas on the Vaalbank MRA Extension Area situated the furthest west from the processing plant and wash plant (and therefore the longest haul routes). Findings from this scenario were applied to assess impacts from the Roodebloem MRA Extension Area. • As a worst-case scenario, it was assumed that overburden was tipped to overburden stockpiles. • Only routine emissions were estimated and modelled. This was done for the provided operational hours. • Gaseous emissions from vehicle exhaust and other auxiliary equipment were not quantified as the impacts from these sources are usually localized and unlikely to exceed health screening limits outside the project area. The main pollutant of concern from the operations at the study site is particulate matter and hence formed the focus of the study. ➲ Impact assessment: • Impacts due to the operational phase (Year 25-30 scenario) were assessed quantitatively, whilst the construction, closure and decommissioning phases were assessed qualitatively due to the limited information available. • The impact assessment was limited to airborne particulate (including TSP, PM10 and PM2.5) the main pollutants of concern from surface mining operations. • There will always be some degree of uncertainty in any geophysical model, but it is desirable to structure the model in such a way to minimize the total error. A model represents the most likely outcome of an ensemble of experimental results. The total uncertainty can be thought of as the sum of three components: the uncertainty due to errors in the model physics; the uncertainty due to data errors; and the uncertainty due to stochastic processes (turbulence) in the atmosphere. Nevertheless, dispersion modelling is generally accepted as a necessary and valuable tool in air quality management. ➲ Greenhouse gas (GHG): • The information on which the GHG inventory was based was the same as for the previous Kranspan study.

SPECIALIST REPORT	ASSUMPTIONS, UNCERTAINTIES AND GAPS
	• Scope 1 and Scope 2 carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O) emissions were calculated for the operational phase (using the annual fuel usage as calculated from equipment information contained in the Kranspan Mine Working Plan). This includes diesel used for mining and infrastructure operations.
Noise Impact Assessment Airshed (2022b)	The following limitations and assumptions should be noted: ➲ The mitigating effect of infrastructure acting as acoustic barriers was not taken into account, providing a conservative assessment of the noise impacts off-site. ➲ The quantification of sources of noise was limited to the operational phase of the project, including mining at the Kranspan, Vaalbank and Roodebloem areas. Construction and closure phase activities are expected to be similar or less significant and its impacts only assessed qualitatively. Noise impacts from mining and processing activities will cease post-closure. ➲ All activities were assumed to be 24 hours per day, 7 days per week. ➲ Although other existing sources of noise within the area were identified, such sources were not quantified but were taken into account during the survey. ➲ Blast vibration and blast noise did not form part of the scope of work of this assessment.
Heritage Impact Assessment Beyond Heritage (2023)	The authors acknowledge that the brief literature review is not exhaustive on the literature of the area. Due to the nature of heritage resources and pedestrian surveys, the possibility exists that some features or artefacts may not have been discovered/recorded and the possible occurrence of graves and other cultural material cannot be excluded. This limitation is successfully mitigated with the implementation of a Chance Find Procedure and monitoring of the study area by the Environmental Control Officer (ECO). This report only deals with the footprint area of the proposed development and consisted of non-intrusive surface surveys. This study did not assess the impact on medicinal plants and intangible heritage as it is assumed that these components will be highlighted through the public consultation process if relevant. It is possible that new information could come to light in future, which might change the results of this Impact Assessment.
Palaeontological Impact Assessment Bamford (2022)	Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, sandstones, shales and sands are typical for the country and do contain fossil plant, insect, invertebrate and vertebrate material. The site visit and walk through in early October 2022 by palaeontologists confirmed that there are no fossils on the surface. There were no outcrops of shales that could potentially preserve fossils. The outcrop of sandstone in the western part of Farm Vaalbank is coarse-grained and very weathered and it has no fossils on the surface. It was too dangerous to inspect the sink holes and so it is not known what lies below the surface. The sands of the Quaternary period would not preserve fossils.
Social Impact Assessment ABS Africa (2023)	The contents of the SIA: ➲ Are based on the legal requirements for undertaking an EIA, as defined in the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the scope of services as defined within the contractual undertakings between Ilima and ABS Africa;

SPECIALIST REPORT	ASSUMPTIONS, UNCERTAINTIES AND GAPS
	➲ Are specific to the intended development at the proposed extension area. The report shall not be used nor relied upon neither by any other party nor for any other purpose without the written consent of ABS Africa. ABS Africa accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report; ➲ Reflect the best judgement of ABS Africa in light of the information available at the time of preparation. The analyses contained in this report has been developed from information provided by Ilima and other parties. This information is not within the control of ABS Africa and ABS Africa has not audited such information and makes no representations as to the validity or accuracy thereof; ➲ Are based on the project description provided by the Applicant. Changes to this project description may influence the assessment and the mitigation measures in the Environmental Management Programme (EMPr); ➲ Where relevant, have placed reliance on the information and recommendations in the specialist studies completed for the Project; ➲ Have assumed that the respective specialists have ensured that the relevant quality control standards were applied with respect to sample collection, preparation and laboratory testing protocols, including equipment calibration; and ➲ Are based on the understanding that the Applicant will establish the financial and administrative framework necessary for the complete implementation of the mitigation measures outlined in the EMPr over the LoM.
Blasting Impact Study Rorke (2022)	➲ Exclusions • During the Construction and Decommissioning phases of the Ilima Colliery no blasting operations will occur. This report therefore concentrates on the operational phase of mining. • There is no risk assessment for blasting in any underground operations, as mining will be done by mechanical methods and there will be no blasting related impacts. ➲ Assumptions • Attenuation rates for vibration are site-specific and depend on the geology. There is no vibration attenuation information for the Ilima Mine area, and therefore conservative attenuation constants have been applied meaning that actual values are likely to be lower than the predicted values. ➲ Uncertainties and Knowledge Gaps • There is uncertainty on the impact of blasting on animals in the vicinity. Loud bangs have a negative impact on animals. An example is the stress on pets from the noise of firecrackers going off. • However, the proposed maximum air blast limit of 120 dBL is low and therefore, mitigated blasting should be a relatively quiet activity that is unlikely to impact any animals negatively.
Visual Impact Assessment ABS Africa (2023)	➲ Reflect the best judgement of ABS Africa considering the information available at the time of preparation. The analyses contained in this report

SPECIALIST REPORT	ASSUMPTIONS, UNCERTAINTIES AND GAPS
	has been developed from information provided by Ilima, government agencies and other third parties. This information is not within the control of ABS Africa and ABS Africa has not audited such information and makes no representations as to the validity or accuracy thereof; and ➲ The assessment has been based on the project description provided by Ilima. Changes to this project description may influence the assessment and the proposed mitigation measures.
Mine Rehabilitation and Closure Plan ABS Africa (2023)	The following assumptions and limitations apply to the assessment: ➲ This Closure Plan must ensure that the closure objectives are incorporated into the design, and that concurrent rehabilitation will be implemented whenever possible. ➲ No treatment of seepage water from the mined areas will be required. ➲ The assessment is based on rates associated with the works, as per 2023. ➲ The final land uses are to be established in consultation with the community and local authorities. ➲ Monitoring will continue for a period of 3 years after the start of the decommissioning phase.

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

The need and desirability for the Project has been established. The mitigation hierarchy has been applied to the several negative impacts that have been identified. and management controls have been recommended to reduce the extent of residual impacts.

Accordingly, based on the findings of the impact assessment, and with the understanding that the mitigation measures will be implemented, and the conditions of the environmental authorisation enforced by the relevant authorities, the EAP is of the opinion that an environmental authorisation for the development may be granted.

16 PERIOD FOR WHICH ENVIRONMENTAL AUTHORISATION IS REQUIRED

In terms of the MPRDA, the maximum period a mining right may be issued for is 30 years, with the option to renew for another 30 years. Ilima began coal mining at the Kranspan Mine in 2022. Ilima has identified the need to expand the approved Kranspan MRA to extract identified coal resources found on the proposed adjacent properties. Thus it is not the intention of Ilima to prolong the period of the Life of Mine (LoM), but instead to mine additional coal resources within the same LoM, i.e. a period of 30 years.

17 UNDERTAKING

The undertaking required to meet the requirements of this section is provided at the end of the EMPr in PART B, Section 23.

18 FINANCIAL PROVISION

18.1 EXPLAIN HOW THE AFORESAID AMOUNT WAS DERIVED

The estimate for rehabilitation and closure for the Kranspan Mining Right Extension Project is based on the principles and closure activities as set out in the report. The closure plan is considered conceptual and therefore certain uncertainties relating to the actual activities to be implemented as part of the decommissioning and closure phases of the project will only be confirmed once a detailed closure plan has been developed.

The costing is based on the DMRE methodology, in PART B of this report.

Ilima has an approved financial provision in the form of guarantees to the total amount of R30 971 412.00 for the Kranspan Mining Right. The quantum for closure for the existing Kranspan Mining Right is summarized in Table 22-4 and reflects the latest environmental closure liability as calculated for the period ending 2022. The liability assessment includes provision for the demolition of the current plant (dry crushing and screening) .

The liability for the Kranspan extension area for the first 6 -18 months of the LoM is expected to be similar or less than that of Kranspan. This liability will be provided in the Final EIR.

18.2 CONFIRM THAT THIS AMOUNT CAN BE DERIVED FROM THE OPERATING EXPENDITURE

In compiling and submitting their Mine Work Programme, the Applicant has confirmed that the required amount for financial provision for rehabilitation and closure can be derived from operating expenditure over the LoM.

19 DEVIATIONS FROM APPROVED SCOPING REPORT AND PLAN OF STUDY

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

No deviations from the impact assessment methodology outlined in the Scoping Report and Plan of Study are applicable.

19.2 MOTIVATION FOR THE DEVIATION

No motivation applicable.

20 OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

In compliance with the provisions of sections 24(4) (a) and (b) read with section 24 (3) (a) and (7) of NEMA, the following additional requirements are included below.

20.1 IMPACT ON THE SOCIO-ECONOMIC CONDITIONS OF ANY DIRECTLY AFFECTED PERSON

The socio-economic impact of the proposed mining activities have been assessed and are described in Section 7 of the EIA Report. In addition, the geohydrological study has identified that certain boreholes are likely to be destroyed or affected by the proposed mining activities. Replacement of these boreholes and other impacts would need to be included in the discussions between the Applicant and individual landowners as part of the access to land agreement to be negotiated between the parties.

Although the potential impacts of the proposed Ilima mining activities on directly affected communities have been assessed in the Scoping and EIA Process, it is understood that community relocation is not certain at this stage but leasing is (lease agreement).

20.2 IMPACT ON ANY NATIONAL ESTATE REFERRED TO IN SECTION 3(2) OF THE NATIONAL HERITAGE RESOURCES ACT

The HIA is provided in Appendix 8.

Heritage sites that have significant importance were identified by the specialist investigation. Buffers have been applied to avoid heritage features of high significance. A chance find procedure is included as a mitigation measure in the EMPr. SAHRA has been consulted through the Scoping and EIA Process Process and their requirements have been addressed.

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

In terms of the notice published on 05 July 2019 by the DFFE, the submission of a report generated from the national web-based environmental screening tool is compulsory when submitting an application for environmental authorisation in terms of regulation 19 and regulation 21 of the 2014 EIA Regulations (as amended). The National Screening Tool Reports generated for the proposed extension areas (Farms Vaalbank and Roodebloem) were submitted with the EA Application. The screening tool report outlines the specialist studies that need to be considered as part of the project. In this regard, the EIA Report will include the specialist studies identified in the screening tool report along with an explanation regarding the applicability of these specialist studies in relation to the project. The specialist studies that will be undertaken during the EIA phase are described in Section 9.

All reasonable and feasible alternatives in terms of site layout, location, public participation, potential impacts and mitigation have been addressed throughout the EIA Report.

PART B
ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

22 DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

22.1 DETAILS OF THE EAP

TABLE 22-1: EAP DETAILS

COMPANY DETAILS		
Company Name:	ABS Africa (Pty) Ltd.	
Physical Address:	Block C Suite 2, Carlswald Close Office Park, c/o New & 7th Roads, Carlswald, 1685	
Telephone Number:	+27 11 805 0061	
NAME	**ROLE**	**EMAIL**
Kristy Robertson	Environmental Assessment Practitioner (EAP)	kristy@abs-africa.com
Paul Furniss	Report Reviewer	paul@abs-africa.com

22.2 DESCRIPTION OF THE ASPECTS OF THE ACTIVITY

The following aspects have been identified for the proposed Kranspan Mining Right Extension, and are described in detail in Table 6-24 of PART A of the EIA Report:

1. Climate
2. Topography
3. Geology
4. Soils and Agricultural Land Capability
5. Hydropedology
6. Terrestrial Ecology - Flora
7. Terrestrial Ecology - Fauna
8. Surface Water
9. Groundwater
10. Air Quality
11. Noise
12. Heritage Resources
13. Palaeontology Resources
14. Visual Aesthetics
15. Socio-economic

22.3 COMPOSITE MAP

The broad placement of the surface infrastructure was informed by an environmental sensitivity plan which, based on the findings of the specialist studies, considered the location of all known sensitive physical, social and environmental features within the Kranspan Mining Right Extension Area.

The placement of the two site infrastructure options in relation to the identified sensitive areas is shown in Appendix 3 Map 5.

The Final Site Layout Map showing the proposed location of the mine structures and infrastructure is shown in Appendix 3 Map 3 and Appendix 4.

22.4 DESCRIPTION OF IMPACT MANAGEMENT OBJECTIVES INCLUDING MANAGEMENT STATEMENTS

22.4.1 DETERMINATION OF CLOSURE OBJECTIVES

Rehabilitation and closure of areas disturbed in mining and related operations will be considered to be complete when:

- All structures, equipment and infrastructure not consistent with the post closure land use have been decommissioned, demolished and removed from site;
- Ownership of all remaining infrastructure and services required to support the proposed post closure land use have been formally returned/transferred to the affected landowner;
- The area has been made safe for all post closure land users and livestock;
- All surface disturbances and remaining landforms are structurally and ecologically stable and have sustainable soil and vegetation covers where applicable; and
- Surface water management structures are in place and are free of damage due to erosion.

22.4.2 THE PROCESS FOR MANAGING ANY ENVIRONMENTAL DAMAGE, POLLUTION, PUMPING AND TREATMENT OF EXTRANEOUS WATER OR ECOLOGICAL DEGRADATION AS A RESULT OF A LISTED ACTIVITY

All management actions and controls identified through the impact assessment, including the specialist studies undertaken, have been included in Table 6-33, Table 9-1 and Table 11-1.

The actions and controls are aimed in the first instance at preventing or avoiding damage, pollution, or degradation of the environment. A comprehensive surface and groundwater monitoring programme will be implemented. The results of the monitoring will be used to assess the risks and impacts of the mining activities throughout the LoM. The actions and controls will be updated based on the monitoring results.

22.4.3 POTENTIAL RISK OF ACID MINE DRAINAGE

Acid mine drainage occurs when sulphide minerals (typically pyrite) are exposed to oxygen and water. Pyrite is often associated with coal deposits. A chemical reaction follows resulting in the formation of dissolved metal ions (typically iron) and sulphuric acid. The latter results in a reduction in pH which then causes the leaching of metals at concentrations which are harmful to the environment. Microorganisms which thrive in acidic environments also contribute to acid mine drainage by accelerating the metal leaching process.

The geochemical assessment and waste classification study (Appendix 8) assessed the acid generating and other environmental risks associated with 10 drill core samples taken from the Roodebloem part of the extension area. The study results indicate that the acid generating risk associated with the material tested can be considered low, with only one of the 10 samples considered a risk. The drill core log indicated that this layer was only 57 cm thick, so the total volume of this higher risk material is likely to be insignificant. It must also be recognised that the standard static waste tests are indicative of a worst case scenario as a -75 µm fraction is used. This significantly increases both the reactive surface area and extent of mineral liberation. In reality, particularly for waste rock material, the particle size will be substantially larger, so both the rate and extent of acid generation and mobilisation of metals will be reduced. These results were similar to the geochemical characterisation testwork undertaken on the samples from the Kranspan Farm. Given the similar geology and coal seam characteristics of the region, it is expected that drill core samples from the Vaalbank part of the extension area will indicate that this material will also present a low acid generating risk.

22.4.4 STEPS TAKEN TO INVESTIGATE, ASSESS, AND EVALUATE THE IMPACT OF ACID MINE DRAINAGE

The first step in controlling acid mine drainage is the geochemical characterisation of the mine materials (overburden stockpiles / waste rock material). Geochemical characterisation aims to identify the distribution and variability of key geochemical parameters (such as sulphur content, acid neutralising capacity and elemental composition) and acid generating and metal leaching characteristics.

Waste rock/overburden material from the Kranspan Farm was previously tested. The previous geochemical characterisation also included coal discard material.

The following testwork has been undertaken for waste rock material from the proposed Kranspan Mining Right Extension area:

- Whole rock and elemental analysis;
- Mineralogical analysis;
- Acid base accounting (ABA);
- Net acid generation (NAG); and
- Short term leaching tests.

The static tests provide an often unrealistic, worst case scenario as a result of the sample preparation. Milling the material to -75 µm creates a reactive surface area and degree of mineral liberation that is very significantly greater than is likely on an actual waste rock dump. As such, while the tests may be indicative of acid generating and metal leaching potential, the magnitude is often overestimated.

A total of 10 samples were selected from the three cores drilled into the proposed opencast expansion on the Roodebloem part of the extension area. These are representative of waste rock material. The samples were analysed at a SANAS accredited laboratory.

The results of the geochemical characterisation static leach testwork were then considered in the geohydrological study. The latter also considered the findings of the surface water ecosystems study, particularly with respect to the description of sensitive surface water resources like pans and wetlands which could be impacted on by acid mine drainage.

The potential for acid mine drainage from ROM pads, product stockpiles, overburden handling and decant from rehabilitated pits was then modelled in the geohydrological study. The model considered the potential impacts during the operational phase and the post-closure phase.

Mitigation measures for preventing and managing acid mine drainage have been proposed based on the results of these studies.

22.4.5 ENGINEERING OR MINE DESIGN SOLUTIONS TO BE IMPLEMENTED TO AVOID OR REMEDY ACID MINE DRAINAGE

Avoidance of acid mine drainage is more cost-effective than the treatment thereof. Control measures for avoiding or preventing acid mine drainage include the following:

- Land reclamation, which includes management of overburden stockpiles and rehabilitation of mined areas in a manner which facilitates the quick movement of surface water flow off mined areas;
- Alkaline amendment to active disturbances. This includes managing stockpiles by blending acid-generating material with material with a high acid neutralising potential as well as the use of limestone to increase alkalinity;
- Alkaline recharge trenches comprising of or surface trenches filled with alkaline material to add alkalinity to water prior to infiltration. The increased alkalinity buffers the formation of acid;

- Oxygen barriers: These involve the installation of technologies like impervious membranes, dry seals, hydraulic mine seals, grout curtains/walls to restrict the extent to which material which may acid-generating comes in contact with oxygen or water;
- Water covers, involving the placement of material which may be acid-generating beneath a pond or lake, either natural or artificial;
- Alkaline amendment to abandoned mines. Measures include the removal of surface stockpiles known to be a source of acid mine drainage and backfilling of underground voids with impermeable material;
- Remining and reclamation: This involves returning to a previously mined area to decrease the recharge, cover acid-producing materials and/or remove the remaining coal, which is the source of most of the pyrite; and
- To the extent applicable to the proposed mining activities at the Kranspan MRA extension area, these controls have been considered and applied to the proposed mining activities.

Avoidance measures implemented for the potential acid mine drainage impact associated with the proposed mining activities include:

- Revision of the mine plan to avoid the extent to which environmentally sensitive areas are directly impacted upon;
- Implementation of strip mining and concurrent rehabilitation measures to minimise the surface area extent potentially exposed to oxidation;
- After mining, reinstatement of the overburden material in the same stratigraphic sequence in which it was removed. This prevents mixing of the different soils and limits the extent to which carbonaceous material may be exposed to oxidative conditions;
- Design of clean and dirty water storm water systems to minimise the flow of surface water into areas where acid may be generated, including the pits and overburden stockpile areas. In addition, the stormwater management plan must provide for HDPE-lined PCDs for containing dirty water runoff, seepage into mine workings and decant from rehabilitated pits;
- Prevention of dirty surface water runoff and decant into sensitive environmental features like wetland and pans;
- In-pit disposal of discard:
    - Must be limited to Pit 5 at Farm Kranspan;
    - The discard material must not be backfilled beyond the level of the pre-mining coal seam depth;
    - Should additional discard disposal capacity be required and the material be backfilled to above the pre-mining coal seam depth, that geochemical and groundwater modelling is undertaken to estimate this impact prior to the implementation of this management option. The outcome of these simulations must guide the extent to which discard can be placed above the coal seam depth;
    - The full extent of the discard material must be placed below the regional rest (pre-mining) groundwater table; and
- Additional mitigation measures must be implemented to further reduce the risk of in-pit disposal of discard to groundwater resources.
- The EMPr must be updated to include the detailed engineering design and related management measures for any surface discard facility, should it be required.

