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mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

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

ENVIRONMENTAL AUTHORISATION APPLICATION FOR KHUTALA COLLIERY PROPOSED 5 SEAM COAL MINING PROJECT WITHIN PORTION 3, OF THE FARM COLOGNE 34 IS, REMAINING EXTENT OF PORTION 2, PORTION 3, 6, 16, 17 AND 18 OF THE FARM ZONDAGSVLEI 9 IS, PORTION 40 OF THE SCHOONGEZICHT 218 IR, PORTION 35 OF THE FARM LEEUWFONTEIN 219 IR AND REMAINING EXTENT OF THE FARM KLEINZUIKERBOSCHPLAAT 5 SITUATED IN THE EMALAHLENI MAGISTERIAL DISTRICT, EMALAHLENI AND VICTOR KHANYE LOCAL MUNICIPALITIES, MPUMALANGA PROVINCE.

Name of Applicant:	Seriti Power (Pty) Limited
Tel No:	013 648 5042
Fax No:	013 648 1423
Physical Address:	34 Farm Cologne, Kendal, Ogies, 2250, South Africa
File Reference Number SAMRAD:	DMRE Mining Right Reference No.:**MP30/5/1/2/2/118MR.** DMRE Environmental Management Reference No.: **MP 30/5/1/2/3/2/1/ (118) EM**
Project Reference Number:	LEM-A0433-03-2020
Date:	04 June 2021

DMRE IMPORTANT NOTICE: ENVIRONMENTAL AUTHORISATION PROCESS

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

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

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

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

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

DOCUMENT REVIEW AND APPROVAL

Client	Seriti Power (Pty) Limited – Khutala Colliery
Report Type:	Environmental Authorisation Application: Draft Environmental Impact Assessment Report
Project Name:	Environmental Authorisation Process for Khutala Colliery proposed 5-Seam Coal Mining Project within Portion 3, of the Farm Cologne 34 IS, Remaining Extent of Portion 2, Portion 3, 6, 16, 17 And 18 of the Farm Zondagsvlei 9 IS, Portion 40 of the Schoongezicht 218 IR, Portion 35 of the Farm Leeuwfontein 219 IR and Remaining Extent of the Farm Kleinzuikerboschplaat 5 IS Situated in the eMalahleni Magisterial District, eMalahleni Local Municipality, Mpumalanga Province
Project Number:	LEM-A0433-03-2020

Name and Surname	**Position and Qualifications**	**Responsibility**	**Signature**	**Date**
Johny Mafego	National Diploma Environmental Science	Report Compiler		28 May 2021
Boipelo Tshehla	BSc. (Hons Environmental Sciences: Hydrology and Geohydrology)	Report Compiler		28 May 2021
Bongani Motha	BSc (Hons Environmental Management)	Report Compiler		03 June 2021
Ralph Repinga (Pr Sci.Nat)	Principal Environmental Scientist MSc (Environmental Sciences) SACNASP Registration Number: 400097/02	Report Reviewer		03 June 2021

OBJECTIVES OF THE SCOPING AND ENVIRONMENTAL IMPACT REPORT PROCESS

THE OBJECTIVES OF THE SCOPING P AND ENVIRONMENTAL IMPACT REPORT ROCESS IS TO, THROUGH A CONSULTATIVE PROCESS-

(a) Identify the relevant polices and legislation relevant to the activity;
(b) Motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
(c) Identify and confirm the preferred activity and technology alternatives through an impact and risk assessment and ranking process;
(d) Identify and confirm the preferred site, through a detailed site selectin process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
(e) Identify the key issues to be addressed in the assessment phase;
(f) Agree on the key issues addressed in the assessment phase; including the methodology to be applied, the expertise required as well as the extend of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and
(g) Identify suitable measures to avoid, manage, or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

EXECUTIVE SUMMARY

Licebo Environmental and Mining (Pty) Ltd (Hereafter referred as '**LEM'**) has been appointed by Seriti Power (Pty) Limited (Hereafter referred as '**Seriti**') (Formerly known as South32 SA Coal Holdings (Pty) Limited: South Africa Energy Coal) as the Environmental Assessment Practitioners (EAP) to conduct an environmental regulatory approval applications which includes an Environmental Authorisation Application involving the compilation of the Scoping and Environmental Impact Report (S&EIR) process as promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended (NEMA) and applicable regulations and Integrated Water Use License Application (IWULA) process in terms of the National Water Act, Act 36 of 1998 as amended (NWA) associated with the proposed 5 Seam Mining Project at Khutala Colliery (Khutala).

Seriti is the holder of a converted mining right for coal, issued under Department of Mineral Resources and Energy (DMRE) reference **MP30/5/1/2/2/118 MR** and registered at the Mining Titles Registration Office under reference **07/2013** in respect of the mining operations situated at Khutala Colliery. Seriti is the owner and operator of Khutala Colliery which falls under a cost-plus arrangement with Eskom Holdings SOC Limited (Eskom). Khutala Colliery is predominately an underground operation. It is located in the eMalahleni and Victor Khanye Local Municipalities, within the Nkangala District Municipality, in the Mpumalanga Province of South Africa.

Khutala is a large, multi-section underground and opencast mine, predominantly supplying the domestic market. Seriti supplies domestic coal, specifically coal from the 4 and 2 Seam from Khutala to Eskom's Kendal power station under the long-term Kendal coal supply agreement (CSA). Khutala was commissioned as a single product mine to supply Kendal, with first coal delivered in 1986. Currently, Khutala supplies ~13.3 Mtpa of coal to Kendal and is critical to the long-term sustainability of the power station.

The Environmental Authorisation (EA) application and the Final Scoping Report (FSR) were submitted to the Department of Mineral Resources and Energy (DMRE), Mpumalanga Region Witbank Offices on the 24th of February 2021. The FSR was acknowledged and accepted by the DMRE on the 10th of March 2021 to allow Khutala Colliery to undertake Environmental Impact Assessment (EIA) and Environmental Management Programme Report (EMPr) for the proposed 5 Seam Mining Project.

Project applicant

The details of the applicant for this project are indicated on the table below:

Name of Applicant:	Seriti Power (Pty) Limited – Khutala Colliery		
Registration Number (if any):	1963/000537/07		
Trading Name (if any):			
Responsible person:	Eldoreen van der Wath		
Name of Project:	Khutala 5 Seam Mining Project		
Contact Person	Thembani Mashamba		
Physical Address:	Portion 3 of the Farm Cologne 34 IS, Ogies		
Postal Address:	PO Box 440, Ogies		
Postal Code	2230	**Cell phone**	082 908 2881
Telephone:	013 689 4130	**Fax:**	086 718 2070
E-mail:	Thembani.Mashamba@seritiza.com.		

Brief description and location

Mine description and location	Khutala Colliery, an operation of Seriti, which is situated on the R555 near Kendal Power Station and approximately 10km south of Ogies, Mpumalanga Province. The total size of the mining lease area on which Khutala Colliery is situated is approximately 97.06 km^2 in size. Khutala Colliery's Mining Right was converted to a new order right on 11 October 2011. Khutala comprises of mineable 5, 4 and 2 coal seams. The 2 and 4 coal seams are dedicated to Eskom and are mined by Khutala for supply to the Kendal Power Station as part of the CSA, whilst the 5 Seam coal within the mining right area is held by Seriti and the coal is of export quality and can be sold in the open market. These resources form part of the larger extent of Khutala, which is located in the eMalahleni (Witbank) in eMalahleni and Victor Khanye Local Municipalities within Nkangala District Municipality, Mpumalanga Province. It is situated approximately 100 km

	east of Johannesburg, and about 50 km to 60 km towards the south-west of eMalahleni, South Africa.
Mining Right Reference Number	MP 30/5/1/2/2/118 MR
DMRE Environmental Management Reference Number	MP 30/5/1/2/3/2/1/ (118) EM
Mining Right Issue Date and Validity	The new order mining right was converted on 11 October 2011 and will continue to be in force for a period of 30 years until 10 October 2041.
Holder of the Mining Rights and Environmental Authorisations	Seriti Power (Pty) Limited (Formerly known as South32 SA Coal Holdings (Pty) Ltd) – Khutala Colliery (Company Registration Number: 1963/000537/07)
Municipality and Magisterial District	eMalahleni and Victor Khanye Local Municipalities within Nkangala District Municipality, Mpumalanga Province. Magisterial/Administrative District of eMalahleni (Witbank) and Delmas.

Approach and methodology for the Public Participation

The COVID-19 Regulations, (Directions Regarding Measures to Address, Prevent and Combat the Spread of Covid-19 Relating to National Environmental Management Permits and Licences (GN R 650 of 5 June 2020)) as well as the Environmental Impact Assessment (EIA) Regulations, 2014 (GN R 982 of 4 December 2014 as amended by GN R326 of 7 April 2017) (EIA Regulations, 2014), as amended promulgated under the NEMA, have been considered for this application process and Public Participation. The Public Participation Process (PPP) is central to the investigation of environmental and social impacts. Stakeholders who are affected by the proposed Project will be given an opportunity to identify concerns to ensure that local knowledge, needs and values are understood and taken into consideration as part of the EIA process.

Listed Activities Applied for

The below listed activities has been applied to be authorised as part of this environmental impact report.

Name of activity (All activities including activities not listed) (E.g. excavations, blasting, stockpiles, discard dump or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stones, workshop, processing plant, storm water control, beams, roads, pipeline, power lines, conveyors etc.)	**Aerial extent of the activity** Ha or m^2	**Listed activity.** Mark with an X where applicable or affected	**Applicable listing notice** (GNR 983, GNR 984 or GNR 985) / not listed	**Waste Management Authorisations** (indicate whether an authorisation is required in terms of the National Environmental Management Waste Act)
The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water- (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughout of 120 litres per second or more. **Activities associated with the construction of water reticulation and stormwater management infrastructure including canals.**	Approximately 2000m (Linear activity	Activity Number 9	GNR 327 - Listing Notice 1	N/A
The development of — (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs — (a) within a watercourse; (b) in front of a development setback; or	Approximately 3000m (Linear activity)	Activity Number 12	GNR 327 - Listing Notice 1	N/A

Name of activity (All activities including activities not listed) (E.g. excavations, blasting, stockpiles, discard dump or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stones, workshop, processing plant, storm water control, beams, roads, pipeline, power lines, conveyors etc.)	**Aerial extent of the activity** Ha or m^2	**Listed activity.** Mark with an X where applicable or affected	**Applicable listing notice** (GNR 983, GNR 984 or GNR 985) / not listed	**Waste Management Authorisations** (indicate whether an authorisation is required in terms of the National Environmental Management Waste Act)
(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. **Associated with the development and construction of the proposed mining activities and associated infrastructure including the KPS/KHU Link Road.**				
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. **Activities associated with the development and construction of the mining project and associated infrastructure including the KPS/KHU Link Road within wetlands and streams.**	Approximately 6 ha	Activity Number 19	GNR 327 - Listing Notice 1	N/A
The development of a road – (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the	Approximately 11.2 ha	Activity Number 24	GNR 327 - Listing Notice 1	N/A

Name of activity (All activities including activities not listed) (E.g. excavations, blasting, stockpiles, discard dump or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stones, workshop, processing plant, storm water control, beams, roads, pipeline, power lines, conveyors etc.)	**Aerial extent of the activity** Ha or m^2	**Listed activity.** Mark with an X where applicable or affected	**Applicable listing notice** (GNR 983, GNR 984 or GNR 985) / not listed	**Waste Management Authorisations** (indicate whether an authorisation is required in terms of the National Environmental Management Waste Act)
road is wider than 8 metres. **Construction of the proposed KPS/KHU Link Road and stream crossings. The link road will be used to transport coal in between Khutala and Klipspruit.**				
The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation. **Clearance of vegetation to accommodate the construction of the KPS/KHU Link road. Vegetation clearance will be undertaken on Portion 3 and 17 of the farm Zondagsvlei 9 IS and the Remaining Extent of Portion 5 of the farm Kleinzuikerboschplaat 5 IS.**	Approximately 11.2 ha (Length x width) The section that will be cleared for road construction, is (2242 m x 50m)	Activity Number 27	GNR 327 - Listing Notice 1	N/A
Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture on or after 01 April	Approximately 538 ha	Activity Number 28	GNR 327 - Listing Notice 1	N/A

Name of activity (All activities including activities not listed) (E.g. excavations, blasting, stockpiles, discard dump or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stones, workshop, processing plant, storm water control, beams, roads, pipeline, power lines, conveyors etc.)	**Aerial extent of the activity** Ha or m^2	**Listed activity.** Mark with an X where applicable or affected	**Applicable listing notice** (GNR 983, GNR 984 or GNR 985) / not listed	**Waste Management Authorisations** (indicate whether an authorisation is required in terms of the National Environmental Management Waste Act)
1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes. **Activities relating to the development of the proposed 5 Seam Mining Project including the associated infrastructure and the KPS/KHU Link Road which will fall within the institutional development within the eMalahleni and Victor Khanye rural areas.**				
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	Approximately 4000m^2	Activity Number 6	GNR 325 – Listing Notice 2	N/A

Name of activity (All activities including activities not listed) (E.g. excavations, blasting, stockpiles, discard dump or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stones, workshop, processing plant, storm water control, beams, roads, pipeline, power lines, conveyors etc.)	**Aerial extent of the activity** Ha or m^2	**Listed activity.** Mark with an X where applicable or affected	**Applicable listing notice** (GNR 983, GNR 984 or GNR 985) / not listed	**Waste Management Authorisations** (indicate whether an authorisation is required in terms of the National Environmental Management Waste Act)
emissions, pollution or effluent, excluding— (i) activities which are identified and included in Listing Notice 1 of 2014; and (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 **Activities relating to the NWA, Section 21 (g) water use licence activities associated with the Run of Mine Coal Stockpile of approximately 10 000 tons per month (t/m) including associated infrastructure.**				
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—	Approximately 527 ha	Activity number 17	GNR 325 – Listing Notice 17.	N/A

Name of activity (All activities including activities not listed) (E.g. excavations, blasting, stockpiles, discard dump or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stones, workshop, processing plant, storm water control, beams, roads, pipeline, power lines, conveyors etc.)	**Aerial extent of the activity** Ha or m^2	**Listed activity.** Mark with an X where applicable or affected	**Applicable listing notice** (GNR 983, GNR 984 or GNR 985) / not listed	**Waste Management Authorisations** (indicate whether an authorisation is required in terms of the National Environmental Management Waste Act)
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. **Activities relating to the 5 Seam mining activities, coal extraction, classifying, crushing, screening or washing.** **Section 102 application to support mining of the 5 seam coal reserves.**				

Project activities and phase description

This section provides a preliminary description of activities that are part of the proposed 5 Seam Mining Project. Each activity can be linked to the proposed mining activities, transportation of coal, dirt and clean water management and any other associated activities that constitute the various collieries' operations. These activities act as driving forces that exert pressure on the natural environment, ultimately resulting in impacts on the biophysical, social and cultural environments.

Activities that will be undertaken as part of the 5 Seam Mining Project are listed in Table below.

Project activities for 5 Seam Mining Project.

Activity No.:	Proposed activities to take place
Construction Phase	
Activity 1	Recruitment, Procurement and Employment.
Activity 2	Transportation of construction material to site
Activity 3	Use and storage of construction fuel and lubricants
Activity 4	Site clearance and topsoil removal as a result of the proposed Project.
Activity 5	Construction Surface Infrastructure (Including KPS/KHU Link Road, Ventilation Shaft, Transfer Chute and associated Water Management Infrastructure)
Activity 6	Construction of ROM Stockpile and associated Water Management Infrastructure
Activity 7	Development and operation of the 5 Seam underground mining activities.
Operational Phase	
Activity 8	Recruitment, procurement and employment
Activity 9	Operation of the 5 Seam underground mining activities
Activity 10	Storage, use and control of fuel and lubricants to be used for the underground mining activities and at the RoM Plant.
Activity 11	Operation of the RoM Stockpile and associated water management infrastructure.
Activity 12	Transportation of coal via the KPS/KHU Link Road
Activity 13	Dirty water management
Activity 14	Waste and sewage generation and disposal
Rehabilitation, Decommissioning and Closure Phases	
Activity 15	Retrenchment of mine employees and staff.

Activity No.:	Proposed activities to take place
Activity 16	Demolition of infrastructure
Activity 17	Final rehabilitation
Post-Closure	
Activity 18	Aftercare and Maintenance

A number of specialist studies were undertaken as part of the proposed Environment Authorisation process between November 2020 and April 2021. The findings of the specialist can be summarised as followed:

Climate

The mine is situated in the Eastern Transvaal Highveld, of the Mpumalanga Province. The climate is largely controlled by the movement of air-masses associated with the Inter-Tropical Convergence Zone. During the summer, high land temperatures produce low pressures and moisture is brought to the catchment through the inflow of maritime air masses from the Indian Ocean. During the winter, the sun moves north and the land cools, causing the development of a continental high-pressure system. The descending and outflowing air produces the regional dry season. For this reason, rainfall is seasonal and largely occurs during the summer months, October to April. Rainfall generally occurs in the form of conventional thunderstorms and is usually accompanied by lightning, heavy rain, strong winds and sometimes hail. The rainfall events are highly localised and can vary over short distances.

The highest rainfall in 24 hours recorded at Ogies between 1903 and 2000 was 129 mm on 19 December 1986. At Bethal, 88 mm was recorded on 27 February 1981. Prior to 1980, storm events produced rainfall as high as 158 mm during a 24-hour period.

The general landscape is typical of the Mpumalanga Highveld with a gently undulating topography. The proposed site is representative of the local topography and is not characterised. by any prominent topographical features. The highest point of the area is approximately 1620 mamsl with the lowest being 1600 mamsl.

Soil

The land use of the of the 5 Seam Mining Project area is dominated by mining area, grazing, residential area, open space/wildlife, plantation and cultivation agriculture. The dominate Land Use of the proposed 5 Seam Mining Project is open area and cultivation followed by mining and infrastructural development.

The Land Use associated with the KPS/KHU Link Road is dominated by mining followed by open space, cultivation, infrastructure and plantation. Five soil groups were encountered during the field assessment and these included Oxidic soils, Plintihic soils, Cumulic soils, Gleyic soils and Anthropic soils. The distribution of these soils groups on landscape depicted that the project areas traverse the Oxidic, Plinthic, Cumulic, Gleyic and Anthropic catena.

Land capability is determined by a combination of soil, terrain and climate features. The identified soil forms were classified into seven (7) land capability and land potential classes
The land type data indicated that the soil of the projects area is reddish and classified as plinthic catena dystrophic and/or mesotrophic. The soil is fairly deep for most deep-rooted crops cultivation. The soils are dominated by Hutton (red apedal (deep)), Emerlo (yellow-brown apedal (deep)) and Lichteburg (red apedal/gard plinthic).

Air quality

The project falls within the Highveld Priority Air Quality Management Area in terms of the National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004) (NEMAQA). This area was declared as priority due to the poor air quality and elevated concentrations of criteria pollutants by industrial and non-industrial sources.

There are several coal-fired power stations nearby and elevated levels of sulphur dioxide (SO_2), particulates (PM_{10} and $PM_{2.5}$) and Nitrous oxides (NO_x) are prevalent, with Kendal Power Station located within a 5km distance to the project. The air quality from a perspective of dust fall-out is affected by the farming activities in the area and is seasonally dependent on the crops covering the site as well as the wind conditions. A substantial amount of dust is generated when fields are worked during windy conditions. There is also dust generation from the nearby opencast mine activities in the general area.

Flora

The study site is situated within the Grassland Biome of South Africa. This biome is dominated by grasslands wherein high summer rainfall, combined with dry winters, night frost and marked

diurnal temperature variations are unfavourable to tree growth. Most plant species in grasslands are non-grassy herbs (forbs), most of which are perennial plants with large underground storage structures. Furthermore, many Rare and Threatened plant species in the summer rainfall regions of South Africa are restricted to high-rainfall grasslands, making the Grassland Biome in most urgent need of conservation.

The Grassland Biome comprises several vegetation types (Mucina & Rutherford, 2006). This site is situated within the historical extent of the Eastern Highveld Grassland. The vegetation is short dense grassland dominated by the usual highveld grass composition (Aristida, Digitaria, Eragrostis, Themeda, Tristachya etc.) with small, scattered rocky outcrops with wiry, sour grasses and some woody species (*Senegalia caffra, Celtis africana, Diospyros lycioides subsp lycioides, Parinari capensis, Protea caffra, P. welwitschii* and *Searsia magalismontanum*). This vegetation type is Endangered. Only a small portion of this grassland type is conserved in nature reserves, while most of its extent is cultivated and transformed by urban development, plantations, and mining in the area (Mucina and Rutherford, 2006).

Much of the site was modified from the reference state of Eastern Highveld Grassland. Secondary grassland and moist grassland were present in between cultivated land and the mining infrastructure. The moist grasslands were also cultivated historically and were subsequently extensively grazed. Certain areas mapped as moist grassland also included a high frequency of terrestrial species, however, a moist element (e.g., species that favour moist soils) were present throughout the grasslands.

The vegetation associations identified on the site were based on the overall similarity in species composition, vegetation structure and disturbance regimes. Mapped associations will thus show where certain vegetation is predominant, but smaller inclusions of another vegetation association or species variation do exist but have not been mapped separately.

The assessed vegetation was grouped as follows:

- Modified land
- Secondary grassland
- Moist grassland
    - Imperata cylindrica moist grassland
    - Senecio gregatus moist grassland
    - Gomphocarpus fructicosus moist grassland

  - Andropogon appendiculatus moist grassland
  - Modified moist grassland (within mining area)
- Not assessed: likely Imperata cylindrica dominated; and
- Not assessed: modified (includes the mining area and infrastructure).

The vegetation along the Link Road has been cultivated, mined, impacted on, or comprises stands of the invasive Eucalyptus (Blue gum) and Acacia (wattle) trees. The 4km northern extent of the proposed road follows an existing conveyer in the north. A dirt road follows the eastern side of the conveyer, while a smaller farm road is present close to the western side of the conveyer. The southern 3.2km extent of the route, as well as the 2.6km west-east section of the site aligns within an existing mine road.

Fauna

Mammals

The following (Threatened or Protected) TOP and endemic species have been previously recorded (Past fauna surveys and Animal (Demographic Unit) ADU) in the area:

- Serval (*Leptailurus serval*) (GN151 Protected). Servals may play a functional role in agricultural landscapes in controlling the numbers of pest species, specifically rodents and invertebrates. Main threats include loss and degradation of wetlands and associated grasslands. Wetlands generally harbour high rodent densities compared with other habitat types, and form the core areas of Serval home ranges; disruption to such habitats reduces prey-base (Ramesh et al., 2016).
- Pretoria Mole-rat (*Cryptomys pretoriae*) (Endemic). Species is considered an eco-engineer increasing the humic content of soil, aerating soil and may enhance infiltration and water-holding capacity of soil. They create refuge for other species within their burrows to escape fires. Species is not threatened but is occasionally persecuted as agricultural, garden and golf-course pest (Bennett et al., 2016).

Other TOP and endemic species likely on site for more extended period rather than just brief foraging excursions or rests include:

- Southern African Hedgehog (*Atelerix frontalis*) (GN151 Protected). Plays a role in invertebrate pest control as an insectivore. Main threats include habitat loss, degradation and fragmentation from urban sprawl and agriculture. Also threatened by illegal harvesting from the wild for food, or for sale as pets and traditional medicine (Light et al., 2016).

- Honey Badger (*Mellivora capensis*) (GN151 Protected). Species could potentially aid in control of rodents and arthropods. Main threats to the species arise from conflict and persecution by bee farmers (Begg et al., 2016).
- Forest Shrew (*Myosorex varius*) (Endemic). The Forest Shrew is an important prey for the Barn Owl, Water Mongoose, African Striped Weasel and Striped Polecat. The main threat to Forest Shrew is the loss or degradation of moist, productive areas such as wetlands and rank grasslands within suitable habitat. Climate change also seen as threat (Taylor et al., 2016a).
- Southern Reedbuck (*Redunca arundinum*) (GN151 Protected). Impacted in the past by habitat transformation and degradation associated with agricultural activities and settlements. On agricultural land, they are subjected to possible persecution due to damage to pastures and crops. Also, susceptible to hunting, snaring and poaching (du Plessis et al., 2016).

Herpetofauna

The previously recorded TOP and endemic herpetofauna for the area and those with distributions across the area are indicated in Table 8. No rocky habitat was observed on site and rocky specialists have been listed as unlikely to occur on site. The following TOP and endemic species have been previously recorded in the greater area:

- Transvaal Thick-toed Gecko (*Pachydactylus affinis*) (Endemic – Partially Restricted).
- Delalande's Sandveld Lizard (*Nucras lalandii*) (Endemic).
- Giant Bullfrog (*Pyxicephalus adspersus*) (GN151 Protected). Species is threatened by loss and degradation of its wetland and neighbouring terrestrial habitat.

Other TOP and endemic species that are likely to occur on site include:

- Coppery Grass Lizard (*Chamaesaura aenea*) (Endemic). Habitat transformation has impacted on species numbers and the species is close to being listed as Vulnerable (Bates et al., 2014).
- Eastern Ground Agama (*Agama aculeata distanti*) (Endemic).
- Aurora House Snake (*Lamprophis aurora*) (Endemic).
- Common Slug-eater (*Duberria lutrix lutrix*) (Endemic).
- Olive Ground Snake (*Lycodonomorphus inornatus*) (Endemic).
- Rattling Frog (*Semnodactylus wealii*) (Endemic).
- Clicking Stream Frog (*Strongylopus grayii*) (Endemic).

Birds

Many of the historically recorded species are wetland and aquatic habitat specialists and may utilise the area periodically, although the representative habitat units on site are not extensive and largely disturbed. The following TOP and endemic species have been historically recorded in the area (SABAP and past surveys):

- Southern Bald Ibis (*Geronticus calvus*) (Endemic) (GN151 Vulnerable; (Red-listed) RL Vulnerable; IUCN Criteria C Vulnerable; Global Population <4 000). Species is threatened by poachers taking eggs and nestlings, by pesticides and poisoning, and habitat destruction and degradation (Taylor et al., 2015).
- African Marsh Harrier (*Circus ranivorus*) (GN151 Protected; RL Endangered). Species provides little in terms of ecological services but together with other species may contribute to control of pest invertebrates, rodents and AIS avifauna. Main threats include deterioration and loss of wetlands, primarily draining and damming of wetlands. Also threatened by poor land management practices and direct disturbance by humans during the breeding season (Taylor et al., 2015).
- Secretarybird (*Sagittarius serpentarius*) (RL Vulnerable; IUCN Vulnerable). Main threats include loss and degradation of grassland habitat through poor grazing and fire management, bush encroachment, urban development and agriculture. Also threatened by trade, hunting and nest raiding, collisions with power-lines, drowning in sheer-walled reservoirs and wind-farms (Taylor et al., 2015).
- Maccoa Duck (*Oxyura maccoa*) (IUCN Vulnerable). Species provides little in terms of ecological services but together with other species may contribute to control of aquatic invertebrates / vectors. Threats include draining of wetlands, pollution through bio-accumulation and Alien Invasive Species (AIS) infestation. Water quality changes that alter their food source could also impact population numbers (Taylor et al., 2015).
- Caspian Tern (*Sterna caspia*) (RL Vulnerable). Species feeds on fish and may contribute to control of AI fish. Main threats to the species include disturbance during the breeding season, egg collection and predation of eggs by predators, including domestic animals. Also threatened by extreme weather that affects water levels (climate change) and bio-accumulation of heavy metals, pesticides and pollution which may also affect breeding success (Taylor et al., 2015).
- South African Cliff Swallow (*Hirundo spilodera*) (Endemic). African Pied Starling (*Spreo bicolor*) (Endemic). Species feeds on insects, fruit and aloe nectar and will act as pollinator for aloes and also as a seed disperser.

- Cape Weaver (*Ploceus capensis*) (Endemic). Species feeds on insects, fruit, nectar and pollen and will act as pollinator and also as a seed disperser.

The following TOP and endemic species are likely on site:

- Blue Korhaan (*Eupodotis caerulescens*) (Endemic) (GN151 Vulnerable). Species has a range restricted to the grasslands, and threats to the Grassland Biome may put pressure on the species (Taylor et al., 2015).
- Lesser Kestrel (*Falco naumanni*) (GN151 Vulnerable). Species mainly faces threats in Europe and Asia, but also locally threatened by control of insects through pesticides, felling of tall trees and collisions with vehicles (Taylor et al., 2015).

Surface water

Khutala Colliery falls within the Upper Olifants Catchment, predominantly in Management Unit (MU) 5, however a portion falls in MU 22 in the Mpumalanga Province. The quaternary catchments in which the Colliery lies is B11F with a small portion lying within the B20E and F quaternary catchments, refer to **Figure 40**. Streams from the mining area drain to tributaries of the Wilge River in quaternary catchments B20E and F and to the Klippoortjiespruit in quaternary catchment B11F which drains to the Tweefonteinspruit approximately 6km upstream of the confluence with the Olifants River. The Wilge River drains to the Olifants River approximately 20 km upstream of Loskop Dam. The Mean Annual Runoff (MAR) for Loskop Dam is 397 x 106 m^3. The water downstream of the site is used primarily for agriculture.
The Olifants Catchment covers an estimated 54 570 km^2 and is subdivided into 9 secondary catchments. The total MAR is approximately 2400 million cubic metres per year (Mm^3/a). The Olifants River and some of its tributaries, notably the Klein Olifants River, Elands River, Wilge River and Bronkhorspruit, rise in the Highveld grasslands.

The upper reaches of the Olifants River Catchment are characterised by extensive opencast and underground coal mining, agricultural and conservation activities. Highly erodible soils result in high sediment loads to the Olifants River which is exacerbated by overgrazing and poorly managed mining activities in the catchment.

There are many large dams in the Olifants Water Management Area, however Witbank and Loskop dams in the Upper Olifants catchment are relevant to the downstream impacts from Khutala Colliery, just one mine amongst many others.

Present ecological state and river characteristics

The Present Ecological State (PES) is defined as the current state or condition of a water resource in terms of its biophysical components (drivers) such as hydrology, geomorphology and water quality and biological responses viz. fish, invertebrates and riparian vegetation. The degree to which ecological conditions of an area have been modified from the natural (reference) condition and the Ecological Importance and Sensitivity (EIS) relate to the presence, representativeness and diversity of species of biota and habitat. Ecological Sensitivity relates to the vulnerability of the habitat and biota to modifications that may occur in flows, water levels and physico-chemical conditions (DWAF, 2006).

This is an area of flat grasslands with rolling rocky zones on top of the escarpment (1 500-1 750 mamsl). Sandstone and shale harbour rich coal deposits, covered by deep, red to yellow sandy soils. Wetlands that overlie these deposits are threatened by potential mining activities. Precipitation is 600-800 mm per year, frequently in the form of summer storms. Mean annual temperatures range from 14-16°C.

The Wilge, Bronkhorstspruit and Klein Olifants Rivers are tributaries of the Olifants River that, together with the Olifants River, originate in the Highveld grasslands in these areas. The river structure varies from a narrow channel with no definite riparian zone up to a 20-30 m wide channel with well-defined riparian habitat. The Witbank and Doringpoort Dams are in this section of the Olifants River.

Mining, predominantly for coal, and other industrial activities in this area are the main contributors to poor in-stream and riparian habitat conditions. In-stream conditions are impaired by poor water quality, where acid leachate from mines is a primary contributor. Low pH (high acidity) and high concentrations of dissolved salts are characteristics of streams in this section.

Stream diversions occur as a result of agricultural and mining activities. In some parts, access roads, mostly related to mining and industrial activities, have resulted in acid water leach from mine dumps, severe disturbance of riparian habitats, and increased erosion of both land and riverbed. In some places the riverbeds are eroded down to the bedrock, leaving little suitable habitat for fish and aquatic invertebrates. Alien plants such as wattles also occur within the riparian zone, competing with indigenous vegetation and reducing available water in the riparian zone. Overgrazing occurs in some areas (DWS, 2016c).

Groundwater

Groundwater elevation vs surface elevation scatter plot for both shallow and deep aquifers for March 2020. The scatter plot indicates that groundwater levels have been impacted by mining activities measured in some deeper boreholes, (BHUG) drilled into the old Kendal 5 Seam workings, Old Block A Rehab and M2_US_Block_A. These deep groundwater levels do not reflect the same level of correlation with the surface topography shown by the shallow boreholes in the shallow weathered aquifer zone.

Coal chemistry

Statistical analyses were carried out on raw 5 Seam, 4 Seam and 2 Seam proximate and ultimate analysis obtained from diamond drill hole assay database received from the mine in March 2021. The statistical results are summarised in **Figure 47**. The results show that 5 Seam chemical composition is different from that of Seam 2 and 4, having relatively higher calorific value (CV), volatile matter (VM), fixed carbon and total sulphur; and lower ash content and volatile matter than recorded for the other seams, although within the same overall statistical range (**Figure 47).** This suggests that the acid rock drainage risk potential of 5 Seam might be slightly higher than the other seams mined underground at Khutala.

The chemical characteristics of 5 Seam coal within the proposed mine areas are largely similar to those recorded outside of the proposed workings (**Table 32**). The total sulphur content of 5 Seam coal at Khutala mine ranges mostly between 0.3% and 4% **(Figure 48**)

Contamination plume

During the operational period the plume will be contained as a result of the water level drawdown. After closure, the plume will start moving along the groundwater gradient. Based on our understanding of the area and the existing groundwater model (Golder, 2020), The water levels in the proposed 5 Seam Mining Project area should be filling up to become flat. With the low hydraulic conductivities within the mining area, it is predicted that the contamination plume will not spread significantly but it is a function of the source concentration. Previous work (Golder, 2020) indicated that the source concentration changes over time and has a wide range:

- Sulphate has an average concentration of 934 mg/l, ranging from 183 mg/l to 2374 mg/l sulphate.
- TDS has an average concentration of 1618 mg/l, ranging from 346 mg/l to 4050 mg/l.

Noise

The current ambient noise levels are generally comparable with the levels associated with farming activities, traffic on the national roads and haul roads, and mining related activities and blasting. Agricultural noise is more seasonal however, whereas mining activities generate noise levels all year round.

The noise meter recordings for all the sampled points as well as the SANS rating limits are presented below. Day & Night-time measurements were undertaken both at the project application area & receptors surrounding Khutala Main Plant near Kendal Power station in the Mpumalanga Province. Sampling was conducted over a 2 X 10 -minute period interval from 10:00 to 03:00 Hrs.

Night-time results

Based on the daytime results from the noise measurements it is noted that the LAeqI levels measured above the SANS guideline for the maximum allowable outdoor daytime rating level for ambient noise in rural districts (53.8 dBA, 54.3dBA 51.8 dBA, 55.1 dBA, 58.2 dBA, 55.6 dBA) at rural receptors P1, P2, P3, P4, P5 and P6. The night-time results comply according to SANS Ambient Noise District Classification.

Day-time results

In terms of the Noise Regulations, a noise disturbance is created when the prevailing ambient noise level is exceeded by 7.0 dB(A) or more. The LAeqI levels measured during day-time is also above the noise national standards.

Based on the baseline survey and the predictive noise calculations, the proposed 5 Seam Mining Project will comply with the relevant Noise Control Regulations, 1994 and SANS 10103 of 2008 provided that the mitigatory noise measures are in place and that the noise management plan is adhered to at all times

Wetland

Eleven hydro-geomorphic (HGM) units were identified within the study and 500 m investigation areas, the eleven HGM observed formed part of a greater wetland system falling outside of the bounds of investigation associated with this study. Although historical delineations were largely used as the basis of this study, the systems were characterised based on the observations of the site visit on the 20th of October 2020 and some variations to the historical data may have occurred.

Present Ecological State

The health of a wetland can be defined as a measure of the deviation of wetland structure and function from the wetland's natural reference condition (Macfarlane et al., 2009). The wetlands associated with the project area have been impacted by a long history of agricultural land uses as well as impacts related to mining.

The major impacts to the wetlands/watercourses identified through the health assessments can be summarised as follows:

- Severe encroachment due to agropastoral activities dominating the landscape. HGM2, HGM6, HGM8, HGM9, HGM10 and HGM11 were all directly impacted by ploughing of fields, while HGM1, HGM4, HGM5 and HGM7 were impacted as a result of livestock grazing:
    - Cultivation of the wetlands and the surrounding catchment affecting the hydrological regime of the wetlands as well as the biodiversity integrity.
    - Utilisation of the wetlands by cattle leading to loss of basal cover, trampling, overgrazing and water quality impacts.
- Historical opencast and underground mining activities have been taking place in the vicinity of the study area since 1986, with impacts to water quality and fragmentation of the wetland systems observed.
- Surface infrastructure development such as offices, the mining complex, roads, trenches and stockpiles have resulted in direct losses of wetland habitat over the years, and impacts to the natural hydrological setting, as well as the creation of preferential flow paths and altered water retention and distribution profiles.

Heritage and Archaeological resources

The identified graveyard is outside the area proposed for the construction of the mining related infrastructure, but within the proposed 5 Seam underground mining area. The mine is not planning to construct any infrastructure in proximity to this graveyard. It is anticipated that none of these heritage resources will not be impacted by the proposed Project.

Palaeontological

Fossils likely to be found are mostly plants (**Figure 61)** such as 'Glossopteris flora' of the Vryheid Formation. The aquatic reptile Mesosaurus and fossil fish may also occur with marine invertebrates, arthropods and insects. Trace fossils can also be present. During storms a great variety of leaves, fructifications and twigs accumulated and because they were sandwiched

between thin films of mud, they were preserved to bear record of the wealth and the density of the vegetation around the pools. They make it possible to reconstruct the plant life in these areas and wherever they are found, they constitute most valuable palaeobotanical records (Plumstead 1963) and can be used in paleoenvironmental reconstructions.

Review of the EIR Report

The Draft EIR was made available for public review for a period of 30 days, from **21 May 2021** to **21 June 2021** by following the below information:

- Licebo Environmental and Mining (Pty) Ltd website (https://licebo.co.za) under Public Review Documents: http://www.licebo.co.za/projects/public-review-documents/seriti-khutala-5-seam-mining-project-environmental-authorisation;
- Requested from Licebo Environmental and Mining (Pty) Ltd Offices;
- Khutala Colliery Main Security Gate;
- eMalahleni Public Library;
- Ogies Public Library; and
- Victor Kanye Public Library.