During mining, focus must be placed on creating conditions that are not conducive to acid mine drainage. In this regard, the following specific management measures are recommended:

- Undertake a geochemical assessment to confirm the risk of acidification during mining and post closure. This study should be undertaken during the planning phase of mining, but not later than the end of the construction phase.
- Avoid leaving sulphide-rich material exposed in the pits for an extended period of time. The pits should be backfilled and rehabilitated as soon as possible as part of the planned concurrent rehabilitation programme.
- Avoid stockpiling material containing metal sulphides for any extended period on surface.
- Remove and/or ameliorate contaminated soils.
- Create free-draining surfaces during rehabilitation.
- Ensure that dirty areas are bunded until final rehabilitation is completed.
- If sulphide-rich material is to be left in-situ post closure, these mine residue stockpiles must be capped to reduce ingress of rainwater. The designs must be completed during the planning phase. Any changes to the work presented in this report should be updated and re-evaluated at the hand of the mine residue designs, including the discard facility. A detailed discard management assessment was completed during 2019 for the operations (iLEH, 2019). The management measures in these reports are applicable to the Kranspan Extension project. Operational and long-term impact assessments should also be updated, as required.
- Divert dirty runoff to dedicated PCDs until final rehabilitation is completed and clean runoff is confirmed from rehabilitated areas. PCDs that will not be required for post-closure decant management should be removed and rehabilitated once runoff is clean.
- Implement the groundwater, surface water and mine water quality monitoring programme, as determined by specialist studies during the EIA process.

22.4.6 MEASURES THAT WILL BE PUT IN PLACE TO REMEDY ANY RESIDUAL OR CUMULATIVE IMPACT THAT MAY RESULT FROM ACID MINE DRAINAGE

Groundwater monitoring will continue throughout the LoM to detect changes in water quality and this will be used to inform the need for any additional control measures, including post-closure water treatment.

Decant will be contained in an HDPE-lined, engineered facility, appropriately designed for the volume water required to be managed.

Poor quality water will not be released into the environment.

Various technologies can be employed for treating acid mine drainage should this be necessary. The choice of the technology is dependent on several factors including the volume of water, level of acidity, water oxidation status and concentrations of metals. Without knowing these variables, it is not possible to accurately design and cost a water treatment system.

In general, water treatment can be undertaken:

- Actively, typically through the establishment of a water treatment plant and the use of chemicals; and
- Passively, by, for example, the construction of wetlands which make use of natural chemical and biological processes to improve the quality of water. Passive water treatment systems are suitable for conditions of low to moderate flow and acidity.

Active water treatment is an expensive management option which, if necessary, will have to be implemented for the long-term. The focus must therefore be on preventing and limiting the extent to which acid mine drainage may occur in the first instance.

Should the monitoring programme indicate that water treatment of acid mine drainage is likely to be necessary, a treatment plan will be developed based on the quality and flow of water requiring treatment. The preference will be on using passive water treatment technologies.

The treatment plan will include the cost for the treatment of water for as long as this may be needed. This cost will be included in the update to the mine's financial provisioning for rehabilitation and closure, as required by legislation.

22.4.7 VOLUMES AND RATES OF WATER USE REQUIRED FOR THE MINING, TRENCHING OR BULK SAMPLING OPERATION

The water requirements for the proposed mine development and operations are described in Section 3.2 of the EIA Report.

22.4.8 HAS A WATER USE LICENCE BEEN APPLIED FOR?

Ilima has submitted an Integrated Water Use Licence Application (IWULA) for all water uses pertaining to the proposed mining activities at the Roodebloem part of the extension area. This is discussed in Part A, Section 4.1 of the EIA Report. Further information on the various water uses is provided in the Draft Integrated Waste and Water Management Plan (IWWMP), submitted in support of the IWULA.

An IWUL is already in place for the water uses associated with the mining activities on the Kranspan Farm.

22.4.9 IMPACTS TO BE MITIGATED IN THEIR RESPECTIVE PHASES

The mitigation measures to be implemented are summarised in the required DMRE format in Table 22-2.

TABLE 22-2: IMPACTS TO BE MANAGED IN THEIR RESPECTIVE PHASES

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
ADMINISTRATIVE CONTROLS					
➲ Employment ➲ Human resource management ➲ Interaction with local community ➲ Ongoing environmental monitoring (dust fallout, surface water, groundwater)	All phases	4 974.96 Ha	➲ The EMPr shall be incorporated into any Environmental Management System (EMS) applicable to the site; ➲ All resources required to ensure compliance with the EMPr, including budgetary, personnel and equipment shall be in place for the duration of the LoM; ➲ A signed commitment to ensure compliance with the EMPr shall be obtained from Contractors appointed to undertake any of the activities on behalf of the holder of the EA; ➲ An appropriately qualified, trained and experienced person shall be designated to fulfil the compliance monitoring requirements in the EMPr; ➲ The following records shall be maintained on site: ➢ Environmental Authorisation; ➢ Approved EMPr; ➢ Emergency preparedness and response plan; ➢ Documentation concerning compliance monitoring, environmental performance and EMPr implementation; ➢ Record of all individuals receiving job-specific and SHE training;	Implementation of the mitigation measures will ensure compliance with NEMA, NEMAQA, NEMWA, MPRDA and the regulations, norms and standards promulgated in terms of these Acts	Mitigation measures are required to be implemented from the commencement of site preparation activities throughout the LoM Compliance monitoring must, as a minimum, include weekly inspections, quarterly internal audits and annual external audits.

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			➢ Compliance monitoring and auditing data/reports and results of inspections conducted; ➢ Approved SHE method statements; ➢ Waste management records; ➢ Equipment maintenance records; ➢ Maintenance and inspection of all safety equipment e.g. fire extinguishers; ➢ A completed and signed environmental incident/non-conformance report in respect of each reported environmental incident or nonconformity; ➢ A completed and signed environmental incident/non-conformance register; ➢ A completed and up-to-date external complaints and grievances form and register in respect of each external complaint received; ➢ Emergency contact register; ➢ A hazardous substance register.		
CLIMATE					
Equipment and vehicles used during mining activities	Operation	-	➲ Climate change management includes both mitigation and adaptation. The main aim of mitigation is to stabilise or reduce GHG concentrations as a result of anthropogenic activities. This is achievable by lessening sources (emissions) and/or enhancing sinks through human intervention.	Compliance with NEMA and NEM:AQA	Daily inspection throughout the LoM

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			➲ One way to keep GHG emissions to a minimum would be to ensure there is minimal fuel use, this can be achieved by ensuring the vehicles and equipment is maintained through an effective inspection and maintenance program. A measure of reducing the project's impact is to limit the removal of vegetation and to ensure that as much as possible revegetation occurs and possibly even the addition of vegetation surrounding the project area.		
GEOLOGY					
Clearing of Areas for Site Access, Infrastructure Siting and Opencast Mining	Construction and Operational	1637 Ha	➲ Local geology and exploration results were considered in the siting of surface infrastructure; ➲ Limit all project activities to the development footprint to minimise the extent of the possible impacts. All areas outside of the project footprint must be regarded as No-go areas; and ➲ Pit wall stability will be reviewed through an on-going monitoring programme and as part of the mine closure planning process.	MPRDA	Daily inspection throughout the LoM
TOPOGRAPHY					
Site clearing, levelling and cut and fill construction activities, blasting activities and mining of opencast pits Rehabilitation activities	All Phases	2168 Ha	➲ Limit all project activities to the development footprint to minimise the extent of the possible impacts. All areas outside of the project footprint must be regarded as no-go areas. ➲ Stormwater management measures must be implemented as per the IWWMP to avoid flooding due to changes in the local topography and drainage systems within the Project area.	Compliance with IWWMP; MPRDA; NEMA; NEMBA; GN704 and CARA will ensure: ➲ Effective stormwater management	Daily inspection throughout the LoM

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			➲ Concurrent rehabilitation soon after mining of an area as well as dust suppression can reduce the negative visual impact of the project; and ➲ Concurrent rehabilitation with indigenous species and vegetative screening measures must be adopted.	➲ Effective clean and dirty water separation ➲ Effective closure and rehabilitation strategy	
SOILS AND AGRICULTURAL LAND CAPABILITY					
Ancillary infrastructure (Offices and Workshops), Stockpiling and Opencast mining	All Phases	2168 Ha	➲ Ensure proper storm water management designs are in place; ➲ If any erosion occurs, corrective actions (contour berms) must be taken to minimize any further erosion from taking place. Topsoil must be sourced and replaced and shaped to reduce the recurrence of erosion; ➲ Only the designated access routes are to be used to reduce any unnecessary compaction. Compacted areas are to be ripped to loosen the soil structure. ➲ The topsoil must be stripped by means of an excavator bucket, and loaded onto dump trucks. Topsoil is to be stripped when the soil is dry, as to reduce compaction. The handling of the stripped topsoil will be minimized to ensure the soil's structure does not deteriorate significantly. Compaction of the removed topsoil must be avoided by prohibiting traffic on stockpiles; ➲ The subsoil approximately 0.3 – 0.8 m thick will then be stripped and stockpiled separately; ➲ Stockpiles must be kept to a maximum height of 12 m if space allows. Soil can be stockpiled to a	Compliance with the IWWMP; MPRDA; NEMA; NEMBA; GN704 and CARA will ensure the following management outcomes: ➲ Soil resources protected from contamination. ➲ Successful rehabilitation of disturbed areas. ➲ Accidental leaks and spillages responded to rapidly and all contamination remediated in accordance with legal requirements.	➲ Mitigation measures to be implemented from the onset of construction activities throughout the LoM ➲ Daily and weekly inspections ➲ Monitoring: Bi-annual monitoring during construction; Annual monitoring during operation; Monthly monitoring during decommissioning; Compaction and erosion must be monitored within the first month of rehabilitation. Thereafter, similar monitoring must be

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			height of 20m where it is absolutely necessary, keeping the 20m footprint as small as possible. ➲ The stockpiles will be vegetated (details contained in rehabilitation plan) in order to reduce the risk of erosion, prevent weed growth and to reinstitute the ecological processes within the soil; ➲ Prevent any spills from occurring. Machines must be parked within hard park areas and must be checked daily for fluid leaks. If a spill occurs, it is to be cleaned up immediately and reported to the appropriate authorities. All vehicles are to be serviced in a correctly bunded area or at an off-site location. Leaking vehicles will have drip trays place under them where the leak is occurring; ➲ A soil fertility and post-mining land capability assessment must be done to address any compaction or fertility issues that may arise from the stockpiling (Post-rehabilitation); ➲ Implement land rehabilitation measures as defined in rehabilitation report; ➲ After the completion of the project the area is to be cleared of all infrastructure. The foundations to be removed. Compacted areas are to be ripped to loosen the soil structure and vegetation cover re-instated; ➲ Topsoil to be replaced for rehabilitation purposes;	Storage and handling of hazardous substances guidelines in the Hazardous Substances Act (Act No. 15 of 1973) as amended.	applied every six months until closure is obtained. ➲ Sampling: Soil samples taken before the operational phase must be used as soil baseline data for the rehabilitation stage. Soil samples must be undertaken within the first month of rehabilitation. Annual soil sampling must be carried out within the same season as the previous sampling in all the arable post closure land uses until closure is obtained.

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			➲ The rehabilitated area must be assessed once a year for compaction, fertility, and erosion; and ➲ Annual soil sampling post rehabilitation is applicable to arable post closure land uses, and not applicable to grazing land. Soil sampling at this stage must be informed by the level of vegetation cover established during the rehabilitation phase.		
HYDROPEDOLOGY					
Compaction and surface sealing activities Opencast mining activities	Construction and Operation	334 Ha	➲ Attenuation ponds and subsurface drains must form an integral part of stormwater plans to reduce overland flow. ➲ Development footprint must adhere to the buffer zones around all wetlands. This will enable water to infiltrate and feed laterally into the wetlands. Application of good quality water which accumulates in pits on areas downslope of pit to maintain saturation at the soil/bedrock interface of Interflow (soil/bedrock) soils.	NEMA and NWA	➲ Mitigation measures to be implemented from the onset of construction activities throughout the LoM ➲ Daily and weekly inspections ➲ Quarterly internal compliance audits ➲ Annual external compliance audits
TERRESTRIAL ECOLOGY - FLORA					
Clearance of vegetation from construction activities Opencast mining activities Influx of labourers and contractors	Construction, Operation and Closure	2168 Ha	➲ The only viable option within the Mitigation Hierarchy for the impact on CBAs in the project area is Avoidance. While the loss of 125.7ha of areas classified as CBA: Optimal could potentially be mitigated by offsets, this would require the conduction of a focused, larger scale study. The loss of 713.1 ha of areas classified as CBA: Irreplaceable cannot be mitigated through the offset mitigation	Compliance with the MPRDA, NEMA, NEMWA, NFA and NEMBA will ensure the following management outcomes: ➲ CBAs be kept in a natural or near-	Mitigation measures to be implemented from the onset of construction activities throughout the LoM.

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			option and can only be mitigated through Avoidance. ➲ Design opencast areas and other infrastructure footprints to exclude areas of Natural Habitat with High EI situated within areas identified as CBA: Irreplaceable in the MBSP. Particular emphasis should be placed on ensuring that the opencast pit situated in the north western part of the Farm Roodebloem around the recommended 26ha buffer zone for Sensitive Species 1200 does not isolate the buffer zone form contiguous areas of CBA: Irreplaceable situated to the north of the project area. All project infrastructure should be placed within Modified Habitats with Low or Very Low EI. ➲ Design opencast areas and other infrastructure footprints to exclude areas of Natural Habitat with High EI situated within areas identified as CBA: Optimal in the MBSP. Where any infrastructure remains located within areas of CBA: Optimal, this impact should be mitigated by the formal protection of offset areas identified within the project area and/or its immediate surrounds by an appropriate specialist assessment. ➲ Vegetation clearance should be entirely restricted to areas within the infrastructure footprints that have received Environmental Authorisation. The mine should institute an internal permitting procedure (issuing of a 'permit to clear') administered by the mines	natural state, with no further loss of habitat or species.	

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Environmental Division to control and manage vegetation clearance. Where it is possible to relocate Protected plant species occurring within areas permitted by the Environmental Division for clearing, permits for the relocation of protected plant species should be applied for from the relevant provincial authority and included in the 'permit to clear' procedure. ➲ All parts of the Project Area that are not lost as a result of the construction of Authorised mining infrastructure should be managed for optimal biodiversity in accordance with a site-specific Biodiversity Management Plan (BMP). ➲ A 'veld management plan' should be developed and implemented for all parts of the project area that are not situated within infrastructure footprints as part of the BMP. ➲ In order to limit the severity and frequency of impacts on Natural Habitat resulting from elevated dust emissions, a detailed dust suppression plan should be developed for the mine and the strict implementation of this plan should be regularly audited. ➲ In order to protect the subpopulation of Sensitive species 1200 recorded within the project area, a minimum buffer zone of 26ha was recommended by the specialist and this buffer was accommodated in the final revision of the mine plan provided by the project proponent. The adequacy of the minimal 200m buffer should be verified in the field		

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			prior to construction by a wetland specialist with input from a geo-hydrologist if necessary and this recommendation should be included in the EMP for the project. It must be emphasised that the recommended ca. 26ha preliminary buffer is a 'minimal buffer' within which no mining infrastructure should be located and no mining related activities should occur. Furthermore, it is crucial that the 26ha buffer should not be isolated by mining activities and that ecological connectivity should be maintained by establishing an effective ecological corridor, to the west of the railway line that links the 26ha buffer to the currently contiguous area of CBA: Irreplaceable situated directly to the north of the buffer area and extending to the north of the project area. Detailed management recommendation for the 26ha buffer should be included in the recommended BMP for the project area; preliminary management recommendations include: o The stand of the alien invasive tree *Acacia dealbata** situated within the 26ha buffer should be eradicated prior to construction of the opencast pit and all other occurring alien invasive plants should		

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			be controlled on an ongoing basis. ○ A stringent dust control programme should be implemented for the opencast area directly adjacent to the buffer. ○ All blast rock that lands in the buffer area should be removed immediately following each blasting event using hand labour. ○ The entire buffer area should be subject to light grazing and burning at appropriate intervals. ○ Access to the buffer should be strictly controlled and all vehicles entering the area must be authorised and supervised by the mines Environmental Department. ○ The Sensitive species 1200 subpopulation		

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			and its habitat should be monitored annually by a botanist using simple methods such as plant counts, fixed point photography and, when necessary, monitoring of vegetation cover and species composition within a limited number of sampling quadrats. ➲ In order to protect the two subpopulations of *K. carolinensis* recorded within the project area, a minimum buffer of 200m around the maximum extent of each colony should be implemented. It must be emphasized that the recommended buffers are 'minimal buffers' within which no mining infrastructure should be located and no mining related activities should occur. Furthermore, it is crucial that the colonies and their buffers should not be isolated by mining activities and that ecological connectivity should be maintained between the various colonies or recorded localities as is the case for the current mine plan. It is recommended that research institutions (e.g. SANBI's Walter Sisulu National Botanical Garden) should be afforded and opportunity to rescue some of the *Khadia carolinensis* plants comprising the colony at		

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Site 58a, which is situated within the footprint of an opencast area, for research purposes prior to construction. The recorded *Khadia carolinensis* subpopulations and their habitat should be monitored annually by a botanist using simple methods such as plant counts, fixed point photography and, when necessary, monitoring of vegetation cover and species composition within a limited number of sampling quadrats. Detailed management recommendation management of the recorded *Khadia carolinensis* should be included in the recommended BMP for the project area. ➲ Any authorised development within any of the four Natural Habitat recorded within the project area should be should be preceded by a thorough search for threatened plant species within the footprint of the development, and in immediately adjacent areas, prior to construction Such searches ('walk-over' surveys) should be conducted by a botanist at the appropriate time of year which coincides with the flowering times of potentially occurring SCC. In the event that any SCC are confirmed, appropriate in situ and / or ex situ conservation measures should be developed in consultation with the relevant conservation authorities. This recommendation should be incorporated into the EMP for the mine. ➲ In order to confirm the presence or absence of additional SCC within the project area, and		

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			provide a more comprehensive species list that forms a sound basis for site-specific biodiversity management, an additional botanical survey which incorporates seasonal coverage should be conducted for the project area as part of the development of the recommended Biodiversity Management Plan for the mine. This survey should place emphasis on searching potentially suitable habitat for the two SCC that are considered to have a moderate to high likelihood of occurring within the project area, namely *Aspidoglossum xanthosphaerum* (VU) and *Lessertia phillipsiana* (DDD). ➲ The mine should develop and implement a site-specific integrated Alien Plant Control Programme (as per the AIS Regulations), which identifies the species that pose the greatest threat, in terms of habitat transformation, to Natural Habitat within the project area, and considers all appropriate chemical, mechanical, biological and cultural control methods for the alien species listed in Appendix 1 of the specialist report. Emphasis should be placed on controlling the 17 declared alien invasive species listed in Appendix 1 of the specialist report and in particular the five alien invasive habitat transformers identified as posing the greatest threat to the Natural Habitats and indigenous vegetation of the project area and its immediate surrounds, namely *Acacia dealbata**, *Acacia mearnsii**, *Campuloclinium*		

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			*macrocephalum**, *Pyracantha angustifolia** and *Richardia brasiliensis**. ➲ A team of appropriately equipped and trained should be appointed to conduct continuous alien plant control at the 'priority control sites' identified in the Alien Plant Control Programme. This team should work under the auspices of the mines Environmental Division, which should be tasked with supervising and thoroughly documenting all alien plant control activities. ➲ Where planting of trees and shrubs around mine offices, workshops and processing facilities is deemed necessary, only trees and shrubs indigenous to the study area and its immediate surrounds should be planted, and these should be grown from locally obtained seeds or other propagules. No trees, alien or indigenous, should be planted anywhere within the Natural Habitats of the project area. The alien invasive grass *Pennisetum clandestinum** (Kikuyu) should not be used for the establishment of lawns at mine premises. ➲ Access by mine personnel and trespasses to all parts of the project area comprising Natural Habitat should be strictly controlled. Access control should be achieved by the erection of a five-strand cattle fence that is permeable to wildlife around the perimeter of the project area, regular signage prohibiting access and regular patrols by mine security personnel. Security personnel tasked with patrolling areas		

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			of Natural Habitat should receive basic training in the following aspects: ○ Prevention of illegal plant harvesting and animal poaching. ○ Location of sensitive Natural Habitats and buffer areas for SCC that should form the focus of patrol efforts. ○ Basic environmental sensitivities of the areas they are tasked with patrolling (e.g. areas where vehicle access is prohibited). ○ Procedures for reporting any incidents of illegal access, plant harvesting, poaching and environmental incidents such as accidental fires and pollution spills. ➲ The damaging or destruction of plant species that are Protected in terms the Mpumalanga Nature Conservation Act (No.10 of 1998) during any future development should be avoided wherever possible, and a permit for the removal or destruction of any such		

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			protected plant must be obtained from the provincial authorities (Permitting Office of the MTPA) prior to development. It is recommended that where untransformed Natural Habitat is to be affected by an infrastructure footprints. Protected plant species should be rescued and placed in a nursery or donated to a research institute (e.g. SANBI botanical gardens) prior to development, rather than simply being destroyed. Where feasible, viable subpopulations of such species should also be translocated to transformed (including rehabilitation areas) or untransformed areas within the project area which provide potentially suitable habitats, but such translocations will have to be carried out in a manner that ensures that no ecological degradation of the host habitat occurs, and will have to be evaluated by a botanist for each species and each potential translocation area.		
TERRESTRIAL ECOLOGY - FAUNA					
Clearance of vegetation from construction activities Opencast mining activities Influx of labourers and contractors	Construction and Operation	2168 Ha	➲ The direct loss of habitat and subsequent loss and displacement of faunal species of conservation concern can only be significantly mitigated through the application of the Avoidance option of the Mitigation Hierarchy. ➲ Develop and implement a Biodiversity Management Plan with the objective of managing all remaining Natural Habitat through conservative grazing, fire	Compliance with the MPRDA, NEMA, NEMWA and NEMBA will ensure the following management outcomes: ➲ CBAs be kept in a natural or near-natural state, with	Mitigation measures to be implemented from the onset of construction activities throughout the LoM.