After the review of the draft EIR, modifications will be made, and incorporated in the Final EIR that will be submitted to the DMRE. Any comments received after closure of the EIR review periods will be forwarded to the DMRE for consideration in decision making.

Conclusion

This report outlines the draft EIR for the proposed 5 Seam Mining Project as part of the approval process required by Seriti in terms of the NEMA in order to develop the underground mining to exploit the available 5 Seam coal within Khutala Colliery mining rights area. It provides a description of the proposed project area and information on the affected environment, the details of the potential environmental impacts and the proposed mitigation measures to prevent, minimise and manage the related impacts. This information together with issues raised and/or will be raised by I&APs as part of this draft EIR, as well as consultation with the regulatory authorities will then be incorporated as part of the Final EIR and EMPr.

The draft specialist studies will be finalised upon the completion of the draft EIR Phase to ensure that the proposed impact assessment and recommended mitigation measures can then be accepted and implemented for the project. The EIR Phase has allowed for an in-depth assessment of the impacts, potential mitigations and further recommendations with regards to

the proposed Project. Registered I&APs will still be consulted and informed throughout the EIR approval process.

The environmental authorisation process followed to date meets the requirements of applicable legislation to ensure that the regulatory authorities will receive sufficient information to enable them to make an informed decision to make an informed decision about the EIR and EMPr process followed.

The draft EIR will be made available for 30 days commenting period as indicated in Section 9. All comments received during DEIR will be captured on the Public Participation Report as part of the Comment and Response Register (CRR) attached as **Appendix 7.**

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STRUCTURE OF THE EIR AND EMP REPORT APPLICATION

This EIR and EMPr Report have been compiled in accordance with the DMR EIR and EMPr Report Template and in accordance with the EIA 2014 Regulations. The EIR and EMPr Report have been compiled in a diligent and independent manner, and **Table 1** denotes the relevant GNR requirements and corresponding sections within this report.

Table 1: Legislation Requirements as Detailed in the EIA 2014 Regulations

Legislated Requirements as per the NEMA GNR 982	**Relevant Report Section**
Details of the EAP who compiled the report.	Section 2.1
Details of the expertise of the EAP to carry out an EIA.	Section 2.2
The location of the activity, including- The 21-digit Surveyor General code of each cadastral land parcel; Where available, the physical address and farm name; and Where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties.	Section 3
A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is- a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or on land where the property has not been defined, the coordinates within which the activity is to be undertaken.	Section 3.2
A description of the scope of the proposed activity, including- All listed and specified activities triggered; and A description of the activities to be undertaken, including associated structures and infrastructure.	Section 4
A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.	Section 6

Legislated Requirements as per the NEMA GNR 982	**Relevant Report Section**
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 location.	Section 7
Details of all the alternatives considered.	Section 8.1
Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 9
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.	Refer to Section 9.4 and **Appendix 5**
The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	Section 10
The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts: • Can be reversed; • May cause irreplaceable loss of resources; and • Can be avoided, managed or mitigated.	Section 0
The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives.	Section 12.1
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 geographical, physical, biological, social, economic, heritage and cultural aspects.	Section 13
Motivation where no alternative sites were considered	Section 15
Statement motivating the alternative development location within the overall site.	Section 16

Legislated Requirements as per the NEMA GNR 982	**Relevant Report Section**
Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (In respect of the final site layout plan) through the life of the activity.	Section 17
Summary of Specialist reports.	Section 18
Environmental Impact statement	Section 19
Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr;	Part B of the EMPr
Final proposed alternatives.	Section 20
Aspects for inclusion as conditions of Authorisation.	Part B of the EMPr
Description of any assumptions, uncertainties and gaps in knowledge.	Section 21
Reasoned opinion as to whether the proposed activity should or should not be authorized	Section 22
Period of which the Environmental Authorisation is Required	Section 22.4
Undertaking	Section 23
Financial Provision	Section 24
Deviations from the approved scoping report and plan of study.	Section 25

SECTION A:

SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1. INTRODUCTION

The purpose of the EIA process is to ensure that potential environmental and social impacts associated with the construction, operation, decommissioning, rehabilitation and closure phases of a project are identified, assessed and appropriately managed. There are two primary phases of an EIA process, namely the scoping phase and the impact assessment phase. Identification of potential impacts occurs during the scoping phase, whilst the assessment and mitigation of those impacts occurs during the impact assessment phase.
The PPP is an integral part of the EIR Phase as it ensures that all potential and registered I&APs are informed of the proposed activity and are provided with an opportunity to give their input, comments and concerns about the Project.

Licebo Environmental and Mining (Pty) Ltd (LEM) has been appointed by Seriti as the independent Environmental Assessment Practitioner (EAP) to undertake the Environmental Authorisation for the proposed 5 Seam Mining Project in order to develop the underground mining to exploit some of the available 5 seam coal in the mining rights area.

Khutala Colliery's EMP that includes the underground mining activities was approved by the DMRE under the Ref. No.: **OT6/2/2/192** on 16 April 2003, Environmental Management Programme report for Khutala Colliery including Block I Opencast Section, Report No.: IKC 047-03/0801, August 2001. The approved EMP only includes mining of the 2 and 4 Seam coal reserves and does not include mining of 5 seam coal reserve. The only included 5 seam workings is associated with the decommissioned Kendal 5 seam. Seriti is intending to apply for Environmental Authorisation to include the proposed mining of 5 seam coal reserve as part of the Khutala Colliery operation.

The proposed activities of the 5 Seam Mining Project will be undertaken on Portion 3 of the Cologne 34 IS, Portion 40 of the Farm Schoongezicht 218 IR, Portion 35 of the Farm Leeuwfontein 219 IR, Remaining Extent of Portion 2 and Portion 3, 6, 16, 17, and 18 of the Farm Zondagsvlei 9 IS and Remaining Extent of the Farm Kleinzuikerboschplaat 5 IS. The proposed development requires Seriti to obtain the following authorisations / licences prior to the commencement of the construction and operation of the project.

- Environmental Authorisation in terms of the National Environmental Management Act, Act No 107 of 1998 (NEMA) as amended; and

- Integrated Water Use Licence (IWUL) in terms of the National Water Act, Act 36 of 1998 as amended

It should be indicated that a separate Section 102 application process will be undertaken to include the 5 Seam Mining Project as required in terms of the Mineral and Petroleum Resources Development Act, act 28 of 2002 as amended.

As stated above, an application for an Integrated Water Use Licence Application (IWULA) will be submitted to the Department of Water and Sanitation (DWS) for various water uses in accordance with Section 21 of the National Water Act, 1998 (Act No. 36 of 1998) (NWA). An Integrated Water and Waste Management Plan (IWWMP) will be developed to manage the water resources and waste streams produced during the mining operations. In addition, environmental authorisation is required for listed activities triggered in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).

A Scoping Report was compiled in support of the above-mentioned Environmental Authorisation and was made available for public review and comment, as well as being submitted to the DMRE for consideration. The Final Scoping Report was accepted by the DMRE on the 10th of March 2021 (Refer to **Appendix 3**), accepting it to proceed with the EIA Phase. This Draft EIA and EMPr Report aims to identify and assess impacts associated with the Listed Activities and mining operations associated with the proposed 5 Seam Mining and KPS/KHU Link Project activities, as well as to provide mitigation and management measures to reduce and limit adverse impacts on the receiving environment.

In terms of the NEMA, Interested and Affected Parties (I&APs) must be given the opportunity to comment on the proposed Project. Thus, this Draft EIA and EMPr Report will be made available for public review before the submission of the Final EIR and EMPr to the competent authority and will detail the proposed Project, the environment of the area that the proposed Project is located, identified impacts and their significance and mitigation and management measures for activities associated with the 5 Seam Mining Project area.

2. CONTACT PERSON AND CORRESPONDENCE ADDRESS

2.1. Details of The EAP who prepared the report.

Licebo Environmental has been appointed as the independent EAP to undertake the EIA process and associated IWULA. The details of the EAP are provided in the Table below.

Practitioner company details	Licebo Environmental and Mining (Pty) Ltd
Name of the Practitioner	Mandla Ralph Repinga
Postal Address	Postal Address: P.O. Box 20519, Del Judor Extension 4, Witbank, 1044
Tel No.:	013 692 0212 or 083 257 8869
Fax No.:	086 667 1169
E-mail address:	**ralph.repinga@gmail.com or ralph.repinga@licebo.co.za**

2.2. Expertise of the EAP

2.2.1. The Qualifications of the EAP (with evidence attached as **Appendix 1**)

Qualification	BSc (Biochemistry and Microbiology (University of Zululand); BSc (Honours) Microbiology (University of Zululand); and MSc Environmental Science (University of Witwatersrand) ***Refer to Appendix 1 for the copy of the EAP's Curriculum Vitae***
Professional Affiliation	South African Council for Natural Scientific Professions (SACNASP)
Registration Number	400097/02

2.2.2. Summary of the EAP's Past Experience

*(Attached the EAP's curriculum vitae as **Appendix** 1)*

Ralph Repinga has more than 15 years of experience in the field of Environmental Impact Assessment and management, with 12 of those years spent in the coal mining sector. He is a registered professional environmental scientist with a MSc (Environmental Sciences) degree and registered professional natural scientist with the South African Council for Natural Scientific Professions (SACNASP) (Registration number: 400097/02).

He started his career as an Environmental Officer with the Mpumalanga Department of Environmental Affairs and Tourism. He also worked for Transvaal Sugar Ltd as a Safety, Health, Environmental and Quality Training Officer. In March 2001, he was appointed by Ingwe

Collieries (Formerly BHP Billiton) started as an Environmental Officer to Environmental Manager (for 6 years) within its various operations. He is currently working as the Managing Director and environmental consultant for Licebo Environmental and Mining (Pty) Ltd (LEM) since March 2012. He has an extensive environmental management experience especially focusing mostly construction projects, water management and coal mining industry.

As part of LEM, he has been involved in several environmental projects which includes environmental auditing (auditing of environmental authorisations and approvals), compilation of EIAs, EMPrs, WULs, undertaking public participation, socio-economic assessments supervision of environmental projects and other environmental related projects.

3. DESCRIPTION OF THE PROPERTY

3.1. Description of the property to which the authorisations are being applied.

Table 2 below provide a description of the properties to which the environmental authorisations are being applied for.

Table 2: Description of the property

Farm Name:	Cologne 34 IS, Zondagsvlei 9 IS, Leeuwfontein 219 IR, Schoongezicht 218 IR and Kleinzuikerboschplaat 5 IS.
Application Area (Ha):	Approximately 538 ha
Magisterial District:	Khutala Colliery is situated in both eMalahleni and Delmas Magisterial Districts, in the eMalahleni and Victor Khanye Local Municipality within Nkangala District Municipality, Mpumalanga Province.
Distance and direction from nearest town	Khutala Colliery is located approximately 8 km south west of the town of Ogies and 35 km south west of Witbank and just approximately 5 km south-east of the Kendal Power Station in Mpumalanga Province, South Africa.
21-digit Surveyor General Code for each farm portion	**Portion 3 of the Farm Cologne 34 IS** T-0IS-000-0000-00034-00003 **Portion 40 of the Farm Schoongezicht 218 IR** T-0IR-000-0000-00218-00040 **Remaining Extent of Portion 2, Portion 3, Portions 6, 16, 17 and 18 of the Farm Zondagsvlei 9** T-0IS-000-0000-00009-00002 T-0IS-000-0000-00009-00003 T-0IS-000-0000-00009-00006 T-0IS-000-0000-00009-00016 T-0IS-000-0000-00009-00017 T-0IS-000-0000-00009-00018 **Portion 35 of the Farm Leeuwfontein 219 IR** T-0IR-000-0000-00219-00035 **Remaining Extent of the Farm Kleinzuikerboschplaat 5 IS.** T-0IS-000-0000-00005-00005

3.2. Locality Map

*(Show nearest town, scale not smaller than 1: 250 000 as **Appendix 2**)*

Locality map	The nearest towns to the proposed development site are Ogies, located approximately 8 km south west of the town of Ogies and 35 km south west of Witbank and just approximately 5 km south-east of the Kendal Power Station in Mpumalanga Province, South Africa. Refer to **Figure 1** and **Appendix 2** for the proposed project's locality maps.

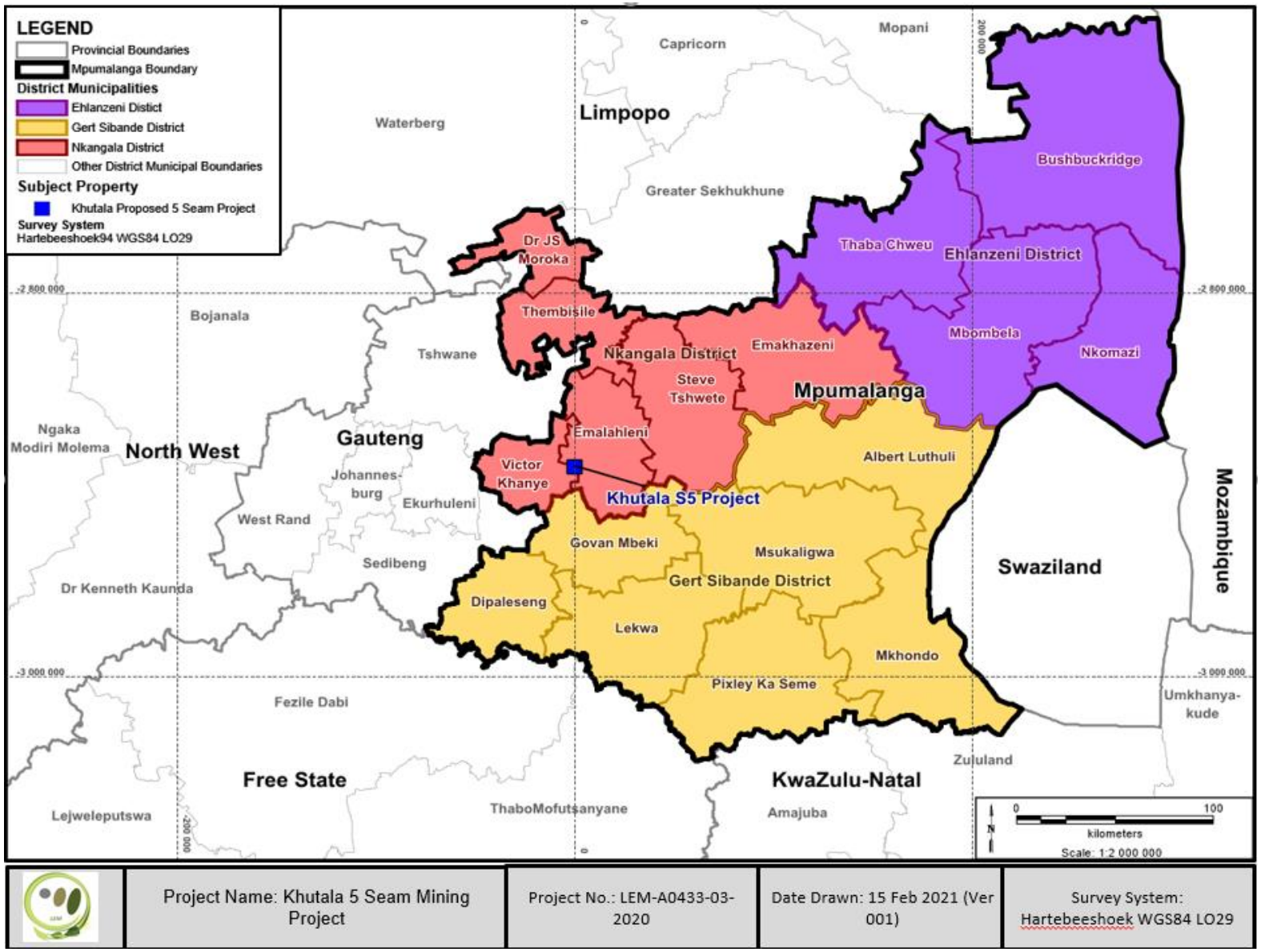

Figure 1: Locality Map

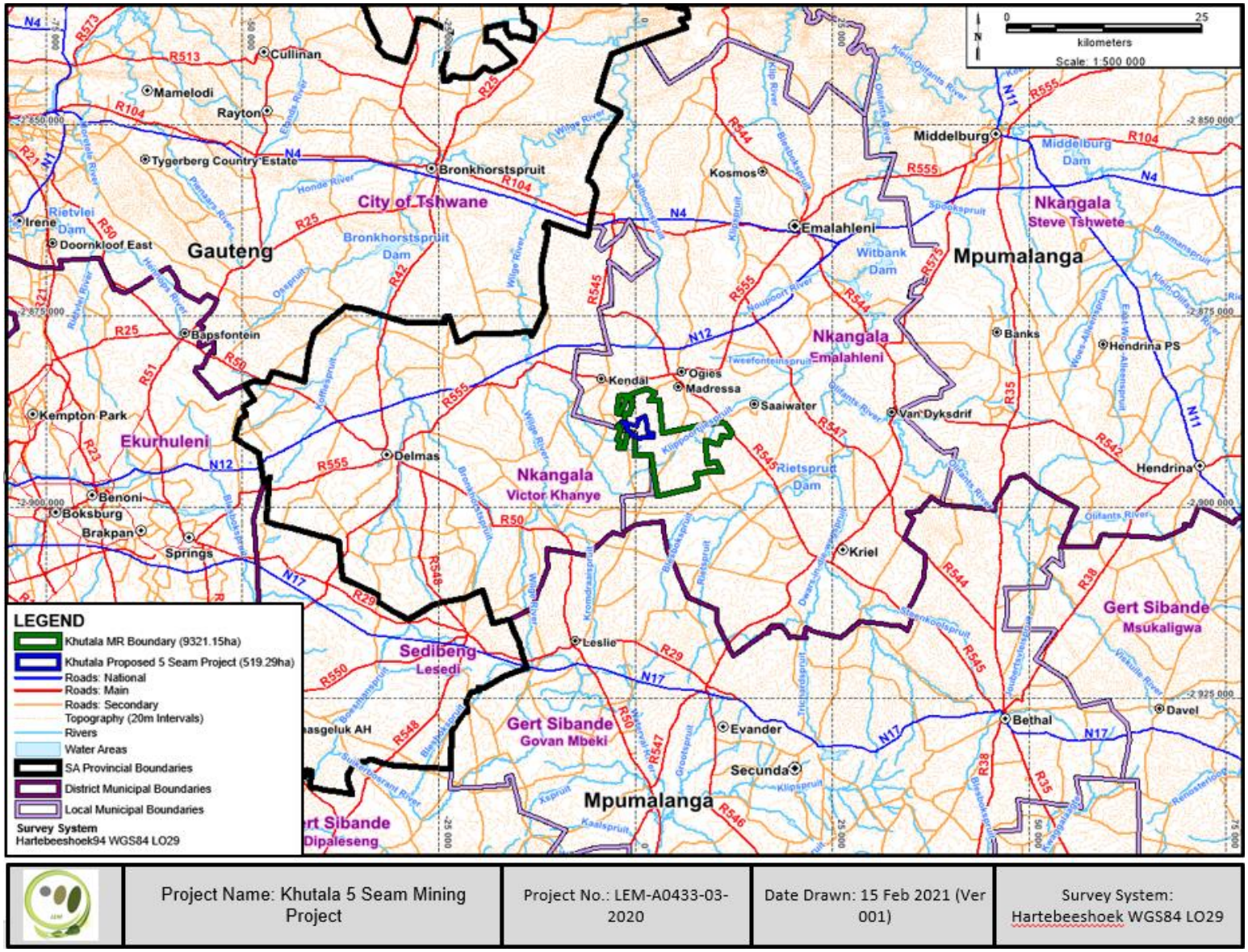

Figure 2: Regional Plan

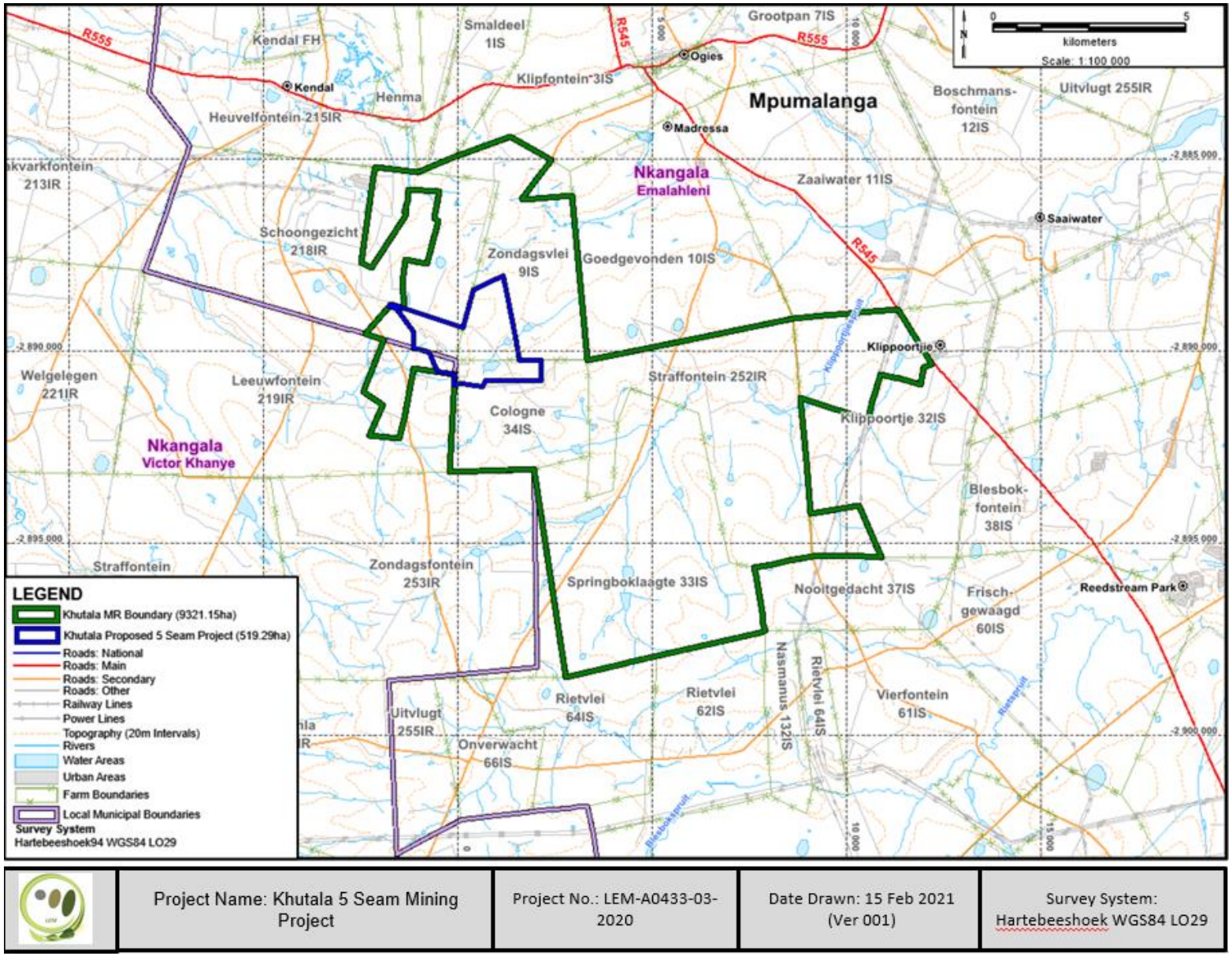

Figure 3: Khutala Parent Farms

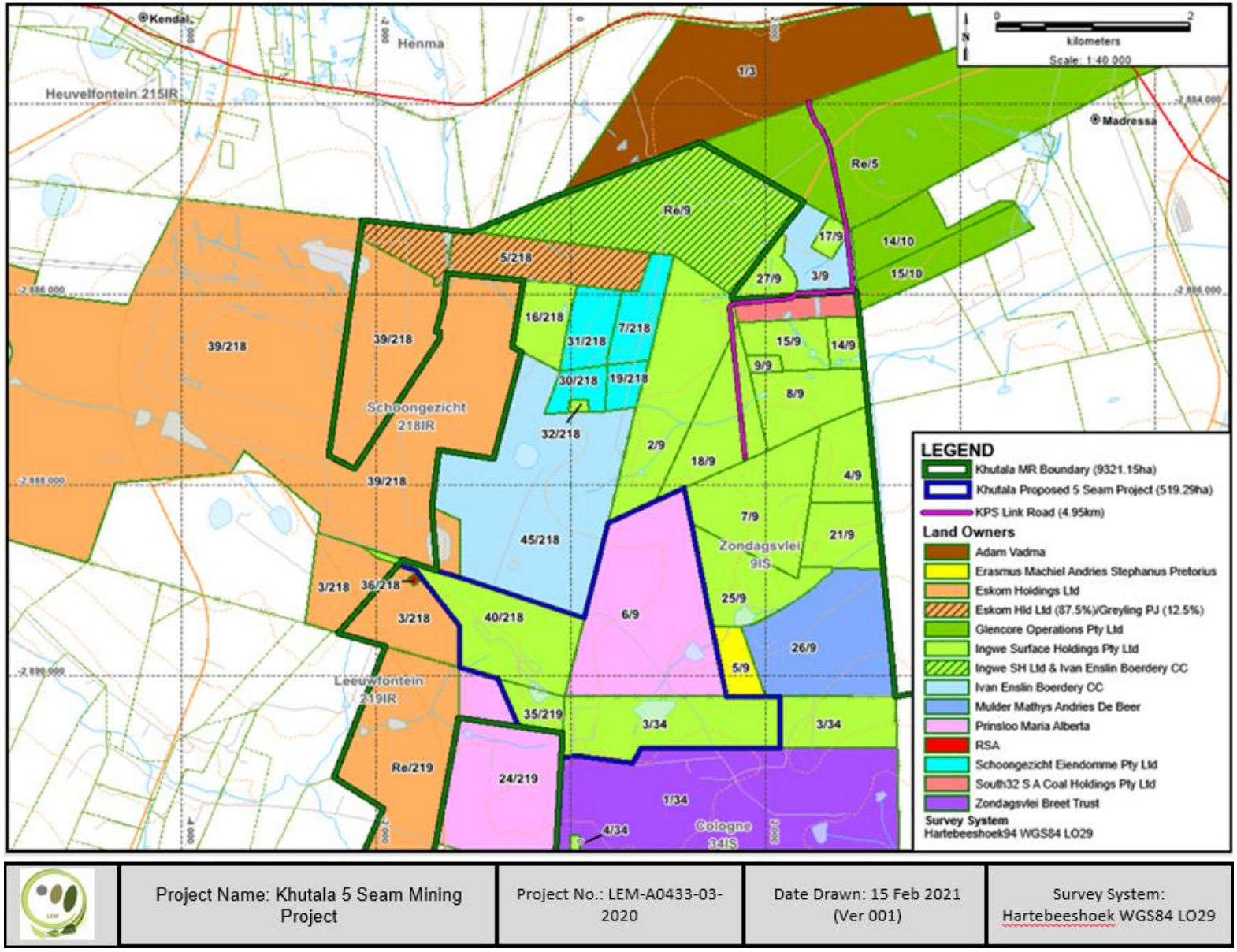

Figure 4: Khutala 5 Seam Mining Project showing Link road.

4. DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY

Seriti intends to undertake the relevant environmental authorisation processes in order to develop the underground mining to exploit the available 5 Seam coal in the mining rights area. These processes will involve the compilation of the S&EIR, EMPr and an IWULA for the proposed mining activities. An application for environmental authorisation associated with the proposed development was submitted to the DMRE, Mpumalanga Region on the 24th of February 2021 and IWULA to the Department of Water and Sanitation (DWS), Mpumalanga Region, Bronkhorstspruit Office will be submitted in September 2021.

The proposed 5 Seam Mining Project activities will be undertaken within the following farm portions: Portion 3 of the Farm Cologne 34 IS, Portion 35 of the Farm Leeuwfontein 219 IR, Portion 40 of the Farm Schoongezicht 218 IR and Remaining Extent of Portion 2, Portion 3, 6, 16, 17 and 18 of the Farm Zondagsvlei 9 IS and Remaining Extent of the Farm Kleinzuikerboschplaat 5 IS

Activities to be undertaken will involve the development and mining of the 5 seam underground workings, construction of ventilation shaft, construction of the transfer chute from the existing conveyor belt, construction of a link road between Khutala Colliery and Klipspruit South, a coal stockpile area and associated water management infrastructure. The mine will use most of the existing infrastructure to support the proposed 5 Seam Mining Project. The 5 Seam Mining Project area and infrastructure layout plan are illustrated in **Figure 5** and **Figure 6 .** The project environmental activities are provided in **Table 3**.

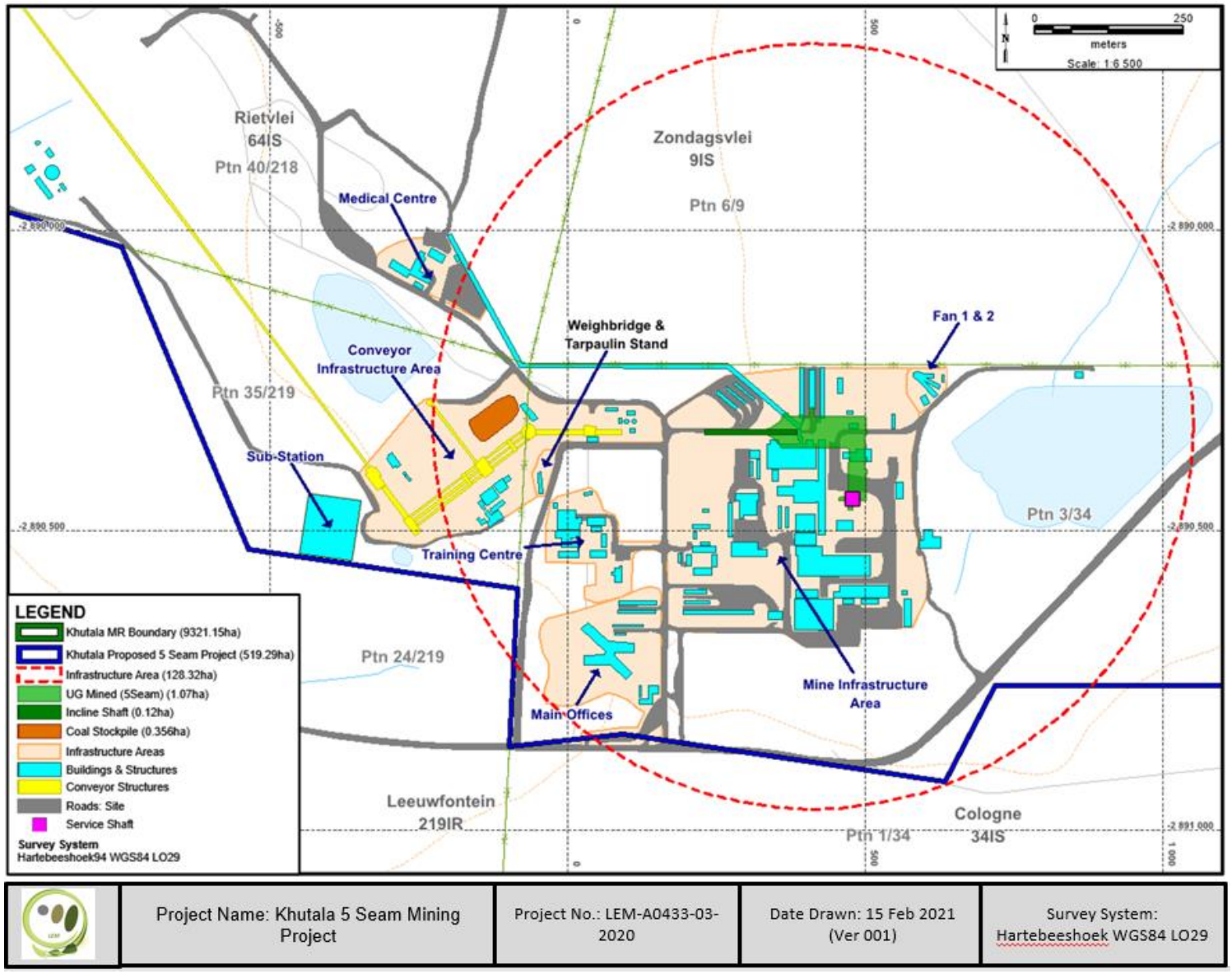

Figure 5: Khutala Existing and proposed 5 Seam Mining Project Infrastructure Plan

	Project Name: Khutala 5 Seam Mining Project	Project No.: LEM-A0433-03-2020	Date Drawn: 15 Feb 2021 (Ver 001)	Survey System: Hartebeeshoek WGS84 LO29

Figure 6: Google Earth Infrastructure Plan

4.1. Listed and specified activities

Provide a plan drawn to a scale acceptable to the competent but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site and attach as ***Appendix 4.***

Table 3: Applied environmental listed activities.

Name of activity (All activities including activities not listed) (E.g. excavations, blasting, stockpiles, discard dump or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stones, workshop, processing plant, storm water control, beams, roads, pipeline, power lines, conveyors etc.)	**Aerial extent of the activity** Ha or m^2	**Listed activity.** Mark with an X where applicable or affected	**Applicable listing notice** (GNR 983, GNR 984 or GNR 985) / not listed	**Waste Management Authorisations** (indicate whether an authorisation is required in terms of the National Environmental Management Waste Act)
The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water- (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughout of 120 litres per second or more. **Activities associated with the construction of water reticulation and stormwater management infrastructure including canals.**	Approximately 2000m (Linear activity	Activity Number 9	GNR 983 as amended by 327 – Listing Notice 1	Not applicable
The development of — (iii) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or	Approximately 3000m (Linear activity)	Activity Number 12	GNR 983 as amended by 327 – Listing Notice 1	Not applicable

Name of activity (All activities including activities not listed) (E.g. excavations, blasting, stockpiles, discard dump or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stones, workshop, processing plant, storm water control, beams, roads, pipeline, power lines, conveyors etc.)	**Aerial extent of the activity** Ha or m^2	**Listed activity.** Mark with an X where applicable or affected	**Applicable listing notice** (GNR 983, GNR 984 or GNR 985) / not listed	**Waste Management Authorisations** (indicate whether an authorisation is required in terms of the National Environmental Management Waste Act)
(iv) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs — (d) within a watercourse; (e) in front of a development setback; or (f) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. **Associated with the development and construction of the proposed mining activities and associated infrastructure including the KPS/KHU Link Road.**				
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. **Activities associated with the development and construction of the mining project and**	Approximately 6 ha	Activity Number 19	GNR 983 as amended by 327 – Listing Notice 1	Not applicable

Name of activity (All activities including activities not listed) (E.g. excavations, blasting, stockpiles, discard dump or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stones, workshop, processing plant, storm water control, beams, roads, pipeline, power lines, conveyors etc.)	**Aerial extent of the activity** Ha or m^2	**Listed activity.** Mark with an X where applicable or affected	**Applicable listing notice** (GNR 983, GNR 984 or GNR 985) / not listed	**Waste Management Authorisations** (indicate whether an authorisation is required in terms of the National Environmental Management Waste Act)
associated infrastructure including the KPS/KHU Link Road within wetlands and streams.				
The development of a road – (iii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres. **Construction of the proposed KPS/KHU Link Road and stream crossings. The link road will be used to transport coal in between Khutala and Klipspruit.**	Approximately 4.484 ha	Activity Number 24	GNR 983 as amended by 327 – Listing Notice 1	Not applicable
The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation. **Clearance of vegetation to accommodate the construction of the KPS/KHU Link road. Vegetation clearance will be undertaken on Portion 3 and 17 of the farm Zondagsvlei 9 IS and the Remaining Extent of Portion 5 of the farm Kleinzuikerboschplaat 5 IS.**	Approximately 4.484 ha (Length x width) The section that will be cleared for road construction, is (2242 m x 20m)	Activity Number 27	GNR 983 as amended by 327 – Listing Notice 1	Not applicable

Name of activity (All activities including activities not listed) (E.g. excavations, blasting, stockpiles, discard dump or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stones, workshop, processing plant, storm water control, beams, roads, pipeline, power lines, conveyors etc.)	**Aerial extent of the activity** Ha or m^2	**Listed activity.** Mark with an X where applicable or affected	**Applicable listing notice** (GNR 983, GNR 984 or GNR 985) / not listed	**Waste Management Authorisations** (indicate whether an authorisation is required in terms of the National Environmental Management Waste Act)
Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes. **Activities relating to the development of the proposed 5 Seam Mining Project including the associated infrastructure and the KPS/KHU Link Road which will fall within the institutional development within the eMalahleni and Victor Khanye rural areas.**	Approximately 538 ha	Activity Number 28	GNR 983 as amended by 327 – Listing Notice 1	Not applicable
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	Approximately 4000m^2	Activity Number 6	GNR 983 as amended by 327 – Listing Notice 1	Not applicable

Name of activity (All activities including activities not listed) (E.g. excavations, blasting, stockpiles, discard dump or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stones, workshop, processing plant, storm water control, beams, roads, pipeline, power lines, conveyors etc.)	**Aerial extent of the activity** Ha or m^2	**Listed activity.** Mark with an X where applicable or affected	**Applicable listing notice** (GNR 983, GNR 984 or GNR 985) / not listed	**Waste Management Authorisations** (indicate whether an authorisation is required in terms of the National Environmental Management Waste Act)
release of emissions, pollution or effluent, excluding— (i) activities which are identified and included in Listing Notice 1 of 2014; and (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 **Activities relating to the NWA, Section 21 (g) water use licence activities associated with the Run of Mine Coal Stockpile of approximately 10 000 tons per month (t/m) including associated infrastructure.**				
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—	Approximately 527 ha	Activity number 17	GNR 983 as amended by 327 – Listing Notice 1	Not applicable

Name of activity (All activities including activities not listed) (E.g. excavations, blasting, stockpiles, discard dump or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stones, workshop, processing plant, storm water control, beams, roads, pipeline, power lines, conveyors etc.)	**Aerial extent of the activity** Ha or m^2	**Listed activity.** Mark with an X where applicable or affected	**Applicable listing notice** (GNR 983, GNR 984 or GNR 985) / not listed	**Waste Management Authorisations** (indicate whether an authorisation is required in terms of the National Environmental Management Waste Act)
c) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or d) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing. **Activities relating to the 5 Seam mining activities, coal extraction, classifying, crushing, screening or washing.** **Section 102 application to support mining of the 5 seam coal reserves.**				

4.2. Project activities and phase description

This section provides a preliminary description of activities that are part of the proposed 5 Seam Mining Project. Each activity can be linked to the proposed mining activities, transportation of coal, dirt and clean water management and any other associated activities that constitute the various collieries' operations. These activities act as driving forces that exert pressure on the natural environment, ultimately resulting in impacts on the biophysical, social and cultural environments.

Activities that will be undertaken as part of the 5 Seam Mining Project are listed in **Table 4** below.

Table 4: Project activities for 5 Seam Mining Project.

Activity No.:	Proposed activities to take place
Construction Phase	
Activity 1	Recruitment, Procurement and Employment.
Activity 2	Transportation of construction material to site
Activity 3	Use and storage of construction fuel and lubricants
Activity 4	Site clearance and topsoil removal as a result of the proposed Project.
Activity 5	Construction Surface Infrastructure (Including KPS/KHU Link Road, Ventilation Shaft, Transfer Chute and associated Water Management Infrastructure)
Activity 6	Construction of RoM Stockpile and associated Water Management Infrastructure
Activity 7	Development and operation of the 5 Seam underground mining activities.
Operational Phase	
Activity 8	Recruitment, procurement and employment
Activity 9	Operation of the 5 Seam underground mining activities

Activity No.:	Proposed activities to take place
Activity 10	Storage, use and control of fuel and lubricants to be used for the underground mining activities and at the RoM Plant.
Activity 11	Operation of the RoM Stockpile and associated water management infrastructure.
Activity 12	Transportation of coal via the KPS/KHU Link Road
Activity 13	Vehicular activity
Activity 14	Dirty water management
Activity 15	Waste and sewage generation and disposal
Rehabilitation, Decommissioning and Closure Phases	
Activity 16	Retrenchment of mine employees and staff.
Activity 17	Demolition of infrastructure
Activity 18	Final rehabilitation
Post-Closure	
Activity 19	Aftercare and Maintenance

5. DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN

(Description methodology of technology to be employed, and for a linear activity, a description of the route of the activity.)

5.1. Background Information for the current and proposed mining areas

Khutala Colliery's EMP (MP 30/5/1/2/3/2/1/ (118) EM) was approved by the Mpumalanga DMRE. The EMP approval only includes the mining of the 2 and 4 Seam Coal Reserves and does not include mining of 5 Seam coal reserve. Seriti is intending to apply for environmental authorisation to include the proposed mining of 5 Seam coal reserve as part of the Khutala Colliery operation. The proposed activities of the 5 Seam Mining Project and associated infrastructure will be undertaken on Portion 3 of the Farm Cologne 34 IS, Portion 35 of the Farm Leeuwfontein 219 IR, Portion 40 of the Farm Schoongezicht 218 IR and Remaining Extent of Portion 2, Portion 3, 6, 16, 17 and 18 of the Farm Zondagsvlei 9 IS and Remaining Extent of the Farm Kleinzuikerboschplaat 5 IS.

The proposed development requires Seriti to obtain the following authorisations / licences prior to construction and operation commencing.

- Environmental Authorization in terms of the National Environmental Management Act (Act No 107 of 1998) (NEMA) and Mineral and Petroleum Resources Development Act, (Act 28 of 2002) as amended.
- Water Use Licence (WUL) in terms of the National Water Act (Act 36 of 2008)

Seriti will undertake the development and exploitation of the proposed 5 Seam coal area as an underground operation similar to the existing Khutala Colliery activities. The location of the mining activities in relation to the farm portions is show in **Figure 3**. The coal will be mined using drill and blast methods. The drill and blast underground mining method ensures that mined material is extracted across a horizontal plane while leaving "pillars" of untouched material to support the strata, leaving open areas or "rooms" underground. This assists in ensuring that the mined-out areas are supported to prevent subsidence (collapse) of mined-out areas from affecting the surface. Additional support is provided through the use of roof bolts. The coal will be loaded onto underground coal loaders which tip the coal onto a conveyor system. From there, it will be transported out of the mine using the existing underground conveyor belt systems. A proposed diversion / transfer chute to divert coal from the existing conveyor into the proposed coal stockpile area situated close to the silo refer **Figure 5.**

Table 5: Khutala Colliery 5 Seam Mining Project: Surface Rights Landownership

Farm	Portion	Total Extent /Area (Ha)	Surface Rights Owner	Title Deed Number	Surveyor-General Cadastral Code
Cologne 34 IS	Portion of Portion 3	Mining Area: 132.7588 Ha (Farm Total Extent 192.5012 Ha)	South32 SA Coal Holdings (Pty) Limited	T76541/1999	T-0IS-000-0000-00034-00003
Leeuwfontein 219 IR	Portion 35	23.62121 Ha	South32 SA Coal Holdings (Pty) Limited	T76582/1999	T-0IR-000-0000-00219-00035
Schoongezicht 218 IR	Portion 40	124.2594 Ha	South32 SA Coal Holdings (Pty) Limited	T127590/2001	T-0IR-000-0000-00218-00040
Zondagsvlei 9 IR	Remaining Extent of Portion 2	160.5374H	Ingwe Surface Holdings Pty Ltd	T6840/2009	T0IS00000000009000002
	Portion 3	44.1952H	Ivan Enslin Boerdery cc	T8513/1998	T0IS00000000009000003
	Portion 6	246.1902 Ha	MA Prinsloo	T5290/2017	T-0IS-000-0000-00009-00006
	Portion 16	30.9728H	South32 S A Coal Holdings Pty Ltd	T119913/2004	T0IS00000000009000016
	Portion 17	9.5576	Ingwe Surface Holdings Pty Ltd	T74419/2004	T0IS00000000009000017

Farm	Portion	Total Extent /Area (Ha)	Surface Rights Owner	Title Deed Number	Surveyor-General Cadastral Code
	Portion 18	85.6513	Ingwe Surface Holdings Pty Ltd	T132534/2003	T0IS00000000009000019
Kleinzuikerboschplaat 5 IS.	Remaining Extent	528.5919H	Glencore Operations Pty Ltd	T7750/2014	T0ISs00000000005000000

5.2. Proposed project activities and mining area

The proposed 5 Seam Mining Project reserve total area to be included into the Khutala Colliery mining area is approximately 538 Ha including the proposed infrastructure, which is the ROM Stockpile, Ventilation Shaft and KPS/KHU Link Road. The proposed 5 Seam Mining Project area is situated within the existing Khutala Colliery workings and mining activities will be undertaken as an underground operation using drill and blast mining method. The Surface infrastructure that will be constructed as part of the proposed project include construction of the KPS/KHU link road, 5 Seam coal stockpile, ventilation shaft and transfer chute. The physical surface environment that will be affected by the proposed development is approximately 10 Ha.

5.2.1. Proposed Infrastructure Associated with 5 Seam Mining Project

The mining infrastructure that needs to be established to enable the mining of 5 Seam Mining Project are listed on **Table 6** below.

Table 6: Summary of Proposed Infrastructure

Infrastructure	Description	Coordinates
Transfer Chute	Modification of the existing ROM silo to include a means of transferring the 5 Seam coal from the top of the silo to the new stockpile situated approximately 50m from the silo. This will be by	26° 07’ 7.093” S 28° 59’ 59.703” E

Infrastructure	Description	Coordinates
	means of a diversion chute / transfer conveyor/ hopper.	
Stockpile	A stockpile to accommodate 10 000t/m (Tonnes per month) of coal, including all required infrastructure such as water and waste management facilities to accommodate loading with a front-end loader onto road haul trucks	26° 07' 5.789" S 28° 59' 58.629" E
KPS/KHU Link Road	A haul road to link KPS South to Khutala Colliery for future transportation of coal	Start 26° 05' 54.42" S 29° 01' 04.33" E End 26° 03' 50.34" S 29° 01' 32.97" E
Ventilation shaft	Construction of ventilation shaft to supply fresh air to underground workings.	26° 07' 17.65" S 29° 00' 14.80" E

5.3. Coal crushing and screening

The extracted coal from the 5 Seam Mining Project underground workings will be brought on surface via the existing conveyor belt system currently used for the 2 and 4 Seams coal mining activities. The coal will be either blended with 2 Seam or 4 Seam coal in the silo and loaded to the conveyor transporting coal to Kendal Power Station or transported via the proposed link road to the Phola Coal Processing Plant (PCPP) for further processing or out for inland market using road link trucks.

5.4. Supporting infrastructure

5.4.1. Existing at Khutala Colliery Mining Infrastructure

Khutala Colliery currently conducts underground mining operation, and the existing associated surface and underground infrastructure are illustrated on **Figure 5** and listed on **Table 7** below.

Table 7: Summary of Existing Surface Infrastructure

Infrastructure	Description	Coordinates
Access	Access to the 5 Seam Mining Project Area is through the Main Khutala Mine gate. This access is also used for all mine personnel and light vehicles entering the mine. Access is controlled by security and all permitted personnel will be subjected to Khutala's access verification processes upon arrival at the mine. Personal vehicles will park in the existing personnel vehicle parking, whilst buses will drop personnel off at the existing bus turnaround located at entrance to the mine gate. Light delivery vehicles and heavy delivery vehicles up to 10 t single body trucks will also enter via the existing Khutala Main entrance and deliver to the required location, or to the existing store facilities. The heavy delivery vehicles and coal hauling trucks access the site via an existing Plant access road.	26° 07' 30.9300" S 29° 00' 07.1149" E
Surface Buildings	Khutala administration offices, training centre, clinic, surface workshops, warehouse change houses and mine laboratory are located on the 5 Seam Mining Project Application Area. The majority of Khutala personnel use these facilities with limited crews being deployed through the KSA pit access and offices.	26° 07' 21.8750" S 29° 00' 05.3114" E
Main Shaft	The Khutala Main Shaft is located in the vicinity of the 5 Seam Mining Project Area is and is used to deploy personnel and machinery to the 4 and 2 Seams underground sections. This facility with a capacity of 373 persons for a single trip will also be used to access the 5 Seam mine sections.	26° 07' 20.3020" S 29° 00' 18.0880" E
ROM Silo	Khutala Main ROM silo with a capacity of 6000 tonnes of coal is located on the surface. The silo is for temporary storage of the 4 and 2 Seam before material is processed and transferred to customer.	26° 07' 16.7410" S 28° 59' 58.7400" E

Infrastructure	Description	Coordinates
Discard Bin	The discard bin located on the area of interest is currently decommissioned however, the infrastructure is not rehabilitated and the structure is still on surface.	26° 07' 15.1120" S 28° 59' 52.7190" E
Fans	Fan 1, Fan 2 and Fan 3 are located on the surface. These fans supply an estimated 900 m^3/s volume of air to the underground sections for ventilation purposes and support the Khutala 2 & 4 Seam east mine and Spine area. Fan 3 is currently not running however the ducting is still on surface.	26° 07' 13.7830" S 29° 00' 22.1840" E
Electrical	The Khutala surface infrastructure is supported by the 132kV Eskom Cologne substation situated on the "Application Area "and the voltage is stepped down by 132/22kV Eskom transformers to provide the mine with the required 22kV feed. The mine accepts electrical input at 22kV at this point, where it is then stepped down by the mine to 11kV by 22/11kV transformers located at the substation. A series of 11kV, 22 kV and 132 kV power lines intersect the Project Area and are connected to the Cologne and Khutala Main and the Township substations.	26° 07' 21.9350" S 28° 59' 46.5360" E 26° 07' 24.5530" S 29° 00' 04.1500" E 26° 06' 53.5700" S 28° 59' 41.5070" E
Water Management	There are three dams in the vicinity of the Application Area, • the Main Office Complex Pollution Control Dam (PCD) with a capacity of 215 mega litres, • the Main Administration Building Dam (Clean stormwater catchment dam) with a capacity of 2 mega litres, and • the Plant Crusher PCD with a 1 mega litre capacity.	26° 07' 17.5380" S 29° 00' 31.4490" E 26° 07' 28.5540" S 29° 00' 00.9069" E 26° 07' 23.6520" S 28° 59' 51.8800" E
Sewage Plant	The sewage plant is located on surface with a capacity of 1 mega litres.	26° 07' 02.7911" S

Infrastructure	Description	Coordinates
		28° 59" 29.7980" E
Telecommunications Tower	A telecommunication tower is located near the Main Admin building of approximately 35m height.	26° 07' 28.0260" S 29° 00' 03.9814" E

5.4.2. Mine infrastructure

Various surface structures have already been constructed as part of the approved EMP for the current Khutala Colliery as mentioned above and it includes access road and parking areas, surface buildings (offices, workshops, medical centre, etc), ventilation shafts, main shaft, ROM silo, discard bin, fans, electrical, conveyor belt system, water management (Crusher Plant PCD and dirty water drains), sewage treatment plant and telecommunications tower. Khutala Colliery infrastructure is shown in **Figure 5** and proposed infrastructure are listed on **Table 6.**

5.4.3. Roads, railway lines and power lines

The National Road N12 from eMalahleni and Kendal Power station secondary road is used to gain access to the mine. Existing roads will be used to access the construction and the proposed infrastructure areas. There is no railway line in close proximity of the proposed mining area, except for the main railway servicing the Ogies area. A 400 kV transmission power line runs west of Khutala Colliery. A new link road will be constructed to join Khutala and Klipspruit (KPS/KHU Link Road).

It should be indicated that Seriti has already entered into servitude agreements with the affected landowners where the KPS/KHU Link Road will be constructed. This include Glencore Operations (Pty) Ltd for the Remaining Extent of the farm Kleinzuikerboschplaat 5 IS and Ivan Enslin Boerdery cc in respect of Portion 3 of the farm Zondagsvlei 9 IS.

5.4.4. Water management infrastructure

Stormwater diversion berms/channels

Clean water and dirty water management drains and/or cut-off canals have been constructed to ensure separation of clean and dirty water at Khutala Colliery. Additional stormwater management system will be required for activities associated with the 5 Seam Mining Project. This will include dirty water drains associated with the RoM Coal Stockpile and clean water stream and wetland crossing with erosion protection measures including drains associated with KPS/KHU Link Road.

Dirty water management

The existing Pollution Control Dams (PCD) located at the Main Office Complex which includes the Main Office Complex PCD and Plant Crusher PCD which were constructed

as part of the Khutala initial construction activities will be utilised to cater for the dirty water run-off. Based on the surface water assessment, the dirty water runoff will not increase since the proposed dirty water catchment areas have been planned to be constructed within the already affected areas and no additional PCD will be required. But as part of the construction of the ROM Stockpile, dirty water drains will be constructed to channel contaminated water to the PCD.

Potable water

The existing potable water source will be utilised, and no additional potable water infrastructures will be constructed.

5.4.5. Workshops, administration and other buildings

No additional buildings will be constructed, except for the proposed ventilation fan and the RoM Stockpile including associated infrastructure. It should be noted that all buildings, workshops and administration blocks are in place as part of the existing activities and will be used as part of the 5 Seam Mining Project.

5.4.6. Housing, recreation and other employee facilities

Employees and construction workers will commute daily as to the site as is it currently done. No housing or recreational facilities will be constructed on the proposed site.

6. POLICY AND LEGISLATIVE CONTEXT

Applicable legislation and guidelines used to compile the report *(A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are appliable to this activity and are to be considered in the assessment process)*				**How does this development comply with and respond to the legislation and policy context** *(E.g., In terms of the National Water Act a Water Use Licence has/has not been applied for)*	**Reference where applied**
	Legislation	**Regulations / Guidelines**	**Description / Requirement**	**Project Implication**	
Environmental rights	**Constitution of the Republic of South Africa, Act 108 of 1996 as amended**	24. Environment	Everyone has the right— (a) to an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that— (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.	Consideration for environmental protection and prevention of pollution and ecological degradation. Consideration to sustainable development and use of natural resources as part of the development of this proposed project	Whole document

Applicable legislation and guidelines used to compile the report *(A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are appliable to this activity and are to be considered in the assessment process)*				**How does this development comply with and respond to the legislation and policy context** *(E.g., In terms of the National Water Act a Water Use Licence has/has not been applied for)*	**Reference where applied**
	Legislation	**Regulations / Guidelines**	**Description / Requirement**	**Project Implication**	
EIA Process and Listed Activities	**National Environmental Management Act, Act 107 of 1998 as amended**	Section 2 of NEMA	Sets out the principles of environmental management	Section 2 principles are to be considered during the environmental impact assessment process	Whole document
		Chapter 5 of NEMA	Integrated environmental management, provides information on environmental management tools that promote the implementation of principles set out in Section 2 of NEMA	Environmental management tools are to be considered during the EIA process for the project.	Whole document

Applicable legislation and guidelines used to compile the report *(A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are appliable to this activity and are to be considered in the assessment process)*				**How does this development comply with and respond to the legislation and policy context** *(E.g., In terms of the National Water Act a Water Use Licence has/has not been applied for)*	**Reference where applied**
	Legislation	**Regulations / Guidelines**	**Description / Requirement**	**Project Implication**	
		Government Notice Regulation 982 of 2014 as amended by GN 326 in April 2017.	Chapter 2: Timeframes Chapter 3: General requirements for applications Chapter 4: Application for environmental authorisation Part 1 and 2) Chapter 6: Public participation process Chapter 7: General matters	S&EIR must be undertaken in accordance to GN R 982 as amended.	Whole document

Applicable legislation and guidelines used to compile the report *(A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are appliable to this activity and are to be considered in the assessment process)*				**How does this development comply with and respond to the legislation and policy context** *(E.g., In terms of the National Water Act a Water Use Licence has/has not been applied for)*	**Reference where applied**
	Legislation	**Regulations / Guidelines**	**Description / Requirement**	**Project Implication**	
		Government Notice Regulation 983 of 2014 as amended by GN 327 in April 2017 (Listing Notice 1)	Lists activities requiring a basic environmental assessment.	Environmental authorisation must be obtained for activities described under this listing notice prior to commencement with listed activities.	Section 4.1
		Government Notice Regulation 984 of 2014 as amended by GN 325 in April 2017 (Listing Notice 2)	Lists activities requiring a scoping and environmental impact assessment.	Environmental authorisation must be obtained for activities described under this listing notice prior to commencement with listed activities.	Section 4.1

Applicable legislation and guidelines used to compile the report *(A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are appliable to this activity and are to be considered in the assessment process)*				**How does this development comply with and respond to the legislation and policy context** *(E.g., In terms of the National Water Act a Water Use Licence has/has not been applied for)*	**Reference where applied**
	Legislation	**Regulations / Guidelines**	**Description / Requirement**	**Project Implication**	
		Guideline 4 and Guideline Series 7	Public Participation in support of the EIA regulations Public Participation Guideline	The public participation process to be followed.	Section 9
		General Notice 891 of 2014	Guideline on need and desirability in terms of the Environmental Impact Assessment (EIA) Regulations, 2010	Determination of need and desirability of the project	Section 7
		General Notice Regulation 1147	Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations	Compile the financial provision associated with the proposed 5 Seam Project.	Section 0
		Guideline 5	Assessment of Alternatives and Impacts	The EIA process to be followed	Section 8.1

Applicable legislation and guidelines used to compile the report *(A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are appliable to this activity and are to be considered in the assessment process)*				**How does this development comply with and respond to the legislation and policy context** *(E.g., In terms of the National Water Act a Water Use Licence has/has not been applied for)*	**Reference where applied**
	Legislation	**Regulations / Guidelines**	**Description / Requirement**	**Project Implication**	
COVID-19	**Disaster Management Act, Act 57 of 2002 as amended**	General Notice Regulation 650 of 05 June 2020.	Directions regarding measures to address, prevent and combat the spread of COVID-19 relating to National Environmental Management Permits and Licences.	Impact on the on site assessment as part of the undertaking of specialists studies and conducting of public participation activities.	Section 9

Mining	**Minerals and Petroleum Resources Development Act, Act 28 of 2002 as amended**	Regulation 527	Pollution Control and Waste Management Regulations	The following impacts are included in the Scoping report: Soil, land capability and land use; Air quality impacts; Noise impacts; Visual impacts; Blasting, vibrations and shock impacts; Water pollution; Socio-economic impacts; Paleontological impacts; Cultural, heritage and archaeological impacts; Waste management; and Soil pollution	Section, 10
Biodiversity	**National Environmental |Management: Biodiversity Act, Act 10 of 2004 as amended**	Regulation 151 Publication of critically endangered, vulnerable and protected species	No person may carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit.	A permit might be required prior to removal of endangered, vulnerable and protected species that might be identified and impacted within the study area.	Currently no endangered, vulnerable and protected species have been identified within the study area.
	National Forests Act,	Notice 835 List of Protected	No person may carry out a restricted activity on any protected tree except if	A licence might be obtained prior to removing any	Currently no protected trees have been

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	Legislation	**Regulations / Guidelines**	**Description / Requirement**	**Project Implication**	
	Act 84 of 1998 as amended	tree species under the Act	there is a licence granted by the minister.	protected trees on site.	identified within the study area.
	Mpumalanga Nature Conservation Act, Act 10 of 1998	Section 2 Protected Plants	No person shall remove protected plants without a permit.	A permit will be required for the removal of protected plants that may be cleared as a result of the extension project.	Section, 10.11 with respect to Fauna and Flora
Waste Management	**National Environmental Management: Waste Act, Act 59 of 2008 as amended**	NEMWA variuos applicable sections	Waste management as part part of the project's construction and operation.	Management of waste that will be generated as part of this project to prevent environmental pollutin and littering.	Section, 10, with respect to waste management

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	Legislation	**Regulations / Guidelines**	**Description / Requirement**	**Project Implication**	
Water Use	**National Water Act, 36 of 1998 as amended**	NWA variuos applicable sections	Water management as part part of the project's construction and operation.	Water management as part of this project to prevent the contamination and pollution of water resources.	Section, 10.8 and 10.7 with respect to Surface Water
WUL procedural requirements	**National Water Act, 36 of 1998 GN R267**	GN R267	Regulations regarding the procedural requirements for water use licence applications and appeals.	WULA to be made and forming part of the water use application process.	Separate water use licence application process.
General Authorisations for Section 21(c) or Section 21(i)	**National Water Act, 36 of 1998 GN R509**	GN R509	General Authorisation in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998) for water uses as defined in Section 21(c) or Section 21(i)	WULA to be undertaken and include activities located within 500m of watercourses.	Separate water use licence application process.

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	Legislation	**Regulations / Guidelines**	**Description / Requirement**	**Project Implication**	
Protection of water resources	**National Water Act, 36 of 1998 GN 704**	All applicable regulation forming part of GN 704	Regulations on use of water for mining and related activities aimed at the protection of water resources	Application for the exemption from the requirements of the identified activities.	Section 10.7 with respect to Surface Water
Heritage Resources	**National Heritage Resources Act , Act 11 of 1999**	Section 38	Any person who intends to undertake a linear development exceeding 300m and undertaking a development exceeding 5 000m² must inform the responsible heritage resources authority.	South African Heritage Resources Agency (SAHRA) has to be notified of the proposed development.	Section, 10.11, to cultural, heritage and archaeological aspects
Noise	**National Environmental Management: Air Quality Act, Act 39 of 2004**	Section 34	Control noise in general, by specific machinery, activities or in specified places or areas; Also with respect of determining definition for noise and maximum levels of noise.	Applicant is to adhere to the national standards for noise.	Section 0 with respect to noise

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	Legislation	**Regulations / Guidelines**	**Description / Requirement**	**Project Implication**	
Veld Fires	**National Veld and Forest Act 101 of 1998**	Chapter 4 Section 12	Places a duty on owners to prepare and maintain firebreaks. The procedure in this regard and the role of adjoining owners and the fire protection association are dealt with.	A firebreak must be maintained around the mine perimeter fence.	Section 10.1, 10.3 with respect to fauna and flora
Land Use Management	**Conservation of Agricultural Resources Act 1983 (Act No 43 of 1983) as amended**	Regulation 280 of 2001	Requires the landowner to manage agricultural resources i.e. the removal of invasive species, protection of soils against water and wind erosion and the management of water resources.	An alien invasive species plan must be developed for the mine and a land use and soil management plan must be developed.	Section, 10.3 and 10.4 with respect to Fauna and Flora

Applicable legislation and guidelines used to compile the report *(A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are appliable to this activity and are to be considered in the assessment process)*				**How does this development comply with and respond to the legislation and policy context** *(E.g., In terms of the National Water Act a Water Use Licence has/has not been applied for)*	**Reference where applied**
	Legislation	**Regulations / Guidelines**	**Description / Requirement**	**Project Implication**	
	Local Government Municipal Systems Act, 2000 (Act No. 32 of 2000) as amended.	The whole Act and applicable Regulations.	Provides a framework for planning by local government, describes contents of an IDP and the process to be followed.	Applicable environmental related management plans which are to be incorporated into the IDP.	Section 22.2

	Spatial Planning and Land Use Management Act, Act 16 of 2013 (SPLUMA) and applicable Regulations.	Chapter 5 dealing with Land Use Management and Chapter 6 dealing with Land Development Management.	Provide a framework for spatial planning and land use management in the Republic; to specify the relationship between the spatial planning and the land use management system and other kinds of planning; Provide for the inclusive, developmental, equitable and efficient spatial planning at the different spheres of government; provide a framework for the monitoring, coordination and review of the spatial planning and land use management system; Provide a framework for policies, principles, norms and standards for spatial development planning and land use management; to address past spatial and regulatory imbalances; to promote greater consistency and uniformity in the application procedures and decision-making by authorities responsible for land use decisions and	Municipal Land Use Planning which requires that rezoning of land must be done in terms of the Local Municipality Municipal By-Laws on Spatial Planning and Land Use Management.	Separate applications for the rezoning of the land need to be done by mine to the eMalahleni Municipalty

Applicable legislation and guidelines used to compile the report *(A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are appliable to this activity and are to be considered in the assessment process)*				**How does this development comply with and respond to the legislation and policy context** *(E.g., In terms of the National Water Act a Water Use Licence has/has not been applied for)*	**Reference where applied**
	Legislation	**Regulations / Guidelines**	**Description / Requirement**	**Project Implication**	
			development applications; and Provide for the establishment, functions and operations of Municipal Planning Tribunals; to provide for the facilitation and enforcement of land use and development measures.		

Applicable legislation and guidelines used to compile the report *(A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are appliable to this activity and are to be considered in the assessment process)*				**How does this development comply with and respond to the legislation and policy context** *(E.g., In terms of the National Water Act a Water Use Licence has/has not been applied for)*	**Reference where applied**
	Legislation	**Regulations / Guidelines**	**Description / Requirement**	**Project Implication**	
	eMalahleni Local Municipality Municipal By-Law on Spatial Planning and Land Use Management, 2016 Published under PN 4 in Mpumalanga Provincial Gazette 2653 of 24 February 2016.	Part C: Dealing with the rezoning of land.	Section 66. Application for amendment of a land use scheme by rezoning of land.	Requires that an applicant, who wishes to rezone land, must apply to the Municipality for the rezoning of the land in the manner provided for in Chapter 6. The mine to confirm that the proposed activities that need to be conducted will be undertaken within an area that has been rezoned as mining land use.	A separate application for the rezoning of the land need to be done by mine to the eMalahleni Local Municipalty.

Applicable legislation and guidelines used to compile the report *(A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are appliable to this activity and are to be considered in the assessment process)*				**How does this development comply with and respond to the legislation and policy context** *(E.g., In terms of the National Water Act a Water Use Licence has/has not been applied for)*	**Reference where applied**
	Legislation	**Regulations / Guidelines**	**Description / Requirement**	**Project Implication**	
	Victor Khanye Local Municipality Municipal By-Law on Spatial Planning and Land Use Management, 2015 Published under the Mpumalanga Provincial Gazette 2610 of 23 November 2015 GN 535 of 2015).	Part C: Dealing with the rezoning of land	Section 66. Application for amendment of a land use scheme by rezoning of land	Requires that an applicant, who wishes to rezone land, must apply to the Municipality for the rezoning of the land in the manner provided for in Chapter 6.	A separate application for the rezoning of the land need to be done by mine to the Victor Khanye Local Municipalty.

Applicable legislation and guidelines used to compile the report *(A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are appliable to this activity and are to be considered in the assessment process)*				**How does this development comply with and respond to the legislation and policy context** *(E.g., In terms of the National Water Act a Water Use Licence has/has not been applied for)*	**Reference where applied**
	Legislation	**Regulations / Guidelines**	**Description / Requirement**	**Project Implication**	
Occupational Health and Safety	**Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) as amended**	The whole Act and applicable Regulations.	Provides for the health and safety of persons at work, including some of the environmental aspects including atmospheric emission from workplaces, sets out certain general duties of employers and to their employees, empowers the Minister of Labour to make regulations regarding various matters and further require any employer to ensure that their activities do not expose non-employees to health hazards	The environmental impacts such as air emissions from the workplace environment has implications.	

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	Legislation	**Regulations / Guidelines**	**Description / Requirement**	**Project Implication**	
Environmental pollution.	**National Health Act, 2003** **(Act No. 61 of 2003) as amended**	Relevant sections of the Act and applicable Regualtions.	Makes reference to the performing of environmental pollution control by municipalities and municipal health services are defined as including the responsibility for environmental pollution control. The responsibility for municipal health services rests with metropolitan and district municipalities and National and provincial departments of health have the duty to perform environmental pollution control.	Environmental management within the municipalities falls within environmental pollution control to be established and implemented by the municipalities.	

7. 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)

7.1. Project motivation for need and desirability.

7.1.1. Economic Consideration

The proposed development will result in the extension of the Khutala Colliery life of mine and thus ensure that the current mining activities continue to support the local and national economic and social needs.

The project will ensure that the employees' current working at the other underground working sections retain their jobs since mining will commence in this section soon as the approvals are received.

Mining operations have a positive impact on the regional socio-economic structure. Many jobs have been created and business opportunities provided for local and other enterprises. The effect of the mine extends beyond the project area, it will have a positive effect in current and the long term.

7.1.2. Social Consideration

The proposed activity will have several advantages for the local community. The proposed mining activity will provide an income generation for the area, as well as a cash injection into the country's economy. The continuation of the existing current local labour workforce at Khutala will ensure that it maintains the reduced unemployment rate in the area, as well as allow for the uplifting of the project construction employees.

As an operational mine, Khutala has an existing Social and Labour Plan (SLP), the ongoing implementation of the SLP will contribute to the empowerment of both the workforce and local community. In addition to the aforesaid the socio-economic benefits, the proposed development will result in employment opportunities and skills development in the area mostly during the construction phase. Seriti will endeavour to source most of the workforce as stipulated in the Social and Labour Plan, more specifically from the local communities surrounding the mine. It is estimated that employment opportunities will be created during the construction and decommissioning of this project as indicated above.

Seriti, through the corporate social investment programmes inject know-how as well as money into capacity building in the community focusing particularly on the following areas:

- Education;
- Healthcare;
- HIV/Aids;
- Local economic development;
- Crime prevention;
- Housing and infrastructure;
- Youth and women empowerment;
- Job creation
- Capacity building; and
- Environmental management.

7.1.3. Environmental Consideration

The proposed project will aim to improve the environmental conditions through the following processes which have been discussed below:

- Separation of clean and dirty water;
- Monitoring of environmental conditions including surface water, groundwater, air quality, potential subsidence, etc;
- Development of a Stormwater Management Plan (SWMP);
- Conduct rehabilitation activities in respect to areas disturbed during the construction phase; and
- Return of mining disturbed areas to usable agricultural land use and land capability after the closure of the mine.

It should be indicated that the mine will ensure that mining activities and related infrastructure are not placed within 100 m of the existing watercourse without the required water use licences and exemptions as required in terms of the NWA. The mine will ensure that it complies with the requirements of GN R 704, but in case whereby mining activities or infrastructure might potentially impact on the watercourse, the mine will ensure that the required exemption will be applied. The final mine plan will be determined based on the recommendation of the specialist's studies that will be undertaken within the study areas.

The SWMP will be reviewed to ensure that the additional activities do not contribute to contamination of water resources and ensure that the activities are in line with current

SWMP. The proposed mining activities have a potential to cause an impact to the environment, specifically the impact on surface and groundwater. These will require monitoring of the impact of mining activities on surface and groundwater to ensure that mining related impacts are minimised, and pollution is prevented.

7.1.4. Health and Safety Consideration

Coal mining activities associated with underground mining activities have a potential of causing health and safety risks associated with the fall of ground due to roof stability and coal dust inhalation. Seriti has developed health and safety standards which all employees are required to adhere to. Should the EIR and EMPr be approved, these health and safety standards will be implemented during the construction, operational, decommission and closure stages of the proposed 5 Seam Mining Project.

The identified proposed environmental specialists' studies including soil, land use and land capability, wetland, hydropedology, ecology, blasting and vibration, surface water, groundwater, noise, climate change, air quality impacts will be undertaken to ensure their impacts to the local communities and environment are assessed, quantified and managed in order to prevent health and safety effects.

8. DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PROPOSED PREFERRED SITE.

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

8.1. Details of all alternatives considered.

*With reference to the site plan provide as **Appendix 4** and the location of the individual activities on site, provide details of the alternatives considered with respect to:*

(a) The property of which or location where it is proposed to undertake the activity
(b) The type of activity to be undertaken;
(c) The design or layout of the activity;
(d) The technology to be used in the activity;
(e) The operational aspects of the activity, and
(f) The option of not implementing the activity

One of the objectives of an EIA is to investigate alternatives to the proposed project. The Integrated Environmental Management procedure stipulates that the environmental investigation needs to consider feasible alternatives for any proposed development. Therefore, several possible proposals or alternatives for accomplishing the same objectives should be identified and investigated. To ensure that the proposed development enables sustainable development, feasible alternatives must be explored.

The identification, description, evaluation, and comparison of alternatives are important for ensuring a sound environmental scoping process. Alternatives should be considered as a norm within the Environmental Process. The alternatives considered for the proposed development includes associated infrastructure location alternatives, mining method alternatives, technology alternatives, and the No-go option. The preferred alternatives will be assessed against the status quo in the EIR, in terms of environmental, social and technical feasibility. It must be indicated that the location for this project is based on the coal resource and its proximity to its infrastructure to keep the footprint as small as possible and to limit transport/handling since the current infrastructure at Khutala Colliery will be used.

The following section provides an overview of the alternatives identified; these include:

- Associated infrastructure and layout alternatives;
- Mining method alternatives;
- Coal handling and processing alternatives; and
- No-go option.

8.1.1. Associated infrastructure location and layout alternatives

The present location and layout of the proposed activities have been informed by the existing WULs, the NEMA EAs granted for the Khutala Colliery and previous specialist studies conducted in the area (biodiversity, aquatics, surface and groundwater, geochemical, geotechnical, soil, land use and land capability, heritage, noise, air quality, climate change, and visual studies). It should be noted that most of the existing Khutala Colliery infrastructure will be used as part of the proposed 5 Seam Mining Project activities. Specialist studies will be conducted to assess and finalise the layout of the planned infrastructure. The preferred and alternative site have been assessed and the final layout site determined based on the following factors:

- Distance of proposed mining activities from existing infrastructure such as shaft, offices and water management infrastructure;
- Distance of proposed surface infrastructure from wetland areas;
- Areas already disturbed by Khutala mining operations
-

8.1.2. Mining Method Alternatives

Coal is mined by two methods, namely opencast mining and underground mining. The choice of mining method is largely determined by the geology of the coal deposit. An array of underground and surface mining techniques exists; however, technical and economic feasibility studies are required to determine which process/method is best. These studies are based on the regional geologic conditions, including characteristics of the site; coal seams continuity; thickness; structure; quality; and depth and strength.

Preferred mining plan

The preferred 5 Seam Coal reserve that will be covered by this application is approximately 538 ha. The preferred alternative was selected based on the coal reserves, and distance from existing surface infrastructure.