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			management and continual eradication of alien plant species. ➲ If any faunal species of conservation concern (as indicated in this report) are recorded during the construction/mining phase, the ECO should be informed, and should then issue instructions for its capture, translocation and safe release into suitable habitat within the project area with the relevant permits obtained from the relevant authority if necessary. ➲ All domestic waste generated (if present) during construction and mining operations should be removed from the project area as soon as possible and be disposed of at an authorised landfill to reduce the risk of colonisation by feral mammals, scavengers or competitively superior indigenous bird species (e.g. Pied Crows). ➲ Personnel and staff should be advised by means of environmental awareness training on the biodiversity importance of the area. The intentional killing of any faunal species (in particular invertebrates, reptiles and snakes) should be avoided by means of awareness programmes presented to the labour force. The labour force should be made aware of conservation issues pertaining to the taxa occurring on the project area. ➲ Ensure that construction and mining activities do not extend beyond the authorised	no further loss of habitat or species.	

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			infrastructure footprints onto adjacent natural habitat in order to provide displaced fauna the opportunity to disperse into suitable habitat (although potential dispersal by small animals is highly limited). ➲ It is recommended that prior to commencement of fencing and construction it is ensured that the no large mammal species, especially reedbuck are trapped within any area fenced with security fencing. ➲ All Natural Habitat which is not part of actively mined areas must be fenced with standard 5-strand cattle fencing and not diamond mesh security fencing that will prevent the movement of Reedbuck and other fauna. The relevant conservation scientists of the MTPA should also be approached in order to ascertain the conservation importance of the subpopulations of Mountain Reedbuck and Common Reedbuck that utilise the project area and determine whether further conservation measures are necessary. Such measures may include monitoring, collaboration with surrounding landowners to prevent poaching and ensuring the availability of large and contiguous areas of suitable habitat. ➲ The practice of excavating trenches around the project area as a form of access control should be prohibited as such trenches act as lethal 'pitfall traps' and barriers to dispersal of mammals, reptiles and amphibians and are		

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			regarded as an unnecessary and severe impact to such fauna occurring within the project area and its immediate surrounds. ➲ Contractors should be accommodated off-site (i.e. not within the project area), reducing the risk of poaching and persecution of fauna. ➲ Labour supervisors and SHE officials should monitor the activities of labourers when working away from infrastructure in Natural Habitat. ➲ Personnel and staff should be advised by means of environmental awareness training on the biodiversity importance of the area. The intentional killing of any faunal species (in particular invertebrates, reptiles and snakes) should be avoided by means of awareness programmes presented to the labour force. The labour force should be made aware of conservation issues pertaining to the taxa occurring on the project area. ➲ Regular monitoring of the project area, especially areas of natural habitat where active mining activities are absent, is advised to identify areas where illegal settlement may occur. If any illegal erecting of housing occurs, the mine's public liaising officer should immediately advice on a resolution, which may involve a re-location strategy.		
SURFACE WATER					
Destruction of wetland units during all	Construction and Operation	334 Ha	➲ Vegetation and extent of groundcover plays an important role in preserving wetland		

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
construction phase activities due to heavy machinery and indiscriminate habitat destruction. Wetland vegetation alteration following disturbances that will enhance exotic vegetation encroachment. Fragmentation of interconnected wetland units (watercourses) that would otherwise offer migratory corridors.			functionality. It binds soils to protect from erosion, reduces the scouring potential of runoff water through the reduction of velocity and energy dissipation and also provides the micro-habitat and refuge for supporting a greater array of wetland-dependent biodiversity. Indiscriminate destruction of vegetation layers from wetland areas that fall outside of the ultimate infrastructure footprint should be avoided. It is recommended that the buffer zones be fenced off within applicable areas to avoid indiscriminate habitat destruction and treated as "no-go" areas. This includes using these areas for soil stockpiling, equipment storage, fuelling areas, etc. ➲ Erosion and sedimentation must be managed as an ongoing concern throughout all the phases of the development activities. This includes protection of stockpiled soils, rock dumps and other stored materials. Stormwater management must ensure erosion protection at the outfall points into the receiving environment. There are multiple impoundments along most of the watercourses within the survey area that already act as sediment traps. Before an engineering solution to sediment management is sought, it is recommended that a monitoring plan be developed to determine the level of functionality that these impoundments already offer as the various	Compliance with the IWWMP, MPRDA, NEMA, NWA, NEMBA, GN704 and CARA will ensure the following management outcomes: ➲ Managed storm water flow. ➲ Uncontrolled release of dirty stormwater or effluent from onsite activities prevented. ➲ Wetland feature not impacted upon by mine activities.	Mitigation measures to be implemented from the onset of construction activities throughout the LoM. Day to day inspections, compliance monitoring and sampling as may be required.

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			phases of the proposed mining development progress. ➲ A management strategy should be in place for the encroachment of opportunistic alien vegetation.		
Excavation of deep opencast pits near to wetland habitat that will deviate lateral inter soil flow patterns into the pits that would otherwise sustain wetland units, leading to loss of water source for the wetland and subsequent loss of the unit.	Operation		➲ The water that seeps into the pit that requires decanting could be pumped to an attenuation feature that then releases the water back into the wetland unit. This would depend on the quality of the water, which may require a level of processing prior to it being released. The attenuation feature should be engineered to ensure that the outfall does not induce erosion of the watercourse. Depending on the elemental content of the water, the wetland itself could be utilised as a biological filter and management tool to ensure suitable water quality for the downstream wetlands, aquatic habitats, and other water users. Intact ecological integrity of the wetland units located downstream of decanting sites is vital to the successful implementation of a water management scheme such as this.		
All construction phase activities that result in soil destabilisation.	All		➲ Any soil that is removed for trenching purposes must be stored in their respective layers and returned to the excavation in reverse order. The soils must be stored outside of the wetland and buffer zones in order not to smother established wetland vegetation. ➲ Adequate site reinstatement must be implemented to abate the formation of		

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			erosion through modification of the surface water hydrology. Silt traps and fencing should be used in areas of steeper topography (if applicable). ➲ The movement of heavy machinery within wetland zones should be limited to only single access roadways. Upon completion of the construction phase, this roadway should be ripped and/or disk ploughed to loosen the compacted soils and to allow for the establishment of vegetation within the affected areas, which should be a mixture of veld grasses typical of the surrounding area within similar habitat units. ➲ Indiscriminate habitat destruction should be avoided and the construction footprint, including service and support areas should be kept to a minimum.		
Impacts to wetland units during the operations phase from runoff pollution, siltation, habitat smothering and vegetation alteration.	Operation		➲ Possible sources of contamination include hydrocarbons (from poorly designed and managed fuelling stations and/or workshop and maintenance areas) and runoff water from processing areas, and these should be kept separate from clean water runoff with a suitable stormwater management system, and general surface water runoff should be treated prior to release into the environment. ➲ Erosion management to prevent water quality degradation. ➲ Onsite sewerage treatment and/or management to avoid contamination of the		
All construction phase and operations phase activities associated with water contamination	All				

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			surface water ecosystems. Untreated sewerage contamination of the surface water ecosystems could occur due to poorly designed sewerage treatment systems, treatment systems where processing capacity is exceeded, poorly maintained infrastructure leading to water-borne effluent leaks prior to processing, sewerage spills during (for example) septic tank pumping, and informal ablutions near watercourses. Careful attention to sewerage treatment and sewerage systems will reduce the risk of contamination of the resource. ➲ During decanting, the pit water must be routinely tested at an accredited laboratory to develop an appropriate management strategy to treat the water to within target water quality standards prior to release. Routine monitoring and testing of the water will also determine whether treatment is, in fact, required prior to release.		
GROUNDWATER					
Storage of hazardous substances for construction activities Mine dewatering and opencast mining activities	Construction and Operation	2168 Ha	➲ Design and build all PCDs before any mining activities commence. ➲ Implement and maintain a groundwater monitoring programme in mine and private boreholes situated in the zones of influence identified for the mining areas. ➲ Implement sound house-keeping measures to prevent and clean spills, address leaks and undertake regular inspections. Ensure that the	Compliance with the MPRDA and NEMA principles, water management measures in compliance with NWA and IWUL; will ensure the following management outcomes:	➲ Groundwater levels must be monitored on a monthly basis in the dedicated monitoring boreholes. This information together with daily on-site rainfall measurements must be used to improve the

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			record-keeping procedure is in place and that instructions given are carried out. ➲ Measure rainfall daily on site. ➲ Negotiations must be entered into with the owners of private boreholes that will be destroyed during opencast mining. ➲ A dedicated groundwater monitoring programme must be implemented in all private boreholes within the delineated zone of influence. This monitoring programme must include groundwater level and quality measurements. Should monitoring information indicate adverse impacts, Ilima must enter into negotiations with the affected landowners to negotiate alternative water supply options of equivalent quantity and quality. ➲ Feedback must be provided to owners of boreholes within the affected zones regarding progress made with mining activities, rehabilitation and the outcome of monitoring programmes on a quarterly basis when groundwater monitoring will take place to ensure that they are informed of aspects of mining that may be of significance. ➲ The volume of water pumped from underground and the pits to surface during the operational phase must be recorded. This information must be used to update the impact assessment presented in this report, as necessary.	➲ Implement a management plan aimed at reducing and/or eliminating adverse impacts on existing private groundwater users, wetlands, the pans, rivers and streams ➲ Good stakeholder relations with community members. ➲ Groundwater resources protected from contamination. ➲ Accidental leaks and spillages responded to rapidly and all contamination remediated in accordance with legal requirements.	understanding of the rate of recharge as well as of aquifer parameters like storage coefficients and specific yield. ➲ The numerical model used in this assessment should be updated, verified and re-calibrated on a regular basis as monitoring information becomes available. ➲ The final model must be prepared at least five years prior to mine closure to ensure that predictions of long-term impacts are undertaken with the highest possible level of confidence.

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			➲ If water-bearing structures are intersected during mining that contribute significant volumes of seepage to the pits and underground workings, they must be characterised and quantified. The risk and timing of decant must be re-assessed taking this information into consideration. ➲ Should mining activities on the Farm Vaalbank extend to the C-Seam workings in the historical Union Colliery underground workings, provision must be made to dewater and contain additional underground water in the mine's dirty water management system. The impact assessment must be updated at least a year prior to mining into the old underground workings to ensure that sufficient planning can be made to address potential cumulative impacts. Specific focus must be placed on the perceived increased volume of extraneous water that will have to be contained as well as the increased risk of decant from the affected pits. ➲ Surface rehabilitation measures must be designed to minimise the risk of decant. In order to do so, concurrent rehabilitation of the opencast pits must be maintained throughout the life of mining. ➲ Maintain the groundwater monitoring programme in mine and private boreholes located. ➲ Ilima will enter into negotiations with existing groundwater users to identify suitable		

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			alternatives, should monitoring information indicate that private groundwater use is negatively affected by mining activities. ➲ Replace groundwater monitoring boreholes that may be destroyed during mining. ➲ Record all groundwater-related complaints and deal with each complaint within the agreed upon timeframe. ➲ Implement and maintain concurrent rehabilitation to reduce the duration of impacts and allow recovery of wetlands/springs. ➲ Complete regular inspections of PCDs, specifically noting incidences of overflow and leakage. If the latter is identified, measures must be taken to rectify non-compliances immediately. ➲ Maintain sound house-keeping measures to prevent spills and leaks. ➲ Dedicated monitoring boreholes must be maintained in the three lineaments that transect the mining area. If any of the current boreholes drilled into these structures are destroyed during mining, they must be replaced. ➲ Surface infrastructure, like the wash plant, must be positioned off the lineaments. Prior to the establishment of these areas, a geophysical survey must be completed to pin-point the faults.		

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			➲ Measures developed during the 2019 study to manage the impact of discard must be implemented and maintained at the Kranspan mining area (iLEH, 2019). ➲ Updated contaminant transport simulations must be undertaken once this information is available in order to improve the confidence levels in long-term predictions. These simulations must be completed at least five years prior to mine closure to ensure that effective measures are developed to manage long-term impacts.		
Decant from pits	Post-closure	1632 Ha	➲ If water-bearing structures, specifically the regional faults, are intersected during mining that contribute significant volumes of seepage to the pits and underground workings, they must be characterised and quantified. The risk and timing of decant must be re-assessed taking this information into consideration. ➲ Based on kinetic leach tests completed for the Kranspan Mine (refer to Appendix 8), leachate from the mining area is not expected to significantly acidify and decant is therefore expected to be of moderate quality. If monitoring of the decant indicates that the quality is not suitable for release to the environment, provision must be made to contain all decant to avoid negative impacts on surface water, soil and wetlands. ➲ Surface rehabilitation measures must be designed to minimise the risk of decant.	Compliance with the MPRDA and NEMA principles, water management measures in compliance with NWA and IWUL; will ensure the following management outcomes: ➲ Maintain groundwater monitoring programme. ➲ Groundwater resources protected from contamination.	➲ Decant quality must be monitored on a monthly basis until closure. ➲ The groundwater monitoring programme must be maintained for a period of at least two years after mine closure in both mine monitoring and private boreholes. This information must be used to confirm the impact of rehabilitation at mine closure. ➲ At the end of the two-year monitoring

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			Opencast mining areas and box cuts must be backfilled, shaped and made free draining to limit the rate of recharge of rainwater to the absolute minimum. ➲ A decant interception system must be implemented to collect decant water and divert this to a containment facility. Where feasible, it is recommended that horizontal drains are installed at the decant locations to capture, control and divert decant to the designated dirty water containment facility. It is recommended that a PCD or a number of PCDs are used for this purpose. A qualified professional must complete a water balance for the PCDs to confirm that these will be sufficient in size to contain all decant post closure. ➲ Visual inspections along pit perimeters must be undertaken on a monthly basis. If any additional decant is recorded, the decant interception system must be adjusted to ensure that all decant is captured and stored. ➲ Decant quality must be monitored on a monthly basis until closure. ➲ Measures must be taken during the operational phase of mining to contain all decant anticipated. In areas where significant decant may take place, PCDs must not be rehabilitated at closure but must be prepared, re-sized if necessary and used to contain decant post closure. Based on the available dataset, the		programme, the post-closure groundwater impact assessment must be re-evaluated and adjusted, as necessary, based on the results of the monitoring programme.

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			following pits are expected to result in significant decant if not managed well: o Pit 1 o Pit 5 o Pit 10 o Pit 11 o Pit 16 o Pit 19 o Pit 20 o Pit 22 o Pit 23 ➲ The risk of decant associated with other pits not listed above must be evaluated during the operational phase as additional monitoring information becomes available. Based on this information, appropriate post-closure decant management measures must be implemented during the rehabilitation phase. ➲ The PCDs must be sized to take decant volumes into consideration and cutoff trenches and berms must be put in place to divert decant to the PCDs. The planning and possible re-sizing of PCDs must be completed prior to mine closure. ➲ Should mining activities on the Farm Vaalbank extend to the C-Seam workings in the historical Union Colliery underground workings, provision must be made to handle additional underground water in the mine's dirty water management system. Based on field observations, the additional volume of water from the historical underground workings that have to be handled can be up to 160 000 m^3/a.		

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			This volume of water is likely to impact on operational mine water management as well as decant volumes post closure. This additional decant volume can be used in the wash plant to avoid need for rehandling and storage. It is reported in literature (Steyn, 2019) that several areas of subsidence are associated with Union Colliery. Care should be taken to identify areas of subsidence and incorporate these into the mine plan for pits that will extend to the C Seam in the old workings. The areas of subsidence should also be considered when planning to manage decant from the mining areas. Pits that overly the historical Union Colliery underground workings are included below and it is noted that some of these pits are already highlighted as potential areas of significant decant potential: o Pit 16 o Pit 19 o Pit 21 o Pit 22 o Pit 23 Post Closure Management Plan: ➲ All rehabilitation must be completed during the decommissioning phase. In terms of groundwater, the rehabilitation must focus on containing dirty water and leachate, preventing the ingress of clean runoff and rainfall to the mining area and avoid ponding over rehabilitated areas.		

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			➲ The groundwater monitoring programme must be maintained for a period of at least two years after mine closure in both mine monitoring and private boreholes. This information must be used to confirm the impact of rehabilitation at mine closure. ➲ At the end of the two-year monitoring programme, the post-closure groundwater impact assessment must be re-evaluated and adjusted, as necessary, based on the results of the monitoring programme. ➲ Once the monitoring data and the re-assessment of post-closure groundwater impacts are available, Ilima must discuss these with the authorities and determine the need of additional monitoring through consultation. ➲ All seepage from the current and planned new mining areas must be contained to avoid decant into the catchment. ➲ All seepage from the mining areas and potential decant must be contained in PCDs that meet the requirements of GN704.		
AIR QUALITY					
Construction activities such as topsoil removal, material loading and hauling, stockpiling, grading, bulldozing, as well as metal and concrete works for the	Construction	-	➲ Air quality impacts during construction would be reduced through basic control measures such as limiting the speed of haul trucks; limit unnecessary travelling of vehicles on untreated roads; and to apply water sprays on regularly travelled, unpaved sections.	Compliance with the NEM:AQA, Dust Control Regulations GNR 827 of 2013 and Ambient Air Quality Standards (24 of	Day to day inspections, compliance monitoring and monthly dust fallout sampling to be undertaken.

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
establishment of infrastructure			➲ The access road to the Project also needs to be kept clean to minimise carry-through of mud on to public roads.	December 2009) will ensure the following management outcomes: ➲ Good stakeholder relations with community members. ➲ Air emissions from the development managed in accordance with legal requirements. Compliance with monitoring standards	
Operation activities such materials handling, bulldozing, drilling, blasting, vehicle entrainment on unpaved surfaces, crushing and screening, windblown dust from overburden dumps and coal stockpiles	Operation		Vehicle activity on unpaved roads: ➲ Regular water sprays and road binders on unpaved roads to ensure at least 90% control efficiency. ➲ Regular water sprays on unpaved inpit roads to ensure at least 75% control efficiency. ➲ Monthly physical inspection of road surface, daily visual observation of entrained dust emissions from unpaved road surfaces. Drilling and Blasting: ➲ Controlled blasting techniques to be used to ensure minimal dust generation. ➲ Blasting only to be conducted on cloudless days, if possible. ➲ Addition of chemical surfactants to water sprays to lower water surface tension and increase binding properties. ➲ Drilling to be controlled through water sprays or vacuum packs Materials Handling: ➲ Increase in-pit material moisture content. ➲ Drop height from excavator into haul trucks to be kept at a minimum for coal and waste rock.		

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			➲ Tipping onto ROM storage piles to be controlled through water sprays, must significant amounts of dust be generated. ➲ Keep material handled by dozers and wheeled loaders moist to achieve a control efficiency of 50%, especially during dry periods. ➲ Regular clean-up at loading areas. Wind Erosion: ➲ Water sprays at ROM stockpile can achieve 50% control efficiency. Increase in moisture content provides higher threshold friction velocity and ensures that particulates are not as easily entrained due to high surface winds. ➲ Reshape all disturbed areas to their natural contours. ➲ Cover disturbed areas with previously collected topsoil and replant native species. ➲ Rock cladding with larger pieces of waste rock is recommended to reduce wind erosion emissions from the overburden storage piles. ➲ Revegetation of overburden stockpile is recommended. Crushing: ➲ Water sprays at the crushers to achieve at least 50% control efficiency.		
Decommissioning activities such as demolition and stripping	Decommissioning		➲ Air quality impacts during decommissioning would be reduced through basic control measures such as limiting the speed of haul		

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
away of structures and facilities, windblown dust from stockpiles and exposed areas, and degradation of roads resulting in exposed areas surfaces			trucks; limit unnecessary travelling of vehicles on untreated roads; and to apply water sprays on regularly travelled, unpaved sections. ➲ The access road to the Project also needs to be kept clean to minimise carry-through of mud on to public roads.		
NOISE					
➲ Construction activities ➲ Blasting, mining operations, haulage ➲ Decommissioning activities	All phases	-	➲ Equipment with lower sound power levels must be selected. Vendors must be required to guarantee optimised equipment design noise levels; ➲ Where possible, other non-routine noisy activities such as construction, decommissioning, start-up and maintenance, must be limited to day-time hours; ➲ All diesel-powered equipment and plant vehicles must be kept at a high level of maintenance. This must particularly include the regular inspection and, if necessary, replacement of intake and exhaust silencers. Any change in the noise emission characteristics of equipment must serve as trigger for withdrawing it for maintenance; ➲ In managing noise specifically related to truck and vehicle traffic, efforts must be directed at: ➲ Minimising individual vehicle engine, transmission, and body noise/vibration. This is achieved through the implementation of an equipment maintenance program.	Compliance with SANS Environmental Noise Standards will ensure the following management outcomes: ➲ Prevent noise impacts from development activities at sensitive noise receptors. ➲ Complaints which are received are properly investigated and responded to appropriately. ➲ Good stakeholder relations with community members and authorities.	➲ Bi-annual noise monitoring campaign ➲ Ad hoc monitoring in response to complaints ➲ Mitigation measures implemented from construction and throughout the LoM as applicable to the emission sources

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			➲ Maintain road surface regularly to avoid corrugations, potholes etc. ➲ Avoid unnecessary idling times. ➲ Minimising the need for trucks/equipment to reverse. This will reduce the frequency at which disturbing but necessary reverse warnings will occur. Alternatives to the traditional reverse 'beeper' alarm such as a 'self-adjusting' or 'smart' alarm could be considered. These alarms include a mechanism to detect the local noise level and automatically adjust the output of the alarm is so that it is 5 to 10 dB above the noise level near the moving equipment. Another alternative to the traditional reverse 'beeper' is the use of white-noise generators. This enables the listener to instantly locate where and what direction the sound is coming from. The broadband sound also gives workers wearing hearing protection devices (HPDs) and people with hearing difficulties a better chance of hearing the alarm. White-noise reverse alarms create a "ssh-ssh" sound which is gentle on the ear and dissipates quickly, meaning the alarm can only be heard in the danger zone; ➲ Limiting traffic to hours to between sunrise and sunset. This must include other non-routine noisy activities such as construction, decommissioning, start-up and maintenance; ➲ A noise complaints register must be kept; ➲ Good public relations are essential at all stages of the project. Surrounding receptors must be	Compliance with set working hours	

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			informed about the sound generated by proposed project operations. Community involvement needs to continue throughout the project. The mine must implement a line of communication (i.e. a help line where complaints could be lodged). All potential sensitive receptors must be made aware of these contact numbers. The mine must maintain a commitment to the local community and respond to concerns in an expedient fashion. ➲ As the site or activity is in close proximity to NSRs, equipment and methods to be employed must be reviewed to ensure the quietest available technology is used. Equipment with lower sound power levels must be selected in such instances and vendors/contractors must be required to guarantee optimised equipment design noise levels; ➲ Plant and equipment must be sited as far away from NSRs as possible. It is recommended that buffer zones be established and that noise generating activities be conducted no closer than 300 m from NSRs; ➲ Machines used intermittently must be shut down between work periods or throttled down to a minimum and not left running unnecessarily. This will reduce noise and conserve energy; ➲ Construction materials such as beams must be lowered and not dropped;		

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			➲ If noise control at the source and the use of distance between source and receiver is not possible, screening methods must be considered. The careful placement of barriers such as screens or berms can significantly reduce noise impacts but may result in additional visual impacts. Although vegetation such as shrubs or trees may improve the visual impact of construction sites, it will not significantly reduce noise impacts and must not be considered as a control measure; ➲ If efforts at controlling noise at the source and the installation of acoustic barriers fail, possible receptor based noise mitigation measures, such as double paned windows and insulated buildings must be considered. It must however first be confirmed through monitoring that the mining activities are the source of disturbance at the receptor locations before the onus falls on the mine to implement such measures at the receptor locations; ➲ Noise monitoring at sites where noise is or may become an issue is essential. It is recommended the bi-annual noise sampling be conducted at the closest sensitive receptors to the active areas at any given time; and ➲ In the event that noise related complaints are received short term (24-hour) ambient noise measurements must be conducted as part of investigating the complaints. The results of the measurements must be used to inform any follow up interventions. The investigation of		

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			complaints must include an investigation into equipment or machinery that likely result or resulted in noise levels annoying to the community. This could be achieved with source noise measurements.		
			HERITAGE RESOURCES		
Construction phase activities resulting in disturbance of surfaces and/or sub-surfaces	Construction	< 500 Ha	➲ The preferable course of action is avoidance of the features to prevent impacts to the recorded sites. If this is not possible Phase 2 mitigation will be required which will require an assessment by a conservation architect before a destruction permit can be applied for. ➲ The study area must be monitored by the ECO during construction to implementation the Chance Find Procedure for the project. ➲ Recorded heritage features must be indicated on development plans and construction crews must be made aware of expected resources and applicable mitigation measures. ➲ Confirmation of the presence of graves at these features. If confirmed to be graves the cairns must be avoided with a 100m buffer zone and access for family members. ➲ Burial sites and stone cairns (that could potentially be graves until proven otherwise) must be avoided with a 100 m buffer zone. Access for the family members must be ensured.	Compliance with NHRA and SAHRA will ensure that no heritage resources are damaged or destroyed during construction and mining activities. SAHRA Burial Grounds and Graves permitting policy 2020	➲ Mitigation measures implemented from construction and throughout the LoM as applicable to the emission sources
			PALAEONTOLOGY RESOURCES		
Construction activities and Opencast Mining	Construction and Operation	2168 Ha	Monitoring Programme for Palaeontology – to commence once the excavations / drilling / mining	Compliance with NHRA and SAHRA will	➲ Mitigation measures implemented from

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			activities begin. The following procedure is only required if fossils are seen on the surface and when drilling/excavations/mining commence: ➲ When excavations begin the rocks and discard must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (trace fossils, fossils of plants, insects, bone or coalified material) must be put aside in a suitably protected place. This way the project activities will not be interrupted. ➲ Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones. This information will be built into the EMP's training and awareness plan and procedures. ➲ Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment. ➲ If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, must visit the site to inspect the selected material and check the dumps where feasible. ➲ Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA	ensure that no palaeontological resources are damaged or destroyed during construction and mining activities.	construction and throughout the LoM as applicable to the emission sources

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits. ➲ If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils. ➲ If no fossils are found and the excavations and mining have finished then no further monitoring is required.		
VISUAL AESTHETICS					
Construction activities and opencast mining	Construction and Operation	2168 Ha	➲ Structures that are required to be built from steel or concrete can be painted in a natural tone fitting with the surrounding environment; ➲ To reduce the potential of glare external surfaces of buildings and structures must be articulated or textured to create interplay of light and shade; ➲ During construction, access roads will require an effective dust suppression management program, such as regular wetting and/or the use of non-polluting chemicals that will retain moisture in the road surface; ➲ Where practicable, concurrent rehabilitation with indigenous species and vegetative screening measures, as opposed to a horticultural approach to landscaping must be adopted. It is not advisable to plant more exotic	Compliance with NEMA and MPRDA Compliance with rehabilitation standards and objectives.	Implementation during the construction phase and inspection / maintenance throughout the LoM

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			trees, focus must rather be placed on greening of dumps and fast rehab of pits; and ➲ Shielding of night lights can greatly reduce the sky glow by ensuring that lights have proper shielding which ensures that light does not spill into the night sky. The direction of the main beam of all lights directed towards any potential observer must be at an angle smaller than 70°. Higher mounted lights allow lower main beam angles, which can assist in reducing glare.		
Rehabilitation	Post Closure (Rehabilitation)		Rehabilitation soon after mining of an area as well as dust suppression can reduce the negative visual impact of the project.		
SOCIO-ECONOMIC					
All activities involving employment and procurement of goods and services All opencast mining activities	All Phases	2168 Ha	➲ Measures proposed to enhance this positive impact include the development of an Employment Equity Plan by Ilima and to support the employment of labour from the local communities during the LoM. ➲ Local employment targets must include employment of youth and women from historically disadvantaged backgrounds. ➲ Prioritise employment and training of people living within the project area, especially for unskilled and semi-skilled positions. Ensure that employment opportunities and skills requirements are advertised locally. Communicate available employment opportunities and skills training and requirements with the local community to manage expectation.	Compliance with Mining Charter and MPRDA ensuring the following management outcomes: ➲ Community conflict avoided. ➲ Employment from community. ➲ Local procurement. ➲ Good stakeholder relations with community	Mitigation measures are required to be implemented from the commencement of site preparation activities throughout the LoM

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			➲ Ensure that the mine's Community Liaison Officer is informed of all project developments to facilitate on going and active engagement with stakeholders. ➲ Implementation of the HRD programme, as described in the SLP, which is expected to result in skills transfer, career progression, re-skilling and improved levels of literacy for employees and in the wider community. ➲ Implement and continuously update the SLP to ensure maximum benefits to the community. The SLP must align with the associated legislation and include intensive stakeholder consultations as prescribed in the law. ➲ Implementation of the agreed LED projects committed to in the SLP will have a significant positive impact for the broader community. ➲ Should the mine extension be approved, Ilima must seek surface access agreement with the affected landowners. Ilima must develop a policy and framework outlining the procedures to be followed for land acquisition and lease agreements prior to any change of land use activity. ➲ Ilima will provide for farming to continue (where identified and following rehabilitation of pits). Land will be rehabilitated and returned to farmers post mining. Rehabilitation of the mined areas must take place as soon as possible to restore the land, for example to agriculture use.	members and authorities. Compliance with the Occupational Health and Safety Act (Act No. 85 of 1993), Mine Health and Safety Act (Act No. 29 of 1996) (MHSA) and Hazardous Substances Act (Act No. 15 of 1973)	

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			➲ Ilima seeks to focus on the agricultural sector in terms of LED projects since the community of Carolina is largely dependent on this sector for its daily livelihood. Hence, the proposed LED Project for this SLP is an Expansion of Tibaya Farming Projects that were previously initiated and funded by the company in the other SLP. Ilima proposed to purchase additional farming land to sustain all the farming ventures that the company initiated and funded under Tibaya Farming Project (Pty) Ltd. Because of the additional farming land, it is logical for Ilima to expand these projects by adding more livestock, agricultural implements, and other farming facilities to ensure that they become more sustainable and create more jobs for the community of greater Carolina. ➲ Implement a written complaints and grievance procedure. ➲ An influx management plan must be developed in collaboration with the CALLM. The plan must identify responsibilities between the Applicant and the CALLM, for ensuring that access to municipal services such as public health, public safety, water, sanitation, power and affordable housing are available in the local area. ➲ Where possible, construction employees must be locally sourced as they will live with their families. ➲ Liaise with Local Government to ensure that expected population influx is considered in		

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			infrastructure development and spatial development planning. ➲ Ensure continuous consultation with local communities, farm landowners and government and promote partnerships to address illegal activities on-site and in the surrounds of the project area. ➲ Explore opportunities for collaboration with local police with regards to safety and security issues relating to project activities in general and any concerns about contractors. Implement security measures within the Kranspan MRA extension area. ➲ The Applicant must establish a community engagement forum comprising of representatives of, among others, the mine management, surrounding landowners / land users, community members, authorities, and local businesses. ➲ Implement a comprehensive mine health and safety management programme and adhere to legislation governing mine health and safety requirements. ➲ There must be an emergency preparedness and response plan in place. ➲ Petrochemicals, oils, solvents, paints and other identified hazardous substances shall only be stored under controlled conditions. All hazardous materials will be stored in a secured, appointed area that is fenced and has restricted		

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			entry. All applicable emergency contact details shall be confirmed and displayed at various locations across the site. ➲ Speed limits for mine vehicles and personnel must be established. ➲ A spontaneous combustion prevention plan must be compiled. ➲ Develop information, education and communication campaigns around diseases and health practices including sanitation and hygiene. ➲ Work closely with local health services in monitoring and addressing changes in levels of community health and wellbeing. ➲ Implement an HIV/AIDS awareness programme addressing factual health issues as well as behaviour change. ➲ There must be fencing of the mine area with access control in place preventing unauthorised access to the Kranspan mine. ➲ All hazardous materials will be stored in a secured, appointed area that is fenced and has restricted entry.		
Movement of Man and Materials	Construction and Operational	2168 Ha	➲ Regional road maintenance is the responsibility of the relevant road authority while Ilima are responsible for internal mine road maintenance. ➲ A monitoring system for ensuring safe use of trucks must be implemented.	Compliance with National Road Traffic Act will ensure the following management outcomes:	Mitigation measures to be implemented from the onset of construction activities throughout the LoM.

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				➲ Damage to road surfaces minimised. ➲ Good stakeholder relations with community members and authorities. ➲ Prevent road safety incidents and limit disruptions to traffic flow. ➲ Complaints which are received are properly investigated and responded to appropriately.	
Blasting	Operational	1632 Ha	➲ There is a need to mitigate vibration when mining comes closer than 200 m from the R36 and closer than 1000 m from privately owned homes. Only one hole per delay (instance in time) may be fired to limit ground vibration to the required levels. This is achieved through effective timing designs and using initiation systems that accurately reflect the timing design. ➲ A baseline study of houses within 1000 m of blasting will be needed before blasting commences to determine the current condition of the buildings as a reference. The blasting to	Compliance with Blast Design Specification, Mine Health and Safety Act, Explosives Act, Explosives Regulations (2003) and all relevant SANS standards and health and safety standards will ensure: ➲ Good stakeholder relations with	➲ Design of the blasting programme will be modified as appropriate based on the motoring results. ➲ Monitoring will be undertaken as part of the mining and blasting programme under the supervision

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			date from surrounding existing mines are unlikely to have caused damage, but houses naturally deteriorate with time, so there will be cracks and other damage that are not blasting related and need to be recorded. ➲ Routine air blast and ground vibration monitoring must be carried out near the closest private home to each blast. Occasional audits must be conducted on blasting practices and mitigation options reconsidered if monitoring shows that levels exceed applicable guidelines. ➲ Air blast control will be important to meet the limit of 125 dB and to avoid complaints regarding the mine activities. At 125 dB limit, air blast will be controlled within the blast and will have low significance at distances beyond 100 m. ➲ Air blast and related noise from blasting need to be controlled by providing adequate stemming in each blasthole as per an effective design. Stemming lengths must not be less than 20 hole-diameters, except in presplit holes. Strict control needs to be applied to prevent the occurrence of over-charged holes. ➲ Stemming length control also applies to fly rock control. ➲ Under-burdened faces are a major source of fly rock and air blast. Burden control on free faces must be applied and face profiling must be applied on faces that are oriented towards receptors that are closer than 1000 m from a	community members and authorities. ➲ Safe and secure site	of the environmental manager ➲ Routine air blast and ground vibration monitoring must be carried out near the closest private home to each blast. ➲ Occasional audits must be conducted on blasting practices.

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			blast. Effective burden control implies presplitting of all overburden and mid-burden blasts to create good quality vertical high walls. ➲ As a normal procedure, it will be necessary to temporarily clear people to a safe distance (1000 m) from blasting activities. This control must also apply to people working in the opencast operations immediately adjacent to the mine. ➲ In cases where roads or railway lines (R36 and the railway line to the Southeast of the mine) come within the zone of influence of fly rock from blasting, traffic must be stopped at a safe distance of a minimum of 1000 m during blasting operations. ➲ Pre-split blasting can generate very high air blast amplitudes. This must be controlled by firing presplit holes one at a time in sequence away from nearby receptors and in an upwind direction. ➲ Routine air blast and ground vibration monitoring must be carried out near the closest private home to each blast. Occasional audits must be conducted on blasting practices and mitigation options reconsidered if monitoring shows that levels exceed applicable guidelines. ➲ Only waterproof explosives must be used for blasting. Bulk emulsions and bulk emulsion blends are suitable, but explosives that can dissolve in water, such as ANFO must never be used.		

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			➲ Sleep times (how long a blast stands after it is charged and before it is fired), must be limited to a maximum value depending on manufacturers recommendations. ➲ Any spillages of stored explosives, especially ammonium nitrate prill, must be controlled with adequate bunding and cleaned immediately after a spillage occurs. ➲ Should any nitrous oxide fumes be observed during a blast, blasting activity must be reviewed and the cause of the fumes identified and corrected if needed. Causes include poor charging practices, incorrect explosives formulation or holes that are too close together in softer formations. Heritage sites (including graves): ➲ In several cases, there are heritage sites that will be located closer than 500 m from blasting. These structures are particularly sensitive to fly rock risk. For these structures, the following measures need to be taken in addition to the fly rock control measures outlined previously. 1. Stemming lengths must be increased to >25 hole-diameters. 2. For each blast, every heritage site within 500 m of a blast must be mapped before the blast and then checked after the blast. If there is any fly rock within 250 m of such site specialist advice must be obtained to curb the risk in future blasts.		

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			➲ A video recording of each blast must be made to determine the effectiveness of the fly rock control Sites within the mining area: ➲ Ruins and graves are present within the proposed open cast area. The proposal is to leave remnant pillars around each of these sites that are 50 m in radius. Special care will be needed to minimise the risk of pillar displacement or damage during blasting around the pillar. This will require smaller diameter holes (reduced from 250 mm), long delays, and only one hole firing per delay when blasting closer than 100 m from the pillar. Specialist advice will be needed in working out the mining sequence around the pillars and in designing each blast closer than 100 m from the pillar edges to ensure no pillar displacement occurs and that vibration limits are met. Buildings and people closer than 500 m from blasting ➲ A few people and buildings will remain within the zone of influence of ground vibration and fly rock after the measures outlined above have been applied. For these cases, special additional mitigation measures will need to be applied which will most likely involve a reduced charge mass per hole. This can be achieved through drilling smaller diameter holes, multiple benching or firing decked charges in each hole. The method chosen must be guided by the		

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			mine's technical expertise or by obtaining specialist advice. ➲ An alternative will be for the mine to buy the properties that are within the zone of influence. ➲ There is an active operation on the northeastern corner of Roodebloem Farm that will end up being withing a few tens of metres of blasting during Years 10 to 15. Mitigation will require communicating blasting times and making sure the operation is cleared of people whenever blasting takes place. ➲ All non-mining people and animals must be evacuated when blasting is closer than 1000 m from them. ➲ The active operation on the northeastern corner of Roodebloem Farm must be cleared of people whenever blasting takes place.		
➲ Removal of surface infrastructure ➲ Rehabilitation of mining area	Decommissioning / Post Closure (Including Rehabilitation)	2168 Ha	➲ The Project must encourage and invest in alternative livelihoods development so that at decommissioning and closure phases, the local area is not reliant exclusively on the Project for employment and economic opportunities. Thus by reducing the dependence of the community on mining post closure through local economic development and skills development training. ➲ Plan, update and implement an integrated Mine Decommissioning, Rehabilitation, and Mine Closure Plan with associated Social Closure Planning five years prior to Mine Closure.	Compliance with IWWMP, MPRDA, NEMA, NEMBA, GN704 and CARA will ensure that: ➲ The site is safe post mining ➲ Good stakeholder relations	Mine Closure and Rehabilitation

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			➲ Ilima will follow the procedures for downscaling and retrenchment as set out by the Department of Labour (DoL) and the Labour Relations Act. The impact of closure can be mitigated through the implementation of the measures in the SLP, including regular, consultative review of closure strategies and the portable skills / re-skilling programme. ➲ The final land uses are to be established in consultation with the community and local authorities.		

22.5 IMPACT MANAGEMENT OUTCOMES

The impact management outcomes are summarised in the required DMRE format in Table 22-3.

TABLE 22-3: IMPACT MANAGEMENT OUTCOMES

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
➲ Employment ➲ Human resource management ➲ Interaction with local community ➲ Ongoing environmental monitoring (dust fallout, surface water, groundwater)	All Impacts	Administrative Controls	All phases	➲ The EMPr shall be incorporated into any Environmental Management System (EMS) applicable to the site; ➲ All resources required to ensure compliance with the EMPr, including budgetary, personnel and equipment shall be in place for the duration of the LoM; ➲ A signed commitment to ensure compliance with the EMPr shall be obtained from Contractors appointed to undertake any of the activities on behalf of the applicant; ➲ An appropriately qualified, trained and experienced person shall be designated to fulfil the compliance monitoring requirements in the EMPr; ➲ The following records shall be maintained on site: ➢ Environmental Authorisation; ➢ Approved EMPr; ➢ Emergency preparedness and response plan; ➢ Documentation concerning compliance monitoring, environmental performance and EMPr implementation; ➢ Record of all individuals receiving job-specific and SHE training; ➢ Compliance monitoring and auditing data/reports and results of inspections conducted; ➢ Approved SHE method statements; ➢ Waste management records; ➢ Equipment maintenance records;	Compliance and best environmental practices.