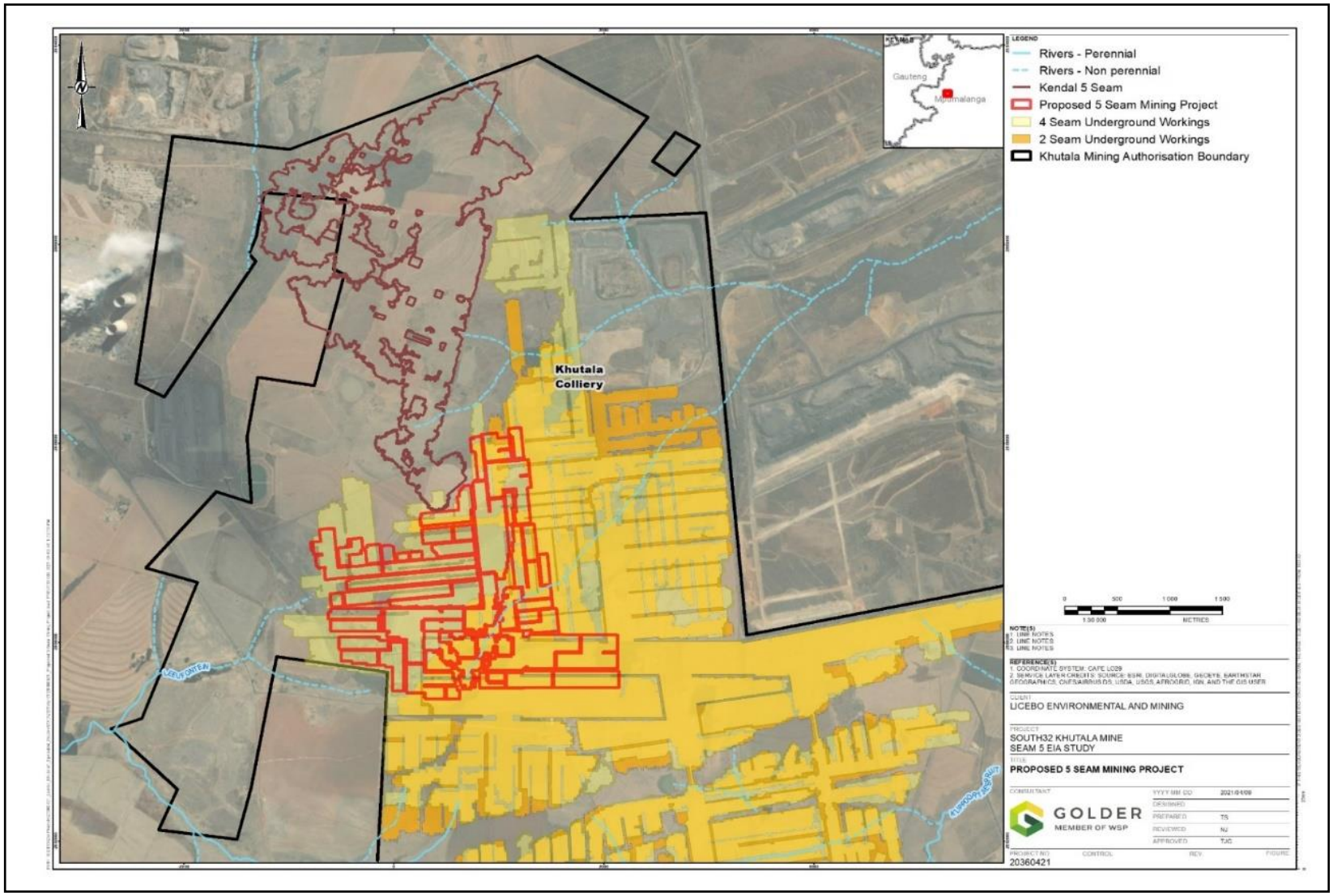


Figure 7: Preferred 5 Seam Mining Project showing the applied 5 Seam coal area

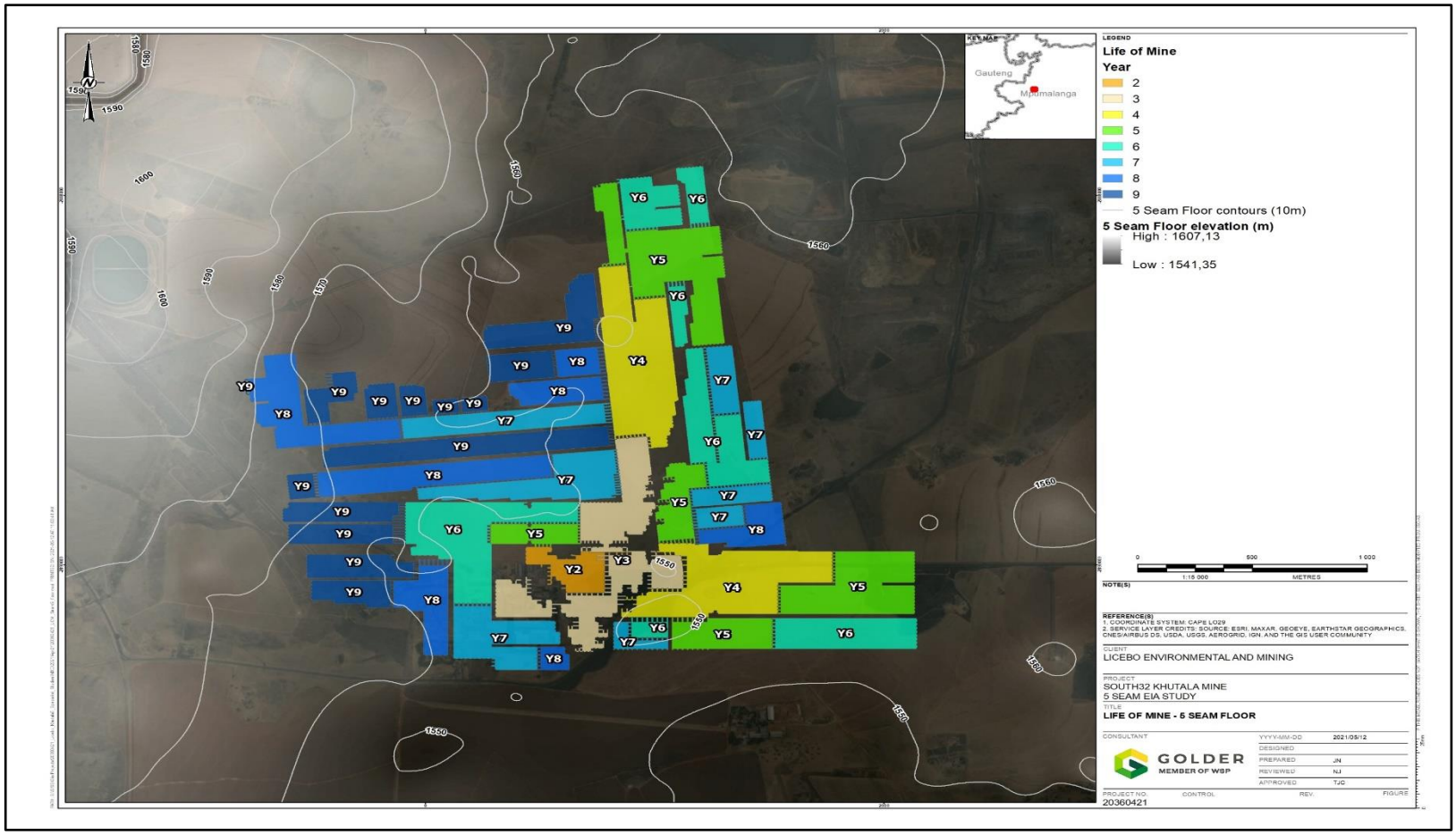


Figure 8: Proposed Khutala 5 Seam Mining Project Life of Mine Plan

Alternative Mining Plan

The Khutala Colliery total 5 Seam coal reserves within the Mining Right Area cover approximately 6257 ha (refer to **Figure 9)**. The total extent was initially the planned application study area, due to the graben situated across the farm Cologne 34 IS and Springboklaagte 33 IS, it was decided that the proposed application should only focus north on the graben within the study area as indicated on **Figure 7** above.

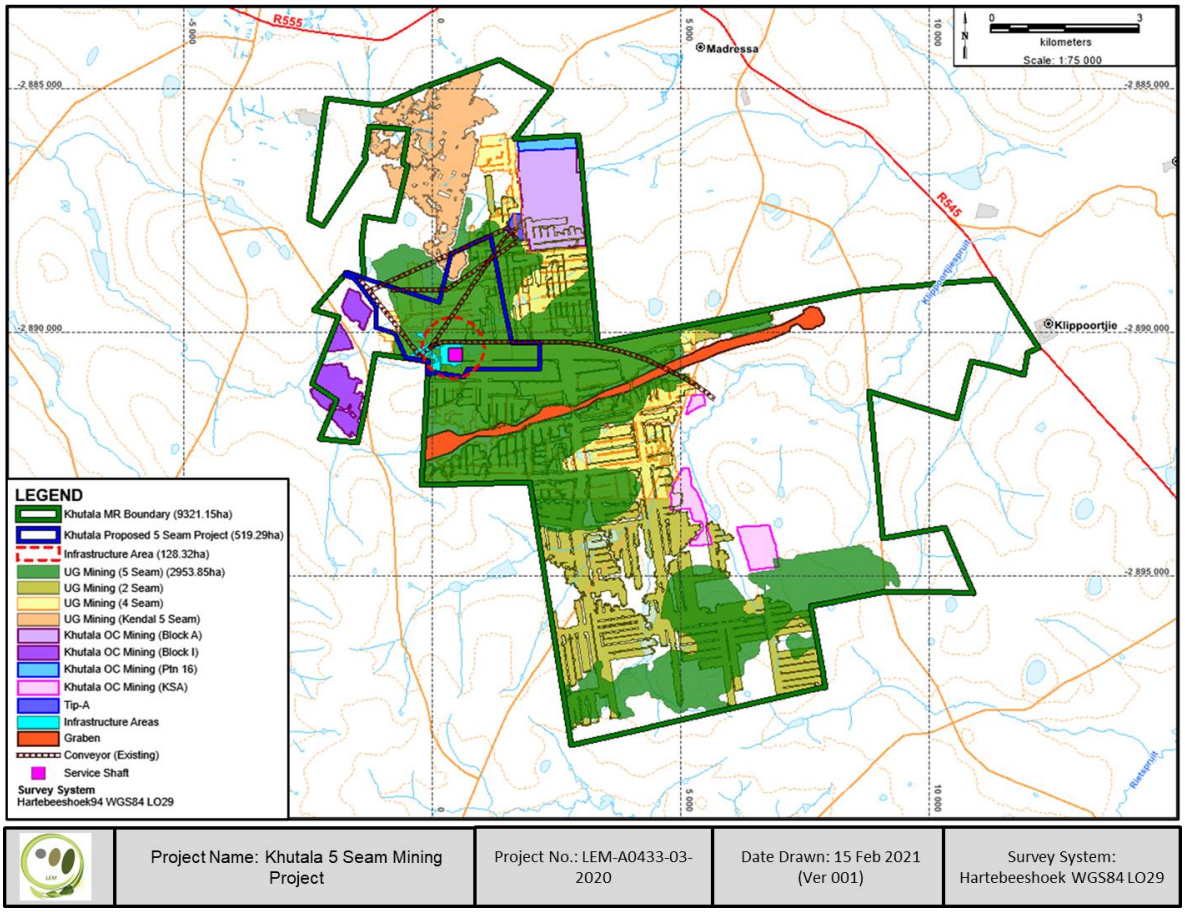


Figure 9: Khutala Colliery 5 Seam Coal reserves extent

Underground mining method (Preferred method)

Mineral production in which all extracting operation are conducted beneath the ground surface is termed underground mining. Underground mining method is usually employed when the depth of the deposit or the waste to ratio (stripping ratio) are too great to commence as surface operation. Based on the high surface mining strip ratio the preferred mining method for the proposed project will be underground. The mining method that will be utilized to extract coal during the operational phase is underground drill and blast mining method.

Blast hole drilling is a technique used in mining whereby a hole is drilled into the surface of the rock, packed with explosive material, and detonated. The aim of this technique is to induce cracks in the inner geology of the surrounding rock, to facilitate further drilling and associated mining activity.

The initial hole into which the explosives are packed is known as the “blast hole”. Blast hole drilling is one of the primary surface drilling techniques employed in mining operations today. This is the preferred mining method to be employed as part of the 5 Seam Mining Project.

Underground mining method (alternative method)

There are also two primary methods for underground mining. These are bord-and-pillar and longwall mining. The bord-and-pillar mining involves leaving pillars of coal to support the roof of the mine, while Longwall mining removes all the coal, while supporting temporarily to hold the roof up. Once coal has been extracted the roof is then allowed to collapse. The bord and pillar mining method using mechanical mining operations with a continuous miner will be the alternative method that will be applied should the preferred method (underground drill and blast mining method) is not applied. But due to the increased contamination of the coal when using mechanical mining operations, it then makes this methodology not feasible. In a case whereby the contamination of the coal is high, the 5 Seam coal will need to be washed in a coal processing plant. As part of this project and the proposed mining extent, it is not feasible to construct a coal washing plant. **Figure 10** below illustrates bord and pillar mining method.

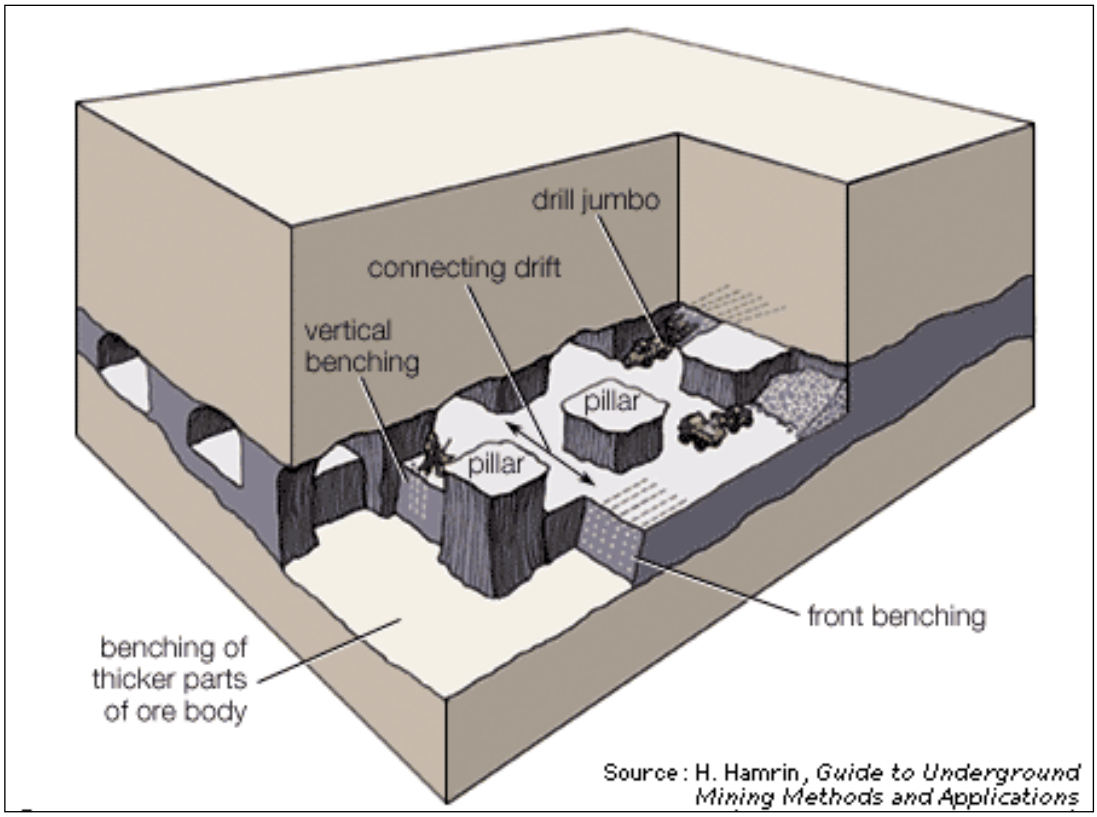


Figure 10: Bord and Pillar mining method illustration.

Opencast mining method (alternative)

Opencast mining is used where a deposit is shallow and it is a method of extracting rock or minerals from open pits, like quarries and burrows. Opencast mines consist of a series of ledges or benches, which companies dig at angles to allow for extraction without causing structural weaknesses.

This method recovers a higher proportion of the coal deposit than underground mining as all coal seams are exploited – 90% or more of the coal can be recovered. Various opencast mining technologies are available to remove the ore from the open pit. The overburden of soil and rock is first broken up by explosives; it is then removed by draglines or by shovel and truck. Once the coal seam is exposed, it is drilled, fractured and systematically mined in strips. The coal is then loaded on to large trucks or conveyors for transport to either the coal preparation plant or direct to where it will be used. After completion of operations, the pit is then backfilled with overburden and reclamation work on restored surface is performed. The high stripping ratio as part of the opencast mining and the increased liability associated with the rehabilitation of the area that will be affected by this project makes it not feasible to undertake this project.

8.1.3. Coal processing

Based on the current available information the mine is not planning to undertake any coal processing on site. The 5 Seam coal will be crushed, screened and sized to the required specifications.

Different options to improve coal qualities are available in case whereby the mine will need to improve on the qualities, this will be investigated during the EIR phase and will include the following options:

- Crushing and screening plant;
- De-stoning plant;
- Combination of washing, de-stoning and blending plants.

8.1.4. No-go alternative (Option of not implementing the activity)

The Impact Assessment Phase requires that all development alternatives be included into the investigation process. The No-Go alternative have been comparatively assessed against the distance of proposed site from wetland areas, distance of mining areas from existing infrastructure, areas already disturbed by mining activities to minimize impacts on green areas The No-Go alternative will entail leaving the site in its present state and the proposed mining extension will not be allowed to take place. This will have an economic impact on the financial viability of the project. The 5 Seam reserves are situated within the mining right area of Khutala Colliery and underground mining was undertaken on the 2 and 4 Seams within the same area. The proposed project will have minimal impacts on the surface with only RoM Coal Stockpile area, KPS/KHU link road and transfer chute as the only planned surface infrastructure.

9. DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

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

The Public Participation Process (PPP) is to be undertaken in compliance with the requirements of the NEMA, MPRDA and NWA, which enable the project team to incorporate stakeholder comments as far as possible into the proposed project and will provide stakeholder with sufficient opportunity to partake meaningfully in the environmental regulatory process. A full Public Participation Report, with accompanying appendices, is included in this report as **Appendix 5**. A high-level summary for the PPP is set out below.

PPP is a key element of the environmental decision-making process, and stakeholder engagement formed part of the Scoping and Impact Assessment Phase of this proposed development, **Figure 11** briefly outlines the broad timeframes and the various technical and stakeholder engagement activities being undertaken during the phases (Pre-application, Application, Scoping, Impact Assessment and Decision-making) of the environmental authorisation and decision-making process relating to the proposed development. Refer to **Appendix 5** for the details of The Public Participation Report that has undertaken as part of this environmental regulatory process.

9.1. PPP Methodology Overview

The public participation process has been undertaken in line with Chapter 6 of the EIA Regulations, 2014 as amended by GN R 326 (For the EIR and EMPr requirements), GN R 267 of the NWA (For meeting the requirements of the IWULA and IWWMP)and the requirements of the latest COVID-19 Disaster Management Regulations and GN R 650, dealing with the directions regarding the measures to address, prevent and combat the spread of COVID-19 relating to National Environmental Management Permits and Licences were also considered. But it should be indicated that in order to ensure that I&APs are given a fair PPP, physical meetings and public documents will be provided to the them. That is, hard copies and electronic copies of the Draft EIR and EMPr will be distributed to the registered I&APs. Also, virtual communication platforms such as Zoom, Microsoft teams and Skype or any other form of consultation will be utilised to engage the registered I&APs and

properly prepared hard copies to prevent the spread of COVID-19 which will be placed at the identified local public places.

The PPP for the environmental authorisation processes, that is for the EIR including the EMPr and IWULA including the IWWMP will be conducted concurrently and in an integrated manner. The following phases will be implemented as part of the PPP:

- Scoping Phase;
- Impact Assessment Phase; and
- Decision-making Phase.

The sub sections below outline the methodology to be followed for each of the phases which will be in line with the NEMA, NWA and MPRDA requirements.

9.1.1. Environmental Authorisation Process

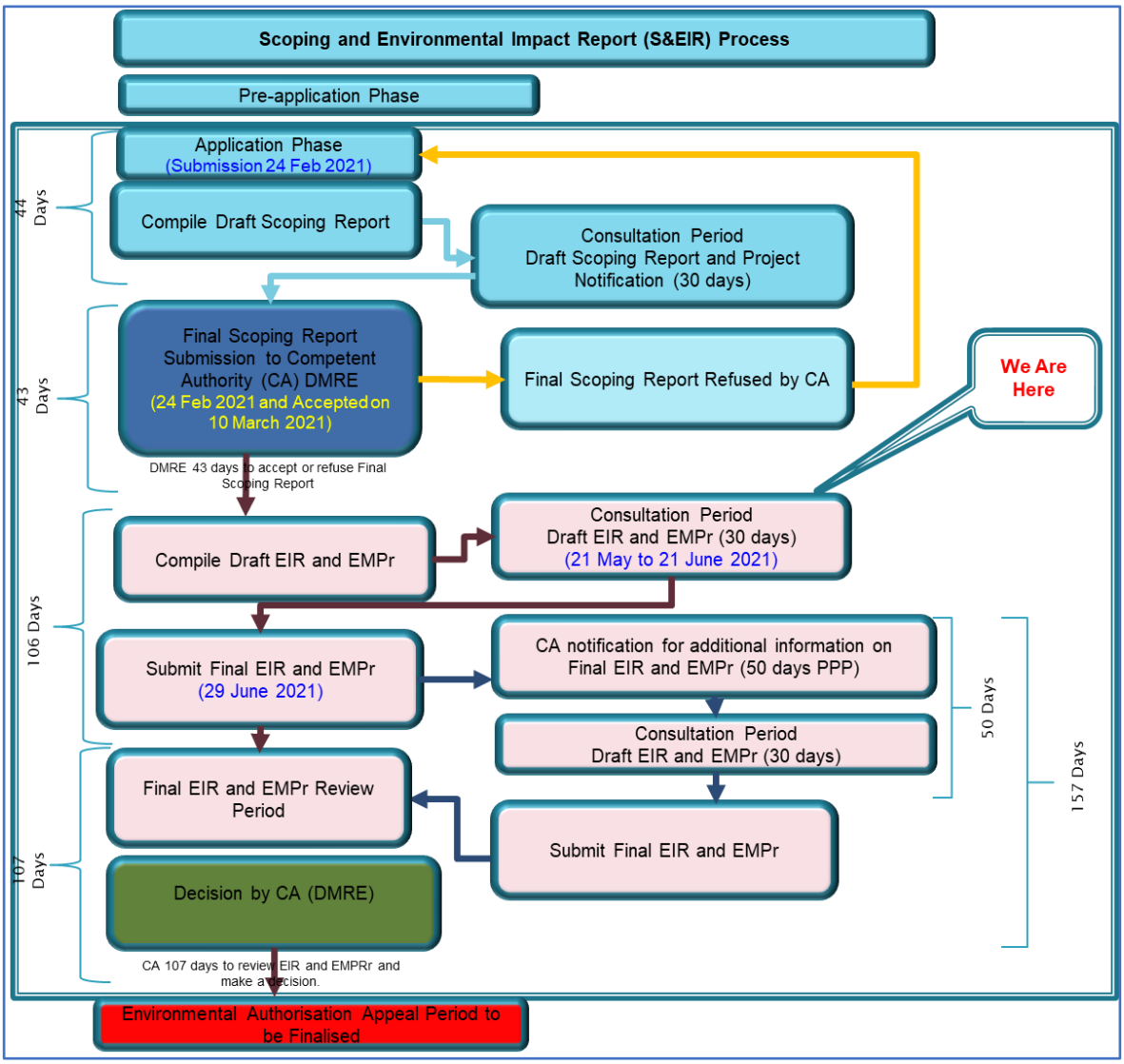


Figure 11: NEMA Process – Scoping and Environmental Impact Assessment- Application

9.1.2. IWULA Process

The DWS has revised the approval process of IWULA to adjust the timeframes accordingly. It should be noted that the DWS has also revised the Regulations (GN R267) to effect the 90 days and address other challenges that were identified since the Regulations were published. The 90 days approval process has been implemented since the 01st of April 2021. The IWULA associated with this Project will be subjected to the revised approval process, refer to **Table 8** and **Table 9** below.

Table 8: DWS summary turnaround time to process an IWULA, after receiving and accepting the technical report

Part	Description	Number of days
	Applicant	
1	Applicant submit the application and the technical report	No Count
	Department	
2	Department screen the technical report, assess the application and make a decision	90
Total		**90**

Table 9: DWS detailed description of the turnaround time to process an IWULA

Phase	Description	Responsible person	Time frames
1: Pre-application enquiry	Engagement between the applicant and DWS to determine type of authorisation, conduct site inspection and information requirements.	Applicant	No count
	Applicant compiles the application, technical report supporting the application is identified. Applicant compile technical report and submit to the Department		
2. Applicant submits the application and DWS screens the documents	The application and technical reports, supporting the application is screened, resulting in its acceptance or rejected. If rejected the application is closed.	Department	90 days

Phase	Description	Responsible person	Time frames
3. Assessment and decision	The application and technical report are evaluated, leading to recommendations and decision.		

9.2. Public Review of the Draft Scoping Report

The I&APs were notified of the proposed development in line with Chapter 6 of the EIA Regulations, 2014 as amended. The EIA Regulations, 2014 allow for an integrated and comprehensive Public Participation Process to be adopted, which provides IA&Ps with accessible information, presented in an objective manner. Based on this, and during the various phases of the EIA Process, this enables IAPs to:

- Raise comments and make recommendations that will have to be considered during the Scoping and Impact Assessment phase;
- Provide comment on project alternatives and the proposed process of assessment;
- Verify that issues raised were recorded and understood;
- Contribute local knowledge to the process; and
- Comment on the findings of the Specialist Studies and the EIA.

As part of the Scoping Phase for the proposed Project, the following PP activities have been undertaken:

- Compilation and distribution of a landowner consent notification letters in terms of regulation 15 (1) of the NEMA EIA Regulations since some of the surface rights are not owned by Seriti. The proof of the notification letter was attached as part of the PPP Report;
- Stakeholder identification by means of Windeed searches, desktop research, I&AP registration, mine's existing stakeholder register, and telephonic consultation;
- Distribution of Public Participation materials to stakeholders which contain project information and the required contact details which enabled stakeholders to register as I&APs;

- Scoping reports (draft and final) were made available for public review and commenting at publicly accessible places and on the Licebo website (www.licebo.co.za); and
- Engagement with I&APs by means of telephonic consultations and one-on-one meetings in order to obtain comments which have been captured in the CRR.

Throughout the Scoping Process a register of IA&Ps has been created and maintained. This provided the platform from which correspondences and comments received from IA&Ps were recorded and maintained.

The public participation process for this process was undertaken in accordance with Chapter 6 of the NEMA EIA Regulations, as amended and it is reflected in **Table 10** below

Table 10: PPP Scoping Phase Activities

Activity	**Details**
Identification of stakeholders	The stakeholder database was and will be developed throughout the process which includes I&APs from various sectors of society.
Distribution of announcement letter and BID	BIDs, announcement letters with Registration and Comment Forms were distributed from Friday, the 04th of December 2020 and as when requested by I&APs.
Placing of newspaper advertisement	An English advert was placed on Friday, the 04th of December 2020 in the Witbank News and Streeknuus.
Placement of site notices	English site notices were put up at the proposed project site, local libraries, and municipal offices on Friday, the 04th of December 2020.
Announcement of DSR	Announcement of availability of the DSR was distributed to stakeholders together with the formal project announcement on Monday, 07th of December 2020. The electronic copies of the DSR were made available on www.licebo.co.za (under Public Documents: https://licebo.co.za/projects/public-review-documents/khu-

Activity	Details
	5seam-draft-scoping-report*) and/or requested from Licebo's offices.* *(30-day comment period for the Scoping Report: Mon, 07th December 2020 to Mon, 27th of January 2021)*
Scoping Stakeholder Meetings	Comments received have been captured in the Comments and Response Report (CRR) attached as **Appendix 5** and these comments and concerns have been addressed as part of the EIA phase and incorporated in the Draft EIR and EMPr.
Announcement of the Final Scoping Report availability	Announcement of submission of the Final Scoping Report to the DMRE have been shared with all registered I&APs following the submission of the Final Scoping Report on the 24th of February 2021. These reports were made available on www.licebo.com (Public Review Documents: https://licebo.co.za/projects/public-review-documents/seriti-khutala-5-seam-mining-project-environmental-authorisation) and/or requested from Licebo's offices.
Obtained comments from stakeholders	Comments, issues of concern and suggestions received from stakeholders during the Scoping phase have been captured in the CRR.

The draft Scoping Report was issued to the I&APs on **04 December 2020,** and it was made available for public review for a period of 30 days from **07 December 2020** to **27 January 2021**. Khutala Colliery stakeholder register was used to inform the registered IA&Ps on the availability of the Draft Scoping Report for review. Any potential I&APs were invited as part of the project notifications and those who responded were added to the stakeholder register as soon as they register their interest and consultation information. Comments received have been recorded in the CRR and form part of **Appendix 5** of the PPP Report as part of the Final Scoping Report.

9.3. Public Review of the Draft EIR

The Draft EIR including the specialists' reports will be issued to the I&APs on the **04th of June 2021** and it will be made available for public review for a period of 30 days from the **07th of June 2021** to **the 08th of July 2021**. The updated stakeholder register will be used to inform the registered IA&Ps on the availability of the Draft EIR for review. Comments received will be recorded in the CRR and form part of the Final EIR PPP Report.

The Draft EIR, IWWMP and specialists' reports will be made available as follows:

Location	Contact
Hard Copies	
eMalahleni Public Library – Corner Mandela and Arras Streets, eMalahleni	(013) 690 6229
Ogies Public Library – 61 Main Street, Ogies	(013) 643 1027
Victor Khanye Local Municipality Main Library, Corner Samuel and van der Walt Streets in Delmas	(013) 665 6000
Khutala Colliery Main Entrance Security Gate Reception, Portion 3 of the Farm Cologne 34 IS, Ogies, 2230	(013) 648 5000
Electronic Copies	
On www.licebo.com (Public Review Documents: https://licebo.co.za/projects/public-review-documents/seriti-khutala-5-seam-mining-project-environmental-authorisation) and/or requested from Licebo's offices.	013 692 0212 / 083 257 8869 Ralph.repinga@licebo.co.za

9.4. Summary of issues raised by Interested and Affected Parties

(Complete the Table summarising comments and issues raised, and reaction to those response)

The details of the PPP are contained on **Appendix 5** of this Draft EIR. Refer to **Table 11** for the summary of the issues and comments that were raised by Interested and Affected Parties during the consultation process.

Table 11: Summary of issues and comments raised by Interested and Affected Parties

Interested and Affected Parties		**Date Comments Received**	**Issues Raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and/or response were incorporated**
Names of persons consulted	mark with an X where those who must be consulted were in fact consulted				
Mr Johan van der Walt (Vos Breedt Boerdery)	X	07/12/2020 - E-mail	Following the telephonic conversation with LEM (Bongani Motha), Mr Johan van der Walt acknowledged receipt of the notification sent to Vos Breedt Boerdery in respect of the proposed Khutala Colliery 5 Seam Mining Project. He wanted to know whether the proposed project will result into construction of any surface infrastructure or opencast mining activities within the Portion of Portion 3 of the Farm Cologne 34 IS where they are currently cultivating. **Telephone communication**	LEM confirmed the telephonic conversation via e-mail to Mr van der Walt indicating that the proposed project will be an underground operation and the surface infrastructure to be constructed are currently planned within the existing disturbed area located at the Mine Office Complex. Currently there are no surface infrastructure planned to be constructed within the Portion of Portion 3 of the Farm Cologne 34 IS where they are currently cultivating.	Section 5.2.1: Proposed infrastructure.
Mr van der Merwe RS (Roelf)	X	07/12/2020 - E-mail	Comment raised during socio-economic assessment undertaken	It was indicated to him that his comment will be further	Section 11 in respect to

Interested and Affected Parties		**Date Comments Received**	**Issues Raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and/or response were incorporated**
Names of persons consulted	mark with an X where those who must be consulted were in fact consulted				
(Representing Ms Prinsloo who is the landowner). Landowner: Mrs Prinsloo Surface Rights Owner of Portion 6 of the farm Zondagsvlei 9 IS.			<u>at Portion 6 of the Farm Zondagsvlei 9 IS</u> Wanted to know whether the proposed project will not impact on the groundwater boreholes since two of his water supply boreholes are located within or near the aquifer closer to the 5 Seam.	assessed as part of the groundwater assessment and incorporated in the draft EIR. The groundwater assessment report will be made available for review.	groundwater impacts.
Glencore Operations South Africa (Pty) Ltd: Nico Dooge	X	05/02/2021 via E-mail.	Following the issuing of the BID, Mr Dooge requested additional plan showing the KPS/KHU Link Road in respect to Remaining Extent of the Farm Kleinzuikerboschplaat 5 IS.	The plan was sent to Nico via E-mail on the 06th of February 2021.	Section 5.2.1: Proposed infrastructure including the KPS/KHU Link Road.
Glencore Operations South Africa (Pty) Ltd Goedgevonden	X	10/02/2021 via E-mail.	Nhlanhla requested the copy of the BID and asked about the expected impact on GGV as a result of the proposed KPS/KHU Link Road?	A copy of the BID was sent to him on the 15th of February 2021.	Section 11 dealing with the plan of study for the expected

Interested and Affected Parties		**Date Comments Received**	**Issues Raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and/or response were incorporated**
Names of persons consulted	mark with an X where those who must be consulted were in fact consulted				
Colliery: Nhlanhla Mkhonto (Sustainable Development Coordinator)			He also requested that a meeting for further engagement be arranged.		impacts to be undertaken as part of the EIR phase. Section 5.2.1: Proposed infrastructure including the KPS/KHU Link Road.
	X	16/02/2021	Acknowledged receipt of the feedback sent on the 15th of February 2021 and requested that LEM must document the EIR phase specialist proposed mitigation measures for their review and comments. He further recommended that Khutala put forward a proposal with	A response was sent to Nhlanhla on the 23 of February 2021 acknowledging receipt of her email and stated that the Project Team will communicate further with him (Glencore) regarding the expected impacts and following the completion of the feasibility studies and the	Section 11 dealing with the plan of study for the expected impacts to be undertaken as part of the EIR phase.

Interested and Affected Parties		**Date Comments Received**	**Issues Raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and/or response were incorporated**
Names of persons consulted	mark with an X where those who must be consulted were in fact consulted				
			the use of the road within their property indicating the traffic volumes, whether the hauling will be undertaken as a 24hrs operation, etc. He stated that this can form part of the premise for future engagement with Seriti. He also requested that the below additional details can be included on Seriti's proposal: • Link road length and width within the Glencore property; • Expected duration of the use and timing of the road; • Safety precautions and procedures to be considered; • Are you considering purchasing the property affected, acquiring servitude, leasing, etc.; and	environmental specialist assessments and we have noted his requirements as per the received e-mail. These requirements will be included in Seriti's further engagement with Glencore.	Section 5.2.1: Proposed infrastructure including the KPS/KHU Link Road.

Interested and Affected Parties		**Date Comments Received**	**Issues Raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and/or response were incorporated**
Names of persons consulted	mark with an X where those who must be consulted were in fact consulted				
			• Any other information that would be helpful for Glencore to make an informed and speedy decision. Further indicated that he will send a plan indicating Goedgevonden's mining plan in close proximity to the proposed link road.		
Frans Mashabela – Department of Agriculture Land Reform & Rural Development.	X	22/02/2021	Department of Agriculture, Land Reform & Rural Development requested the applicant to undertake the following studies: **Comment 1**: Detailed soil studies of all the proposed sites. **Comment 2**: Current land use of all proposed sites. **Comment 3**: Production per ton on farms to be affected.	**Response 1**: A Soil, Land Use and Land Capability Assessment has been undertaken for the propose 5 Seam Mining Project. **Response 2**: The Soil Assessment undertaken includes detail land use of the proposed 5 Seam Mining Project and the Link Road. A Land Use Map that shows all land uses has	Section 10.2 Part A EIR. Section 5 Part B EMPr.

Interested and Affected Parties		**Date Comments Received**	**Issues Raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and/or response were incorporated**
Names of persons consulted	mark with an X where those who must be consulted were in fact consulted				
			Comment 4: Rehabilitation method during and post mining. **Comment 5**: How the affected production land will be brought pack to agricultural production after mining? **Comment 6**: Topsoil and stock piling management. Comment 6: Management of excessive loss of soil. **Comment 7**: Proposed land use post mining.	been developed and included in the Soil Assessment. **Response 3**: Large Portion of the farms where mining will be undertaken have been transformed by mining office complex and surface infrastructure such as pollution control dam, plant and conveyor. Open cast Mining has transformed a section of the farm Zondagsvlei 9 IS. Khutala Colliery is Largely underground operation and has minimal impacts on farm production. The proposed 5 Seam Mining Project will not result to loss of arable agricultural land.	

Interested and Affected Parties		**Date Comments Received**	**Issues Raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and/or response were incorporated**
Names of persons consulted	mark with an X where those who must be consulted were in fact consulted				
				Response 4: The rehabilitation Plan for the proposed project has been undertaken and attached as **Appendix 22**. The Rehabilitation includes post mining land use. **Response 5**: The propose 5 Seam Mining Project will have extremely low impacts on agricultural production since most of the proposed surface infrastructure will constructed on already affected areas. The mining activities will be undertaken as underground mining and will have minimal no impacts on agricultural production. A Rehabilitation Plan has been developed for the proposed	

Interested and Affected Parties		**Date Comments Received**	**Issues Raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and/or response were incorporated**
Names of persons consulted	mark with an X where those who must be consulted were in fact consulted				
				project and is attached as **Appendix 22**. Response 6: As mentioned before the proposed project will be undertaken as underground mining and no topsoil stockpiles will be constructed. During Link Road construction, the topsoil will be stripped in line with the recommendations of the EMPr and stockpiled separately. The soil will then be used immediately as part of post construction rehabilitation. Response 7: A rehabilitation Plan has been developed in line with the existing Khutala Colliery rehabilitation plan. Areas affected by the 5 Seam Mining	

Interested and Affected Parties		**Date Comments Received**	**Issues Raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and/or response were incorporated**
Names of persons consulted	mark with an X where those who must be consulted were in fact consulted				
				Project and Link Road will be utilized as grazing land.	
Mr Sam Nkosi – Director Land Claims Mpumalanga.	X	09/12/2020	A Land claims confirmation letter was sent to Mr Nkosi on the 14th of December 2020 and he was also contacted on the Phone on the 26th January 2021. He Verbally acknowledged the email and noted that he has not been at the office due to death in the family.	A follow-up e-mail message was sent after the telephonic conversation however no feedback has been received yet. Further request via e-mail were then forwarded to Mr V Nkosi and Gugu and no response has been received yet to confirm any land claims within the affected farm portions.	PPP Section on land claims.
David Kleyn	X	09/12/2020	David indicated that he has left DAFF and stated that for those who wish to keep in contact his contact details are as indicated: Cell phone: 0827896915. New E mail address: nuwefontein.kleyn@gmail.com.	The comment has been noted and David Kleyn will be removed from the stakeholder list. Notifications were sent to the new contacts on the 04th of January 2021 and no responses were received from both.	Stakeholder register.

Interested and Affected Parties		**Date Comments Received**	**Issues Raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and/or response were incorporated**
Names of persons consulted	mark with an X where those who must be consulted were in fact consulted				
			Any notification regarding to DAFF National Departmental enquiries please contact Ms M.Ntlokwane: MpumeN@daff.gov.za or Mr I.Riggs: IvanR@daff.gov.za.		

10. BASELINE ENVIRONMENT

This section has been compiled with information obtained from the specialists' environmental reports undertaken as part of this environmental authorisation application process for this Project.

10.1. Air quality

Information regarding the Air Quality assessment within the 5 Seam mining area was obtained from the Air Quality specialist report compiled by LKS consulting (Pty) Ltd (May 2021 Revision). See an attached Air Quality Report on **Appendix 11**.

The project falls within the Highveld Priority Air Quality Management Area in terms of the National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004) (NEMAQA). The High Priority Area (HPA) was declared a priority area by the Minister of Environmental Affairs and Tourism on 23 November 2007 under the National Environmental Management Air Quality Act (Act No. 39 of 2004) (NEM: AQA) (Government Gazette, No. 30518 of 23 November 2007). The Air Quality assessment was undertaken to determine the potential air quality impacts as a result of the 5 Seam Mining Project. In order to determine the potential impact, the ambient air quality, dust fallout, Greenhouse gas (GHG), Vehicle Tailpipe Emissions and Wind erosion were assessed, and results of the assessment are discussed on sections below.