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				➢ Maintenance and inspection of all safety equipment e.g. fire extinguishers; ➢ A completed and signed environmental incident/non-conformance report in respect of each reported environmental incident or nonconformity; ➢ A completed and signed environmental incident/non-conformance register; ➢ A completed and up-to-date external complaints and grievances form and register in respect of each external complaint received; ➢ Emergency contact register; ➢ A hazardous substance register.	
Equipment and vehicles used during mining activities	Greenhouse Gas Emissions.	Climate	Operation	➲ Climate change management includes both mitigation and adaptation. The main aim of mitigation is to stabilise or reduce GHG concentrations as a result of anthropogenic activities. This is achievable by lessening sources (emissions) and/or enhancing sinks through human intervention. ➲ One way to keep GHG emissions to a minimum would be to ensure there is minimal fuel use, this can be achieved by ensuring the vehicles and equipment is maintained through an effective inspection and maintenance program. A measure of reducing the project's impact is to limit the removal of vegetation and to ensure that as much as possible revegetation occurs and possibly even the addition of vegetation surrounding the project area.	Reduce overall carbon footprint associated with the proposed Kranspan Mine extension.
Clearing of Areas for Site Access, Infrastructure Siting and Opencast Mining	Underlying geology will be affected in that mineral resources will be lost.	Geology	Construction and Operational	➲ Local geology and exploration results were considered in the siting of surface infrastructure; ➲ Limit all project activities to the development footprint to minimise the extent of the possible impacts. All	Minimise area of mineral resources lost. Compliance with measures provided by geotechnical

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				areas outside of the project footprint must be regarded as No-go areas; and ➲ Pit wall stability will be reviewed through an on-going monitoring programme and as part of the mine closure planning process.	investigations.
Site clearing, levelling and cut and fill construction activities, blasting activities and mining of opencast pits	Change in topography of the area which could have impacts on the sense of place and visual aesthetics as well as potentially intercepting natural runoff	Topography	Construction and Operation	➲ Limit all project activities to the development footprint to minimise the extent of the possible impacts. All areas outside of the project footprint must be regarded as no-go areas. ➲ Stormwater management measures must be implemented as per the IWWMP to avoid flooding due to changes in the local topography and drainage systems within the Project area.	Compliance with stormwater management plan Stabilisation of steep slopes
Rehabilitation activities	Topography will be (as far as practically possible) restored to that of the pre-mining state, and must be free draining		Closure (Rehabilitation)	➲ Rehabilitation soon after mining of an area as well as dust suppression can reduce the negative visual impact of the project; and ➲ Concurrent rehabilitation with indigenous species and vegetative screening measures must be adopted.	Achieve rehabilitation objectives and standards.
Ancillary infrastructure (Offices and Workshops), Stockpiling and Opencast mining	Loss of Land Capability through erosion, soil degradation, compaction, increase in salinity, land contamination and loss of soil via aeolian processes	Soils and Agricultural Land Capability	All Phases	➲ Ensure proper storm water management designs are in place; ➲ If any erosion occurs, corrective actions (contour berms) must be taken to minimize any further erosion from taking place. Topsoil must be sourced and replaced and shaped to reduce the recurrence of erosion; ➲ Only the designated access routes are to be used to reduce any unnecessary compaction. Compacted areas are to be ripped to loosen the soil structure. ➲ The topsoil must be stripped by means of an excavator bucket, and loaded onto dump trucks. Topsoil is to be stripped when the soil is dry, as to reduce compaction. The handling of the stripped topsoil will be minimized to ensure the soil's structure does not deteriorate	Stabilisation of cleared areas Temporary stormwater control Remedial procedures Soil resources protected from contamination Successful rehabilitation of disturbed areas

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				significantly. Compaction of the removed topsoil must be avoided by prohibiting traffic on stockpiles; ➲ The subsoil approximately 0.3 – 0.8 m thick will then be stripped and stockpiled separately; ➲ Stockpiles must be kept to a maximum height of 12 m if space allows. Soil can be stockpiled to a height of 20m where it is absolutely necessary, keeping the 20m footprint as small as possible. ➲ The stockpiles will be vegetated (details contained in rehabilitation plan) in order to reduce the risk of erosion, prevent weed growth and to reinstitute the ecological processes within the soil; ➲ Prevent any spills from occurring. Machines must be parked within hard park areas and must be checked daily for fluid leaks. If a spill occurs, it is to be cleaned up immediately and reported to the appropriate authorities. All vehicles are to be serviced in a correctly bunded area or at an off-site location. Leaking vehicles will have drip trays place under them where the leak is occurring; ➲ A soil fertility and post-mining land capability assessment must be done to address any compaction or fertility issues that may arise from the stockpiling (Post-rehabilitation); ➲ Implement land rehabilitation measures as defined in rehabilitation report; ➲ After the completion of the project the area is to be cleared of all infrastructure. The foundations to be removed. Compacted areas are to be ripped to loosen the soil structure and vegetation cover re-instated; ➲ Topsoil to be replaced for rehabilitation purposes; ➲ The rehabilitated area must be assessed once a year for compaction, fertility, and erosion; and	Accidental leaks and spillages responded to rapidly and all contamination remediated in accordance with legal requirements

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				➲ Annual soil sampling post rehabilitation is applicable to arable post closure land uses, and not applicable to grazing land. Soil sampling at this stage must be informed by the level of vegetation cover established during the rehabilitation phase.	
Compaction and surface sealing activities Compaction and surface sealing activities and opencast mining activities	Increased erosion and sedimentation due to increase overland flow on the environment Increased overland flow will result in decreased infiltration and therefore less lateral flow at the soil bedrock/ interface or return flow from groundwater. Open cast areas will intercept lateral flow paths and remove connectivity between recharge zones and lateral flow zones. Alteration of this flow path will likely change the wetland water regimes negatively	Hydropedology	Construction and Operation	➲ Attenuation ponds and subsurface drains must form an integral part of stormwater plans to reduce overland flow from paved areas and allow water that runs off from roofs to settle and re-infiltrate ➲ Development footprint must adhere the buffer zones around all wetlands. This will enable water to infiltration and feed laterally into the wetlands. Application of good quality water which accumulates in pits on areas downslope of pit to maintain saturation at the soil/bedrock interface of Interflow (soil/bedrock) soils.	Reduce overland flow No removal of the connectivity between recharge zones and lateral flow zones and prevent desiccation of wetland areas
Clearance of vegetation from construction activities Opencast mining activities Influx of labourers and contractors	Loss of Natural Habitat (untransformed habitat) of High Ecological Importance: The proposed infrastructure footprint includes a total of 545.9 ha of Natural Habitat with High Ecological Importance	Terrestrial Ecology - Flora	Pre-Construction, Construction and Operational	➲ The only viable option within the Mitigation Hierarchy for the impact on CBAs in the project area is Avoidance. While the loss of 125.7ha of areas classified as CBA: Optimal could potentially be mitigated by offsets, this would require the conduction of a focused, larger scale study. The loss of 713.1 ha of areas classified as CBA: Irreplaceable cannot be mitigated through the offset mitigation option and can only be mitigated through Avoidance.	➲ Avoid CBAs and ESAs ➲ Conservation of plant SCC ➲ Implementation of an Alien Plant Management Plan

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	and these areas which will be lost comprise mostly of Untransformed Grassland (337.1ha) and Valley-bottom & Seep wetlands (199.5ha) but also include smaller areas of Sandstone Scarp Shrubland (9.3 ha).			➲ Design opencast areas and other infrastructure footprints to exclude areas of Natural Habitat with High EI situated within areas identified as CBA: Irreplaceable in the MBSP. Particular emphasis should be placed on ensuring that the opencast pit situated in the north western part of the Farm Roodebloem around the recommended 26ha buffer zone for Sensitive Species 1200 does not isolate the buffer zone form contiguous areas of CBA: Irreplaceable situated to the north of the project area. All project infrastructure should be placed within Modified Habitats with Low or Very Low EI. ➲ Design opencast areas and other infrastructure footprints to exclude areas of Natural Habitat with High EI situated within areas identified as CBA: Optimal in the MBSP. Where any infrastructure remains located within areas of CBA: Optimal, this impact should be mitigated by the formal protection of offset areas identified within the project area and/or its immediate surrounds by an appropriate specialist assessment. ➲ Vegetation clearance should be entirely restricted to areas within the infrastructure footprints that have received Environmental Authorisation. The mine should institute an internal permitting procedure (issuing of a 'permit to clear') administered by the mines Environmental Division to control and manage vegetation clearance. Where it is possible to relocate Protected plant species occurring within areas permitted by the Environmental Division for clearing, permits for the relocation of protected plant species should be applied for from the relevant provincial authority and included in the 'permit to clear' procedure. ➲ All parts of the Project Area that are not lost as a result of the construction of Authorised mining infrastructure should be managed for optimal	

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				biodiversity in accordance with a site-specific Biodiversity Management Plan (BMP). ➲ A 'veld management plan' should be developed and implemented for all parts of the project area that are not situated within infrastructure footprints as part of the BMP. ➲ In order to limit the severity and frequency of impacts on Natural Habitat resulting from elevated dust emissions, a detailed dust suppression plan should be developed for the mine and the strict implementation of this plan should be regularly audited.	
	Loss of Plant Species of Conservation Concern (SCC): Two plant SCC were confirmed to occur within the project area during fieldwork, namely Sensitive Species 1200 and *Khadia carolinensis*. In addition, two other SCC not recorded during fieldwork but which are extremely difficult to detect due to their small size (*Aspidoglossum xanthosphaerum*) or occurrence in habitat that remains flooded for protracted periods (*Lessertia phillipsiana*), are thought to have a Moderate to High likelihood of occurring			➲ In order to protect the subpopulation of Sensitive species 1200 recorded within the project area, a minimum buffer zone of 26ha was recommended by the specialist and this buffer was accommodated in the final revision of the mine plan provided by the project proponent. The adequacy of the minimal 200m buffer should be verified in the field prior to construction by a wetland specialist with input from a geo-hydrologist if necessary and this recommendation should be included in the EMP for the project. It must be emphasised that the recommended ca. 26ha preliminary buffer is a 'minimal buffer' within which no mining infrastructure should be located and no mining related activities should occur. Furthermore, it is crucial that the 26ha buffer should not be isolated by mining activities and that ecological connectivity should be maintained by establishing an effective ecological corridor, to the west of the railway line that links the 26ha buffer to the	

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	within the project area.			currently contiguous area of CBA: Irreplaceable situated directly to the north of the buffer area and extending to the north of the project area. Detailed management recommendation for the 26ha buffer should be included in the recommended BMP for the project area; preliminary management recommendations include: ○ The stand of the alien invasive tree *Acacia dealbata** situated within the 26ha buffer should be eradicated prior to construction of the opencast pit and all other occurring alien invasive plants should be controlled on an ongoing basis. ○ A stringent dust control programme should be implemented for the opencast area directly adjacent to the buffer. ○ All blast rock that lands in the buffer area should be removed immediately following each	

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				blasting event using hand labour. ○ The entire buffer area should be subject to light grazing and burning at appropriate intervals. ○ Access to the buffer should be strictly controlled and all vehicles entering the area must be authorised and supervised by the mines Environmental Department. ○ The Sensitive species 1200 subpopulation and its habitat should be monitored annually by a botanist using simple methods such as plant counts, fixed point photography and, when necessary, monitoring of vegetation cover and species composition within a limited number of sampling quadrats.	

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				➲ In order to protect the two subpopulations of *K. carolinensis* recorded within the project area, a minimum buffer of 200m around the maximum extent of each colony should be implemented. It must be emphasized that the recommended buffers are 'minimal buffers' within which no mining infrastructure should be located and no mining related activities should occur. Furthermore, it is crucial that the colonies and their buffers should not be isolated by mining activities and that ecological connectivity should be maintained between the various colonies or recorded localities as is the case for the current mine plan. It is recommended that research institutions (e.g. SANBI's Walter Sisulu National Botanical Garden) should be afforded and opportunity to rescue some of the *Khadia carolinensis* plants comprising the colony at Site 58a, which is situated within the footprint of an opencast area, for research purposes prior to construction. The recorded *Khadia carolinensis* subpopulations and their habitat should be monitored annually by a botanist using simple methods such as plant counts, fixed point photography and, when necessary, monitoring of vegetation cover and species composition within a limited number of sampling quadrats. Detailed management recommendation management of the recorded *Khadia carolinensis* should be included in the recommended BMP for the project area.	

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				➲ Any authorised development within any of the four Natural Habitat recorded within the project area should be should be preceded by a thorough search for threatened plant species within the footprint of the development, and in immediately adjacent areas, prior to construction Such searches ('walk-over' surveys) should be conducted by a botanist at the appropriate time of year which coincides with the flowering times of potentially occurring SCC. In the event that any SCC are confirmed, appropriate in situ and / or ex situ conservation measures should be developed in consultation with the relevant conservation authorities. This recommendation should be incorporated into the EMP for the mine. ➲ In order to confirm the presence or absence of additional SCC within the project area, and provide a more comprehensive species list that forms a sound basis for site-specific biodiversity management, an additional botanical survey which incorporates seasonal coverage should be conducted for the project area as part of the development of the recommended Biodiversity Management Plan for the mine. This survey should place emphasis on searching potentially suitable habitat for the two SCC that are considered to have a moderate to high likelihood of occurring within the project area, namely *Aspidoglossum xanthosphaerum* (VU) and *Lessertia phillipsiana* (DDD).	

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	Introduction and Proliferation of Alien Invasive Plant Species: Construction activities will provide transformed habitat ideal for the establishment and proliferation of alien invasive plant species. These concentrations of alien plants in areas disturbed by mining will provide a source of seeds and other propagules which are likely to are likely to be dispersed by mining activities and natural dispersal agents (e.g. wind and water dispersal). Highly aggressive alien invaders and habitat transformers are highly likely to colonise the verges of haul roads and access roads throughout the project area from where they are likely to spread into adjacent areas of Untransformed Habitats of high Ecological Importance.		Pre-Construction, Construction Operational and Closure	➲ The mine should develop and implement a site-specific integrated Alien Plant Control Programme (as per the AIS Regulations), which identifies the species that pose the greatest threat, in terms of habitat transformation, to Natural Habitat within the project area, and considers all appropriate chemical, mechanical, biological and cultural control methods for the alien species listed in Appendix 1 of the specialist report. Emphasis should be placed on controlling the 17 declared alien invasive species listed in Appendix 1 of the specialist report and in particular the five alien invasive habitat transformers identified as posing the greatest threat to the Natural Habitats and indigenous vegetation of the project area and its immediate surrounds, namely *Acacia dealbata**, *Acacia mearnsii**, *Campuloclinium macrocephalum**, *Pyracantha angustifolia** and *Richardia brasiliensis**. ➲ A team of appropriately equipped and trained should be appointed to conduct continuous alien plant control at the 'priority control sites' identified in the Alien Plant Control Programme. This team should work under the auspices of the mines Environmental Division, which should be tasked with supervising and thoroughly documenting all alien plant control activities. ➲ Where planting of trees and shrubs around mine offices, workshops and processing facilities is deemed necessary, only trees and shrubs indigenous to the study area and its	

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				immediate surrounds should be planted, and these should be grown from locally obtained seeds or other propagules. No trees, alien or indigenous, should be planted anywhere within the Natural Habitats of the project area. The alien invasive grass *Pennisetum clandestinum** (Kikuyu) should not be used for the establishment of lawns at mine premises.	
	Illegal Utilisation of Plant Resources: The highly species rich Natural Habitats of the project area contain numerous plant species that are popular medicinal plants (e.g. Boophone disticha and Eucomis autumnalis) which are likely to be targeted by any illegal medicinal plant harvesters entering the project area. The influx of labourers and contractors could result in an increase in the illegal harvesting of medicinal plants. Furthermore, mines often practice lax access control in the parts of their extensive properties that are not being actively utilised for mining activities leading to an increase		Pre-Construction, Construction and Operational	➲ Access by mine personnel and trespasses to all parts of the project area comprising Natural Habitat should be strictly controlled. Access control should be achieved by the erection of a five-strand cattle fence that is permeable to wildlife around the perimeter of the project area, regular signage prohibiting access and regular patrols by mine security personnel. Security personnel tasked with patrolling areas of Natural Habitat should receive basic training in the following aspects: ○ Prevention of illegal plant harvesting and animal poaching. ○ Location of sensitive Natural Habitats and buffer areas for SCC that should form the focus of patrol efforts. ○ Basic environmental sensitivities of the areas they are tasked with patrolling (e.g.	

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	in illegal medicinal plant harvesting relative to that which occurs on private farmland.			areas where vehicle access is prohibited). ○ Procedures for reporting any incidents of illegal access, plant harvesting, poaching and environmental incidents such as accidental fires and pollution spills. ➲ The damaging or destruction of plant species that are Protected in terms the Mpumalanga Nature Conservation Act (No.10 of 1998) during any future development should be avoided wherever possible, and a permit for the removal or destruction of any such protected plant must be obtained from the provincial authorities (Permitting Office of the MTPA) prior to development. It is recommended that where untransformed Natural Habitat is to be affected by an infrastructure footprints. Protected plant species should be rescued and placed in a nursery or donated to a research institute (e.g. SANBI botanical gardens) prior to development, rather than simply being destroyed. Where feasible, viable subpopulations of such species should also be translocated to transformed (including rehabilitation areas) or untransformed areas within the project area which provide potentially suitable habitats, but such translocations will have to be carried out in a	

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				manner that ensures that no ecological degradation of the host habitat occurs, and will have to be evaluated by a botanist for each species and each potential translocation area.	
Clearance of vegetation from construction activities Opencast mining activities Influx of labourers and contractors	Displacement and Loss of Habitat for Faunal Species: The proposed open cast mining and associated activities will result in the clearing and loss of Natural Habitat. Approximately 545.9 ha of Natural Habitat (comprising vegetation units with High Ecological Importance) is expected to be lost due to mining activities. Areas which will be lost comprise mostly of Untransformed Grassland (337.1ha) and Valley-bottom & Seep wetlands (199.5ha) and smaller areas of Sandstone Scarp Shrubland (9.3 ha).	Terrestrial Ecology - Fauna	Construction and Operational	➲ The direct loss of habitat and subsequent loss and displacement of faunal species of conservation concern can only be significantly mitigated through the application of the Avoidance option of the Mitigation Hierarchy. ➲ Develop and implement a Biodiversity Management Plan with the objective of managing all remaining Natural Habitat through conservative grazing, fire management and continual eradication of alien plant species. ➲ If any faunal species of conservation concern (as indicated in this report) are recorded during the construction/mining phase, the ECO should be informed, and should then issue instructions for its capture, translocation and safe release into suitable habitat within the project area with the relevant permits obtained from the relevant authority if necessary. ➲ All domestic waste generated (if present) during construction and mining operations should be removed from the project area as soon as possible and be disposed of at an authorised landfill to reduce the risk of colonisation by feral mammals, scavengers or	Avoid sensitive habitats and conserve fauna SCC

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				competitively superior indigenous bird species (e.g. Pied Crows). ➲ Personnel and staff should be advised by means of environmental awareness training on the biodiversity importance of the area. The intentional killing of any faunal species (in particular invertebrates, reptiles and snakes) should be avoided by means of awareness programmes presented to the labour force. The labour force should be made aware of conservation issues pertaining to the taxa occurring on the project area.	
	Disruption of Ecological Connectivity and Faunal Dispersal: The open cast mining activities and mine expansion proposed for the project area will aggravate habitat fragmentation and the disruption of natural ecological corridors in the area, thereby impeding the dispersal of faunal species as well as the potential for re-colonisation and recruitment of fauna to the project area during rehabilitation. It is especially sub-populations of medium to large mammal species such as Mountain Reedbuck			➲ Ensure that construction and mining activities do not extend beyond the authorised infrastructure footprints onto adjacent natural habitat in order to provide displaced fauna the opportunity to disperse into suitable habitat (although potential dispersal by small animals is highly limited). ➲ It is recommended that prior to commencement of fencing and construction it is ensured that the no large mammal species, especially reedbuck are trapped within any area fenced with security fencing. ➲ All Natural Habitat which is not part of actively mined areas must be fenced with standard 5-strand cattle fencing and not diamond mesh security fencing that will prevent the movement of Reedbuck and other fauna. The relevant conservation scientists of the MTPA should also be approached in order to ascertain the conservation importance of the subpopulations of Mountain Reedbuck and	

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	and Southern Reedbuck that are at risk of becoming fragmented if natural connectivity is disrupted and when the surface area of natural corridors is reduced to the point that these animals can no longer disperse across the project area.			Common Reedbuck that utilise the project area and determine whether further conservation measures are necessary. Such measures may include monitoring, collaboration with surrounding landowners to prevent poaching and ensuring the availability of large and contiguous areas of suitable habitat. ➲ The practice of excavating trenches around the project area as a form of access control should be prohibited as such trenches act as lethal 'pitfall traps' and barriers to dispersal of mammals, reptiles and amphibians and are regarded as an unnecessary and severe impact to such fauna occurring within the project area and its immediate surrounds.	
	Illegal Utilisation of Faunal Resources: The presence of a large labour force within the project area during mining activities will increase the risk of illegal utilisation of fauna resources, such as hunting and snaring of antelope, small mammals and birds. It is assumed that labour force will be accommodated in nearby towns and not on site, which would lower this risk of hunting and poaching considerably.			➲ Contractors should be accommodated off-site (i.e. not within the project area), reducing the risk of poaching and persecution of fauna. ➲ Labour supervisors and SHE officials should monitor the activities of labourers when working away from infrastructure in Natural Habitat. ➲ Personnel and staff should be advised by means of environmental awareness training on the biodiversity importance of the area. The intentional killing of any faunal species (in particular invertebrates, reptiles and snakes) should be avoided by means of awareness programmes presented to the labour force. The labour force should be made aware of	