10.3.1 Baseline assessment of Air Quality assessment

There are several coal-fired power stations nearby and elevated levels of sulphur dioxide (SO_2), particulates (PM_{10} and $PM_{2.5}$) and Nitrous oxides (NO_x) are prevalent, with Kendal Power Station located within a 5km distance to the project. The air quality from a perspective of dust fall-out is affected by the farming activities in the area and is seasonally dependent on the crops covering the site as well as the wind conditions. A substantial amount of dust is generated when fields are worked during windy conditions. There is also dust generation from the nearby opencast mine activities in the general area. Four sensitive receptors were identified within a radius of 5 km radius of the proposed 5 Seam Mining Project. The sensitive receptors are shown on

Table 12**.**

Table 12: Individual air quality sensitive receptors included as discrete receptor points

Receptor ID	Receptor name	Latitude	Longitude
1	Farmstead	-26.117781°	29.016409°
2	Farmstead	-26.116502°	29.021824°
3	Farmstead	--26.128937°	29.014097°
4	Farmstead	-26.127509°	28.992086°

10.3.2 Acceptable dust fall rates

The standard for acceptable Dust fall rates for residential and non-residential areas is set out in **Table 13.** According to these regulations, the Dust fall at the boundary or beyond the boundary of the premises where it originates cannot exceed 600 mg/m²/day in residential and light commercial areas: or 1 200 mg/m²/day in areas other than residential and light commercial areas. In addition to the dust fall limits, the National Dust Control Regulations (NDCR) prescribe monitoring procedures and reporting requirements. This will be based on the measuring reference method ASTM 01739 averaged over 30 days.

Table 13: Acceptable dust fall rates

Restriction Area	Dust-fall rate (D) (mg/m²-day, 30-day average)	Permitted frequency of exceeding Dustfall rate
Residential	D < 600	Two within a year, not sequential months
Non-residential	600 < D < 1 200	Two within a year, not sequential months

Table 14: Baseline environment of the site

Project Plant area existing information	Description
 	The findings on the site were limited to the haul road and surrounding areas to the Khutala Plant Area during site visit that was conducted on the 12th of January 2021 showing the dust bucket located at farmstead north of the plant area.
	Finding of the baseline environment shows that the main haul roads were professionally managed and regularly applied with dust suppression (dust binding agent).

Project Plant area existing information	Description
	

10.3.3 Dust-Fall Rates at Khutala Colliery

The latest Khutala Colliery dust fall out results in February 2021 are presented in **Table 15** below.

Table 15: Dust fallout monitoring network for Khutala Colliery

Site Description	Site Ref	Latitude	Longitude
Block A – Sampling Stations			
Fan 4 Directional (Installed Jan 2018)	D1	26° 7'16.54"S	29° 2'13.60"E
Mr D. Prinsloo – 03	D2	S26.113266	E29.004667
Mr I. Enslin – 04	D3	S26.069474	E29.010219
Enslin Mud Hut	D4	S26.097031	E29.003121
MR T. Mulder - 02	D5	S26.115523	E29.021150
Game Farm – KHU 2	D6	S26.126493	E29.003113
LH House	D7	S26.118998	E29.015327
Block I Sampling Stations			
Eskom Contractors House – 06	D8	S26.106018	E28.975934
VD Merwe – KHU 3	D9	S26.122975	E28.989560
O/C Crusher – KHU 4	D10	S26.124271	E28.986140
V.d. Merwe 4 Wind Directional	D11	S26.122975	E28.989560
Residence_KHU5	D12	S26.119502	E28.996362
KSA Sampling Stations			
Sullwald	D13	S26.174746	E29.056359

Site Description	Site Ref	Latitude	Longitude
Springboklaagte	D14	S26.132940	E29.038416
AJ Cronje	D15	S26.135300	E29.090376
De Wet @ Klippoortjie	D16	S26.119683	E29.118243
Bombardie Boerdery	D17	S26.167511	E29.008474
Sullwald farm workers residence KSA 001	D18	S26°1021.6	E029°0342.2
Springboklaagte Smittie Erasmus KSA 002 (RE Ptn 2)	D19	S26°0758.6	E029°0218.3
Springboklaagte Sibanyoni KSA 003 (Ptn 3)	D20	S26°07.258	E029°02.935
Springboklaagte 33 Settlement KSA 004	D21	S26°07.333	E029°03.564
Scharrighuisen	D22	S26°3'59.7	E28°57.31.2
Wind Directional – WD1 - N	D23	S26°0722.6	E028°5922.5
Wind Directional – WD1 - S	D24	S26°0722.6	E028°5922.5
Wind Directional – WD1 - E	D25	S26°0722.6	E028°5922.5
Wind Directional – WD1 - W	D26	S26°0722.6	E028°5922.5
Twin Bucket – Khutala A	D27	S26°4'39.6	E29°2'39.7
Twin Bucket – Khutala B	D28	S26°4'39.6	E29°2'39.7

Table 16: February 2021 Dust fallout monitoring results for Khutala Colliery

Site Name	Date Time Measured	Dust insoluble ($g/m^2/day$)	Total Soluble Matter $g/m^2/day$	Dust rate ($g/m^2/day$)	Dust insoluble ($mg/m^2/day$)	Total Soluble Matter ($mg/m^2/day$)	Dust rate ($mg/m^2/day$)
A.J. Cronje	2021/02/17 09:22	0,084	0,038	0,122	84	38	122
Bombardie Boerdery	2021/02/17 12:22	0,078	0,063	0,141	78	63	141
De Wet Klippoortjie	2021/02/17 09:03	0,105	0,037	0,142	105	37	142
Enslin Mud Hut	2021/02/15 12:48	0,168	0,297	0,465	168	297	465
Erasmus	2021/02/17 11:06	0,044	0,035	0,079	44	35	79
Eskom Contractors House - 06	2021/02/16 12:09	1,41	0,088	1,498	1410	88	1498
Fan 4 East	2021/02/23 11:49	0,405	0,029	0,434	405	29	434
Fan 4 North	2021/02/23 11:46	0,236	0,029	0,265	236	29	265
Fan 4 South	2021/02/23 11:49	0,391	0,032	0,423	391	32	423
Fan 4 West	2021/02/23 11:48	0,277	0,031	0,308	277	31	308

Site Name	Date Time Measured	Dust insoluble ($g/m^2/day$)	Total Soluble Matter $g/m^2/day$	Dust rate ($g/m^2/day$)	Dust insoluble ($mg/m^2/day$)	Total Soluble Matter ($mg/m^2/day$)	Dust rate ($mg/m^2/day$)
Game Farm - KHU 2	2021/02/18 10:44	0,13	0,276	0,406	130	276	406
LH House	2021/02/18 11:14	0,219	0,174	0,393	219	174	393
Mr I Enslin - 04	2021/02/16 14:01	0,177	0,029	0,206	177	29	206
Mr. D. Prinsloo - 03	2021/02/18 10:55	0,133	0,076	0,209	133	76	209
Mr. T. Mulder - 02	2021/02/18 11:10	0,138	0,117	0,255	138	117	255
OC Crusher - KHU 4	2021/02/23 13:56	0,133	0,041	0,174	133	41	174
Portion 2 - KSA 004	2021/02/17 11:51	0,079	0,044	0,123	79	44	123
Portion 3	2021/02/18 14:05	0,042	0,078	0,12	42	78	120
Residence - KHU 5	2021/02/22 11:31	1,3	0,086	1,386	1300	86	1386
Springboklaagte	2021/02/18 13:21	0,201	0,17	0,371	201	170	371
Sullwaldt	2021/02/17 13:02	0,105	0,101	0,206	105	101	206

Site Name	Date Time Measured	Dust insoluble ($g/m^2/day$)	Total Soluble Matter $g/m^2/day$	Dust rate ($g/m^2/day$)	Dust insoluble ($mg/m^2/day$)	Total Soluble Matter ($mg/m^2/day$)	Dust rate ($mg/m^2/day$)
Sullwaldt_residence	2021/02/17 13:08	0,099	0,075	0,174	99	75	174
v.d Merwe West	2021/02/23 14:09	0,526	0,051	0,577	526	51	577

10.3.4 Dispersion results

The dispersion model uses the specific input data to run various algorithms to estimate pollutants' dispersion between the source and receptor. The model output is in the form of a simulated time-averaged concentration at the receptor. These simulated concentrations are added to suitable background concentrations and compared with the relevant ambient air quality standard or guideline. The post-processing of air concentrations at discrete receptors as well as the regular grid points includes the calculation of various percentiles, specifically the 99th percentile, which corresponds to the requirements of the NAAQS5.

Dispersion simulations were undertaken for the following scenarios to determine:

- Predicted ground-level impacts from all key sources for TSP (as dust fallout), PM_{10}, and $PM_{2.5}$ for mining activities associated with the 5 Seam project.

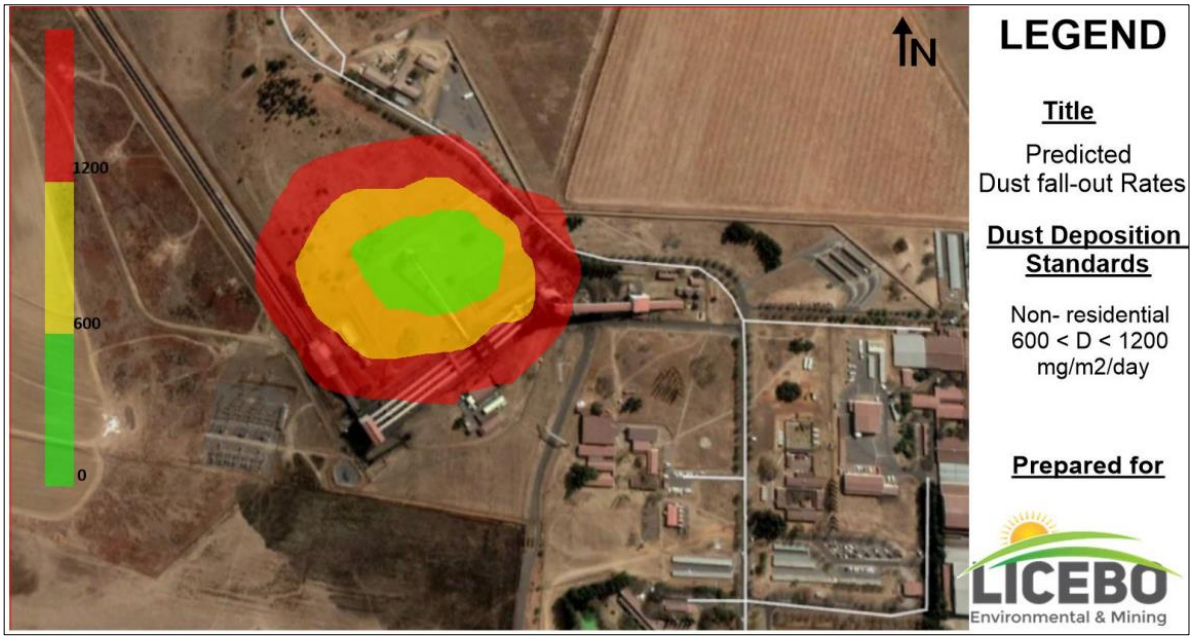


Figure 12: Predicted Dust Fall-out Concentrations during Operational Phase

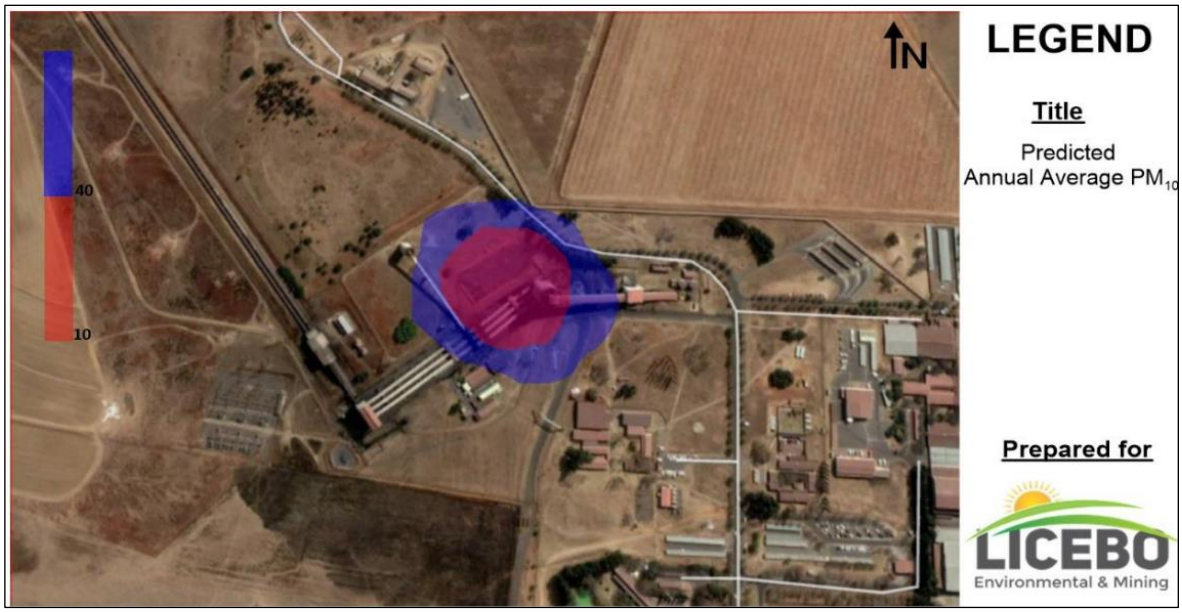


Figure 13: Predicted Annual PM_{10} Concentrations during Operational Phase

Figure 14: Predicted Annual $PM_{2.5}$ Concentrations during Operational Phase

Figure 15: Predicted Dust Fall-out concentrations during along the KPS/KHU Link Road during Operational Phase

10.2. Soil, land capability and land use

Information regarding the Soil, Land Use and Land Capability of 5 Seam Mining Project was obtained from the Soil, Land Use, Land Capability and Land Potential Assessment report compiled by Umongo Environmental Services (Pty) Ltd dated May 2021 (Amended)). Report is attached in **Appendix 8.**

10.4.1 Land Use

The land use of the of the 5 Seam Mining Project area is dominated by mining area, grazing, residential area, open space/wildlife, plantation and cultivation agriculture. The dominate Land Use of the proposed 5 Seam Mining Project is open area and cultivation followed by mining and infrastructural development. **Figure 16** below illustrated the different land uses on the proposed 5 Seam Mining Project study area.

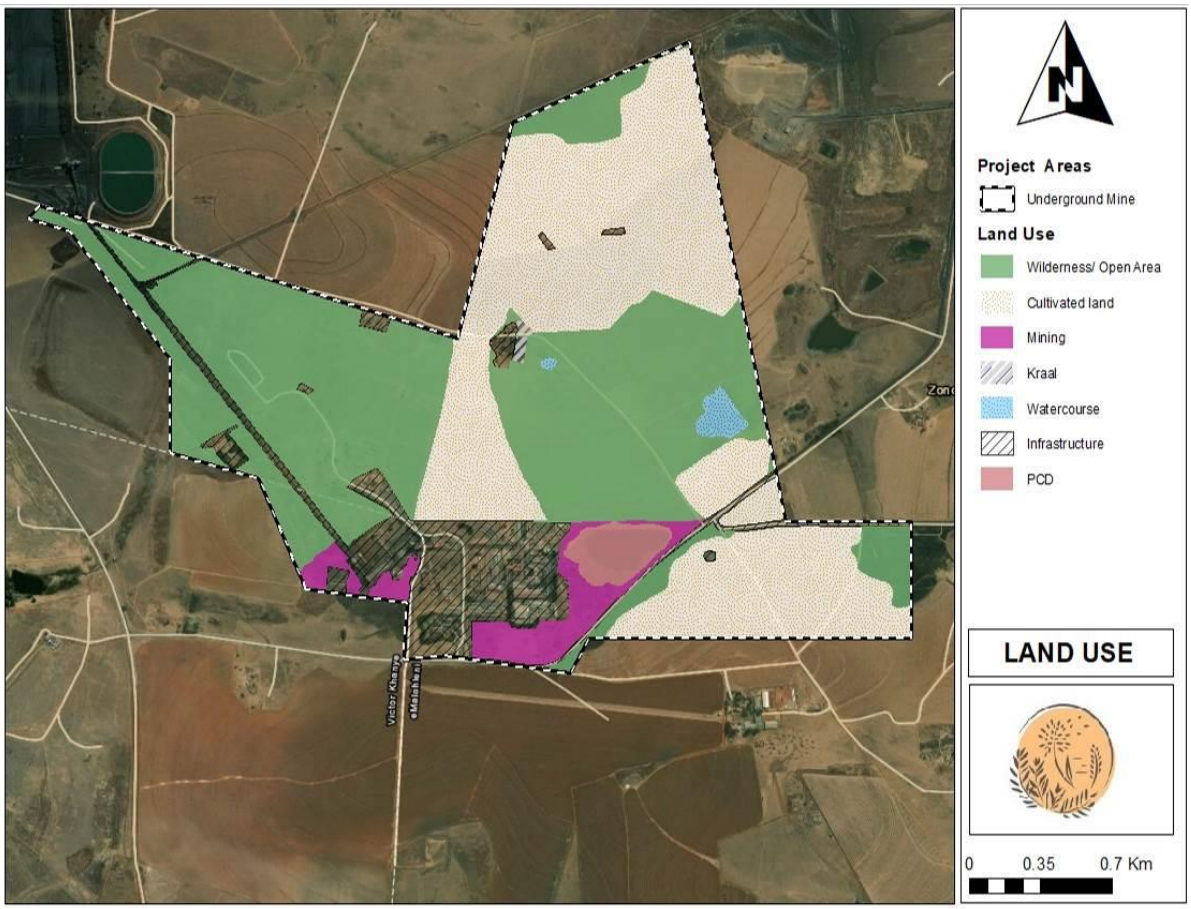


Figure 16 Photographs showing the dominant land use within the investigation area

The Land Use associated with the KPS/KHU Link Road is dominated by mining followed by open space, cultivation, infrastructure and plantation. **Figure 17** below illustrates the Land use associated with the KPS/KHU Link Road.

Figure 17: Land use map representing the land uses occurring within the study area

10.4.2 Land capability

Land capability is determined by a combination of soil, terrain and climate features. The identified soil forms were classified into seven (7) land capability and land potential classes The land type data indicated that the soil of the projects area is reddish and classified as plinthic catena dystrophic and/or mesotrophic. The soil is fairly deep for most deep-rooted crops cultivation. The soils are dominat by Hutton (red apedal (deep)), Emerlo (yellow-brown apedal (deep)) and Lichteburg (red apedal/gard plinthic). Refer to Table 17 for the land capability and land potential classes for the soil forms occurring within the Project area.

Table 17: Land capability and land potential classes for the soil forms occurring within the project area

Soil Forms	Land Capability	Climatic Class	Land Potential	Areal Extent (ha)	Sum of the Extent (ha) Assessed	Percentage (%)
Hutton	Arable (Class I)	Class 2 (Slight limitation)	L1 (Very high potential)	33	45	7
Ermelo				12		
Nkonkoni	Arable (Class II)	Class 2 (Slight limitation)	L2 (High potential)	23	202	32
Glencoe	Arable (Class III)	Class 2 (Slight limitation)		62		
Avalon				38		
Lichtenburg				60		
Bainslvei				34		
Tukulu				7		
Pinedene				1		
Longlands	Arable (Class IV)	Class 2 (Slight limitation)	L3 (Good potential)	23	45	12
Fernwood				3		
Wasbank				49		
Rensburg	Watercourse (Class V)	Class 2 (Slight limitation)	Vlei	24	47	8
Willowbrook				14		
Katspruit				9		
Dresden	Grazing (Class VI)	Class 2 (Slight limitation)	L4 (Moderate potential)	15	15	2
Cullinan	Wildlife (Class VIII)	Class 2 (Slight limitation)	L6 (Very restricted potential)	19	140	22
Witbank				121		

*The remaining 13% is attributed to open water areas and infrastructural areas which are not included in the table above since they are not considered in the land capability and land potential classification system.

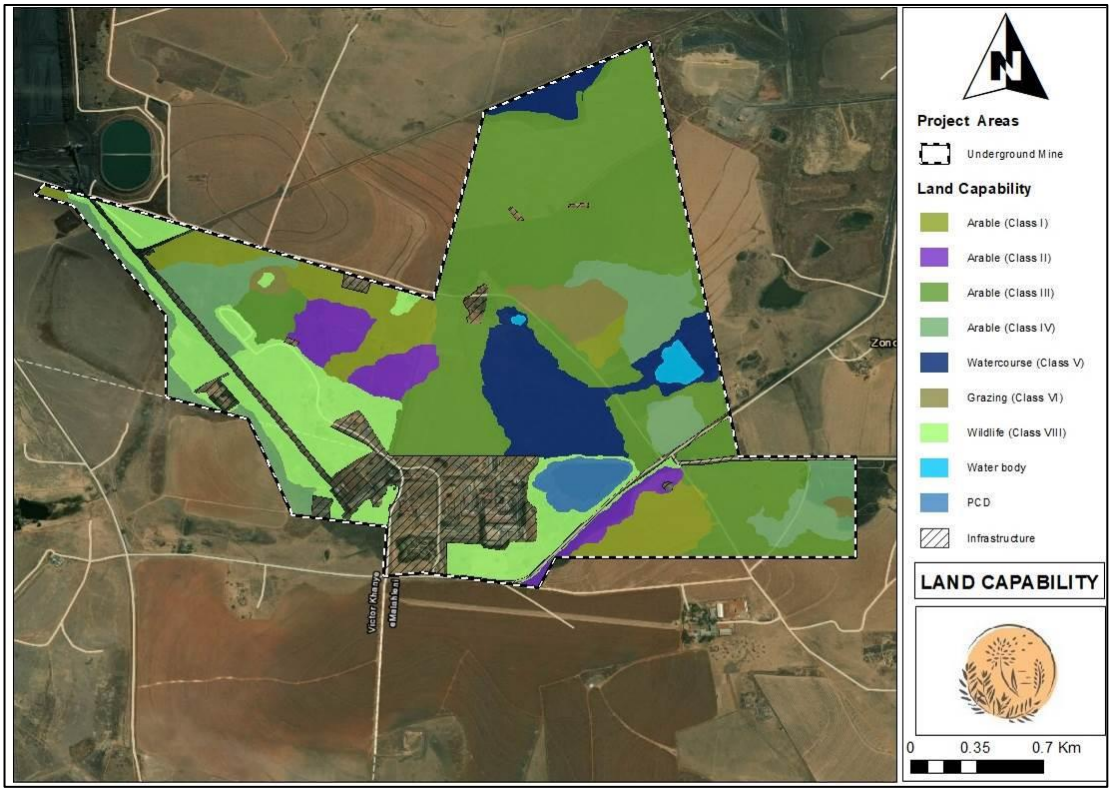


Figure 18: Land capability

Figure 19: Map depicting land capability associated with the KPS/KHU Link Road

Figure 20: Map depicting land potential classes of the identified soil forms occurring within the project area

Figure 21: Map depicting land potential classes of the identified soil forms occurring within the project area

10.4.3 Results of Soil and Land Capacity assessment

The proposed mining and related activities are occupying a flat to gently sloping terrain, which restricts the erosion hazard. Therefore, the physical soil properties take precedence over slope gradient as a determining criterion for erosion risk. The majority of the identified soils display moderate to low susceptibility to erosion under current conditions. The susceptibility of these soils to erosion will be largely increased once the vegetation is cleared for construction activities and the soils are exposed to wind and stormwater. Soil erosion impact may be considered to be moderate to low specifically on those soil forms which are characterised with infiltration rate and drainage. Such soil forms may include Hutton, Ermelo, Nkonkoni, Glencoe, Avalon, Longlands, Wasbank, Tukulu, Pinedene, Lichtenburg, Bainsvlei, and Tukulu soil forms. In addition, soil erosion impacts are considered to be low for the shallow soils such as Dresden soil forms.

Soil Compaction

Heavy equipment traffic during construction activities is anticipated to cause significant soil compaction. The severity of this impact is anticipated to be significant for soil forms associated with wetlands due to the high clay content of these soils. However, such impacts are not anticipated to be severe on the Dresden as result of shallow indurated bedrock as well as the Witbank soil form as it has been already been disturbed.

Potential Soil Contamination

Contamination sources are mostly unpredictable and often occur as incidental spills or leak for construction developments. Thus, all the identified soils are considered equally predisposed to potential contamination. The significance of soil contamination is considered to be moderate before mitigation and low after mitigation for all identified soils, largely depending on the nature, volume and/or concentration of the contaminant of concern as well as the rate at which contaminants are transported by water into the soil. Therefore, strict contamination and waste management protocols as well as activity specific EMPr and monitoring guidelines should be adhered to during all phases of development. It should be noted, the significance of contamination of the wetland soils is high as this will lead to the contaminates being easily transported into nearby watercourses.

Loss of Agricultural Land Capability and Land Potential

The proposed mining and related activities are not anticipated to result in a significant loss of agricultural land capability and land potential. This is attributed to the nature of the proposed project and development footprint to be utilised during the construction and operational phases. The proposed underground mining is not anticipated to have direct agricultural land capability and land potential impact. However, the alteration of the landscape setting as well as the biological, physical and chemical soil characteristics in the vicinity of the development footprint due to subsidence. It should be noted commercial cultivated agriculture is the dominant land use within the project areas, as result some portions of agricultural land use may change into haul road in support of mine product (coal) transportation operations. Rehabilitation interventions must be implemented during decommissioning phase of the proposed project in order minimise the negative impacts on the receiving environment.

10.3. Vegetation

Information regarding the Vegetation of 5 Seam Mining Project was obtained from the Terrestrial Biodiversity (Vegetation) Assessment report compiled Ecology International (Pty) Ltd and Dimela Eco Consulting (Pty) Ltd dated March 2021. Report is attached **Appendix 9**.

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

The Grassland Biome comprises several vegetation types (Mucina & Rutherford, 2006). This site is situated within the historical extent of the Eastern Highveld Grassland. The vegetation is short dense grassland dominated by the usual highveld grass composition (*Aristida, Digitaria, Eragrostis, Themeda, Tristachya* etc.) with small, scattered rocky outcrops with wiry, sour grasses and some woody species (*Senegalia caffra, Celtis africana, Diospyros lycioides subsp lycioides, Parinari capensis, Protea caffra, P. welwitschii and Searsia magalismontanum*). This vegetation type is Endangered. Only a small portion of this grassland type is conserved in nature reserves, while most of its extent is cultivated and transformed by urban development, plantations, and mining in the area (Mucina and Rutherford, 2006).

10.5.1 Land use and land cover on the site

Current Google Earth imagery indicate that most of the site is or was historically cultivated (**Figure 25** and **Figure 24**). According to aerial imagery dated 1944, the western extent of the site (referred to here as the western grassland area) was historically cultivated or planted with pasture (**Figure 25**). However, at the time of this assessment, this area was fallow for several years. Another open grassland area is present just north-east of the existing mine infrastructure (eastern grassland). Most of this area was also seemingly cultivated and faint plough or baling lines can be distinguished on historical Google Earth aerial imagery. Most of the wetland areas on the site was also cultivated at some stage.

A farmhouse is present on the farm Zondagsvlei. Grassland on this farm, as well as the western grasslands on the farm Schoongezight were heavily grazed by cattle (Figure 22). The existing mining area comprised infrastructure, while several smaller structures and disturbances are present in the landscape.

Figure 22: Grazing within the grassland areas on the site

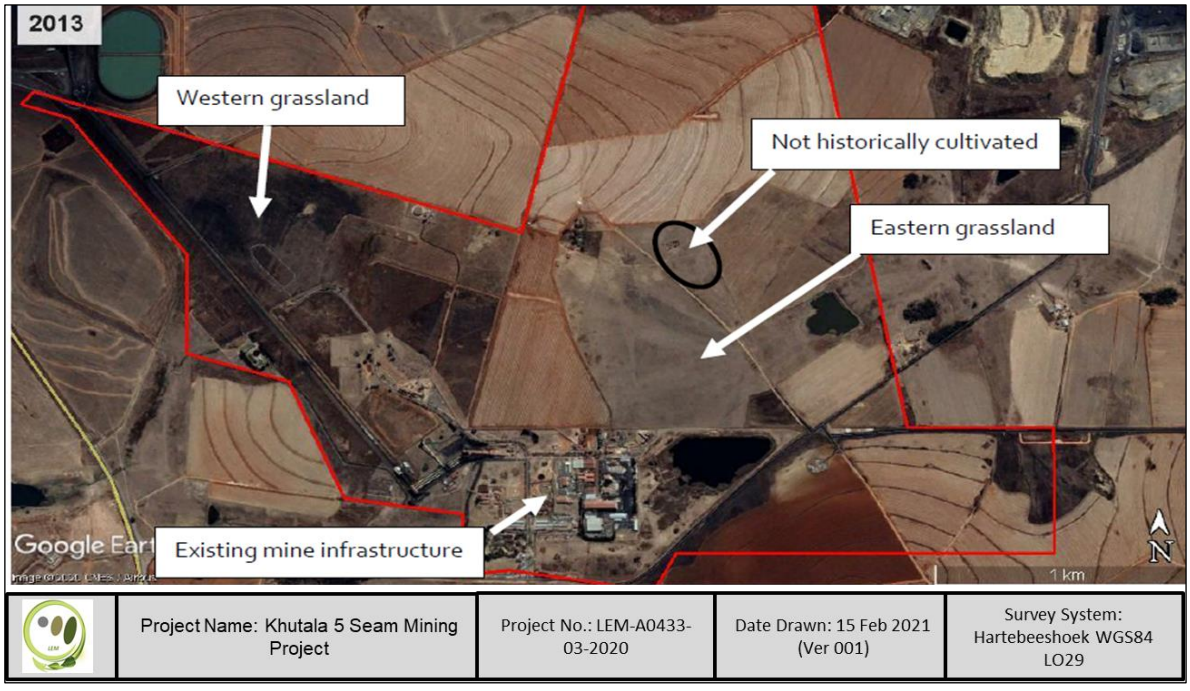


Figure 23: Google Earth imagery dated 2013 showing most of the site cultivated

	Project Name: Khutala 5 Seam Mining Project	Project No.: LEM-A0433-03-2020	Date Drawn: 15 Feb 2021 (Ver 001)	Survey System: Hartebeeshoek WGS84 LO29

Figure 24: Google Earth imagery dated 2019 showing most of the site cultivated

	Project Name: Khutala 5 Seam Mining Project	Project No.: LEM-A0433-03-2020	Date Drawn: 15 Feb 2021 (Ver 001)	Survey System: Hartebeeshoek WGS84 LO29

Figure 25: Historical aerial imagery overlaid with the site boundary

10.5.2 Site Ecological Importance 5 Seam Mining Project Area

The Site Ecological Importance (SEI) in terms of vegetation is discussed and mapped as per the requirements of the Draft Species Environmental Assessment Guideline (SANBI, 2020). The SEI rating was utilised to generate the vegetation sensitivity map **Figure 26** below shows the SEI map.

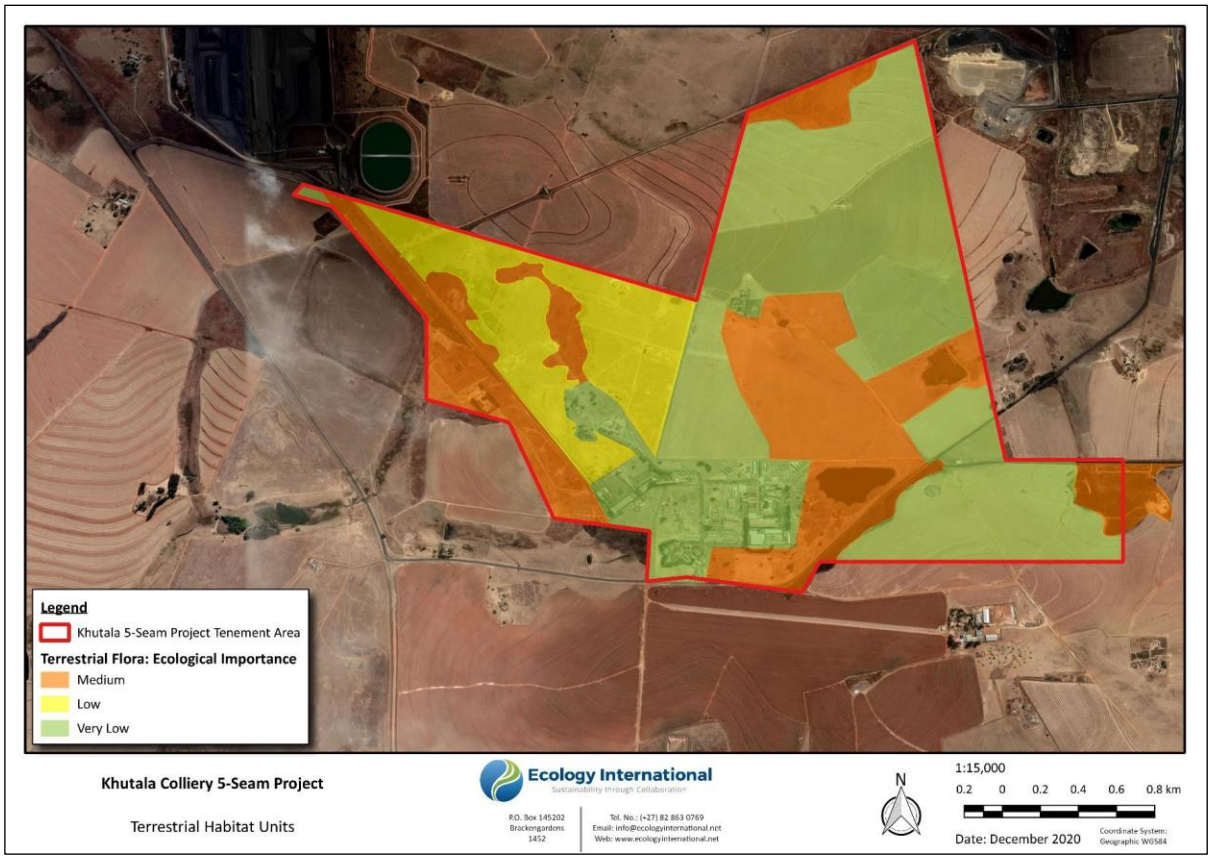


Figure 26: Site Ecological Importance Map

10.5.3 Site Ecological Importance KPS/KHU Link Road

It has been clearly demonstrated that vegetation not only forms the basis of the trophic pyramid in an ecosystem, but also plays a crucial role in providing the physical habitat within which organisms complete their life cycles (Kent & Coker 1992). Therefore, the vegetation of an area will largely determine the ecological sensitivity thereof.

Sit Ecological Importance results

Figure 27: Site Ecological Importance Map of the proposed 5 Seam Mining Project area

Figure 28: Site Ecological Importance map of the proposed KPS/KHU Link Road

10.4. Terrestrial Fauna Biodiversity

Information regarding the Fauna of 5 Seam Mining Project was obtained from the Terrestrial Fauna Biodiversity report compiled by Ecology International (Pty) Ltd, Barbara Kasl dated, April 2021. The Terrestrial Fauna Biodiversity Report is attached **Appendix 12.**

10.6.1 Mammals

Table 18 indicates species confirmed for site based on sightings or unique signs. Some unconfirmed rodent droppings and feeding signs were noted in the northern grassland assumed to belong to Rhabdomys sp. (*R. dilectus*), based on overall habitat, but cannot be confirmed. The following species are endemic and provincially protected:

- Blesbok (*Damaliscus pygargus phillipsi*) (Endemic). Threatened by selective breeding and hybridisation (Dalton et al., 2016).
- Steenbok (Raphicerus campestris). Species may contribute to seed dispersal as the species is known to eat fruit and pods. The Steenbok is also an important prey species for carnivores. No major threats to this species, but minor threats include subsistence hunting, range restriction through erection of fences, and loss of habitat through poor ranch management (Palmer et al., 2016).

10.4.1.1. Alien & Exotic Species

No exotic or AI species were recorded for the Quarter Degree Grid Square (QDGS). It is expected that domestic animals will utilise the site and cows and sheep were the primary stock animals noted on site.

10.4.1.2. Ecological Services

The various ecosystem services provided by the historical, confirmed and likely fauna are fairly typical and include:

- Regulator of prey and / or predator numbers.
- Significant prey-base for predators / raptors.
- Control of potential vermin, pests and AI species, including potential vectors for disease.
- Seed dispersal.

- Ecosystem engineers: Burrowers (for refuge, habitat or simply digging for tubers / roots).
- Diggings and burrows affect flow of resources, trapping materials that change soil chemical, physical nature and moisture, creating a mosaic of varied and regenerating habitat patches.
- Vectors for disease.

Refer to Table 18 for the list of the TOP and Species of Conservation Concern (SCC).