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	In addition, the project may also result in increased utilisation of natural resources due to potential human encroachment and accessibility to the project area owing to people seeking jobs. This could result in the establishment of illegal settlements on areas consisting of natural habitat on the project area where active mining is absent.			conservation issues pertaining to the taxa occurring on the project area. ➲ Regular monitoring of the project area, especially areas of natural habitat where active mining activities are absent, is advised to identify areas where illegal settlement may occur. If any illegal erecting of housing occurs, the mine's public liaising officer should immediately advice on a resolution, which may involve a re-location strategy.	
Destruction of wetland units during all construction phase activities due to heavy machinery and indiscriminate habitat destruction.	Destruction of sensitive habitat: Destruction of wetland units during all construction phase activities due to heavy machinery and indiscriminate habitat destruction.	Surface Water Ecosystems	Construction and Operation	➲ Vegetation and extent of groundcover plays an important role in preserving wetland functionality. It binds soils to protect from erosion, reduces the scouring potential of runoff water through the reduction of velocity and energy dissipation and also provides the micro-habitat and refuge for supporting a greater array of wetland-dependent biodiversity. Indiscriminate destruction of vegetation layers from wetland areas that fall outside of the ultimate infrastructure footprint should be avoided. It is recommended that the buffer zones be fenced off within applicable areas to avoid indiscriminate habitat destruction and treated as "no-go" areas. This includes using these areas for soil stockpiling, equipment storage, fuelling areas, etc. ➲ Erosion and sedimentation must be managed as an ongoing concern throughout all the phases of the development activities. This includes protection of stockpiled soils, rock dumps and other stored materials. Stormwater management must ensure erosion protection at the outfall points into the	Water quality monitoring results show acceptable levels of parameters tested Pollution avoided Stormwater management plan Bunded storage of hydrocarbons, fuels and oils Rehabilitation standards and objectives to be met'
Wetland vegetation alteration following disturbances that will enhance exotic vegetation encroachment.	Destruction of sensitive habitat: Wetland vegetation alteration following disturbances that will enhance exotic vegetation encroachment.				
Fragmentation of interconnected wetland units (watercourses) that would otherwise offer migratory corridors.	Fragmentation of linear surface water habitat: Fragmentation of interconnected wetland units				

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	(watercourses) that would otherwise offer migratory corridors.			receiving environment. There are multiple impoundments along most of the watercourses within the survey area that already act as sediment traps. Before an engineering solution to sediment management is sought, it is recommended that a monitoring plan be developed to determine the level of functionality that these impoundments already offer as the various phases of the proposed mining development progress. ➲ A management strategy should be in place for the encroachment of opportunistic alien vegetation.	Conditions as stipulated in Water Use Licence (WUL) Erosion potential on banks of affected watercourses minimized
Excavation of deep opencast pits near to wetland habitat that will deviate lateral inter soil flow patterns into the pits that would otherwise sustain wetland units, leading to loss of water source for the wetland and subsequent loss of the unit.	Impact to the hydrological functioning of wetlands: Excavation of deep opencast pits near to wetland habitat that will deviate lateral inter soil flow patterns into the pits that would otherwise sustain wetland units, leading to loss of water source for the wetland and subsequent loss of the unit.		Operation	➲ The water that seeps into the pit that requires decanting could be pumped to an attenuation feature that then releases the water back into the wetland unit. This would depend on the quality of the water, which may require a level of processing prior to it being released. The attenuation feature should be engineered to ensure that the outfall does not induce erosion of the watercourse. Depending on the elemental content of the water, the wetland itself could be utilised as a biological filter and management tool to ensure suitable water quality for the downstream wetlands, aquatic habitats, and other water users. Intact ecological integrity of the wetland units located downstream of decanting sites is vital to the successful implementation of a water management scheme such as this.	Downstream water quality to remain within acceptable ranges, as determined through baseline monitoring.
All construction phase activities that result in soil destabilisation.	Soil erosion that impacts watercourses and wetland habitat: All construction phase activities that result in soil destabilisation.		All	➲ Any soil that is removed for trenching purposes must be stored in their respective layers and returned to the excavation in reverse order. The soils must be stored outside of the wetland and buffer zones in order not to smother established wetland vegetation. ➲ Adequate site reinstatement must be implemented to abate the formation of erosion through modification of the surface water hydrology. Silt	

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				traps and fencing should be used in areas of steeper topography (if applicable). ➲ The movement of heavy machinery within wetland zones should be limited to only single access roadways. Upon completion of the construction phase, this roadway should be ripped and/or disk ploughed to loosen the compacted soils and to allow for the establishment of vegetation within the affected areas, which should be a mixture of veld grasses typical of the surrounding area within similar habitat units. ➲ Indiscriminate habitat destruction should be avoided and the construction footprint, including service and support areas should be kept to a minimum.	
Impacts to wetland units during the operations phase from runoff pollution, siltation, habitat smothering and vegetation alteration.	Water quality degradation: Impacts to wetland units during the operations phase from runoff pollution, siltation, habitat smothering and vegetation alteration.		Operation	➲ Possible sources of contamination include hydrocarbons (from poorly designed and managed fuelling stations and/or workshop and maintenance areas) and runoff water from processing areas, and these should be kept separate from clean water runoff with a suitable stormwater management system, and general surface water runoff should be treated prior to release into the environment. ➲ Erosion management to prevent water quality degradation.	
All construction phase and operations phase activities associated with water contamination	Water quality: All construction phase and operations phase activities associated with water contamination		All	➲ Onsite sewerage treatment and/or management to avoid contamination of the surface water ecosystems. Untreated sewerage contamination of the surface water ecosystems could occur due to poorly designed sewerage treatment systems, treatment systems where processing capacity is exceeded, poorly maintained infrastructure leading to water-borne effluent leaks prior to processing, sewerage spills during (for example) septic tank pumping, and informal ablutions near watercourses. Careful attention to sewerage treatment and	

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				sewerage systems will reduce the risk of contamination of the resource. ➲ During decanting, the pit water must be routinely tested at an accredited laboratory to develop an appropriate management strategy to treat the water to within target water quality standards prior to release. Routine monitoring and testing of the water will also determine whether treatment is, in fact, required prior to release.	
Storage of hazardous substances for construction activities Mine dewatering and opencast mining activities	Groundwater availability and rate of groundwater seepage Contamination of groundwater quality Impacts on the shallow weathered aquifer, wetlands and springs Groundwater users (destruction of private boreholes)	Groundwater	Construction and Operation	➲ Design and build all PCDs before any mining activities commence. ➲ Implement and maintain a groundwater monitoring programme in mine and private boreholes situated in the zones of influence identified for the mining areas. ➲ Implement sound house-keeping measures to prevent and clean spills, address leaks and undertake regular inspections. Ensure that the record-keeping procedure is in place and that instructions given are carried out. ➲ Measure rainfall daily on site. ➲ Negotiations must be entered into with the owners of private boreholes that will be destroyed during opencast mining. ➲ A dedicated groundwater monitoring programme must be implemented in all private boreholes within the delineated zone of influence. This monitoring programme must include groundwater level and quality measurements. Should monitoring information indicate adverse impacts, Ilima must enter into negotiations with the affected landowners to negotiate alternative water supply options of equivalent quantity and quality. ➲ Feedback must be provided to owners of boreholes within the affected zones regarding progress made	Groundwater monitoring results show acceptable levels of parameters tested. Avoid contamination of groundwater Regular toolbox talks for management of spills

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				with mining activities, rehabilitation and the outcome of monitoring programmes on a quarterly basis when groundwater monitoring will take place to ensure that they are informed of aspects of mining that may be of significance. ➲ The volume of water pumped from underground and the pits to surface during the operational phase must be recorded. This information must be used to update the impact assessment presented in this report, as necessary. ➲ If water-bearing structures are intersected during mining that contribute significant volumes of seepage to the pits and underground workings, they must be characterised and quantified. The risk and timing of decant must be re-assessed taking this information into consideration. ➲ Should mining activities on the Farm Vaalbank extend to the C-Seam workings in the historical Union Colliery underground workings, provision must be made to dewater and contain additional underground water in the mine's dirty water management system. The impact assessment must be updated at least a year prior to mining into the old underground workings to ensure that sufficient planning can be made to address potential cumulative impacts. Specific focus must be placed on the perceived increased volume of extraneous water that will have to be contained as well as the increased risk of decant from the affected pits. ➲ Surface rehabilitation measures must be designed to minimise the risk of decant. In order to do so, concurrent rehabilitation of the opencast pits must be maintained throughout the life of mining. ➲ Maintain the groundwater monitoring programme in mine and private boreholes located. ➲ Ilima will enter into negotiations with existing groundwater users to identify suitable alternatives,	

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				should monitoring information indicate that private groundwater use is negatively affected by mining activities. ➲ Replace groundwater monitoring boreholes that may be destroyed during mining. ➲ Record all groundwater-related complaints and deal with each complaint within the agreed upon timeframe. ➲ Implement and maintain concurrent rehabilitation to reduce the duration of impacts and allow recovery of wetlands/springs. ➲ Complete regular inspections of PCDs, specifically noting incidences of overflow and leakage. If the latter is identified, measures must be taken to rectify non-compliances immediately. ➲ Maintain sound house-keeping measures to prevent spills and leaks. ➲ Dedicated monitoring boreholes must be maintained in the three lineaments that transect the mining area. If any of the current boreholes drilled into these structures are destroyed during mining, they must be replaced. ➲ Surface infrastructure, like the wash plant, must be positioned off the lineaments. Prior to the establishment of these areas, a geophysical survey must be completed to pin-point the faults. ➲ Measures developed during the 2019 study to manage the impact of discard must be implemented and maintained at the Kranspan mining area (iLEH, 2019). Updated contaminant transport simulations must be undertaken once this information is available in order to improve the confidence levels in long-term predictions. These simulations must be completed at least five years	

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				prior to mine closure to ensure that effective measures are developed to manage long-term impacts.	
Decant from pits	Contamination of groundwater quality Risk of decant		Post-closure	➲ If water-bearing structures, specifically the regional faults, are intersected during mining that contribute significant volumes of seepage to the pits and underground workings, they must be characterised and quantified. The risk and timing of decant must be re-assessed taking this information into consideration. ➲ Based on kinetic leach tests completed for the Kranspan Mine (refer to Appendix 8), leachate from the mining area is not expected to significantly acidify and decant is therefore expected to be of moderate quality. If monitoring of the decant indicates that the quality is not suitable for release to the environment, provision must be made to contain all decant to avoid negative impacts on surface water, soil and wetlands. ➲ Surface rehabilitation measures must be designed to minimise the risk of decant. Opencast mining areas and box cuts must be backfilled, shaped and made free draining to limit the rate of recharge of rainwater to the absolute minimum. ➲ A decant interception system must be implemented to collect decant water and divert this to a containment facility. Where feasible, it is recommended that horizontal drains are installed at the decant locations to capture, control and divert decant to the designated dirty water containment facility. It is recommended that a PCD or a number of PCDs are used for this purpose. A qualified professional must complete a water balance for the PCDs to confirm that these will be sufficient in size to contain all decant post closure. ➲ Visual inspections along pit perimeters must be undertaken on a monthly basis. If any additional decant is recorded, the decant interception system	Avoid contamination of groundwater Complete all rehabilitation to a satisfactory level, to reduce the rate of recharge of rainwater as far as possible. No ponding must be allowed over rehabilitated areas.

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				must be adjusted to ensure that all decant is captured and stored. ➲ Decant quality must be monitored on a monthly basis until closure. ➲ Measures must be taken during the operational phase of mining to contain all decant anticipated. In areas where significant decant may take place, PCDs must not be rehabilitated at closure but must be prepared, re-sized if necessary and used to contain decant post closure. Based on the available dataset, the following pits are expected to result in significant decant if not managed well: o Pit 1 o Pit 5 o Pit 10 o Pit 11 o Pit 16 o Pit 19 o Pit 20 o Pit 22 o Pit 23 ➲ The risk of decant associated with other pits not listed above must be evaluated during the operational phase as additional monitoring information becomes available. Based on this information, appropriate post-closure decant management measures must be implemented during the rehabilitation phase. ➲ The PCDs must be sized to take decant volumes into consideration and cutoff trenches and berms must be put in place to divert decant to the PCDs. The planning and possible re-sizing of PCDs must be completed prior to mine closure. ➲ Should mining activities on the Farm Vaalbank extend to the C-Seam workings in the historical Union Colliery underground workings, provision must be made to handle additional underground water in the mine's	

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				dirty water management system. Based on field observations, the additional volume of water from the historical underground workings that have to be handled can be up to 160 000 m^3/a. This volume of water is likely to impact on operational mine water management as well as decant volumes post closure. This additional decant volume can be used in the wash plant to avoid need for rehandling and storage. It is reported in literature (Steyn, 2019) that several areas of subsidence are associated with Union Colliery. Care should be taken to identify areas of subsidence and incorporate these into the mine plan for pits that will extend to the C Seam in the old workings. The areas of subsidence should also be considered when planning to manage decant from the mining areas. Pits that overly the historical Union Colliery underground workings are included below and it is noted that some of these pits are already highlighted as potential areas of significant decant potential: o Pit 16 o Pit 19 o Pit 21 o Pit 22 o Pit 23 <u>Post Closure Management Plan:</u> ➲ All rehabilitation must be completed during the decommissioning phase. In terms of groundwater, the rehabilitation must focus on containing dirty water and leachate, preventing the ingress of clean runoff and rainfall to the mining area and avoid ponding over rehabilitated areas. ➲ The groundwater monitoring programme must be maintained for a period of at least two years after mine closure in both mine monitoring and private boreholes. This information must be used to confirm the impact of rehabilitation at mine closure.	

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				➲ At the end of the two-year monitoring programme, the post-closure groundwater impact assessment must be re-evaluated and adjusted, as necessary, based on the results of the monitoring programme. ➲ Once the monitoring data and the re-assessment of post-closure groundwater impacts are available, Ilima must discuss these with the authorities and determine the need of additional monitoring through consultation. ➲ All seepage from the current and planned new mining areas must be contained to avoid decant into the catchment. ➲ All seepage from the mining areas and potential decant must be contained in PCDs that meet the requirements of GN704.	
Construction activities such as topsoil removal, material loading and hauling, stockpiling, grading, bulldozing, as well as metal and concrete works for the establishment of infrastructure	The main pollutant of concern from construction operations is particulate matter, including PM_{10}, $PM_{2.5}$ and TSP. PM_{10} and $PM_{2.5}$ concentrations are associated with potential health impacts due to the size of the particulates being small enough to be inhaled. Nuisance effects are caused by the TSP fraction (20 µm to 75 µm in diameter) resulting in soiling of materials and visibility reductions.	Air Quality	Construction	Air quality impacts during construction would be reduced through basic control measures such as limiting the speed of haul trucks; limit unnecessary travelling of vehicles on untreated roads; and to apply water sprays on regularly travelled, unpaved sections. The access road to the Project also needs to be kept clean to minimise carry-through of mud on to public roads.	Pollution minised Dust fallout: a. Residential areas (Dustfall rate<600 mg/m^2/day); b. Non-Residential areas (600<dustfall rate< 1200 mg/m2/day); c. Compliance with the NEM:AQA, Dust Control Regulations GNR 827 of 2013 Particulate Matter - PM10:

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	Thus the impact on air quality is the elevated PM_{10} and $PM_{2.5}$ concentrations and elevated dustfall levels				a. 24 hr = 75 µg/m^3 (more than four times a year); b. Annual = 40 µg/m^3
Operation activities such materials handling, bulldozing, drilling, blasting, vehicle entrainment on unpaved surfaces, crushing and screening, windblown dust from overburden dumps and coal stockpiles	Elevated PM_{10} and $PM_{2.5}$ concentrations and elevated dustfall levels		Operation	Vehicle activity on unpaved roads: ➲ Regular water sprays and road binders on unpaved roads to ensure at least 90% control efficiency. ➲ Regular water sprays on unpaved inpit roads to ensure at least 75% control efficiency. ➲ Monthly physical inspection of road surface, daily visual observation of entrained dust emissions from unpaved road surfaces. Drilling and Blasting: ➲ Controlled blasting techniques to be used to ensure minimal dust generation. ➲ Blasting only to be conducted on cloudless days, if possible. ➲ Addition of chemical surfactants to water sprays to lower water surface tension and increase binding properties. ➲ Drilling to be controlled through water sprays or vacuum packs Materials Handling: ➲ Increase in-pit material moisture content. ➲ Drop height from excavator into haul trucks to be kept at a minimum for coal and waste rock. ➲ Tipping onto ROM storage piles to be controlled through water sprays, must significant amounts of dust be generated.	c. Comply with the National Ambient Air Quality Standards. <u>Particulate Matter – PM2.5</u>: a. 24 hr = 40 µg/m^3 (more than four times a year); b. Annual = 20 µg/m^3 c. Comply with the National Ambient Air Quality Standards.

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				➲ Keep material handled by dozers and wheeled loaders moist to achieve a control efficiency of 50%, especially during dry periods. ➲ Regular clean-up at loading areas. Wind Erosion: ➲ Water sprays at ROM stockpile can achieve 50% control efficiency. Increase in moisture content provides higher threshold friction velocity and ensures that particulates are not as easily entrained due to high surface winds. ➲ Reshape all disturbed areas to their natural contours. ➲ Cover disturbed areas with previously collected topsoil and replant native species. ➲ Rock cladding with larger pieces of waste rock is recommended to reduce wind erosion emissions from the overburden storage piles. ➲ Revegetation of overburden stockpile is recommended. Crushing: ➲ Water sprays at the crushers to achieve at least 50% control efficiency.	
Decommissioning activities such as demolition and stripping away of structures and facilities, windblown dust from stockpiles and exposed areas, and degradation of roads resulting in exposed areas surfaces	Elevated PM_{10} and $PM_{2.5}$ concentrations and elevated dustfall levels		Decommissioning	➲ Air quality impacts during decommissioning would be reduced through basic control measures such as limiting the speed of haul trucks; limit unnecessary travelling of vehicles on untreated roads; and to apply water sprays on regularly travelled, unpaved sections. ➲ The access road to the Project also needs to be kept clean to minimise carry-through of mud on to public roads.	
➲ Construction activities	Elevated noise levels	Noise	All phases	➲ Equipment with lower sound power levels must be selected. Vendors must be required to guarantee optimised equipment design noise levels;	Noise - a. LAeq (equivalent continuous sound

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
➲ Blasting, mining operations, haulage ➲ Decommissioning activities				➲ Where possible, other non-routine noisy activities such as construction, decommissioning, start-up and maintenance, must be limited to day-time hours; ➲ All diesel-powered equipment and plant vehicles must be kept at a high level of maintenance. This must particularly include the regular inspection and, if necessary, replacement of intake and exhaust silencers. Any change in the noise emission characteristics of equipment must serve as trigger for withdrawing it for maintenance; ➲ In managing noise specifically related to truck and vehicle traffic, efforts must be directed at: ➲ Minimising individual vehicle engine, transmission, and body noise/vibration. This is achieved through the implementation of an equipment maintenance program. ➲ Maintain road surface regularly to avoid corrugations, potholes etc. ➲ Avoid unnecessary idling times. ➲ Minimising the need for trucks/equipment to reverse. This will reduce the frequency at which disturbing but necessary reverse warnings will occur. Alternatives to the traditional reverse 'beeper' alarm such as a 'self-adjusting' or 'smart' alarm could be considered. These alarms include a mechanism to detect the local noise level and automatically adjust the output of the alarm is so that it is 5 to 10 dB above the noise level near the moving equipment. Another alternative to the traditional reverse 'beeper' is the use of white-noise generators. This enables the listener to instantly locate where and what direction the sound is coming from. The broadband sound also gives workers wearing hearing protection devices (HPDs) and people with hearing difficulties a better chance of hearing the alarm. White-noise reverse alarms create a "ssh-ssh" sound which is gentle on the ear and dissipates	level) for residential, institutional and educational receptors during daytime hours (07:00 to 22:00) = 55 dBA; b. LAeq for residential, institutional and educational receptors during night-time hours (22:00 to 07:00) = 45 dBA; c. Comply with SANS Environmental Noise Standards

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				quickly, meaning the alarm can only be heard in the danger zone; ➲ Limiting traffic to hours to between sunrise and sunset. This must include other non-routine noisy activities such as construction, decommissioning, start-up and maintenance; ➲ A noise complaints register must be kept; ➲ Good public relations are essential at all stages of the project. Surrounding receptors must be informed about the sound generated by proposed project operations. Community involvement needs to continue throughout the project. The mine must implement a line of communication (i.e. a help line where complaints could be lodged). All potential sensitive receptors must be made aware of these contact numbers. The mine must maintain a commitment to the local community and respond to concerns in an expedient fashion. ➲ As the site or activity is in close proximity to NSRs, equipment and methods to be employed must be reviewed to ensure the quietest available technology is used. Equipment with lower sound power levels must be selected in such instances and vendors/contractors must be required to guarantee optimised equipment design noise levels; ➲ As far as is practically possible, source of significant noise must be enclosed. The extent of enclosure will depend on the nature of the machine and their ventilation requirements. Motors are examples of such equipment; ➲ Plant and equipment must be sited as far away from NSRs as possible. It is recommended that buffer zones be established and that noise generating activities be conducted no closer than 300 m from NSRs;	

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				➲ Machines used intermittently must be shut down between work periods or throttled down to a minimum and not left running unnecessarily. This will reduce noise and conserve energy; ➲ Plants or equipment from which noise generated is known to be particularly directional, must be orientated so that the noise is directed away from NSRs; ➲ Acoustic covers of engines must be kept closed when in use; ➲ Construction materials such as beams must be lowered and not dropped; ➲ Regular and effective maintenance of equipment are essential to noise control. Increases in equipment noise are often indicative of eminent mechanical failure. Also, sound reducing equipment/materials can lose effectiveness before failure and can be identified by visual inspection; ➲ If noise control at the source and the use of distance between source and receiver is not possible, screening methods must be considered. The careful placement of barriers such as screens or berms can significantly reduce noise impacts but may result in additional visual impacts. Although vegetation such as shrubs or trees may improve the visual impact of construction sites, it will not significantly reduce noise impacts and must not be considered as a control measure; ➲ Earth berms can be built to provide screening for large scale earth moving operations and can be landscaped to become permanent features once construction is completed. Care must be taken when constructing earth berms since it may become a significant source of dust; ➲ If efforts at controlling noise at the source and the installation of acoustic barriers fail, possible receptor	