Table 18 : TOP and Endemic Mammals (Bold species are SCC – SANBI, 2020)

Common name	Scientific name	Endemism	SA GN151	SA Red-list	IUCN	MP Protected Schedule
Site species						
Serval (tracks)	*Leptailurus serval*		Protected	NT		
Blesbok	*Damaliscus pygargus phillipsi*	Endemic		NT		
Steenbok	*Raphicerus campestris*					2: Protected Game
Duiker, Common	*Sylvicapra grimmia*					
Gerbil, Highveld (burrows)	*Gerbilliscus sp. (*most likely *G.brantsii)*					
Mongoose, Slender (scat)	*Herpestes sanguineus*					
Mongoose, Yellow (burrows & scat)	*Cynictis penicillata*					
Hare, Savanna	*Lepus sp. (*most likely *L. Victoriae)*					
Mole-rat, Pretoria (burrows)	*Crytomys pretoriae*					
TOP and Endemic Species historically recorded within the greater area / QDGS						
Cat, Black-footed	***Felis* sp.** (*F. nigripes* as cautionary sp.)		**Protected**	**Vulnerable**	**Vulnerable**	
Mole-rat, Pretoria	*Cryptomys pretoriae*	Endemic				

Common name	Scientific name	Endemism	SA GN151	SA Red-list	IUCN	MP Protected Schedule
Rabbit, Hewitt's Red Rock	*Pronolagus* sp. (*P. saundersiae* indicated)	Endemic				
Likely TOP and Endemic species						
Reedbuck, Southern	*Redunca arundinum*		Protected			2: Protected Game
Honey Badger (Ratel)	*Mellivora capensis*		Protected			2: Protected Game
Hedgehog, Southern African	*Atelerix frontalis*		Protected	NT		2: Protected Game
Shrew, Forest	*Myosorex varius*	Endemic				
Possible TOP and Endemic Species						
Oribi	***Ourebia ourebia***		**Endangered**	**Endangered**		**2: Protected Game**
Fox, Cape	*Vulpes chama*		Protected			
Hyaena, Brown	*Parahyaena brunnea*		Protected	NT	NT	2: Protected Game
Otter, Spotted-necked	***Hydrictis maculicollis***		**Protected**	**Vulnerable**	**NT**	**2: Protected Game**
Aardwolf	*Proteles cristata*					2: Protected Game
Waterbuck	*Kobus ellipsiprymnus ellipsiprymnus*					2: Protected Game
Klipspringer	*Oreotragus oreotragus*					2: Protected Game
Aardvark	*Orycteropus afer*					2: Protected Game

Common name	Scientific name	Endemism	SA GN151	SA Red-list	IUCN	MP Protected Schedule
Otter, Cape Clawless	*Aonyx capensis*			NT	NT	2: Protected Game
Unlikely TOP and Endemic Species						
Leopard	*Panthera pardus*		Vulnerable	Vulnerable	Vulnerable	4: Protected Wild Animals
Wildebeest, Black	*Connochaetes gnou*	Endemic	Protected			2: Protected Game
Reedbuck, Southern Mountain	***Redunca fulvorufula***			**Endangered**	**Endangered**	**2: Protected Game**
Shrew, Maquassie Musk	***Crocidura maquassiensis***			**Vulnerable**		
Rat, Robert's Marsh	***Dasymys robertsii***			**Vulnerable**		
Giraffe	*Giraffa camelopardalis giraffa*				Vulnerable	2: Protected Game
Eland, Common	*Tragelaphus oryx*					2: Protected Game
Buffalo, African Savanna	*Syncerus caffer*					4: Protected Wild Animals
Rat, Tete Veld	*Aethomys ineptus*	Possible endemic				
Mole, Highveld Golden	*Amblysomus septentrionalis*	Endemic		NT	NT	
AIS / Exotic Species recorded in the area						
None listed						

10.6.2 Birds

No endemic species were confirmed for the site (**Table 19**), but the following TOP species is confirmed:

- Yellow-billed Stork (Mycteria ibis) (RL Endangered). Species feeds on fish, frogs, insects, worms and crustaceans. Ecosystem services are limited but may contribute to aquatic pest control and possibly control of AI fish. Threats include loss of wetland habitats, including wetland systems of pans, marshes and floodplains used for foraging. Loss of suitable trees for roosting/nesting also threatens species at is known breeding locations in northern KwaZulu Natal (Taylor et al., 2015).

10.4.1.3. Alien & Exotic Species

Three categorised alien invasive species (GN1003, 2020) and one exotic species have been recorded in the area (SABAP). All are Category 3 species which are common species, occurring throughout South Africa and often associated with human settlements. Only the Common Myna is confirmed for site.

10.4.1.4. Ecological Services

Many bird species do not specifically contribute to ecosystem functioning, but cumulatively insectivores, predators of small mammals, birds and fish will contribute to control of pest invertebrates, pest rodents, alien avifauna and alien fish. Furthermore, the cumulative foraging on aquatic invertebrates (largely water-birds) and terrestrial invertebrates means a degree of control of potential disease-carrying vectors.

The various specific ecosystem services provided by avifauna include pollination and seed dispersal. Scavenging birds play a critical role in waste removal and nutrient recycling and reduce the risk of diseases that could arise from carrion. In addition, birds and eggs are food sources to other fauna in the food chain and some species are critical for the survival of parasitic nesters.

Table 19: TOP and Endemic Birds

Common name	Scientific name	Endemism	SA GN151	SA Red-list	IUCN
Site species					
Stork, Yellow-billed	*Mycteria ibis*			Endangered	
Bishop, Southern Red	*Euplectes orix*				
Cisticola, Zitting	*Cisticola juncidis*				
Crow, Pied	*Corvus albus*				
Dove, Laughing	*Spilopelia senegalensis*				
Egret, Cattle	*Bubulcus ibis*				
Egret, Intermediate	*Egretta intermedia*				
Goose, Egyptian	*Alopochen aegyptiacus*				
Guineafowl, Helmeted	*Numida meleagris*				
Heron, Grey	*Ardea cinerea*				
Honeyguide, Lesser	*Indicator minor*				
Ibis, African Sacred	*Threskiornis aethiopicus*				
Ibis, Hadeda	*Bostrychia hagedash*				
Kite, Black-shouldered (-winged)	*Elanus caeruleus*				

Common name	Scientific name	Endemism	SA GN151	SA Red-list	IUCN
Lapwing, Blacksmith	*Vanellus armatus*				
Lapwing, Crowned	*Vanellus coronatus*				
Lark, Spike-heeled	*Chersomanes albofasciata*				
Masked-weaver, Southern	*Ploceus velatus*				
Myna, Common	*Acridotheres tristis*				
Owl, Marsh	*Asio capensis*				
Pipit, African	*Anthus cinnamomeus*				
Quelea, Red-billed	*Quelea quelea*				
Sparrow, Cape	*Passer melanurus*				
Spurfowl, Swainson's	*Pternistis swainsonii*				
Swallow, Greater Striped	*Hirundo cucullata*				
Swift, White-rumped	*Apus caffer*				
Tern, Whiskered	*Chlidonias hybrida*				
Thick-knee, Spotted	*Burhinus capensis*				
Widowbird, Long-tailed	*Euplectes progne*				
TOP and Endemic Species recorded in the greater area					

Common name	Scientific name	Endemism	SA GN151	SA Red-list	IUCN
Ibis, Southern Bald	*Geronticus calvus*	Endemic	Vulnerable	Vulnerable	Vulnerable
Harrier, African Marsh	*Circus ranivorus*		Protected	Endangered	
Secretarybird	*Sagittarius serpentarius*			Vulnerable	Vulnerable
Tern, Caspian	*Sterna caspia*			Vulnerable	
Duck, Maccoa	*Oxyura maccoa*			NT	Vulnerable
Swallow, South African Cliff	*Hirundo spilodera*	Breeding Endemic			
Starling, African Pied	*Spreo bicolor*	Endemic			
Weaver, Cape	*Ploceus capensis*	Endemic			
Likely TOP and Endemic species					
Owl, African Grass	*Tyto capensis*		Vulnerable	Vulnerable	
Korhaan, Blue	*Eupodotis caerulescens*	Endemic	Vulnerable		NT
Kestrel, Lesser	*Falco naumanni*		Vulnerable		
Possible TOP and Endemic Species					
Pelican, Pink-backed	*Pelecanus rufescens*		Endangered	Vulnerable	
Crane, Blue	*Anthropoides paradiseus*	Endemic	Endangered	NT	Vulnerable
Stork, Black	*Ciconia nigra*		Vulnerable	Vulnerable	

Common name	Scientific name	Endemism	SA GN151	SA Red-list	IUCN
Lark, Botha's	*Spizocorys fringillaris*	Endemic		Endangered	Endangered
Falcon, Lanner	*Falco biarmicus*			Vulnerable	
Korhaan, White-bellied	*Eupodotis senegalensis*			Vulnerable	
Thrush, Sentinel Rock	*Monticola explorator*	Endemic			NT
Falcon, Sooty	*Falco concolor*				Vulnerable
Lark, Eastern Long-billed	*Certhilauda semitorquata*	Endemic			
White-eye, Cape	*Zosterops virens*	Endemic			
Rock-thrush, Cape	*Monticola rupestris*	Endemic			
Sunbird, Greater Double-collared	*Cinnyris afer*	Endemic			
Unlikely TOP and Endemic Species					
Crane, Wattled	*Bugeranus carunculatus*		Critically Endangered	Critically Endangered	Vulnerable
Eagle, Martial	*Polemaetus bellicosus*		Vulnerable	Endangered	Vulnerable
Harrier, Black	*Circus maurus*			Endangered	Endangered
Eagle, Verreaux's	*Aquila verreauxii*			Vulnerable	
AIS / Exotic Species recorded in the area					
Dove / Pigeon, Rock	*Columa livia*	Category 3#			

Common name	Scientific name	Endemism	SA GN151	SA Red-list	IUCN
Mynah, Common (Confirmed)	*Acridotheres tristis*	Category 3#			
Sparrow, House	*Passer domesticus*	Category 3#			
Goose, Greylag (Domestic)	*Anser anser*	Exotic			

NT: Near Threatened

GN1003, 2020, South African AIS List

10.6.3 Herpetofauna

Only the Rinkhals (*Hemachatus haemachatus*) is confirmed for the area. No TOP species or endemic species are confirmed for site **Table 20**.

10.4.1.5. Alien & Exotic Species

No AIS or exotic species were identified from ADU lists or iNaturalist.

10.4.1.6. Ecological Services

Many of the herpetofauna species feed on arthropods and will cumulatively contribute to control of invertebrate numbers, including aquatic invertebrates that may be vectors for disease. Many reptiles and frogs are also food source to many birds and mammals, as well as other reptile species.

10.4.1.7. Invertebrates

A summary of TOP and provincially protected invertebrates with distribution ranges over and near the survey area are included in **Table 20** with ADU desktop species (no iNaturalist species) highlighted. It must be stressed that the distribution of many species are unknown and it is very possible that species in **Table 21** do not occur in the area and possibly the province (these are indicated as such). They have been included as a cautionary measure. Furthermore, in many instances, entire Family or Genera are listed. In such cases a full species evaluation is not possible or would be too extensive.

Of the TOP ADU species confirmed for the QDGS (indicated in bold in **Table 20.**

Table 20: TOP and Endemic Herpetofauna (Bold species are SCC – SANBI, 2020)

Common name	Scientific name	Endemism	SA GN151	SA Red-list	IUCN
Site species					
Rinkhals	*Hemachatus haemachatus*				
TOP and Endemic Species recorded in the greater area					
Lizard, Delalande's Sandveld	*Nucras lalandii*	Endemic			
Gecko, Transvaal Thick-toed	*Pachydactylus affinis*	Endemic PR			
Bullfrog, Giant	Pyxicephalus adspersus		Protected	NT	
Likely TOP and Endemic species					
Lizard, Coppery Grass	*Chamaesaura aenea*	Endemic		NT	
Agama, Eastern Ground	*Agama aculeata distanti*	Endemic			
Snake, Aurora House	*Lamprophis aurora*	Endemic			
Slug-eater, Common	*Duberria lutrix lutrix*	Endemic			
Snake, Olive Ground	*Lycodonomorphus inornatus*	Endemic			
Frog, Rattling	*Semnodactylus wealii*	Endemic			
Stream Frog, Clicking	*Strongylopus grayii*	Endemic			

Common name	Scientific name	Endemism	SA GN151	SA Red-list	IUCN
Possible TOP and Endemic Species					
Snake, Striped Harlequin	*Homoroselaps dorsalis*	Endemic		NT	
Snake, Spotted Harlequin	*Homoroselaps lacteus*	Endemic			
Skink, Thin-tailed Legless	*Acontias gracilicauda*	Endemic			
Toad, Raucous	*Amietophrynus rangeri*	Endemic			
Unlikely TOP and Endemic Species					
Python, Southern African	*Python natalensis*		Protected		
Seps, Breyer's Long-tailed	*Tetradactylus breyeri*	Endemic PR		Vulnerable	
Tortoise, Lobatse Hinged-back	***Kinixys lobatsiana***				**Vulnerable**
Snake, Western Natal Green	*Philothamnus natalensis occidentalis*	Endemic			
Skink,Cregoi's Legless	*Acontias breviceps*	Endemic			
Gecko, Black-potted Dwarf	*Lygodactylus nigropunctatus nigropunctatus*	Endemic PR			
Lizard, Van Dam's Dragon	*Smaug vandami*	Endemic PR			
Gecko, Spotted Dwarf	*Lygodactylus ocellatus ocellatus*	Endemic PR			
Lizard, Common Crag	*Pseudocordylus melanotus melanotus*	Endemic PR			

Common name	Scientific name	Endemism	SA GN151	SA Red-list	IUCN
AIS / Exotic Species recorded in the area					
No AIS or exotic species recorded on ADU or iNaturalist					

NT: Near Threatened

PR: Partially Restricted

Table 21: Invertebrates of interest (Shaded species are ADU species)

Order	Family	Scientific name	SA GN151	SA Red-list	IUCN	MP Protected Species
Araneae	Theraphosidae	*Harpactira gigas*	Protected			7: Invertebrates
Araneae	Theraphosidae	*Harpactira hamiltoni*	Protected			7: Invertebrates
Araneae	Theraphosidae	*Pterinochilus lugardi*	Protected			7: Invertebrates
Scorpiones	Liochelidae	*Opisthacanthus validus*	Protected			
Scorpiones	Scorpionidae	*Opistophthalmus glabrifrons*	Protected			
Spirostreptida	Spirostreptidae	*Doratogonus barbatus**			Vulnerable	
Spirostreptida	Spirostreptidae	*Doratogonus furculifer**			Endangered	
Spirostreptida	Spirostreptidae	*Doratogonus precarius**			Vulnerable	
Coleoptera	Carabidae	*Dromica sp.*	Protected			

Order	Family	Scientific name	SA GN151	SA Red-list	IUCN	MP Protected Species
Coleoptera	Carabidae	*Graphipterus assimilis***	Protected			
Coleoptera	Carabidae	*Manticora sp.*	Protected			
Coleoptera	Carabidae	*Megacephala asperata***	Protected			
Coleoptera	Carabidae	*Megacephala regalis***	Protected			
Coleoptera	Carabidae	*Prothyma guttipennis***	Protected			
Coleoptera	Lucanidae	*Nigidius auriculatus***	Protected			
Coleoptera	Lucanidae	*Prosopocoilus petitclerci***	Protected			
Coleoptera	Scarabaeidae	*Ichnestoma sp.*	Protected			
Orthoptera	Tettigoniidae	*Clonia lalandei**			Vulnerable	
Orthoptera	Tettigoniidae	*Peringueyella rentzi**			Endangered	
Orthoptera	Tettigoniidae	*Thoracistus peringueyi**			Critically Endangered	

*** Distribution within province unknown**

**** General distribution unknown**

10.4.1.8. Terrestrial Biodiversity

Table 22 summarises the terrestrial fauna biodiversity findings as required under the terrestrial biodiversity protocol.

Table 22: Terrestrial fauna biodiversity features and preliminary impact statements

Common name	Scientific name	Endemism	SA GN151	SA Red-list	IUCN
Site species					
Stork, Yellow-billed	*Mycteria ibis*			Endangered	
Bishop, Southern Red	*Euplectes orix*				
Cisticola, Zitting	*Cisticola juncidis*				
Crow, Pied	*Corvus albus*				
Dove, Laughing	*Spilopelia senegalensis*				
Egret, Cattle	*Bubulcus ibis*				
Egret, Intermediate	*Egretta intermedia*				
Goose, Egyptian	*Alopochen aegyptiacus*				
Guineafowl, Helmeted	*Numida meleagris*				
Heron, Grey	*Ardea cinerea*				
Honeyguide, Lesser	*Indicator minor*				
Ibis, African Sacred	*Threskiornis aethiopicus*				
Ibis, Hadeda	*Bostrychia hagedash*				
Kite, Black-shouldered (-winged)	*Elanus caeruleus*				

Common name	Scientific name	Endemism	SA GN151	SA Red-list	IUCN
Lapwing, Blacksmith	*Vanellus armatus*				
Lapwing, Crowned	*Vanellus coronatus*				
Lark, Spike-heeled	*Chersomanes albofasciata*				
Masked-weaver, Southern	*Ploceus velatus*				
Myna, Common	*Acridotheres tristis*				
Owl, Marsh	*Asio capensis*				
Pipit, African	*Anthus cinnamomeus*				
Quelea, Red-billed	*Quelea quelea*				
Sparrow, Cape	*Passer melanurus*				
Spurfowl, Swainson's	*Pternistis swainsonii*				
Swallow, Greater Striped	*Hirundo cucullata*				
Swift, White-rumped	*Apus caffer*				
Tern, Whiskered	*Chlidonias hybrida*				
Thick-knee, Spotted	*Burhinus capensis*				
Widowbird, Long-tailed	*Euplectes progne*				
TOP and Endemic Species recorded in the greater area					

Common name	Scientific name	Endemism	SA GN151	SA Red-list	IUCN
Ibis, Southern Bald	*Geronticus calvus*	Endemic	Vulnerable	Vulnerable	Vulnerable
Harrier, African Marsh	*Circus ranivorus*		Protected	Endangered	
Secretarybird	*Sagittarius serpentarius*			Vulnerable	Vulnerable
Tern, Caspian	*Sterna caspia*			Vulnerable	
Duck, Maccoa	*Oxyura maccoa*			NT	Vulnerable
Swallow, South African Cliff	*Hirundo spilodera*	Breeding Endemic			
Starling, African Pied	*Spreo bicolor*	Endemic			
Weaver, Cape	*Ploceus capensis*	Endemic			
Likely TOP and Endemic species					
Owl, African Grass	*Tyto capensis*		Vulnerable	Vulnerable	
Korhaan, Blue	*Eupodotis caerulescens*	Endemic	Vulnerable		NT
Kestrel, Lesser	*Falco naumanni*		Vulnerable		
Possible TOP and Endemic Species					
Pelican, Pink-backed	*Pelecanus rufescens*		Endangered	Vulnerable	
Crane, Blue	*Anthropoides paradiseus*	Endemic	Endangered	NT	Vulnerable
Stork, Black	*Ciconia nigra*		Vulnerable	Vulnerable	

Common name	Scientific name	Endemism	SA GN151	SA Red-list	IUCN
Lark, Botha's	*Spizocorys fringillaris*	Endemic		Endangered	Endangered
Falcon, Lanner	*Falco biarmicus*			Vulnerable	
Korhaan, White-bellied	*Eupodotis senegalensis*			Vulnerable	
Thrush, Sentinel Rock	*Monticola explorator*	Endemic			NT
Falcon, Sooty	*Falco concolor*				Vulnerable
Lark, Eastern Long-billed	*Certhilauda semitorquata*	Endemic			
White-eye, Cape	*Zosterops virens*	Endemic			
Rock-thrush, Cape	*Monticola rupestris*	Endemic			
Sunbird, Greater Double-collared	*Cinnyris afer*	Endemic			
Unlikely TOP and Endemic Species					
Crane, Wattled	*Bugeranus carunculatus*		Critically Endangered	Critically Endangered	Vulnerable
Eagle, Martial	*Polemaetus bellicosus*		Vulnerable	Endangered	Vulnerable
Harrier, Black	*Circus maurus*			Endangered	Endangered
Eagle, Verreaux's	*Aquila verreauxii*			Vulnerable	
AIS / Exotic Species recorded in the area					

Common name	Scientific name	Endemism	SA GN151	SA Red-list	IUCN
Dove / Pigeon, Rock	*Columa livia*	Category 3#			
Mynah, Common (Confirmed)	*Acridotheres tristis*	Category 3#			
Sparrow, House	*Passer domesticus*	Category 3#			
Goose, Greylag (Domestic)	*Anser anser*	Exotic			

NT: Near Threatened

 # GN1003, 2020, South African AIS List

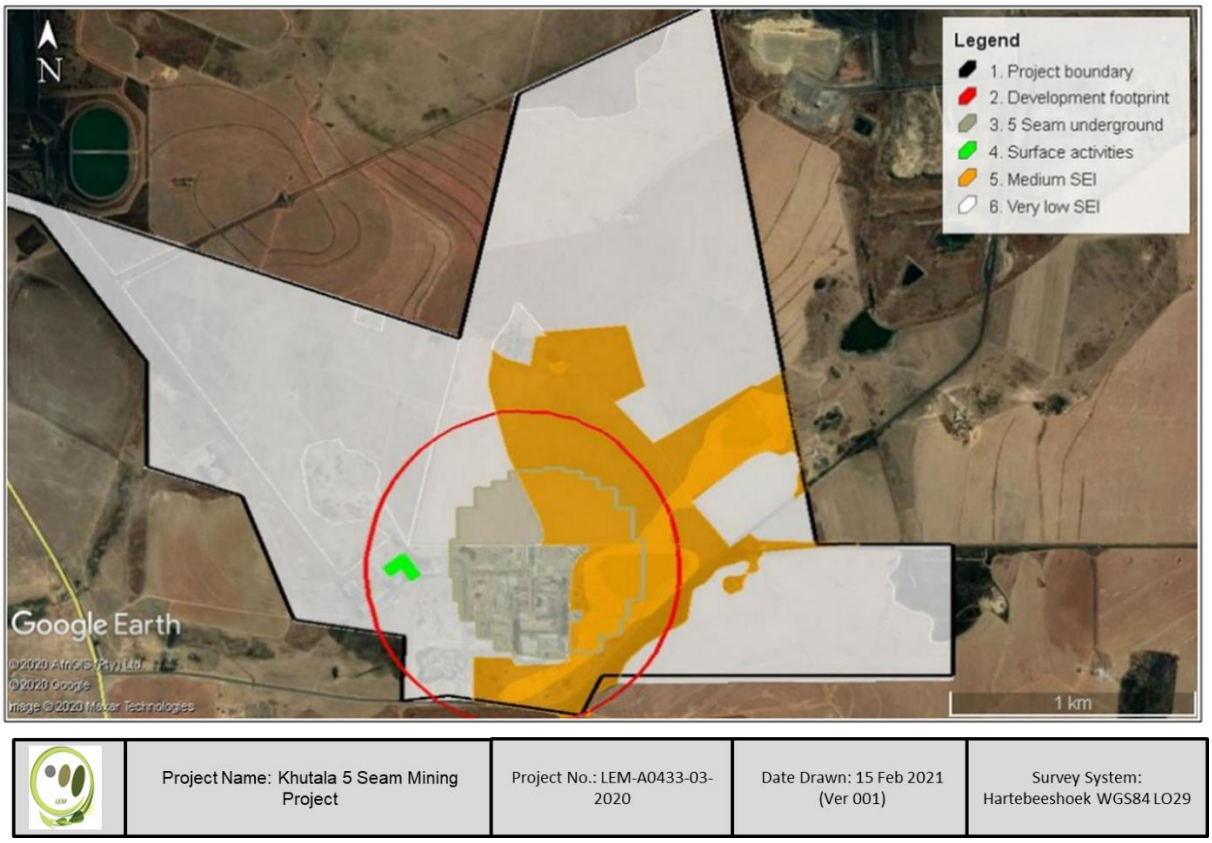
10.6.4 Site Ecological Importance

The site sensitivity is in agreement with the Mpumalanga conservation plan, although the 'other natural area' designated in the west was also historically ploughed and should be considered as part of the old lands or modified lands.

Table 23 summarises the determination of the site's ecological importance in terms of terrestrial fauna. As underground mining has occurred in the area, this is not a new activity in the area and the existing fauna are expected to remain on site (high to very high RR).

Table 23: Overall Site Ecological Importance (SEI) assessment

Evaluation unit	**CI**	**FI**	**BI**	**RR**	**SEI Rating**
Grassland	High	High	High	High	Medium (Minimize and restore
Disturbed Grassland	Low	Medium	Low	Very High	Very Low (Minimize)
Riverine Areas	High	High	High	High	Medium (Minimize and restore
Dams	High	High	High	High	Medium (Minimize and restore
Cultivated	Very Low	Very Low	Very Low	Very Low	Very Low (Minimize)
Disturbed	Very Low	Very Low	Very Low	Very Low	Very Low (Minimize)



	Project Name: Khutala 5 Seam Mining Project	Project No.: LEM-A0433-03-2020	Date Drawn: 15 Feb 2021 (Ver 001)	Survey System: Hartebeeshoek WGS84 LO29

Figure 29: Site Ecological Importance in terms of terrestrial fauna findings

10.5. Wetlands

Information regarding the Wetlands of 5 Seam Mining Project was obtained from the Wetland Assessment report compiled Ecology International dated December 2020 and updated in April 2021. Report is attached **Appendix 7.**

10.5.1. Wetland Declination

The watercourses within the study area were classified according to the classification system (Ollis et al., 2013) as Inland Systems, falling within the Highveld Aquatic Ecoregion, and the Mesic Highveld Grassland Group 4 Wetland Vegetation Type (Mbona et al., 2015). These watercourses were further classified at Level 3 and Level 4 of the classification system as summarised in the table below.

Table 24: Characterisation of the watercourses associated with the study and 500 m investigation areas according to the Classification System (Ollis et. al., 2013).

Level 3: Landscape unit	Level 4: HGM Type
Valley floor: the base of a valley, situated between two distinct valley side-slopes, where alluvial or fluvial processes typically dominate.	Unchannelled valley-bottom wetland: a valley-bottom wetland without a river channel running through it.
Slope: an inclined stretch of ground typically located on the side of a mountain, hill or valley, not forming part of a valley floor. Includes scarp slopes, mid-slopes and foot-slopes.	Hillslope seep: a wetland located on gently to steeply sloping land and dominated by colluvial (i.e gravity-driven) unidirectional movement of water and material down-slope.

Eleven hydro-geomorphic (HGM) units were identified within the study and 500 m investigation areas (**Table 25**). It is important to note that these HGM units were assessed only within the study and investigation areas and some of the systems (with specific mention of HGM11) observed formed part of a greater wetland system falling outside of the bounds of investigation associated with this study. Although historical delineations were largely used as the basis of this study, the systems were characterised based on the observations of the site visit on the 20th of October 2020 and some variations to the historical data may have occurred.

Table 25: The HGM units identified within the study and investigation areas.

Name	HGM Unit Type	Area Extent (Ha)
HGM 1	Unchanneled Valley Bottom	68.38
HGM 2	Hillslope Seep	28.99
HGM 3	Hillslope Seep	59.88
HGM 4	Unchannelled Valley Bottom	20.89
HGM 5	Unchannelled Valley Bottom	38.07
HGM 6	Hillslope Seep	76.93
HGM 7	Unchannelled Valley Bottom	101.72

Name	HGM Unit Type	Area Extent (Ha)
HGM 8	Hillslope Seep	7.09
HGM 9	Unchannelled Valley Bottom	26.04
HGM 10	Hillsope Seep	11.07
HGM 11	Unchannelled Valley Bottom	8.74
Total		**437.80**

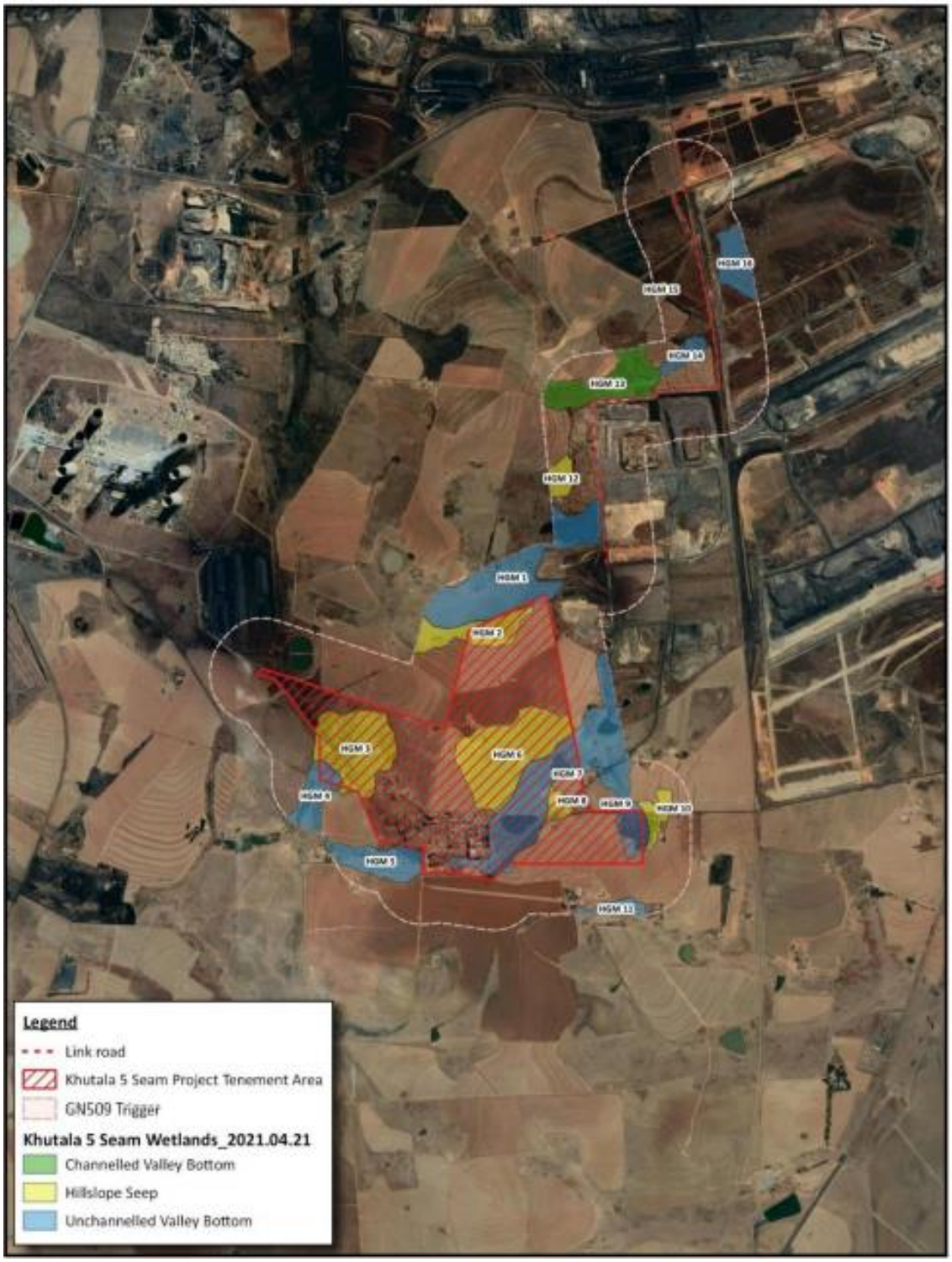


Figure 30: The location of the wetlands/watercourses within the study and 500 m investigation areas.

10.5.2. Present Ecological State

The health of a wetland can be defined as a measure of the deviation of wetland structure and function from the wetland's natural reference condition (Macfarlane et al., 2009). The wetlands associated with the project area have been impacted by a long history of agricultural land uses as well as impacts related to mining.

The major impacts to the wetlands/watercourses identified through the health assessments can be summarised as follows:

- Severe encroachment due to agropastoral activities dominating the landscape. HGM2, HGM6, HGM8, HGM9, HGM10 and HGM11 were all directly impacted by ploughing of fields, while HGM1, HGM4, HGM5 and HGM7 were impacted as a result of livestock grazing:
    - Cultivation of the wetlands and the surrounding catchment affecting the hydrological regime of the wetlands as well as the biodiversity integrity.
    - Utilisation of the wetlands by cattle leading to loss of basal cover, trampling, overgrazing and water quality impacts.
- Historical opencast and underground mining activities have been taking place in the vicinity of the study area since 1986, with impacts to water quality and fragmentation of the wetland systems observed.
- Surface infrastructure development such as offices, the mining complex, roads, trenches and stockpiles have resulted in direct losses of wetland habitat over the years, and impacts to the natural hydrological setting, as well as the creation of preferential flow paths and altered water retention and distribution profiles.

The identified wetlands were assessed according to the WET-Health methodology as described by Macfarlane et al. (2008) and were broadly classified as Moderately Modified (Category C) to Largely Modified (Category D). The results of these assessments (derived from both desktop and field-based verification) are presented graphically in **Figure 31**.

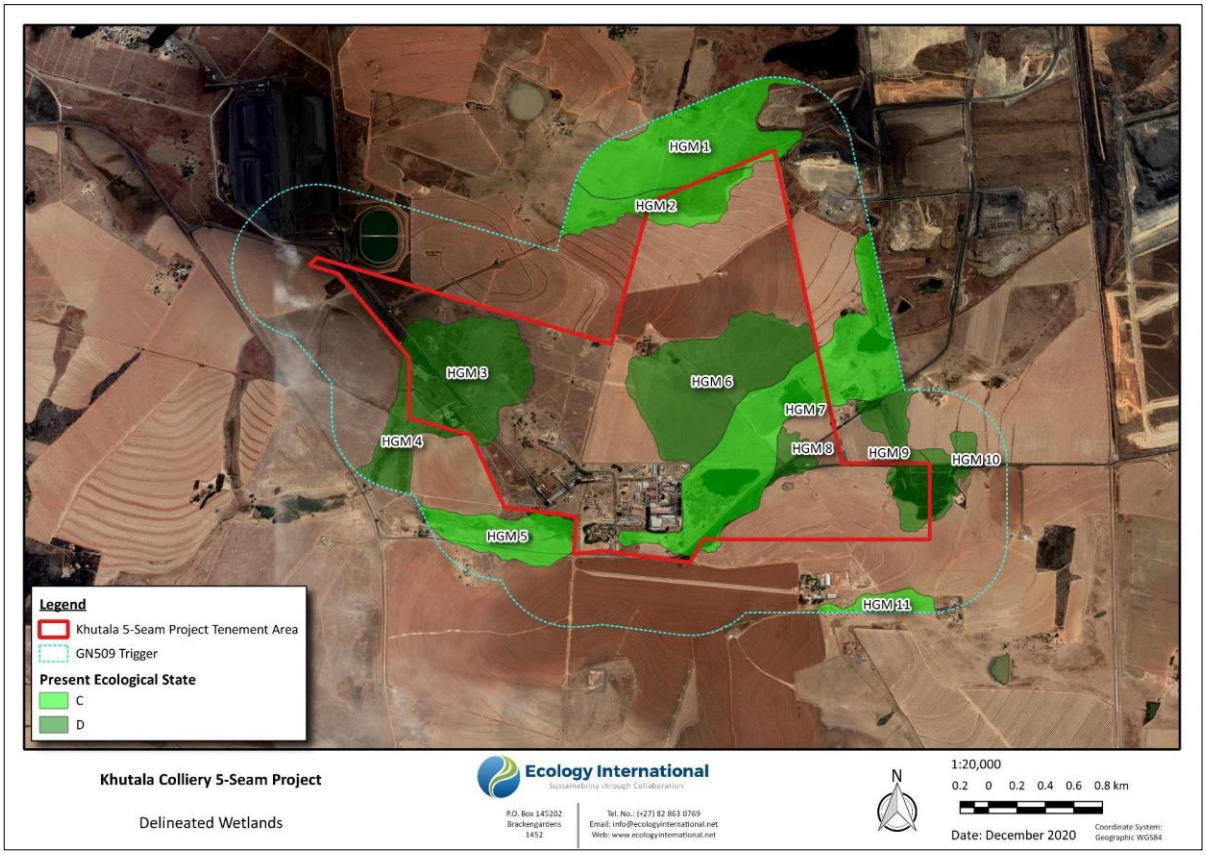
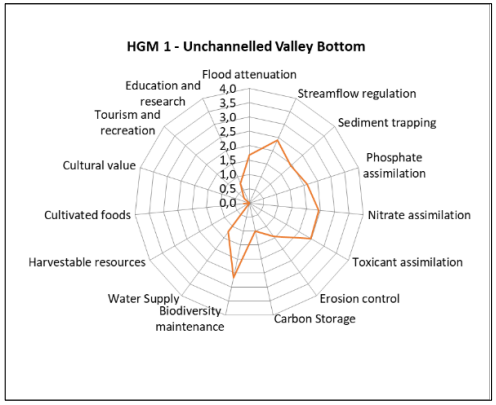


Figure 31: The Present Ecological State of the wetlands/watercourses within the study and 500 m investigation areas.

10.5.3. Wetland Ecological Service Provision

The general features of each HGM unit were assessed in terms of function, and the overall importance of the HGM unit was then determined at a landscape level. The results of the assessment are presented as spider graphs in **Figure 32**. The systems associated with the proposed project may be regarded as of Moderately Low to Intermediate importance in terms of service provision and functionality.

Key services provided are generally related to streamflow regulation, sediment trapping and the assimilation of toxicants and nutrients from the surrounding land use activities. Biodiversity maintenance is regarded as very high across almost all the HGM units indicating the importance for conservation of these systems. Erosion control and flood attenuation services were also regarded as important services, albeit to a lesser extent, as the topography was relatively gradually undulating with very little sign of erosion observed throughout the study area.


HGM 1 - Unchannelled Valley Bottom
Flood attenuation
Streamflow regulation
Sediment trapping
Phosphate assimilation
Nitrate assimilation
Toxicant assimilation
Erosion control
Carbon Storage
Biodiversity maintenance
Water Supply
Harvestable resources
Cultivated foods
Cultural value
Tourism and recreation
Education and research
4,0
3,5
3,0
2,5
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1,5
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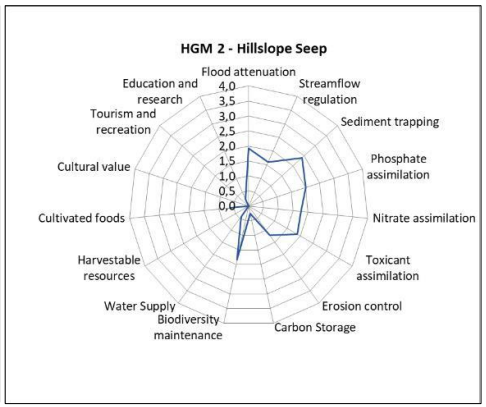
HGM 2 - Hillslope Seep
Flood attenuation
Streamflow regulation
Sediment trapping
Phosphate assimilation
Nitrate assimilation
Toxicant assimilation
Erosion control
Carbon Storage
Biodiversity maintenance
Water Supply
Harvestable resources
Cultivated foods
Cultural value
Tourism and recreation
Education and research
4,0
3,5
3,0
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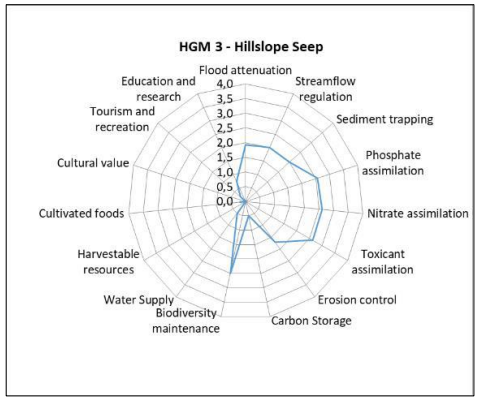
HGM 3 - Hillslope Seep
Flood attenuation
Streamflow regulation
Sediment trapping
Phosphate assimilation
Nitrate assimilation
Toxicant assimilation
Erosion control
Carbon Storage
Biodiversity maintenance
Water Supply
Harvestable resources
Cultivated foods
Cultural value
Tourism and recreation
Education and research
4,0
3,5
3,0
2,5
2,0
1,5
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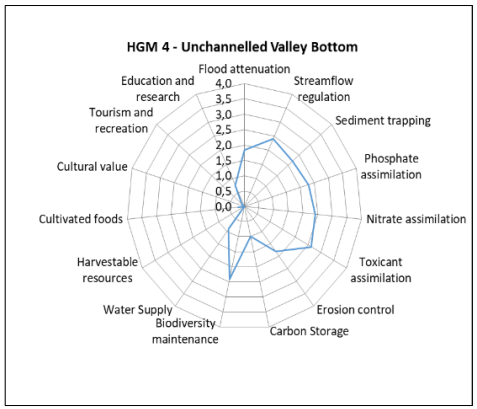
HGM 4 - Unchannelled Valley Bottom
Flood attenuation
Streamflow regulation
Sediment trapping
Phosphate assimilation
Nitrate assimilation
Toxicant assimilation
Erosion control
Carbon Storage
Biodiversity maintenance
Water Supply
Harvestable resources
Cultivated foods
Cultural value
Tourism and recreation
Education and research
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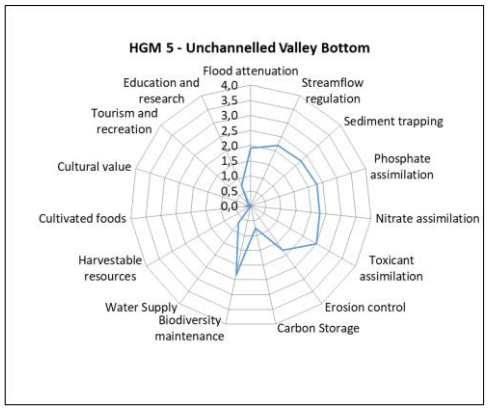
HGM 5 - Unchannelled Valley Bottom
Flood attenuation
Streamflow regulation
Sediment trapping
Phosphate assimilation
Nitrate assimilation
Toxicant assimilation
Erosion control
Carbon Storage
Biodiversity maintenance
Water Supply
Harvestable resources
Cultivated foods
Cultural value
Tourism and recreation
Education and research
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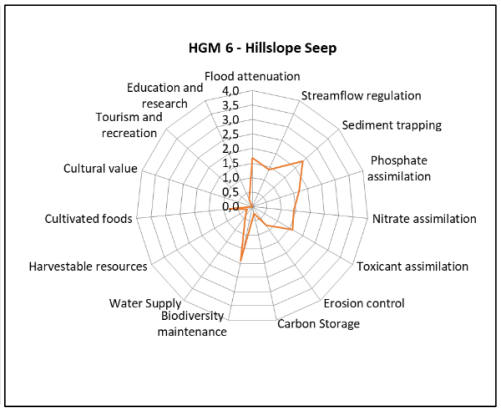
HGM 6 - Hillslope Seep
Flood attenuation
Streamflow regulation
Sediment trapping
Phosphate assimilation
Nitrate assimilation
Toxicant assimilation
Erosion control
Carbon Storage
Biodiversity maintenance
Water Supply
Harvestable resources
Cultivated foods
Cultural value
Tourism and recreation
Education and research
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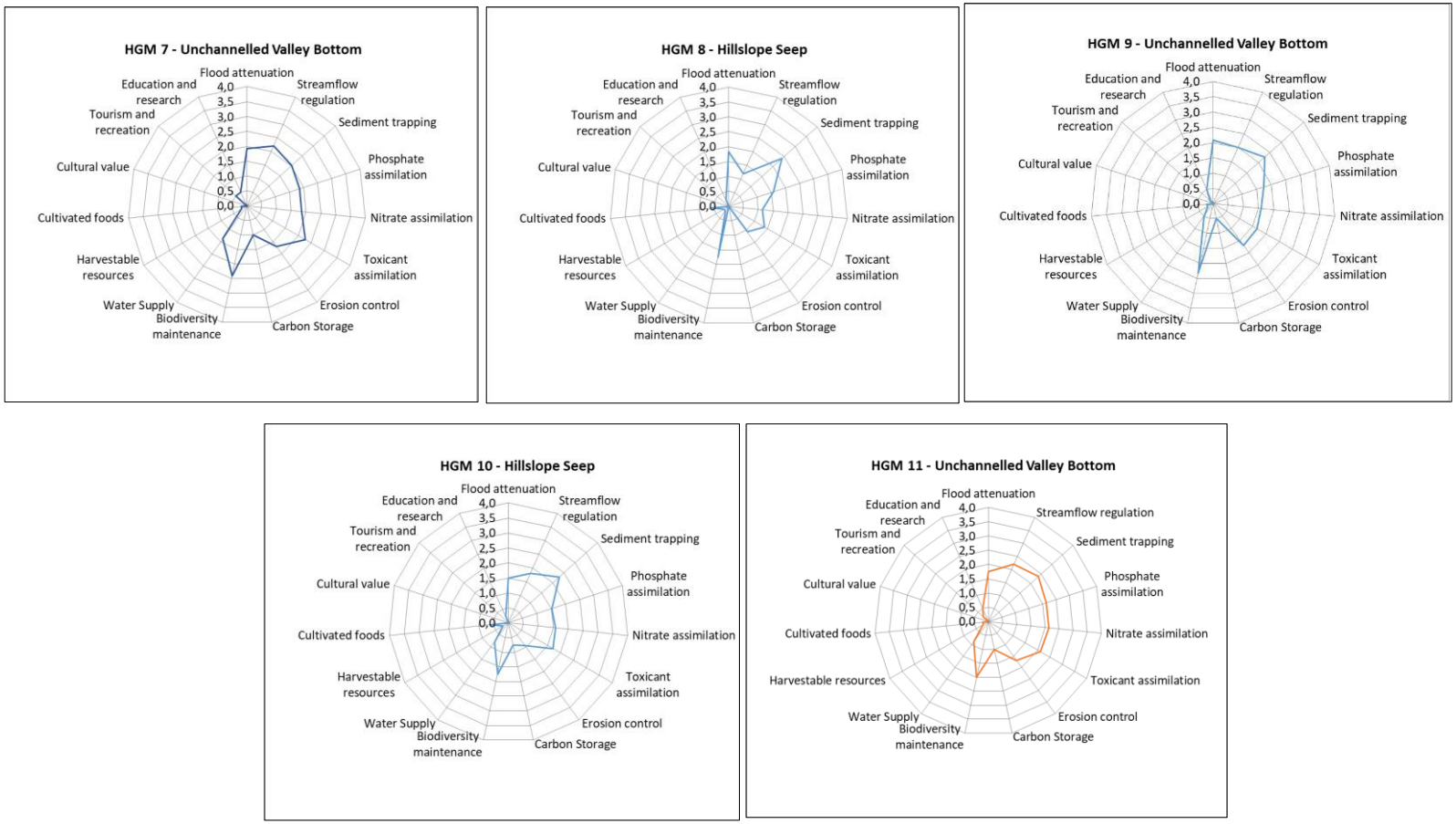

Figure 32: Wetland ecological service provision of the wetlands/watercourses within the study and 500 m investigation areas

10.5.4. Present Ecological State Aquatic habitat

SASS5 data obtained during the present assessment was used in the Macro-Invertebrate Response Assessment Index (MIRAI; Thirion, 2008) in order to determine the Present Ecological State according to the most acceptable method. Chutter (1998) developed the SASS protocol as an indicator of water quality. It has since become clear that SASS gives an indication of more than mere water quality, but rather a general indication of the present state of the invertebrate community. Because SASS was developed for application in the broad synoptic assessment required for the River Health Programme (RHP; now the River EcoStatus Monitoring Programme (REMP)), it does not have a particularly strong cause-effect basis. The aim of the MIRAI, on the other hand, is to provide a habitat-based cause-and-effect foundation to interpret the deviation of the aquatic invertebrate community (assemblage) from the reference condition (Thirion, 2008). This does not preclude the calculation of SASS scores should they be required. However, the use of the MIRAI is now the accepted approach for determining the Present Ecological State of riverine watercourses and as such is used by the Department within the River EcoStatus Monitoring Programme (REMP; previously the River Health Programme purposes, or RHP).

Results obtained during the most recent biomonitoring survey in May 2020 (**Figure 25**) indicated that the aquatic macroinvertebrate assemblage present within the watercourses associated with the study area may be regarded as being in a largely to critically modified state. These results point to a significant deterioration (change in ecological category) in the ecological integrity of the systems since the Spring 2018 assessment where the systems were observed to be in a largely to seriously modified state. Although the difference in ecological categories obtained for sites assessed within the study area during previous biomonitoring surveys relative to the more recent studies appear significant, with the ultimate reflection expressed in the results of the MIRAI, it is deemed likely that these seemingly significant differences were primarily (but not limited to) differences between assessors in perceptions of taxa likely to be present under natural, unimpacted (reference) conditions, which would result in differential interpretation of the metrics assessed. However, as no reference lists of aquatic macroinvertebrate taxa were included within the biomonitoring reports provided, and as such standardisation and calibration of interpretation could not be achieved during the present study.

Table 26: Present Ecological State of the macro-invertebrate assemblages of the sites assessed during the May 2020 biomonitoring survey (NTC Environmental, 2020)

Site	MIRAI (%)	Ecological Category
Eastern Catchment		
Site 4	12.33	F
Western Catchment		
Site 6	9.85	F
Site 7	45.32	D

A graphical depiction of the temporal variations in the Present Ecological State of each site assessed following the MIRAI approach is provided in Figure 11 (for the Eastern Catchment) and Figure 12 (for the Western Catchment).

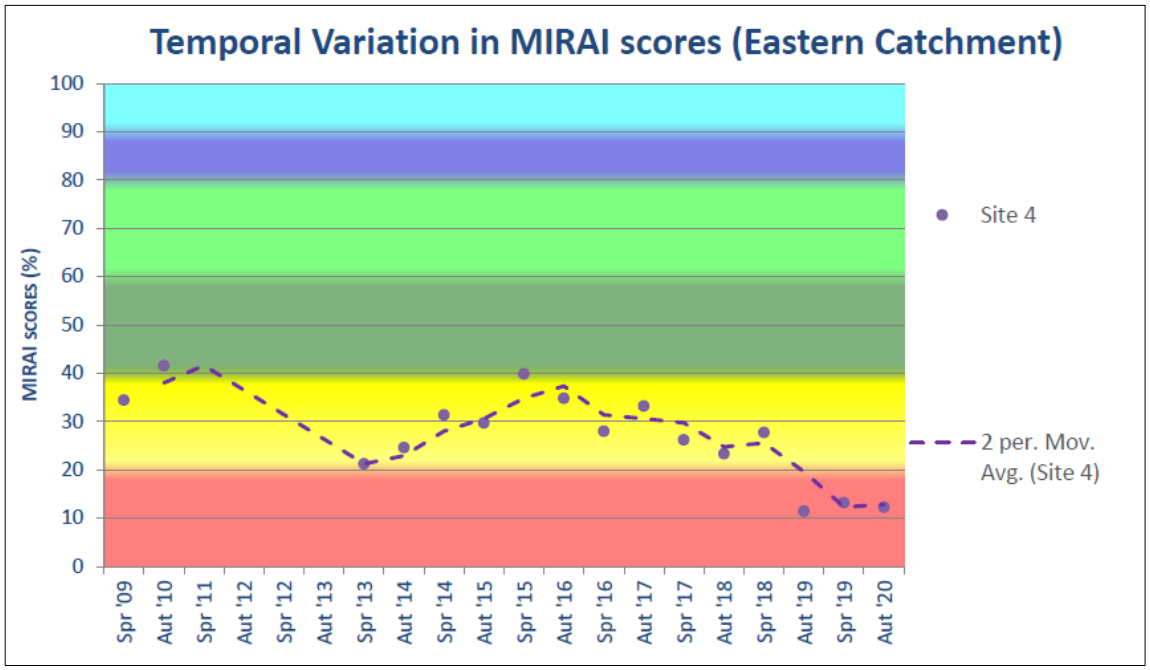

Figure 33: Temporal variation in MIRAI scores obtained for sites located within the Eastern Catchment (Quaternary Catchment B20E)

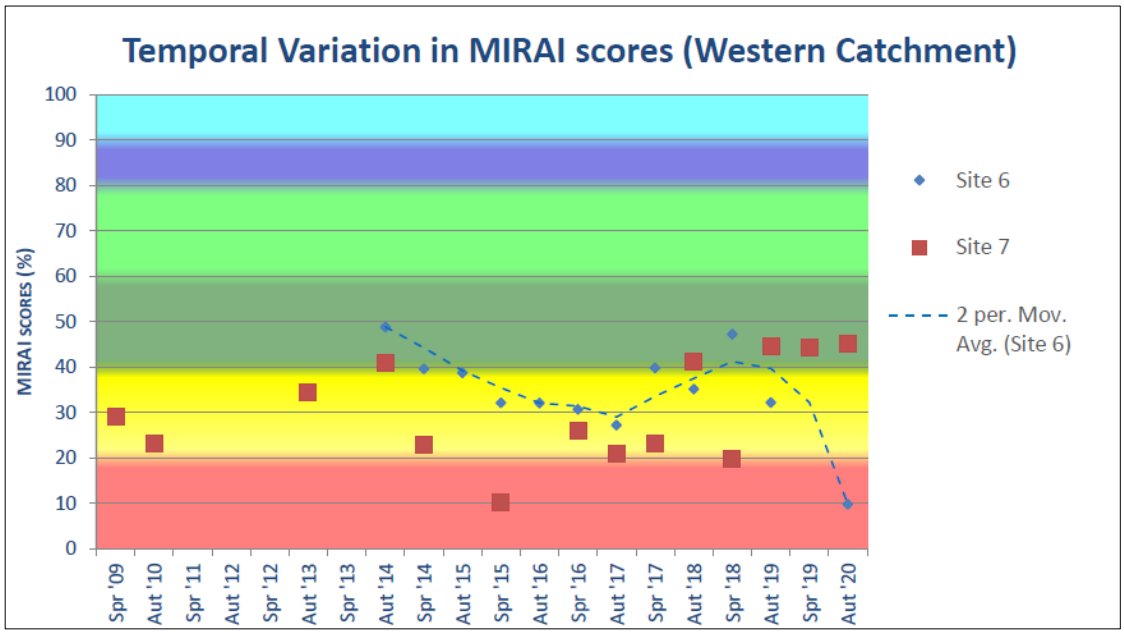

Figure 34: Temporal variation in MIRAI scores obtained for sites located within the Western Catchment (Quaternary Catchment B11H)

The historical data indicates that the water quality along the sites present within the western catchment may generally be regarded as poor (Ecological Category D) to bad (Ecological Category E) with results along the length of the tributary at the various sites noted as somewhat variable over time. SPI scores may be regarded as highly sensitive to varying types of pollution and provide a very good indicator of pollution in specific areas of concern being influenced by pollution factors as well as the nature and flow condition of the waterbodies assessed.

10.6. Hydropedology

10.6.1. Hydrology of soil types

The descriptions of the soil characteristics are found in

Table 27 and the details and results of the hydropedological impact assessment are found in **Appendix 10**.

Table 27: Properties of the soil forms found and regrouping into hydropedological soil types

Soil Forms **(Soil Classification Working Group, 2018)**	**Key Hydropedological Features of the Soil Forms on Site**	**Hydropedological Soil Type** **(Van Tol and Le Roux, 2019)**
Nkonkoni (Nk)	The A and B horizons are red and apedal overlying a very weathered Lithic horizon. The absence of grey mottles in the lithic indicates that water drains through the soil and lithic horizons (**Figure 37 Photo (a)**).	Recharge
Clovelly (Cv)	Hydrologically similar to the Nk soil, but the Yellow-Brown colour is an indication of higher saturation and generally shallower than Nk soil (**Figure 37 Photo (f)**). Therefore, during the wettest seasons the Cv is expected to be saturated for short periods.	Recharge
Mispah (Ms)	Mispah soil is characteristically shallow. Poor water drainage is interpreted from the bleached colour of the Ot horizon.	Responsive (shallow)
Avalon (Av)	The A and B horizons are like the Cv soil but the Sp horizon is an indication that water saturation occurs at the soil/bedrock interface.	Interflow (soil/bedrock)
Fernwood (Fw)	Soil is found on the boundary of Nk soil and the Wetland. The complete removal of Fe is an indication that leaching is present (Figure 15F). The soil is present on an increased slope, suggesting that when the soil is saturated, interflow will occur, leaching the Fe out of the profile laterally.	Interflow
Westleigh (Ws)	Consists of an Ot overlying a soft plinthic horizon (**Figure 37 Photo (c)**).	Stagnating

Soil Forms (Soil Classification Working Group, 2018)	Key Hydropedological Features of the Soil Forms on Site	Hydropedological Soil Type (Van Tol and Le Roux, 2019)
Rensburg (Rg)	Vertic A horizons with very strong structure and high clay contents overlying a G horizon. Physically active soils (shrink and swell). Large cracks in dry state but very low infiltration rate when wet. Will typically generate overland flow due to infiltration excess in peak rainy season.	Responsive (wet)

The distribution of soil types and response types found are presented in **Figure 35** and **Figure 36**, respectively.

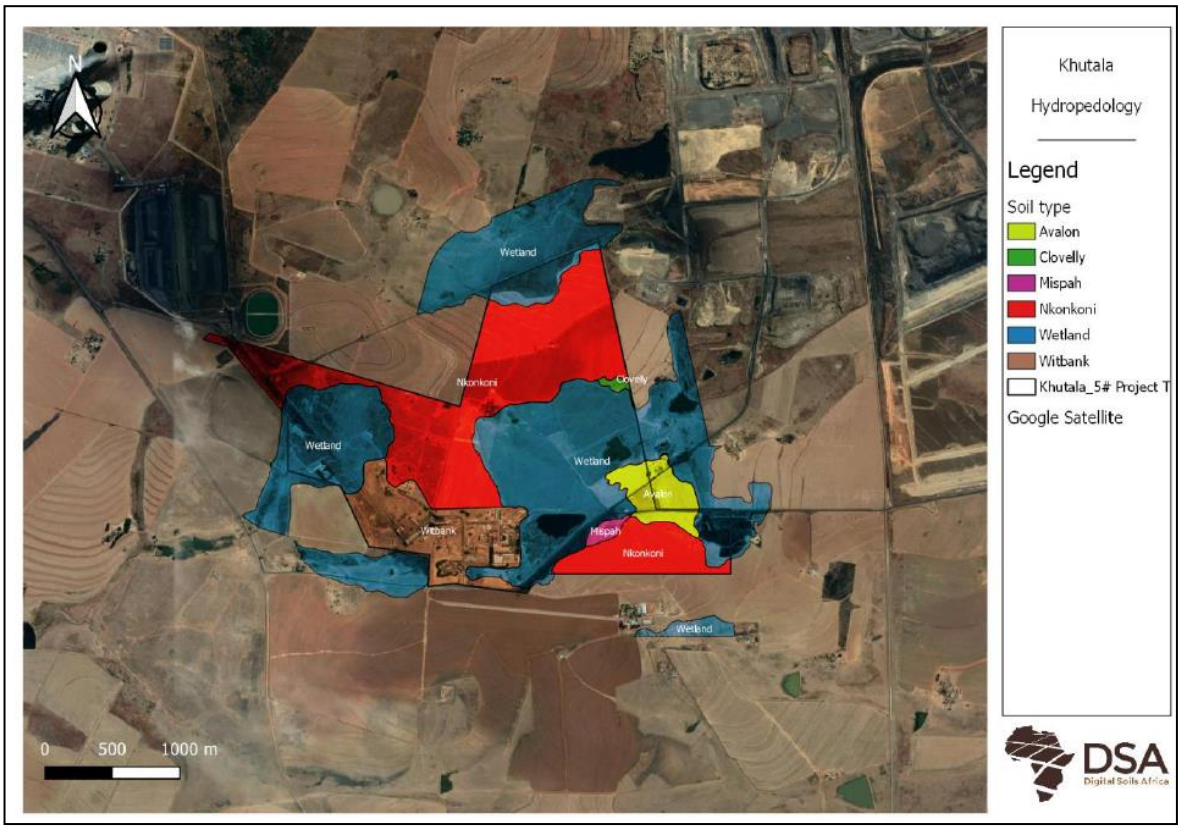

Figure 35: Soil types found in the study area.

Figure 36: Hydrological response of the soils in the study area

Figure 37: Photographs of selected properties found in the study area – (a) The lithic horizon of Nkonkoni soil form, (b) Profile of the Nkonkoni, (c) Soft plinthic in a profile, (d) Rensburg soils typical of the wetlands in the site, (e) Albic horizon of the Fernwood soil, (f) Lithic horizon of the Clovelly soil

10.6.2. Conceptual hydrological response model (CHRM)

Two dominant hillslopes were found in the study area. Conceptual hydrological response model 1 (CHRM 1) (**Figure 38**) is a typical plinthic catena of the highveld that consisted of recharge soils on the crest, soil bedrock interflow on the midslope, more responsive soils on the toeslope and high clay content responsive soils in the valley bottom. Conceptual hydrological response model 2 (CHRM 2) (**Figure 39**) is similar, but the transition of unsaturated to saturated soils in more abrupt.

Recharge- The Nkonkoni soil is present on all the crests of the hillslopes of the study area (CHRM 1 and 2). The lack of gleying in the Lithic below the red apedal indicates that the

water is not impeded sufficiently for long periods of reduction associated with stagnant water. The water will exfiltrate the soil into the weathered rock, either recharge the underground aquifer or move along bedding planes to the lower lying wetlands as return-flow.

Interflow- is present in CHRM 1 as a soft plinthic horizon develops on the midslope below the apedal horizon. Although the horizon is classified as interflow, the gentle gradients of the hillslope the interflow is not expected to be a dominant flowpath. Interflow has also been shown to present in the Apedal horizon above the soft plinthic horizon.

Overland flow- will be present in the responsive soils of the wetlands (CHRM 1 and 2). The smectitic clay present in the wetlands swells when saturated, causing a dramatic decrease in infiltration. The low infiltration then causes the overland flow. The Gley horizon under the Vertic horizons could be cause by return-flow from the Nkonkoni soils.

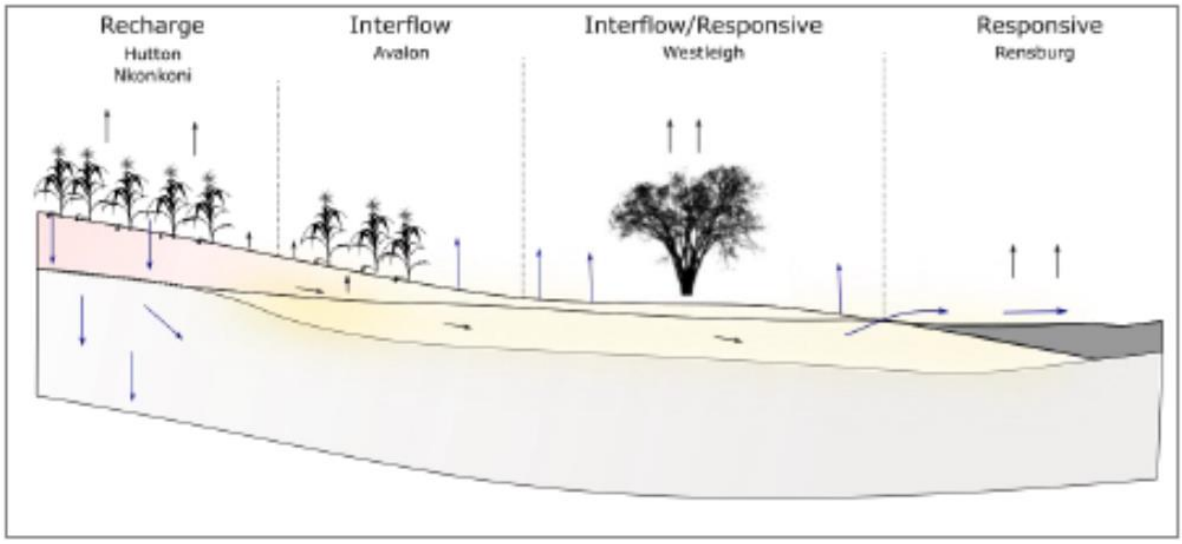

Figure 38: Conceptual hydrological response model 1. *dominant flowpaths in blue arrows, while black arrows indicate other flowpaths present

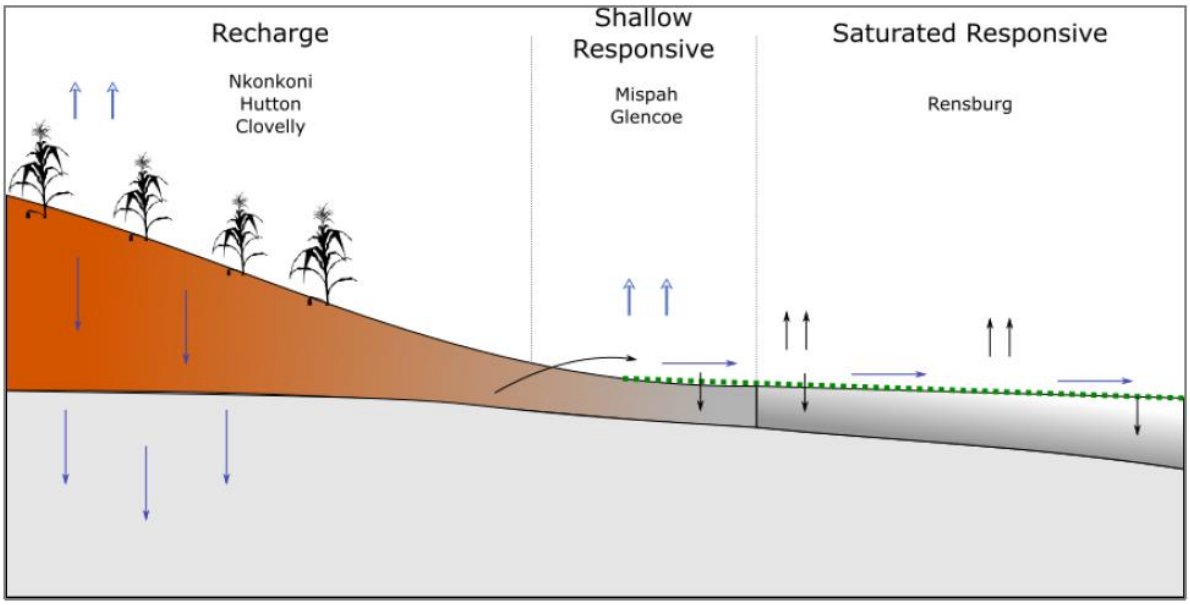

Figure 39: Conceptual hydrological response model 2. *dominant flowpaths in blue arrows, while black arrows indicate other flowpaths present in the soil.

10.6.3. Modelling results

The results show that the study area is dominated by evapotranspiration (ET), with almost 90% on average of the water balance being lost to ET. Although, there is variation in the transpiration and evaporation of different LSU's. The lateral flows are high in the study area (>10 mm in LSU 150).

Theoretically, underground mining will only impact the percolation of the impacted LSU's. The average of the impacted LSU's is 4% on average. LSU 150 has the highest loss of percolation in the study area with a 6% percolation loss predicted. It is important to note that hydropedology aims at predicting the loss of percolation and not characterizing the impact of the deep groundwater. Also, percolation is the amount of water draining out the soil and not necessarily the entire percentage recharge lost to the aquifer.

10.7. Surface Water

10.7.1. Regional hydrology

Khutala Colliery falls within the Upper Olifants Catchment, predominantly in Management Unit (MU) 5, however a portion falls in MU 22 in the Mpumalanga Province. The quaternary catchments in which the Colliery lies is B11F with a small portion lying within the B20E and

F quaternary catchments, refer to **Figure 40**. Streams from the mining area drain to the Leeuwfonteinspruit, which is a tributary of the Wilge River in quaternary catchments B20E and to the Saaiwaterspruit in quaternary catchment B11F which drains to the Tweefonteinspruit after confluence with the Klippoortjiespruit. The Tweefonteinspruit drains to the Olifants River upstream of the Witbank Dam at the DWS Wolwekrans Weir on the Olifants River (DWS monitoring site: (B1H10). The Wilge River drains to the Olifants River approximately 20km upstream of Loskop Dam. The Mean Annual Runoff (MAR) for Loskop Dam is 397 x 106 m^3. The water downstream of the site is used primarily for agriculture.

The Olifants Catchment covers an estimated 54 570 km^2 and is subdivided into 9 secondary catchments. The total MAR is approximately 2400 million cubic metres per year (Mm^3/a). The Olifants River and some of its tributaries, notably the Klein Olifants River, Elands River, Wilge River and Bronkhorspruit, rise in the Highveld grasslands.

The upper reaches of the Olifants River Catchment are characterised by extensive opencast and underground coal mining, agricultural and conservation activities. Highly erodible soils result in high sediment loads to the Olifants River which is exacerbated by overgrazing and poorly managed mining activities in the catchment.
There are many large dams in the Olifants Water Management Area, however Witbank and Loskop dams in the Upper Olifants catchment are relevant to the downstream impacts from Khutala Colliery, just one mine amongst many others.

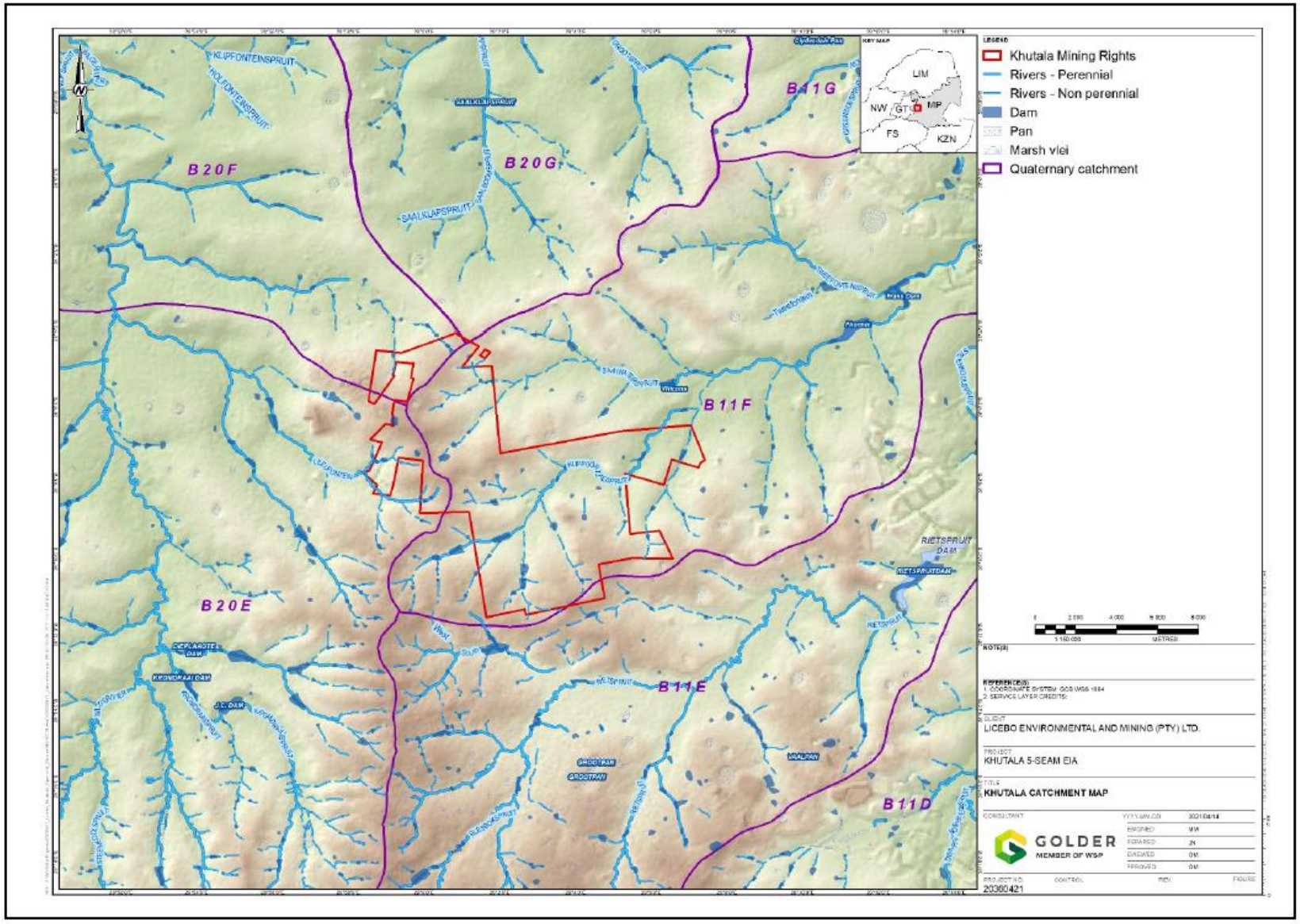

Figure 40: Catchment map showing the Khutala Colliery Water quality

Table 28: Water quality results at relevant monitoring points

Water quality constituent (Units are mg/L unless stated)	Current WUL Limit	WQPL MU22 (Wilge catchment)	WQPL MU5 (Klippoortjiespruit / Saaiwaterspruit catchment)	Wilge River Catchment							Saaiwaterspruit Catchment						
				D/S Block I after confluence	DS Sewerage plant	North Stream US Block I	North Stream DS Block I	Block I Dam 1	Block I Dam 2	Clean water dam US farm Dam	Farmers DS Balance Dam	Farmers Dam Block I	Block A OC Dam	Sump along road next to gate	Security Gate Dam	Surface dam Main office complex	Main Poll. Contr. Dam
pH	6.5 - 9	6.5-8.4	6.5-8.4	7.8	8.6	7.7	7.8	**10.3**	7.37	8.2	7.9	7.2	8.0	7.8	7.5	7.1	8.9
Electrical Conductivity (mS/m)	50	40	77	**114**	**44.2**	**117**	**41.6**	**65.3**	**71.8**	88.9	20.3	53.7	49	**65.8**	37.5	**77**	**126**
Total Dissolved Solids	250	260	500	**808**	**311**	**978**	**270**	**462**	**489**	**650.4**	156	**347**	**340**	**435**	**256**	**474**	**943**
Total Hardness	No limit	No limit	No limit	643	166	545	177	247	274	**449.1**	87	162	221	318	160	284	**464**
M-Alkalinity	No limit	No limit	No limit	186	170	139	234	97.1	152	193.9	78.5	185	108	157	115	361	228
Chloride	No limit	20	50	19.9	15.6	**29.7**	5.62	**29.8**	**26.6**	**27.1**	12.7	**53.8**	10	8.5	7.5	19.4	24.5
Sulphate	150	70	380	**471**	67.6	**537**	8.36	**199**	**211**	**282.7**	25.2	39.7	143	**189**	75.2	70.2	**468**
Orthophosphate as P	No limit	0.025	0.06	0.004	**0.54**	**0.22**	0.017	**0.384**	**0.23**	**0.1**	0.036	**0.066**	0	0.07	0.009	0.983	1.23
Ammonium as N	No limit	0.05	0.05	**0.072**	**0.305**	**0.32**	**3.21**	**0.259**	**0.175**	**0.8**	**0.072**	**0.06**	0	**0.15**	0.13	0.04	0.22
Nitrate as N	No limit	0.5	0.5	0.258	0.308	1.78	0.368	0.197	0.241	2.0	0.21	0.13	1	0.17	0.23	0.249	0.185
Nitrite as N	No limit	No limit	No limit	0.073	0.078	0.045	0.033	0.033	0.054	0.1	0.051	4	0	0.059	0.053	0.084	0.033

Water quality constituent (Units are mg/L unless stated)	Current WUL Limit	WQPL MU22 (Wilge catchment)	WQPL MU5 (Klippoortjiespruit / Saaiwaterspruit catchment)	Wilge River Catchment							Saaiwaterspruit Catchment						
				D/S Block I after confluence	DS Sewerage plant	North Stream US Block I	North Stream DS Block I	Block I Dam 1	Block I Dam 2	Clean water dam US farm Dam	Farmers DS Balance Dam	Farmers Dam Block I	Block A OC Dam	Sump along road next to gate	Security Gate Dam	Surface dam Main office complex	Main Poll. Contr. Dam
Fluoride	No limit	0.75	0.75	0.609	0.352	0.858	0.836	0.611	0.641	0.6	0.693	0.05	1	0.734	0.61	2.4	4.19
Calcium	No limit	32	110	**128**	**36.6**	107	31.6	53.9	54.3	80.3	16.8	32.6	44	55.3	31.5	66.9	105
Potassium	No limit	10	25	**13.2**	3.3	7.01	3.9	9.02	8.03	9.4	9.3	16	6	4.8	4.9	10	6.64
Magnesium	50	20	70	**78.6**	18.1	**67.7**	**23.9**	**27.3**	**33.6**	60.3	10.9	19.5	27	**43.7**	19.8	28.1	49.2
Sodium	50	30	70	30.7	37.8	**71.5**	15.9	**42.7**	**46.3**	32.9	8.94	56.4	19	26.6	16	62.9	120
Aluminium	0.01	0.02	0.02	0.001	0.001	0.015	0.001	0.006	0.018	0.5	0.034	0.089	0	0.002	0.18	0.001	0.001
Iron	1	0.1	0.1	0.002	0.002	0.009	0.002	0.002	0.002	0.6	0.124	0.207	0	0.002	0.002	0.002	0.002
Manganese	0.02	0.02	0.02	**0.863**	**0.001**	**0.073**	**15.6**	**0.001**	**0.219**	0.4	**0.001**	0.216	0	**0.026**	0.001	0.15	0.001
Suspended Solids	No Limit	No Limit	No Limit	14	**128**	15	**2844**	**72**	16	40.4	38	34	112	**60**	14	**227**	27
Turbidity (NTU)	35	No Limit	No Limit	2.7	8.64	6.12	**2606**	**49.5**	12.8	12.6	18.7	8.11	58	34	12.8	116	6.8
Silica	No Limit	No Limit	No Limit	5.81	11.2	7.12	4.22	2.75	6.2	9.0	3.89	6.58	3	3.51	3.51	5.59	1.5
Bicarbonate alkalinity	No Limit	No Limit	No Limit	-	158		233	28.6	152	187.0	77.8	185	107	155	114	361	211

Water quality constituent (Units are mg/L unless stated)	Current WUL Limit	WQPL MU22 (Wilge catchment)	WQPL MU5 (Klippoortjiespruit / Saaiwaterspruit catchment)	Wilge River Catchment							Saaiwaterspruit Catchment						
				D/S Block I after confluence	DS Sewerage plant	North Stream US Block I	North Stream DS Block I	Block I Dam 1	Block I Dam 2	Clean water dam US farm Dam	Farmers DS Balance Dam	Farmers Dam Block I	Block A OC Dam	Sump along road next to gate	Security Gate Dam	Surface dam Main office complex	Main Poll. Contr. Dam
Carbonate alkalinity	No Limit	No Limit	No Limit	-	11.8		1.27	57.5	0.333	7.3	0.657	0.368	1	1.76	0.462	0.41	16.1
Langelier Saturation Index	No Limit	No Limit	No Limit	-	0.47		-0.3	2.08	-0.67	0.7	-0.9	-0.97	0	-0.24	-0.9	-0.5	1.3
Sodium Absorption Ratio	No Limit	2	2	-	1.28		0.52	1.15	1.21	0.7	0.42	1.9	1	0.63	0.55	1.62	**2.4**

10.7.2. Reserve, classification of the Resources and Resource Quality Objectives

The protection of water resources is governed by Chapter 3 of the National Water Act (NWA), and Chapter 5 of the National Water Resources Strategy 2 (NWRS2) (DWA, 2013) which prescribe the protection of the water resources through resource directed measures (RDM) and the classification of water resources. These are measures which, together, are intended to ensure the protection of water resources, as well as being measures for pollution prevention and remedying the effects of pollution while balancing the need to use water as a factor of production to enable socio-economic growth and development.