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				based noise mitigation measures, such as double paned windows and insulated buildings must be considered. It must however first be confirmed through monitoring that the mining activities are the source of disturbance at the receptor locations before the onus falls on the mine to implement such measures at the receptor locations; ➲ Noise monitoring at sites where noise is or may become an issue is essential. It is recommended the bi-annual noise sampling be conducted at the closest sensitive receptors to the active areas at any given time; and ➲ In the event that noise related complaints are received short term (24-hour) ambient noise measurements must be conducted as part of investigating the complaints. The results of the measurements must be used to inform any follow up interventions. The investigation of complaints must include an investigation into equipment or machinery that likely result or resulted in noise levels annoying to the community. This could be achieved with source noise measurements.	
Construction phase activities resulting in disturbance of surfaces and/or sub-surfaces	➲ May destroy, damage, alter, or remove structures of heritage importance ➲ May destroy, damage, alter, or remove ruins of heritage importance ➲ May destroy, damage, alter, or remove stone	Heritage Resources	Construction	➲ The preferable course of action is avoidance of the features to prevent impacts to the recorded sites. If this is not possible Phase 2 mitigation will be required which will require an assessment by a conservation architect before a destruction permit can be applied for. ➲ The study area must be monitored by the ECO during construction to implementation the Chance Find Procedure for the project. ➲ Recorded heritage features must be indicated on development plans and construction crews must be made aware of expected resources and applicable mitigation measures.	No archaeological and cultural resources or graves damaged during construction and operation of the mine. Graves and cemeteries impacted on (KP 14, KP 18, C004, C010B, C010C, C014, C015B, C020, C027, C103 & C105) must be avoided

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	cairns of heritage importance ➲ May destroy, damage, alter, or remove burial sites of heritage importance			➲ The study area must be monitored by the ECO during construction to implementation the Chance Find Procedure for the project as there is a risk of unmarked graves at these sites. ➲ Recorded heritage features must be indicated on development plans and construction crews must be made aware of expected resources and applicable mitigation measures. ➲ Confirmation of the presence of graves at these features. If confirmed to be graves the cairns must be avoided with a 100m buffer zone and access for family members. ➲ Recorded heritage features must be indicated on development plans and construction crews must be made aware of expected resources and applicable mitigation measures. ➲ Burial sites and stone cairns (that could potentially be graves until proven otherwise) must be avoided with a 100 m buffer zone. Access for the family members must be ensured; ➲ Recorded heritage features must be indicated on development plans and construction crews must be made aware of expected resources and applicable mitigation measures.	with a 100 m buffer zone Where graves or any other heritage resources (such as ruins and stone cairns) cannot be avoided, acquire permit from SAHRA or the National Department of Health and the relevant Provincial Department of Health
Construction activities and Opencast Mining	May destroy, damage, alter, or remove resources of palaeontological importance	Palaeontological resources	Construction and Operation	Monitoring Programme for Palaeontology – to commence once the excavations / drilling / mining activities begin. The following procedure is only required if fossils are seen on the surface and when drilling/excavations/mining commence: ➲ When excavations begin the rocks and discard must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (trace fossils, fossils of plants, insects, bone or coalified material) must be put aside in a suitably	Compliance with NHRA and SAHRA will ensure that no palaeontological resources are damaged or destroyed during construction and mining activities.

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				protected place. This way the project activities will not be interrupted. ➲ Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones. This information will be built into the EMP's training and awareness plan and procedures. ➲ Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment. ➲ If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, must visit the site to inspect the selected material and check the dumps where feasible. ➲ Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits. ➲ If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils. ➲ If no fossils are found and the excavations and mining have finished then no further monitoring is required.	
Construction activities and opencast mining	Visual disturbance of the sense of place	Visual Aesthetics	Construction and Operation	➲ Structures that are required to be built from steel or concrete can be painted in a natural tone fitting with the surrounding environment;	Minimise impacts to the aesthetics / visual quality.

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				➲ To reduce the potential of glare external surfaces of buildings and structures must be articulated or textured to create interplay of light and shade; ➲ During construction, access roads will require an effective dust suppression management program, such as regular wetting and/or the use of non-polluting chemicals that will retain moisture in the road surface; ➲ Where practicable, concurrent rehabilitation with indigenous species and vegetative screening measures, as opposed to a horticultural approach to landscaping must be adopted. It is not advisable to plant more exotic trees, focus must rather be placed on greening of dumps and fast rehab of pits; and ➲ Shielding of night lights can greatly reduce the sky glow by ensuring that lights have proper shielding which ensures that light does not spill into the night sky. The direction of the main beam of all lights directed towards any potential observer must be at an angle smaller than 70°. Higher mounted lights allow lower main beam angles, which can assist in reducing glare.	
Rehabilitation	Visual improvement of the sense of place		Post Closure (Rehabilitation)	Rehabilitation soon after mining of an area as well as dust suppression can reduce the negative visual impact of the project.	Achieve rehabilitation objectives and standards.
All activities involving employment and procurement of goods and services All opencast mining activities	➲ Coal Production for Electricity Generation ➲ Economic Growth ➲ Employment Opportunities ➲ Skills Development and	Socio-economic	All Phases	➲ Measures proposed to enhance this positive impact include the development of an Employment Equity Plan by Ilima and to support the employment of labour from the local communities during the LoM. ➲ Local employment targets must include employment of youth and women from historically disadvantaged backgrounds. ➲ Prioritise employment and training of people living within the project area, especially for unskilled and semi-skilled positions. Ensure that employment	➲ Community conflict avoided. ➲ Employment from community. ➲ Local procurement. ➲ Secure and safe site

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	Education Opportunities ➲ Local Economic Development ➲ Government Revenue and Royalties ➲ Change in Land Use resulting in loss of agricultural land and loss of jobs ➲ Population Influx ➲ Security Risks ➲ Mine Health and Safety – General ➲ Mine Health and Safety – Spontaneous Combustion can occur during opencast mining and stockpiling of coal which can damage infrastructure and result in staff injuries ➲ Community Health and Safety – Diseases ➲ Community Health and Safety			opportunities and skills requirements are advertised locally. Communicate available employment opportunities and skills training and requirements with the local community to manage expectation. ➲ Ensure that the mine's Community Liaison Officer is informed of all project developments to facilitate on going and active engagement with stakeholders. ➲ Implementation of the HRD programme, as described in the SLP, which is expected to result in skills transfer, career progression, re-skilling and improved levels of literacy for employees and in the wider community. ➲ Implement and continuously update the SLP to ensure maximum benefits to the community. The SLP must align with the associated legislation and include intensive stakeholder consultations as prescribed in the law. ➲ Implementation of the agreed LED projects (Upgrade of Sports Facilities at Silobela Stadium Project and Expansion of Tibaya Farming Projects) committed to in the SLP will have a significant positive impact for the broader community. ➲ Should the mine extension be approved, Ilima must seek surface access agreement with the affected landowners. Ilima must develop a policy and framework outlining the procedures to be followed for land acquisition and lease agreements prior to any change of land use activity. ➲ Ilima will provide for farming to continue (where identified and following rehabilitation of pits). Land will be rehabilitated and returned to farmers post mining. Rehabilitation of the mined areas must take place as soon as possible to restore the land, for example to agriculture use. ➲ Ilima seeks to focus on the agricultural sector in terms of LED projects since the community of Carolina is	➲ Good stakeholder relations with community members and authorities. Compliance with the Occupational Health and Safety Act (Act No. 85 of 1993), Mine Health and Safety Act (Act No. 29 of 1996) (MHSA) and Hazardous Substances Act (Act No. 15 of 1973)

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	– Traffic and Road Safety			largely dependent on this sector for its daily livelihood. Hence, the proposed LED Project for this SLP is an Expansion of Tibaya Farming Projects that were previously initiated and funded by the company in the other SLP. Ilima proposed to purchase additional farming land to sustain all the farming ventures that the company initiated and funded under Tibaya Farming Project (Pty) Ltd. Because of the additional farming land, it is logical for Ilima to expand these projects by adding more livestock, agricultural implements, and other farming facilities to ensure that they become more sustainable and create more jobs for the community of greater Carolina. ➲ Implement a written complaints and grievance procedure. ➲ An influx management plan must be developed in collaboration with the CALLM. The plan must identify responsibilities between the Applicant and the CALLM, for ensuring that access to municipal services such as public health, public safety, water, sanitation, power and affordable housing are available in the local area. ➲ Where possible, construction employees must be locally sourced as they will live with their families. ➲ Liaise with Local Government to ensure that expected population influx is considered in infrastructure development and spatial development planning. ➲ Ensure continuous consultation with local communities, farm landowners and government and promote partnerships to address illegal activities on-site and in the surrounds of the project area. ➲ Explore opportunities for collaboration with local police with regards to safety and security issues relating to project activities in general and any concerns about contractors. Implement security measures within the Kranspan MRA extension area.	

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				➲ The Applicant must establish a community engagement forum comprising of representatives of, among others, the mine management, surrounding landowners / land users, community members, authorities, and local businesses. ➲ Implement a comprehensive mine health and safety management programme and adhere to legislation governing mine health and safety requirements. ➲ There must be an emergency preparedness and response plan in place. ➲ Petrochemicals, oils, solvents, paints and other identified hazardous substances shall only be stored under controlled conditions. All hazardous materials will be stored in a secured, appointed area that is fenced and has restricted entry. All applicable emergency contact details shall be confirmed and displayed at various locations across the site. ➲ Speed limits for mine vehicles and personnel must be established. ➲ A spontaneous combustion prevention plan must be compiled. ➲ Develop information, education and communication campaigns around diseases and health practices including sanitation and hygiene. ➲ Work closely with local health services in monitoring and addressing changes in levels of community health and wellbeing. ➲ Implement an HIV/AIDS awareness programme addressing factual health issues as well as behaviour change. ➲ There must be fencing of the mine area with access control in place preventing unauthorised access to the Kranspan mine.	

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				➲ All hazardous materials will be stored in a secured, appointed area that is fenced and has restricted entry.	
Movement of man and materials	➲ Community Health and Safety – Traffic and Road Safety	Socio-economic	Construction and Operation	➲ Regional road maintenance is the responsibility of the relevant road authority while Ilima are responsible for internal mine road maintenance. ➲ A monitoring system for ensuring safe use of trucks must be implemented.	No speeding. No accidents. Impacts to local and private roads avoided. Compliance with National Road Traffic Act.
Blasting activities	Blasting impacts	Socio-economic	Operational	➲ There is a need to mitigate vibration when mining comes closer than 200 m from the R36 and closer than 1000 m from privately owned homes. Only one hole per delay (instance in time) may be fired to limit ground vibration to the required levels. This is achieved through effective timing designs and using initiation systems that accurately reflect the timing design. ➲ A baseline study of houses within 1000 m of blasting will be needed before blasting commences to determine the current condition of the buildings as a reference. The blasting to date from surrounding existing mines are unlikely to have caused damage, but houses naturally deteriorate with time, so there will be cracks and other damage that are not blasting related and need to be recorded. ➲ Routine air blast and ground vibration monitoring must be carried out near the closest private home to each blast. Occasional audits must be conducted on blasting practices and mitigation options reconsidered if monitoring shows that levels exceed applicable guidelines.	Control blasting impacts. Compliance with Blast Design Specification, Mine Health and Safety Act, Explosives Act, Explosives Regulations (2003) and all relevant SANS standards and health and safety standards.

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				➲ Air blast control will be important to meet the limit of 125 dB and to avoid complaints regarding the mine activities. At 125 dB limit, air blast will be controlled within the blast and will have low significance at distances beyond 100 m. ➲ Air blast and related noise from blasting need to be controlled by providing adequate stemming in each blasthole as per an effective design. Stemming lengths must not be less than 20 hole-diameters, except in presplit holes. Strict control needs to be applied to prevent the occurrence of over-charged holes. ➲ Stemming length control also applies to fly rock control. ➲ Under-burdened faces are a major source of fly rock and air blast. Burden control on free faces must be applied and face profiling must be applied on faces that are oriented towards receptors that are closer than 1000 m from a blast. Effective burden control implies presplitting of all overburden and mid-burden blasts to create good quality vertical high walls. ➲ As a normal procedure, it will be necessary to temporarily clear people to a safe distance (1000 m) from blasting activities. This control must also apply to people working in the opencast operations immediately adjacent to the mine. ➲ In cases where roads or railway lines (R36 and the railway line to the Southeast of the mine) come within the zone of influence of fly rock from blasting, traffic must be stopped at a safe distance of a minimum of 1000 m during blasting operations. ➲ Pre-split blasting can generate very high air blast amplitudes. This must be controlled by firing presplit holes one at a time in sequence away from nearby receptors and in an upwind direction.	

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				➲ Routine air blast and ground vibration monitoring must be carried out near the closest private home to each blast. Occasional audits must be conducted on blasting practices and mitigation options reconsidered if monitoring shows that levels exceed applicable guidelines. ➲ Only waterproof explosives must be used for blasting. Bulk emulsions and bulk emulsion blends are suitable, but explosives that can dissolve in water, such as ANFO must never be used. ➲ Sleep times (how long a blast stands after it is charged and before it is fired), must be limited to a maximum value depending on manufacturers recommendations. ➲ Any spillages of stored explosives, especially ammonium nitrate prill, must be controlled with adequate bunding and cleaned immediately after a spillage occurs. ➲ Should any nitrous oxide fumes be observed during a blast, blasting activity must be reviewed and the cause of the fumes identified and corrected if needed. Causes include poor charging practices, incorrect explosives formulation or holes that are too close together in softer formations. Heritage sites (including graves): ➲ In several cases, there are heritage sites that will be located closer than 500 m from blasting. These structures are particularly sensitive to fly rock risk. For these structures, the following measures need to be taken in addition to the fly rock control measures outlined previously. 1. Stemming lengths must be increased to >25 hole-diameters. 2. For each blast, every heritage site within 500 m of a blast must be mapped before the blast and then checked after the blast. If there is any fly rock within	

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				250 m of such site specialist advice must be obtained to curb the risk in future blasts. ➲ A video recording of each blast must be made to determine the effectiveness of the fly rock control Sites within the mining area: ➲ Ruins and graves are present within the proposed open cast area. The proposal is to leave remnant pillars around each of these sites that are 50 m in radius. Special care will be needed to minimise the risk of pillar displacement or damage during blasting around the pillar. This will require smaller diameter holes (reduced from 250 mm), long delays, and only one hole firing per delay when blasting closer than 100 m from the pillar. Specialist advice will be needed in working out the mining sequence around the pillars and in designing each blast closer than 100 m from the pillar edges to ensure no pillar displacement occurs and that vibration limits are met. Buildings and people closer than 500 m from blasting ➲ A few people and buildings will remain within the zone of influence of ground vibration and fly rock after the measures outlined above have been applied. For these cases, special additional mitigation measures will need to be applied which will most likely involve a reduced charge mass per hole. This can be achieved through drilling smaller diameter holes, multiple benching or firing decked charges in each hole. The method chosen must be guided by the mine's technical expertise or by obtaining specialist advice. ➲ An alternative will be for the mine to buy the properties that are within the zone of influence. ➲ There is an active operation on the northeastern corner of Roodebloem Farm that will end up being withing a few tens of metres of blasting during Years 10 to 15. Mitigation will require communicating	

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				blasting times and making sure the operation is cleared of people whenever blasting takes place. ➲ All non-mining people and animals must be evacuated when blasting is closer than 1000 m from them. ➲ The active operation on the northeastern corner of Roodebloem Farm must be cleared of people whenever blasting takes place.	
➲ Removal of surface infrastructure ➲ Rehabilitation of mining area	Mine Closure and Associated Effects on the Local Economy	Socio-economic	Decommissioning / Post Closure (Including Rehabilitation)	➲ The Project must encourage and invest in alternative livelihoods development so that at decommissioning and closure phases, the local area is not reliant exclusively on the Project for employment and economic opportunities. Thus by reducing the dependence of the community on mining post closure through local economic development and skills development training. ➲ Plan, update and implement an integrated Mine Decommissioning, Rehabilitation, and Mine Closure Plan with associated Social Closure Planning five years prior to Mine Closure. ➲ Ilima will follow the procedures for downscaling and retrenchment as set out by the Department of Labour (DoL) and the Labour Relations Act. The impact of closure can be mitigated through the implementation of the measures in the SLP, including regular, consultative review of closure strategies and the portable skills / re-skilling programme. ➲ The final land uses are to be established in consultation with the community and local authorities.	Follow the procedures for downscaling and retrenchment as set out by the Department of Labour (DoL) and the Labour Relations Act Complete site clean-up. Reinstate and rehabilitate areas disturbed by mining activities.

22.6 IMPACT MANAGEMENT ACTIONS

The impact management actions are summarised in Table 22-3.

22.7 FINANCIAL PROVISION

22.7.1 DETERMINATION OF THE AMOUNT OF FINANCIAL PROVISION

The estimate for rehabilitation and closure for the proposed Kranspan Mining Right Extension project is based on the principles and closure activities as set out in the report. The closure plan (Appendix 8) is considered conceptual and therefore certain uncertainties relating to the actual activities to be implemented as part of the decommissioning and closure phases of the project will only be confirmed once a detailed closure plan has been developed.

The costing is based on the DMRE methodology, as described earlier in the report.

It is worth nothing that a significant portion of the closure activities can be completed concurrently with the mining operations, thus significantly reducing the works required at the end of the life of mine.

Ilima has an approved financial provision in the form of guarantees to the total amount of R30 971 412.00 for the Kranspan Mining Right. The quantum for closure for the existing Kranspan Mining Right is summarized in Table 22-4 and reflects the latest environmental closure liability as calculated for the period ending 2022. The liability assessment includes provision for the demolition of the current plant (dry crushing and screening).

The liability for the Kranspan extension area for the first 6 -18 months of the LoM is expected to be similar or less than that of Kranspan. This liability will be provided in the Final EIR.

TABLE 22-4: QUANTUM CLOSURE

CALCULATION OF THE QUANTUM							
	KRANSPAN 49-IT - 10224MR	**Location:**	Ilima Coal Company				
	ABS Africa	**Date:**	Jan 2023				
	Description: Class A (Medium Risk)	**Unit:**	**A Quantity**	**B Master rate**	**C Multiplication factor**	**D Weighting factor 1**	**E=A*B*C*D Amount (Rands)**
Component			**Step 4.5**	**Step 4.3**	**Step 4.3**	**Step 4.4**	
1	Dismantling of processing plant & related structures (incl. overland conveyors & Power lines)	m^3	996,01	R18,05	1,00	1,10	R 19 778
2 (A)	Demolition of steel buildings & Structures	m^2	932,00	R251,46	1,00	1,10	R 257 795
2 (B)	Demolition of reinforced concrete buildings & structures	m^2	592,00	R370,57	1,00	1,10	R 241 315
3	Rehabilitation of access roads	m^2	138219,00	R45,00	1,00	1,10	R 6 841 506
4(A)	Demolition & rehabilitation of electrified railway lines	m	0,00	R436,74	1,00	1,10	R 0
4(B)	Demolition & rehabilitation of non electrified railway lines	m	0,00	R238,22	1,00	1,10	R 0
5	Demolition of housing &/or administration facilities	m^2	0,00	R502,92	1,00	1,10	R 0
6	Opencast rehabilitation including final voids & ramps	ha	6,88	R255 958,06	**0,52**	1,10	R 1 007 492
7	Sealing of shafts, adits & inclines	m^3	0,00	R134,99	1,00	1,10	R 0
8(A)	Rehabilitation of overburden & spoils	ha	10,00	R175 756,10	1,00	1,10	R 1 933 278
8(B)	Rehabilitation of processing waste deposits & evaporation ponds (basic, salt producing waste)	ha	0,00	R218 901,05	1,00	1,10	R 0
8(C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic, metal-rich waste)	ha	0,00	R635 792,41	**0,80**	1,10	R 0
9	Rehabilitation of subsided areas	ha	0,00	R147 169,27	1,00	1,10	R 0
10	General surface rehabilitation	ha	35,85	R139 228,48	1,00	1,10	R 5 490 613
11	River diversions	ha	0,00	R139 228,48	1,00	1,10	R 0
12	Fencing	m	640,00	R158,82	1,00	1,10	R 111 806
13	Water management	ha	6,88	R52 938,59	**0,67**	1,10	R 268 483
14	2 to 3 years of maintenance & aftercare	ha	35,85	R18 528,50	1,00	1,10	R 730 690
	Specialist study (Hydrogeological study)	SUM	1,00	**R164 077,74**	**1,00**	1,10	R 180 486
	Specialist study (Auditing)	SUM	1,00	**R81 501,49**	**1,00**	1,10	R 89 652
							R 17 172 894
	Weighting Factor 2 (step 4.4)			**1,05**		**Sub Total 1**	**R 18 031 538**
	Preliminary and General			12% of Sub Total 1			**R 2 060 747**
	Administration and supervision costs			6% of Sub Total 1			**R 1 030 374**
	Engineering Drawings and specifications			2% of Sub Total 1			**R 343 458**
	Engineering and Procurement of specialist work			2.5% of Sub Total 1			**R 429 322**
	Development of a closure plan Final Groundwater modelling			2.5% of Sub Total 1			**R 429 322**
	Contingency			10% of Sub Total 1			**R 1 717 289**
						Sub Total 2	**R 24 042 051**
	VAT (15%)						**R 3 606 308**
	GRAND TOTAL						**R 27 648 359**

The following assumptions will apply to the calculation of the quantum for closure associated with the Kranspan Mining Right Extension Project:

- It is assumed that concurrent rehabilitation will be undertaken as soon as steady state is achieved and the roll-over mining method is employed and that the surface disturbances that the calculations are based on will not change significantly;
- The establishment of a coal wash plant will not be undertaken during the first three years of mining at Kranspan and the financial provision for the closure of these facilities is therefore not presented in the Quantum;
- No underground mining is planned during the first 18 months of mining;
- All structures established for the project will be removed and the affected areas rehabilitated;
- All access roads will be rehabilitated as soon as the roads are no longer required;
- It is assumed that no water treatment will be required following the closure of the mine and that the pollution control facilities will be adequate to contain any seeps from these areas; and
- The conceptual closure plan and associated quantum for closure will be reviewed on an annual basis, as per the requirements of South African legislation and updated accordingly. Any changes to the mine plan or infrastructure requirements will be captured in the annual review and the quantum updated accordingly.

The assumptions will be reviewed on an annual basis based on the monitoring information generated as well as the various specialist studies to be undertaken as part of the calibration of the geohydrological model as well as the refinement of the closure plan.

22.7.2 Confirm Specifically that the Environmental Objectives in Relation to Closure have been Consulted with Landowner and Interested and Affected Parties

All aspects of the conceptual closure planning undertaken to date, including the applicable specialist studies and the closure plan itself is made available for review and comment as part of the public participation process described in the EIA Report.

Throughout the LoM, the applicant should, through appropriate engagement mechanisms such as the Future Forum, established in terms of the SLP, continue to engage with interested and affected parties in order to refine and further develop the closure plan ahead of its actual implementation.

22.7.3 Provide a Rehabilitation Plan that Describes and Shows the Scale Aerial Extent of the Main Mining Activities, Including the Anticipated Mining Area at the Times of Closure

The Closure Plan in Appendix 8 details the conceptual rehabilitation measures to be implemented at the time of closure. The plan details the proposed closure measures to be implemented for the following:

- General reclamation and closure activities;
- Reclamation and closure activities applicable to specific infrastructure areas; and
- Rehabilitation monitoring, aftercare and maintenance.

The post closure land use is shown in Appendix 3 Map 22.

22.7.4 Explain why it can be Confirmed that the Rehabilitation Plan is Compatible with the Closure Objectives

Ilima's objective for the rehabilitation and closure of the mine is to ensure that the site is left in a condition that is safe and stable where long-term environmental impacts are minimised and any future liability to the community and future land use restrictions are minimised. The final post-mining land use will be determined in consultation with the local communities, DMRE as well as other departments responsible for environmental and social aspects. The land uses to be identified during this process are likely to include the following:

- Livestock grazing;
- Cultivation; and
- Wildlife habitat.

For health and safety reasons as well as the protection of specific rehabilitation works, specific areas within the license area may be designated as exclusion zones. Natural soil covers and vegetation will as far as possible be re-established over these areas but access by humans and / or livestock will be prohibited.

The following closure objectives form part of the conceptual closure plan:

- All structures not desirable or usable post closure will be demolished and building material removed or disposed of;
- Hazardous material, equipment and contaminated soils and steel structures will be disposed of safely and in an environmentally acceptable manner;
- The coal wash plant and other areas used for the handling and storage of hazardous materials will be decontaminated;
- Rehabilitation of disturbed areas to a final land use capability that is practical and best suited for the final landform, taking into consideration the socio-economic activities of the receiving communities; and
- At the end of the mine life, the residual facilities will include surface water diversion structures and supporting infrastructure.

The ultimate end-use of the rehabilitated areas is considered to have three major objectives. The first is the re-establishment to the greatest feasible degree of vegetation on the disturbed areas within the concession. The second is the re-integration of the disturbed areas outside the project footprint into the agricultural and other prevalent economies. Thirdly, by working with and involving local people in the re-development of the disturbed land to assist them in working towards a more sustainable form of livelihood.

22.7.5 Calculate and State the Quantum of the Financial Provisions Required to Manage and Rehabilitate the Environment in Accordance with the Applicable Guideline

Ilima has an approved financial provision in the form of guarantees to the total amount of R30 971 412.00 for the Kranspan Mining Right. The quantum for closure for the existing Kranspan Mining Right is summarized in Table 22-4 and reflects the latest environmental closure liability as calculated for the period ending 2022. The liability assessment includes provision for the demolition of the current plant (dry crushing and screening).

The liability for the Kranspan extension area for the first 6 -18 months of the LoM is expected to be similar or less than that of Kranspan. This liability will be provided in the Final EIR.

Refer to the Closure Plan in Appendix 8.

22.7.6 Confirm that the Financial Provision will be Approved as Determined

The financial provision has been issued to the applicant and the amount will be incorporated into the financial model of the mine. The applicant is also committed to ensuring that the financial provision is updated annually as required by legislation.

TABLE 22-5: MECHANISMS FOR MONITORING COMPLIANCE WITH AND PERFORMANCE ASSESSMENT AGAINST THE ENVIRONMENTAL MANAGEMENT PROGRAMME AND REPORTING THEREON

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
All activities throughout the LoM	Audit Reports: ➲ EA and EMPr; ➲ Financial Provision Update	Compliance with the conditions of the EA and EMPr in terms of NEMA. To ensure that the mine is compliant with the financial provision regulations and that there is sufficient funding provided by the mine for closure and rehabilitation cost and meets the requirements as stipulated in Regulation 11(1) of the New Financial Provisioning Regulations.	Independent Environmental Compliance Specialist / Closure Specialist	ECO must undertake weekly inspections, quarterly internal compliance audits and annual external compliance audits Update financial provision annually and must be audited by an independent auditor
Operation activities	Impacts to surface water: water quality	➲ A functioning wetland unit provides a water quality remediation process and therefore adds a protection factor to perhaps more sensitive aquatic habitat located downstream within the system. The capacity for water purification has an obvious limit and is different from one wetland unit to the next. Preserving the overall ecological integrity and functionality of a wetland unit will enhance its capacity for water purification. ➲ The quality of the water that is being discharged into the wetland units (be it clean stormwater runoff, dirty process water or just the water the flows within the wetland zones) needs to be monitored and the results compared to target water quality guideline values. General water quality parameters, elemental scans and bacteriological counts should be part of routine analysis, undertaken at least every six months. ➲ If an incident occurs on site, such as an accidental spill, chemical leaks, sewerage contamination and the like, then a water quality monitoring schedule, targeting specifically the	Mine Manager Environmental Manager Aquatic specialist	Water quality should be monitored for at least every six months (biennially) during normal operations but will increase in response to accidental spillages or other incidences that warrant more frequent monitoring.

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
		offensive pollutant, must be implemented at a frequency recommended by the ECO designated to the site. ➲ If poor or deteriorating water quality trends are observed, then the source of the pollutants must be identified and remedied appropriately, according to the type of pollution impacts identified. ➲ Water quality monitoring should be undertaken at the same site each time and the sampled analysed at an accredited laboratory. ➲ Water samples were taken during the baseline survey to gain an understanding of the water quality within the survey area. This can be modified at the discretion of the plant management if necessary. ➲ Monitoring should be undertaken within watercourses prior to the impact zones as well as within the same watercourses as they leave the impact zones. Recommended water quality monitoring points are provided in the specialist report. As the collection of water samples is dependent on the presence of surface waters, the inclusion of all the recommended points may not be practical. Further to those points recommended, effluent and decanting water outfalls, outfalls of attenuation ponds, and outfalls pertaining to the stormwater management plan should also be included. ➲ Monitoring points must also include as many of the local catchments within the site as possible to gain an overall understanding of the impacts to water quality, how those contaminants are being transported and to where they are being transported to. Managing a local catchment that has a		

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
		single draining watercourse is then easier to manage, should the need arise.		
All activities throughout the LoM	Impacts to groundwater	Depth to groundwater level in mine boreholes: Variations by more than 3m for 2 consecutive months should be investigated.	Mine Manager Environmental Manager Groundwater Specialist	Quarterly
		Depth to groundwater level in all other private boreholes: If any changes in groundwater level of more than 3m are noted, these should be investigated		Every five years
		Water quality analysis in all mine and hydrocensus boreholes: Variations in concentrations by more than 15% for major cations and anions and more than 7% for metal concentrations for more than 2 consecutive months should be investigated. Any result that exceed specified water quality objectives must be investigated when it occurs.		Quarterly
Decant from pits		Decant quality, if applicable		Quarterly
All activities throughout the LoM		Rainfall depth (mm)		Daily on site
		The results of the monitoring programme must be reported on a quarterly and annual basis for the purpose of internal WST water management. These reports must also be submitted to the authorities for review, as per WUL requirements.		Quarterly and annual
All activities throughout the LoM	Impacts to flora and fauna	The BMP should include a simple monitoring programme that focuses on the use of repeatable fixed-point photography to monitor representative areas of the four Natural Habitat vegetation units identified for the project area. The BMP should also include detailed management and monitoring recommendations for the two threatened plant species (*Khadia carolinensis* and Sensitive Species 1200) confirmed to occur within the project area and their habitat.	Mine Manager Environmental Manager Botanist	The plant SCC and their habitat should be monitored annually by a botanist using simple methods such as plant counts, fixed point photography and, when necessary, monitoring of vegetation cover and species composition within a limited number of sampling quadrats.
Construction	Impacts to soil	The project area must be monitored by-annually for the soil disturbance (compaction and erosion) at areas earmarked for mining and supporting infrastructures. In incidents where soil	Mine Manager	Bi-annual monitoring during construction

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
		compaction and/or erosion does occur, action plans must be implemented to apply mitigation measures.	Environmental Manager Soil scientist	
Operation		Soil samples taken on site by a soil scientist in this report and sent to the lab for fertility tests before the operational phase must be used as soil baseline data at the rehabilitation stage. Therefore, soil analysis and sampling will not be necessary at this stage. The results will be used to compare soil fertility of the topsoil prior and after the operation phase of the mine, which will thereby conclude if any degradation of the soil's chemical properties did occur. Since soil erosion occurs due to surface disturbance, monitoring must take place annually up until the start of the decommissioning phase. A specialist must suggest mitigation measures thereafter to rectify any degradation.		Annual monitoring during operation
Decommissioning		The project area must be monitored monthly for soil erosion. In cases where soil erosion does occur, action plans must be implemented to apply mitigation measures and to avoid these areas as much as possible in future.		Monthly monitoring during decommissioning
Rehabilitation		Soil samples must be taken on site to the lab for fertility tests within the first month of rehabilitation. The results thereof must be compared to the results obtained as baseline data and after construction to conclude the findings of the change in the topsoil's chemical properties. Annual soil sampling post rehabilitation is applicable to arable post closure land uses, and not applicable to grazing land. Soil sampling at this stage must be informed by the level of vegetation cover established during the rehabilitation phase. The relevant specialist can suggest mitigation measures thereafter to rectify any degradation. Therefore, annual soil sampling must be carried out within the same season as the previous sampling in all the arable post closure land uses until closure is obtained.		Compaction and erosion must be monitored within the first month of rehabilitation. Thereafter, similar monitoring must be applied every six months until closure is obtained

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
		Compaction and erosion must be monitored within the first month to gain knowledge of areas impacted upon during the decommissioning phase. Rehabilitation of these sites must take place by means of the rehabilitation guidelines provided. Thereafter, similar monitoring and the accompanied mitigation measures must be applied every six months until closure is obtained. A post-mining land capability assessment must form part of a yearly monitoring program to assess the rehabilitated areas against the land capability targets set.		
All construction and opencast mining activities.	Impacts to air quality as a result of dust generation	To ensure that mitigation is effective, it is recommended that continuous dustfall monitoring be conducted via a network comprising of one dust bucket near the dry crusher and eight dust buckets at the AQSRs nearest to the project border, i.e. AQSR1, AQSR4, AQSR 10, AQSR12, AQSR13, AQSR15, AQSR16 and AQSR21. This must be undertaken throughout the Project duration to provide air quality trends. Even though these locations are legally required to comply with the non-residential dustfall limits (1 200 mg/m^2/day), it is recommended that dustfall limits comply with the NDCR residential limit (600 mg/m^2/day). Results from site inspections and monitoring efforts must be combined to determine progress against source- and receptor-based performance indicators. Progress must be reported to all interested and affected parties, including authorities and persons affected by pollution.	Mine Manager Environmental Manager Air quality specialist	Monthly, with monthly and annual reporting Periodic inspections and progress reporting are recommended to be undertaken at regular intervals (at least quarterly), with annual environmental audits being conducted. Annual environmental audits must be continued at least until closure
All construction and opencast mining activities.	Impacts to noise	Noise survey requirements: ➲ Sampling must be carried out using a Type 1 SLM that meets all appropriate IEC standards and is subject to annual calibration by an accredited laboratory.	Mine Manager Environmental Manager	Bbi-annual noise sampling must be conducted at the closest sensitive receptors to the active areas at any given time

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
		➲ The acoustic sensitivity of the SLM must be tested with a portable acoustic calibrator before and after each sampling session. ➲ Samples of 10 min to 24 hours in duration and sufficient for statistical analysis must be taken with the use of portable SLM's capable of logging data continuously over the time period. Samples representative of the day- and night-time acoustic environment must be taken. ➲ The following acoustic indices must be recoded and reported: LAeq (T), statistical noise level LA90, LAFmin and LAFmax, octave band or 3rd octave band frequency spectra. ➲ The SLM must be located approximately 1.5 m above the ground and no closer than 3 m to any reflecting surface. ➲ Efforts must be made to ensure that measurements are not affected by the residual noise and extraneous influences, e.g. wind, electrical interference and any other non-acoustic interference, and that the instrument is operated under the conditions specified by the manufacturer. It is good practice to avoid conducting measurements when the wind speed is more than 5 m/s, while it is raining or when the ground is wet. ➲ A detailed log and record must be kept. Records must include site details, weather conditions during sampling and observations made regarding the acoustic environment of each site. The investigation of complaints must include an investigation into equipment or machinery that likely result or resulted in noise levels annoying to the community.	Trained noise specialist	In the event that noise related complaints are received short term (24-hour) ambient noise measurements must be conducted as part of investigating the complaints

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Construction activities	Impacts to heritage and palaeontological resources	As most heritage and palaeontological resources occur below surface, all earth-moving activities need to be routinely monitored in case of accidental discoveries. The greatest potential impacts are from pre-construction and construction activities. The Environmental Manager must monitor all such activities. If any heritage resources are found, the chance finds procedure must be followed. If risks are manifested (accidental discovery of heritage resources) the chance find procedure must be implemented: 1. Cease all works immediately; 2. Report incident to Site Manager 3. EPC (Engineering Procurement and Construction) Contractor to contact an archaeologist/ palaeontologist to inspect the site; 4. Report incident to SAHRA; as advised by specialist and 5. Employ site specific mitigation measures recommended by the specialist after assessment in accordance with the requirements of the relevant authorities. Only recommence operations once impacts have been mitigated. Ruins (KP 12, KP 13, KP 17, KP 21, KP 22, C001, C012, C013, C017, C024, C025) must be monitored during initial mining activities or construction as these could contain unmarked graves	Mine Manager Environmental Manager	Weekly (Pre construction and construction phase) Ruins must be monitored during initial mining activities or construction as these could contain unmarked graves
Local employment targets	Impacts to the socio-economic environment	Review against set local employment targets	Human Resources and Community Development	Quarterly
Local procurement targets		Review the numbers of local businesses engaged in programs either individuals or through joint ventures	Human Resources and Community Development	Quarterly

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Community and workforce health, safety, and security		On-going identification, management, monitoring of health and safety risks	Mine Manager	Daily
SLP implementation		Conduct annual audits against set targets for implementation	Mine Manager and Board of Directors of Ilima	Annually
HRD Programme		Monitoring and amending of the HRD Programme to improve plan for the existing life of mine	Human Resources and Community Development	Annually
Written complaints and grievance procedure		Track and monitor the number of grievances registered on the matter and their resolution	Community Development and Mine Manger	Daily/weekly
Stakeholder engagement		Monitoring the effectiveness of engagement processes by recording feedback from engagement activities and compiling and tracking the level of achievement of commitments made to communities	Community Development	Daily/weekly
All blasting activities	Impacts to infrastructure and sensitive receptors as a result of blasting	Routine air blast and ground vibration monitoring must be carried out near the closest private home to each blast. Occasional audits must be conducted on blasting practices and mitigation options reconsidered if monitoring shows that levels exceed applicable guidelines. Should any nitrous oxide fumes be observed during a blast, blasting activity must be reviewed and the cause of the fumes identified and corrected if needed. Causes include poor charging practices, incorrect explosives formulation or holes that are too close together in softer formations.	Blasting consultant Environmental Manager	Monitoring will be undertaken as part of the mining and blasting programme under the supervision of the Environmental Manager

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
		For each blast, every heritage site within 500 m of a blast must be mapped before the blast and then checked after the blast. If there is any fly rock within 250 m of such site specialist advice must be obtained to curb the risk in future blasts. A video recording of each blast must be made to determine the effectiveness of the fly rock control.		

22.8 INDICATE THE FREQUENCY OF THE SUBMISSION OF THE PERFORMANCE REPORT

It is noted that Regulation 55 of the MPRDA Regulations, 2004 (as amended) was repealed by Government Notice No. R. 420 of 27 March 2020, promulgated in terms of Section 107(1) of the Minerals and Petroleum Resources Development Act 8 of 2002.

Mine environmental performance will be assessed through inspections and audits. A key objective of the inspections and audits must be to identify the effectiveness of the management measures. Any gaps should be addressed, and if necessary, the EMPr updated to ensure the site requirements and management of risks and impacts are effective and practicable.

It is recommended that the ECO undertake weekly inspections of the site, quarterly internal compliance audits and annual external compliance audits, including an audit at the end of construction. Auditing of compliance with the Environmental Authorisation and EMPr must be conducted in accordance with Regulation 34 of GN No. R 982 (04 December 2014).

22.9 ENVIRONMENTAL AWARENESS PLAN

22.9.1 Manner in which the Applicant Intends to Inform his or her Employees of any Environmental Risk which may result from their Work

The following environmental awareness activities shall be undertaken throughout the LoM, as relevant to the mine development phases (construction, operation and closure) and activities to be undertaken by specific contractors and/or employees:

- Induction training shall be provided to all personnel and visitors accessing the site. The induction training shall include information on at least the following:
  - All SHE hazards and risks on the site;
  - Emergency procedures to be followed in the event of an incident;
  - Heritage chance-find procedure;
  - Measures to prevent accidents, injuries and impacts to the environment;
  - No-go areas, including sensitive environmental features like wetlands and watercourses; and
  - Overview of the EMPr.
- Specific training programmes for all employee groups (management, supervisor, new hire, and refresher) relative to the type of work to be conducted shall be developed and implemented. These programmes shall, as a minimum, address the following:
  - Training of employees in all aspects of their work environment, hazard recognition, first aid, personal hygiene, electrical safety, rigging and lifting, vehicle safety, fire safety, safety practices for working around machinery with moving parts and other topics that may relate specifically to a job assignment or physical location at the Site;
  - Procedures for responding to fires, explosions, spills and leaks, injuries, vehicle accidents, property damage, bomb threats and robberies and attempted robberies;
  - Hazardous substances training summarising the requirements for the handling of hazardous substances on the site and how to respond to emergency situations shall be included in site induction and refresher training programmes;
  - Toolbox talks shall be presented daily with the objective of creating awareness of the Site SHE risks and hazards and how to effectively prevent accidents, injuries and impacts to the environment; and

- All employees shall undergo initial and refresher training on spillage prevention and response, including the use of the onsite spill response equipment.

22.9.2 Manner in which Risk will be Dealt with in Order to Avoid Pollution or the Degradation of the Environment

The mine must continue to reassess the risks and impacts of the development throughout its operational life. Should any change in the risk and impact profile of the development be determined, additional management controls and mitigation measures must be implemented and the EMPr amended to reflect these changes.

22.10 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

No specific information has been requested by the competent authority for the proposed Kranspan Mining Right Extension project.

The financial provisions for closure and rehabilitation will be confirmed annually and all audits and associated statutory reporting requirements will be adhered to throughout the LoM.

23 UNDERTAKING

The EAP herewith confirms:

(a) The correctness of the information provided in this reports;

(b) The inclusion of comments and inputs from stakeholders and IAPs;

(c) The inclusion of inputs and recommendations from the specialist reports where relevant, and

(d) The acceptability of the project in relation to the findings of the assessment and the level of mitigation proposed.

I Kristy Robertson herewith undertake that the information provided in the foregoing report is correct, and that the comments and inputs from stakeholder and interested and affected parties has been correctly recorded in the report.

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Signature of the EAP

Date: 30 March 2022

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