In order to give effect to the concept of sustainability, an understanding of the nature and requirements of aquatic ecosystems under present conditions is needed. In addition, the pressures being placed upon resources, how the resources are being used, the water resources management intent, and finally the objectives which provide a statement (in terms of biota, habitat, flow and water quality) of the conditions that need to be met are also factors that must be considered.

The Reserve, classification of the resources and Resource Quality Objectives have been promulgated for the Upper Olifants WMA in which the proposed 5 Seam Mining Project is located.

10.7.3. Classification

The Water Resource Classification Study (WRCS) places the following principles at the forefront of implementation:

- Maximising economic returns from the use of water resources,
- Allocating and distributing the costs and benefits of utilising the water resource fairly, and
- Promoting the sustainable use of water resources to meet social and economic goals without detrimentally impacting on the ecological integrity of the water resource.

The Wilge River catchment has been classified as a Class II River and the Saaiwaterspruit/Klippoortjiespruit as a Class III River in Government Gazette No 39943, 22 April 2016, Notice No 466, National Water Act, 1998 (Act No.36 of 1998) Classes and

Resource Quality Objectives of Water Resources for the Olifants Catchment (DWS, 2016b), where the classes are described as per **Table 29**.

Table 29: Catchment classification

Class	Description
I	Water resource is one which is minimally used, and the overall condition of that water resource is minimally altered from its pre-development condition
II	Water resource is one which is moderately used, and the overall condition of that water resource is moderately altered from its pre-development condition
III	Water resource is one which is heavily used, and the overall condition of that water resource is significantly altered from its pre-development condition

10.7.4. The Reserve

The Reserve specifies the quantity, quality, habitat and biotic integrity requirements necessary for the protection of the resource, has priority over other water uses, and will vary according to the class of the resource. The Reserve is a protection measure that comprises two components:

- Basic human needs (BHN), ensuring that the essential needs of individuals served by the water resource in question are provided for; and
- The ecological Reserve which is not intended to protect the aquatic ecosystem per se, but to maintain aquatic ecosystems in such a way that their integrity remains intact, and they can continue to provide the goods and services to society and is specified for groundwater, wetlands, rivers and estuaries.
- Downstream of the confluence of the Wilge River and the Saalklapspruit (**Figure 41**) (DWS, 2016b) Resource Quality Objectives (RQO) have been gazetted for the Wilge River and Olifants River catchments (DWS, 2016b). Sites EWR 1 and 4 are the sites at which RQOs (quantity and quality) have been set, Table 4 and Table 5 respectively.

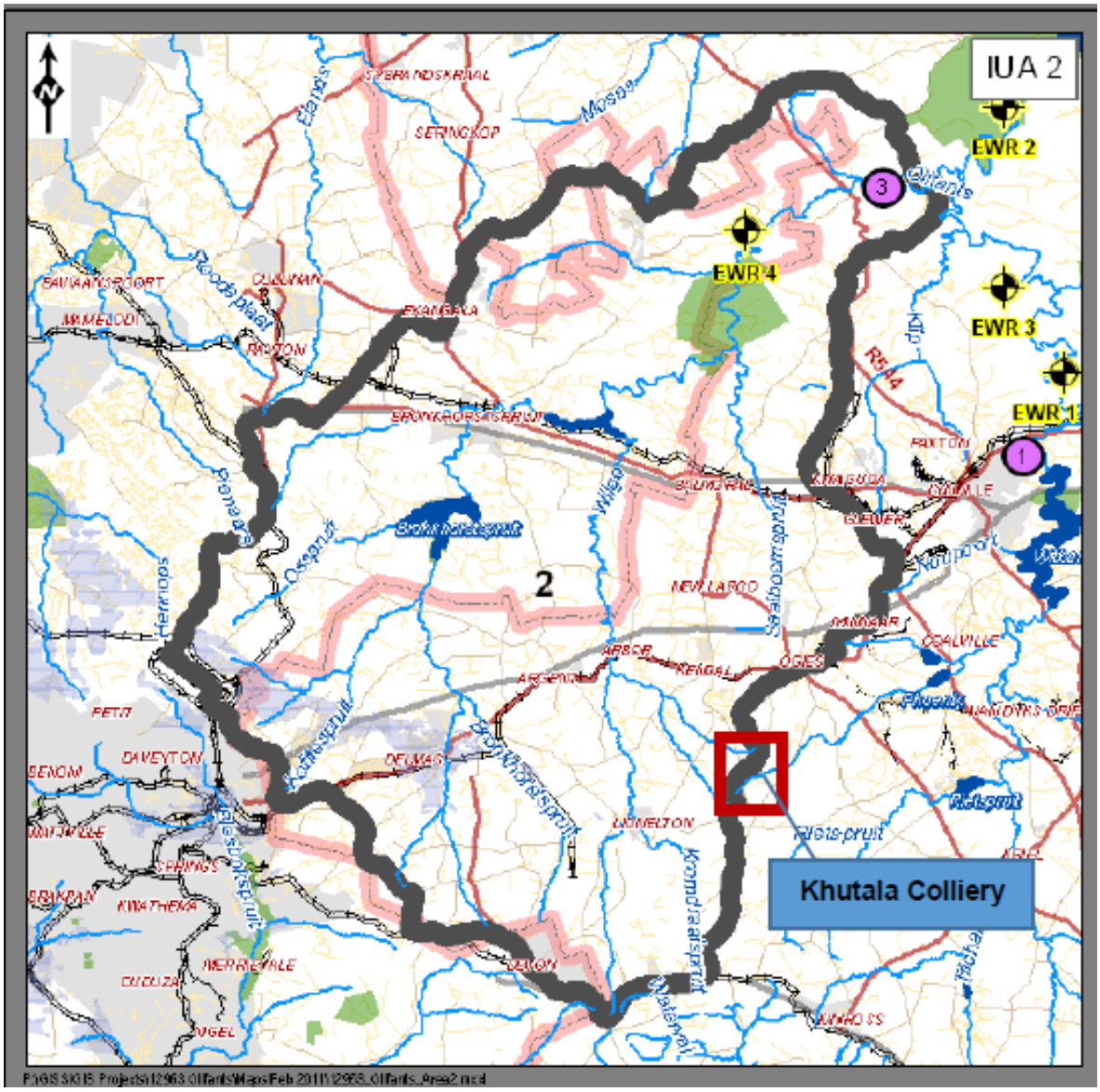

Figure 41: EWR 1 and 4 in relation to Khutala Colliery (DWS, 2016b)

10.7.5. Resource quality objectives

RQOs have been gazetted for the Wilge River and Upper Olifants River catchments (DWS, 2016b). Sites EWR 1 and 4 are the sites at which RQOs (quantity and quality) have been set, **Table 30** and **Table 5** respectively.

Table 30: River water quantity RQO (DWS, 2016b)

River	REC	RQO	Indicator / Measure	Numerical limits				
				EWR 1			EWR 4	
				Month	Maintenance low flows (m^3/s) (Percentile)	Drought flows (m^3/s) (Percentile)	Maintenance low flows (m^3/s) (Percentile)	Drought flows (m^3/s) (Percentile)
Olifants (EWR site – EWR1) D	D	Low flows need to be improved in order to maintain river habitat for the ecosystem and ecotourism.	EWR maintenance low and drought flows: Olifants EWR 1 in B11J VMAR = 184.5x106 m^3 PES = D category	Oct	0.150 (99)	0.161 (99)	0.806 (50)	0.206 *(99)*
				Nov	0.272 (90)	0.185 (99)	1.094 60)	0.269 (99)
				Dec	0.360 (80)	0.146 (99)	1.235 (60)	0.298 (99)
				Jan	0.447 (99)	0.675 (80)	1.476 60)	0.350 (99)
				Feb	0.549 (99)	0.692 (90)	1.862 (60)	0.436 (99)
				Mar	0.442 (80)	0.261 (90)	1.733 (60)	0.405 (99)
Wilge (EWR site - EWR4, outlet of IUA2)	B	Low flows need to be improved in order to maintain river habitat and the ecosystem.	EWR maintenance low and drought flows: Wilge EWR4 in B20J VMAR = 175.59x10 °m^3 PES=B category	Apr	0.361 (80)	0.204 (90)	1.528 (50)	0.362 (99)
				May	0.249 (80)	0.164 (90)	1.277 (50)	0.307 (99)
				Jun	0.171 (80)	0.127 (99)	1.121 (50)	0.275 (99)
				Jul	0.130 (99)	0.131 (99)	0.961 (60)	0.239 (99)
				Aug	0.103 (80)	0.153 (70	0.802 (60)	0.205 (99)
				Sep	0.091 (80)	0.073 (99)	0.696 (60)	0.183 (99)

10.7.6. Present ecological state and river characteristics

The Present Ecological State (PES) is defined as the current state or condition of a water resource in terms of its biophysical components (drivers) such as hydrology, geomorphology and water quality and biological responses viz. fish, invertebrates and riparian vegetation.

The degree to which ecological conditions of an area have been modified from the natural (reference) condition and the Ecological Importance and Sensitivity (EIS) relate to the presence, representativeness and diversity of species of biota and habitat. Ecological Sensitivity relates to the vulnerability of the habitat and biota to modifications that may occur in flows, water levels and physico-chemical conditions (DWS, 2006).

This is an area of flat grasslands with rolling rocky zones on top of the escarpment (1 500-1 750 mamsl). Sandstone and shale harbour rich coal deposits, covered by deep, red to yellow sandy soils. Wetlands that overlie these deposits are threatened by potential mining activities. Precipitation is 600-800 mm per year, frequently in the form of summer storms. Mean annual temperatures range from 14-16°C.

The Wilge, Bronkhorstspruit and Klein Olifants Rivers are tributaries of the Olifants River that, together with the Olifants River, originate in the Highveld grasslands in these areas. The river structure varies from a narrow channel with no definite riparian zone up to a 20-30 m wide channel with well-defined riparian habitat. The Witbank and Doringpoort Dams are in this section of the Olifants River.

Mining, predominantly for coal, and other industrial activities in this area are the main contributors to poor in-stream and riparian habitat conditions. In-stream conditions are impaired by poor water quality, where acid leachate from mines is a primary contributor. Low pH (high acidity) and high concentrations of dissolved salts are characteristics of streams in this section.

Stream diversions occur as a result of agricultural and mining activities. In some parts, access roads, mostly related to mining and industrial activities, have resulted in acid water leach from mine dumps, severe disturbance of riparian habitats, and increased erosion of both land and riverbed. In some places the riverbeds are eroded down to the bedrock, leaving little suitable habitat for fish and aquatic invertebrates. Alien plants such as wattles also occur within the riparian zone, competing with indigenous vegetation and reducing available water in the riparian zone. Overgrazing occurs in some areas (DWS, 2016c).

10.7.7. Water Balance

Water management at Khutala consists of an underground and surface water reticulation. As part of the 5 Seam Mining Project, there will be no new water storage or handling infrastructure. The existing infrastructure will be utilised to convey and store any additional water required or produced as a result of the 5 Seam Mining Project. The only addition that will impact the current water management is a 5 Seam ROM stockpile. The stockpile is envisaged to be a 10 000 t/m stockpile of coal. The stockpile will be situated near the existing silo and conveyor infrastructure as shown in **Figure 5**. The existing storm water infrastructure in that area will capture any dirty water runoff that will arise as a result of the new stockpile. Refer to section 5.4.4 for a description of the site storm water management. The existing Khutala water reticulation is described in the sub-sections that follow.

10.7.7.1. Surface water reticulation

A diagram depicting the site wide surface water reticulation network is provided in **Figure 42**. Further details of each component are provided in the remainder of this document. Khutala does not receive any "new water" onto the site except for water that enters as a result of rainfall, runoff, recharge and ingress. The Header Tank forms the key storage facility for supply of water to the underground workings. From the Header Tank water is sent to the number 2 and 4 seam underground workings. This water is supplemented by water in the Surface Main PCD in the event that there is not sufficient water to meet the underground demand. The average supply to underground for the simulation period (1 January 2019 until 31 December 2019) is listed below:

- 2 Seam average supply – 1535m^3/d
- 4 Seam average supply – 130m^3/d

The Header Tank has two compartments, one for polluted water and one for potable water. The polluted water side receives treated sewage effluent and supplies water for dust and fire suppression at the opencast conveyor and to the 4 Seam Crusher Plant. Water can also be routed to the Surface Main PCD from the Header Tank.

The potable water side of the Header Tank receives potable water from the 4.5ML Eskom Tank and potable water is supplied from the Header Tank to the underground workings.

The Surface Main PCD receives water from the underground workings in the event that the Main Underground Dam exceeds 12% dam level. Sufficient water is required in the Surface Main PCD to supply the Main Crusher Plant. The Main Crusher Plant water supply volumetric

rate is 18m^3/d. The Surface Main PCD also receives water from the Main Crusher Plant oil separator outlet. Contaminated storm water runoff from the Main Office Complex is routed to the Surface Main PCD. There is a dual flow line from the Surface Main PCD to the 5 Seam PCD to allow for topping up of either PCD or transfer of water in the event of a high level.

The Main Crusher Plant Processes RoM from the 2 Seam underground workings. As mentioned, the water demand is met from the Surface Main PCD any wash water return is sent to the Sump on Surface. Water from the Sump on Surface is sent to the Main Underground Dam for storage provided that there is sufficient available volume in the Main Underground Dam.

Khutala also has a number 4 Seam Crusher Plant that receives RoM from the 4 Seam underground operation as well as from the KSA opencast workings (4 and 5 seams). Contaminated storm water run-off from the 4 Seam Crusher Plant and from the 5 Seam Plant area is routed to the Crusher Plant Dam. The Crusher Plant Dam receives water from the Block A spoils and Void areas (Void 3). Some of this water is used for dust suppression provided that there is sufficient water volume in the Crusher Plant Dam.

The Workshop (MCC) PCD is located near the Workshop area and receives contaminated storm water runoff from the Workshop area at Block A. Some of this water is used for dust suppression provided that there is sufficient water volume in the Workshop PCD. Water from the Workshop PCD can also be routed to the Crusher Plant Dam in the event of high level in the Workshop PCD or low level in the Crusher Plant Dam.

The Workshop PCD also supplies water to the 5 Seam PCD as required. The 5 Seam PCD receives pumped run-off from the 5 seam Plant area. There is a dual flow line between the Surface Main PCD and the 5 Seam PCD as already mentioned. There is also a dual flow line between the 5 Seam PCD and the Crusher Plant Dam. Some of the water from the 5 Seam PCD is used for dust suppression provided that there is sufficient water volume in the dam.
The Security Gate Dam is located near the security gate at the Block A area. Excess water from the Security Gate Dam is routed to the 5 Seam PCD.

The old Block A opencast area consists of spoils, coal stockpiles and Void 2 and Void 3. Void 2 and Void 3 have been created as a result of the opencast operation at Block A. Water from

the Block A spoils area, the 5 seam coal stockpiles and from Void 3 is routed to the underground Section 22 Dam for storage. Water from Void 2 and 3 can also be routed to the Crusher Plant Dam if water is required at the Crusher Plant Dam or if water needs to be moved away from the voids due to high level. There is a dual flow line between Void 3 and the Crusher Plant Dam for transfer of water back to Void 3 as required.

10.7.7.2. Underground water reticulation

A diagram depicting the underground water reticulation network is provided **Figure 43**. **Figure 43** depicts the proposed 5 Seam Mining Project area. The underground operation currently consists of 2 Seam, 4 Seam and the Kendal 5 Seam workings. Currently the Kendal 5 Seam workings in not operational.

The 2 Seam workings is divided into the East and West mines. All water collected and transferred is done at the 2 Seam level. Boreholes from the 4 Seam level allows water to flow to the 2 Seam level. Here the water is collected and moved via various water transfer facilities until it is stored in the Main Underground Dam (MUD), the MegaSeal or is transferred to the Surface Main PCD. In a similar fashion, water from the 5 Seam proposed mining area will be routed to the Main Underground Dam from where it will be pumped to surface.

Water from the 2 Seam East section is pumped via a series of 5 pumps and sumps to the Spine Dam 3 (D-3) which has a capacity of 4 023m^3. The pumps each have a capacity of 60m^3/h. Only two pumps are used at a time.

Similarly, water from the 2 seam West section is pumped via a series of 5 pumps, each having a capacity of 60m^3/h, to Spine Dam 2 (D-2). D-2 has a maximum capacity of 3 750m^3. Once again, only 2 pumps are operated at the same time.

Water is pumped from D-3 to D-2 and then from D-2 to Spine Dam 1 (D-1). D-1 has a maximum capacity of 9 375m^3.

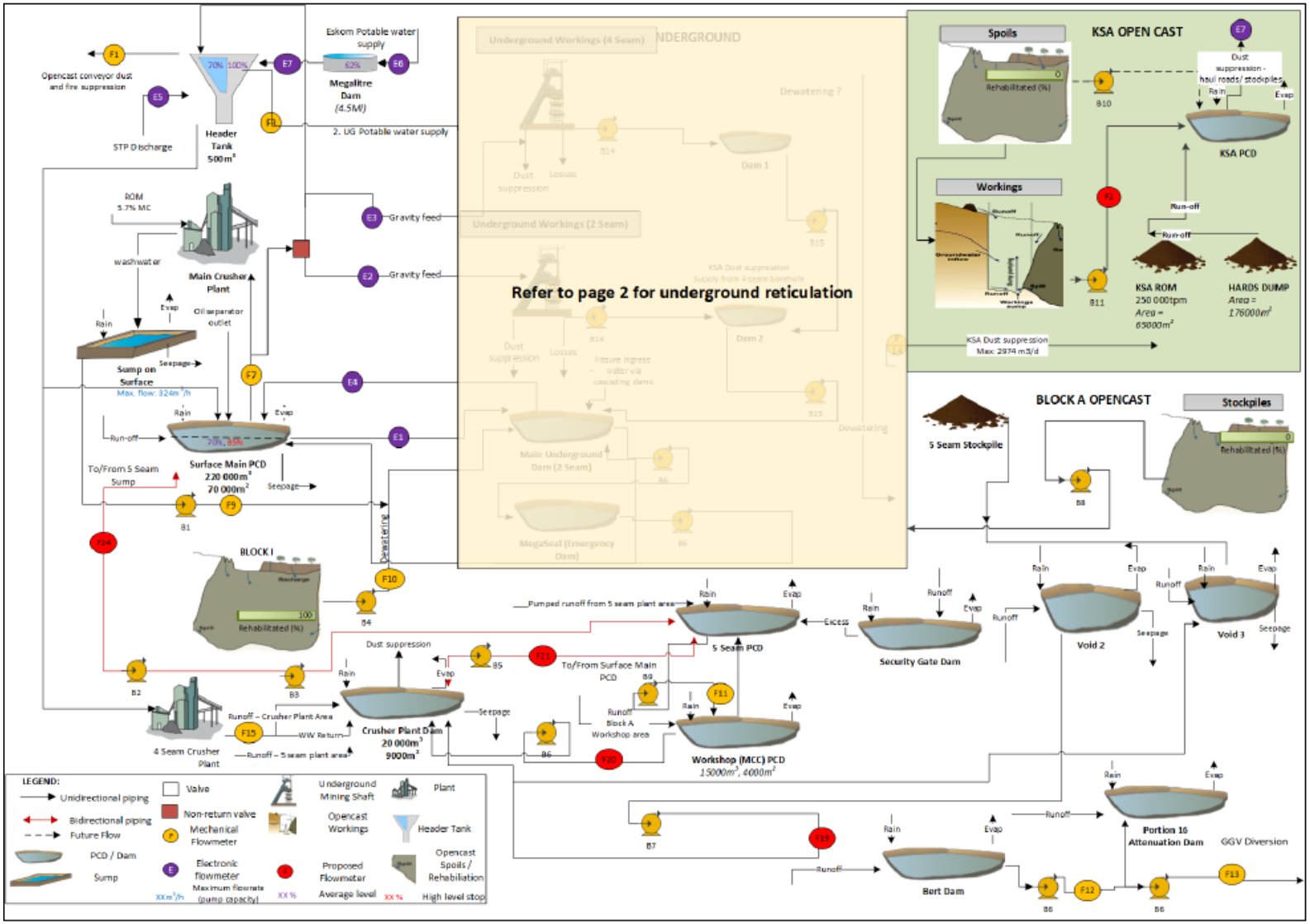

Figure 42: Khutala Colliery site surface water reticulation diagram

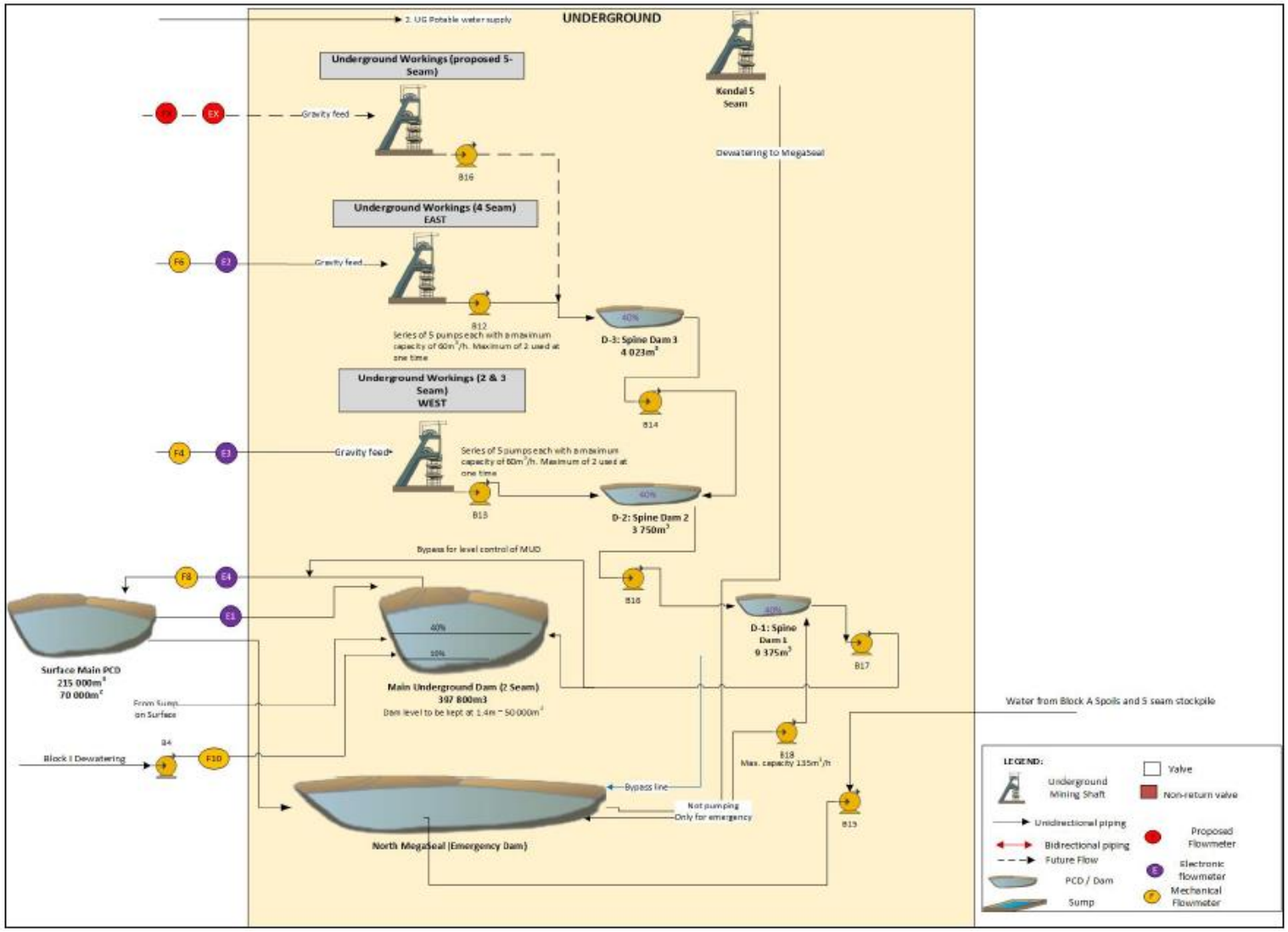

Figure 43: Khutala underground water reticulation

10.7.7.3. Groundwater ingress

According to Golder 2021, the groundwater ingress into the 5 Seam workings is a maximum of 1.2 l/s. In comparison, groundwater ingress into the 2 and 4 Seam workings are taken from Golder, 2020, the Khutala Colliery Hydrogeological Model Update report is shown in **Figure 44** and goes up to for 2 Seam to 2.9 l/s and for 4 seam, 4.6 l/.

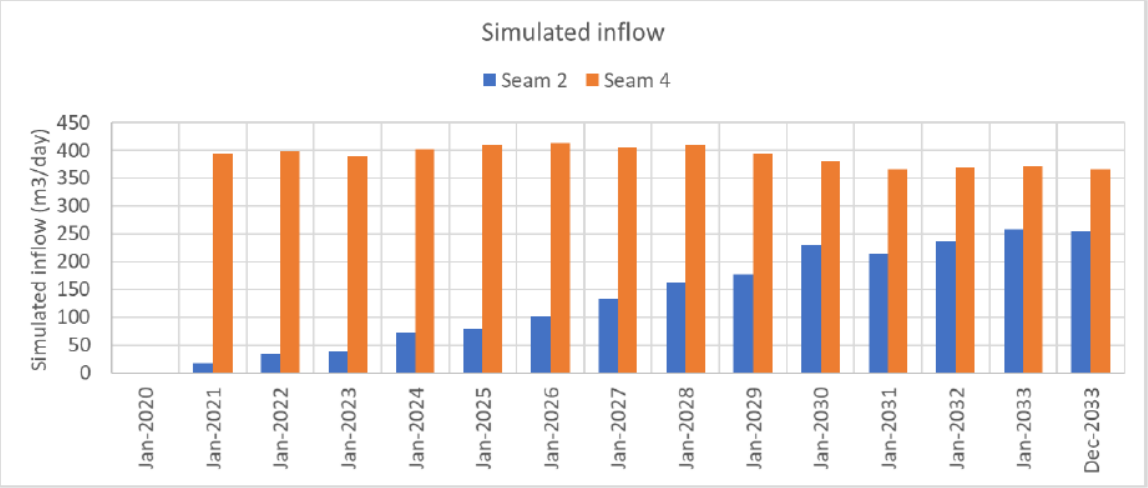

Figure 44: Groundwater ingress into the underground 2 Seam workings (Golder, 2020)

10.7.7.4. Water demands

Additional water demands will include water for dust suppression on the new 5 Seam stockpile as well, dust suppression on the proposed new link road between Khutala and the Phola Coal Processing Plant as well as water for the 5 Seam Mining operation.

Water supply for mining will be sourced from the existing water supply network as for the 2 and 4 seams, i.e., from the Header Tank and the Surface Main PCD. On average the water supply to the 2 and 4 seam mining is 39 839 m^3/mon and 5 764 m^3/mon. This is based on mining an average of 556 kt/mon for both seams. It is unknown what the tonnage profile of the 5 Seam operation will be. Therefore, a maximum water requirement of 15 000 m^3/mon has been assumed.

Water will be required for dust suppression and this water can be sourced from any of the existing surface water infrastructure that supplies water to goosenecks. Dust suppression bowsers will use existing goosenecks to fill-up the tankers for dust suppression. Dust suppression in the water balance model is only applied when the rainfall is less than 5mm/d and an average rate of 100 m^3/d additional.

10.7.8. Water balance results

The water balance for the Khutala mine was modelled from October 2019 until September 2020. Refer to **Figure 45** and **Figure 46** for the average water balance results. The water balance around the 5 Seam mining showing the maximum flows is summarised in **Table 31**. Maximum dust suppression requirement is 100 m^3/d.

Table 31: 5 Seam mining water balance

Inflows	**m^3/d**	**Outflows**	**3/d**
Groundwater ingress	104	Dewatering	504
Water supply for mining	500	Losses	100

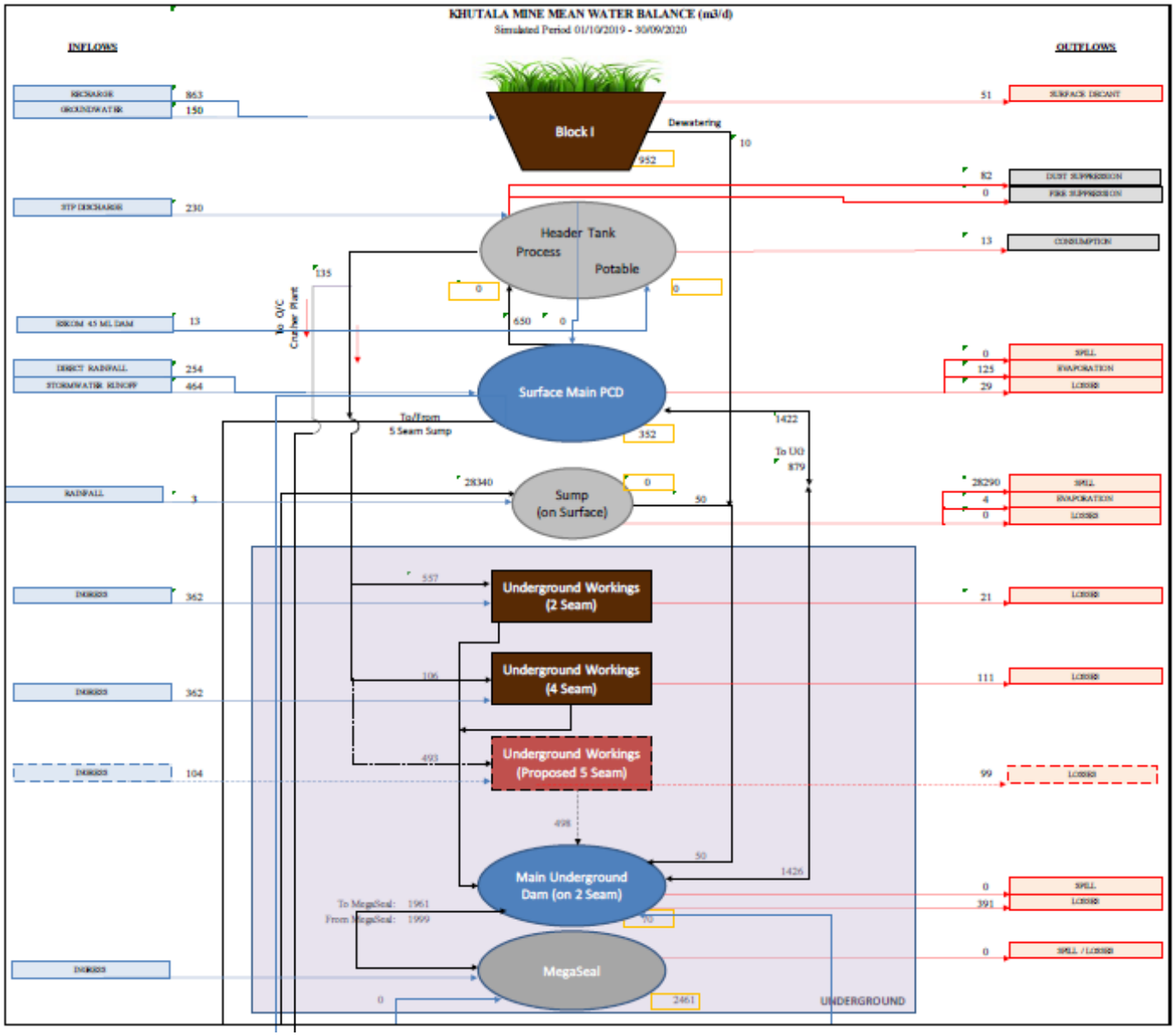

Figure 45: Water balance results showing the 5-Seam mining – Part 1

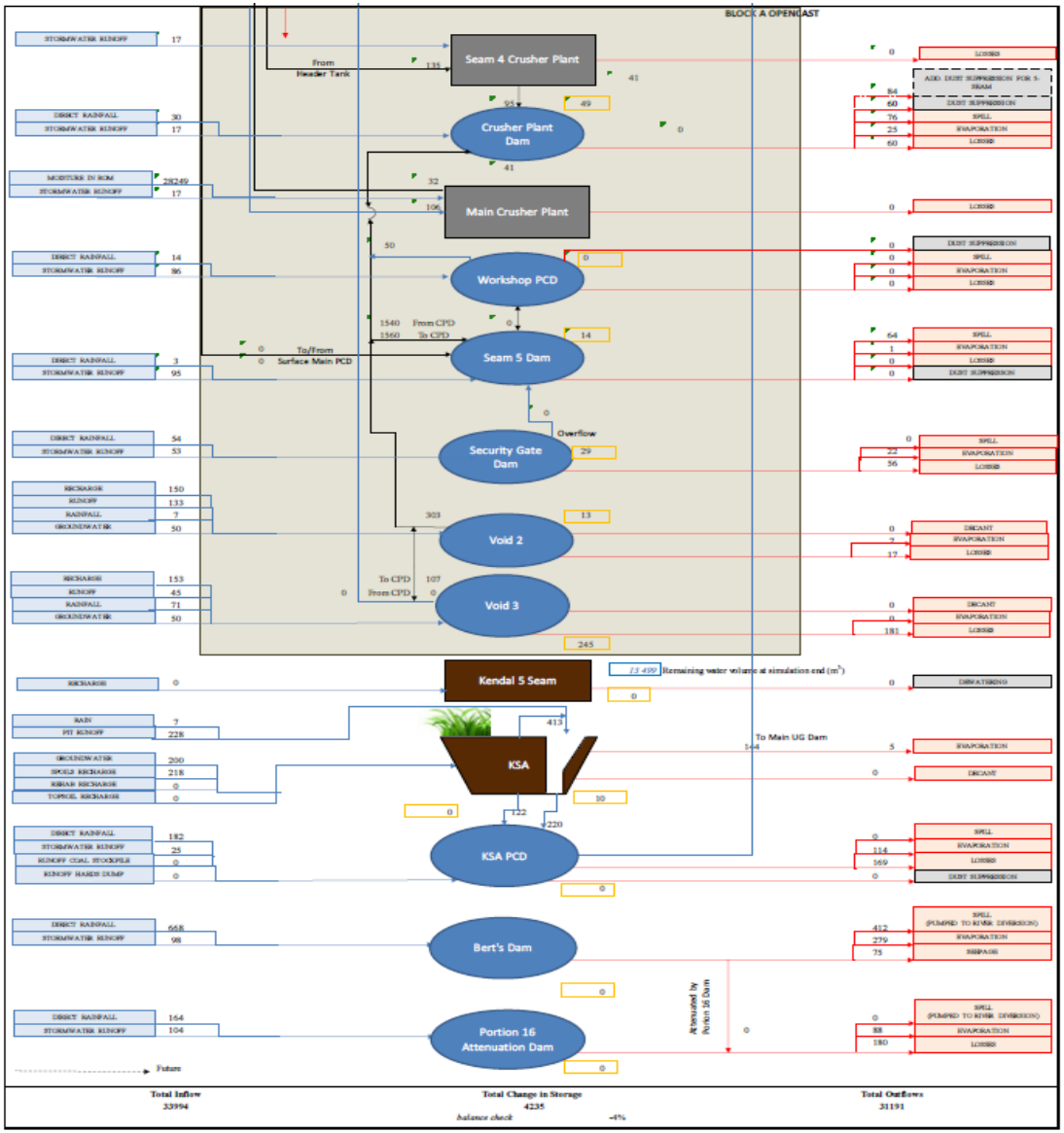

Figure 46: Water balance results showing the 5-Seam mining – Part 2

10.8. Geohydrological and Geochemical

Information regarding Geohydrological assessment associated with the of 5 Seam Mining Project was obtained from the Geohydrological Impact Assessment report compiled Golder Associates Africa (Pty) Ltd dated April 2021. Report is attached **Appendix 16**.

10.8.1. Coal chemistry

Statistical analyses were carried out on raw 5 Seam, 4 Seam and 2 Seam proximate and ultimate analysis obtained from diamond drill hole assay database received from Seriti in March 2021. The statistical results are summarised in **Figure 47**. The results show that 5 Seam chemical composition is different from that of Seam 2 and 4, having relatively higher calorific value (CV), volatile matter (VM), fixed carbon and total sulphur; and lower ash content and volatile matter than recorded for the other seams, although within the same overall statistical range (**Figure 47).** This suggests that the acid rock drainage risk potential of 5 Seam might be slightly higher than the other seams mined underground at Khutala.

The chemical characteristics of 5 Seam coal within the proposed mine areas are largely similar to those recorded outside of the proposed workings (**Table 32**). The total sulphur content of 5 Seam coal at Khutala mine ranges mostly between 0.3% and 4% **(Figure 48**).

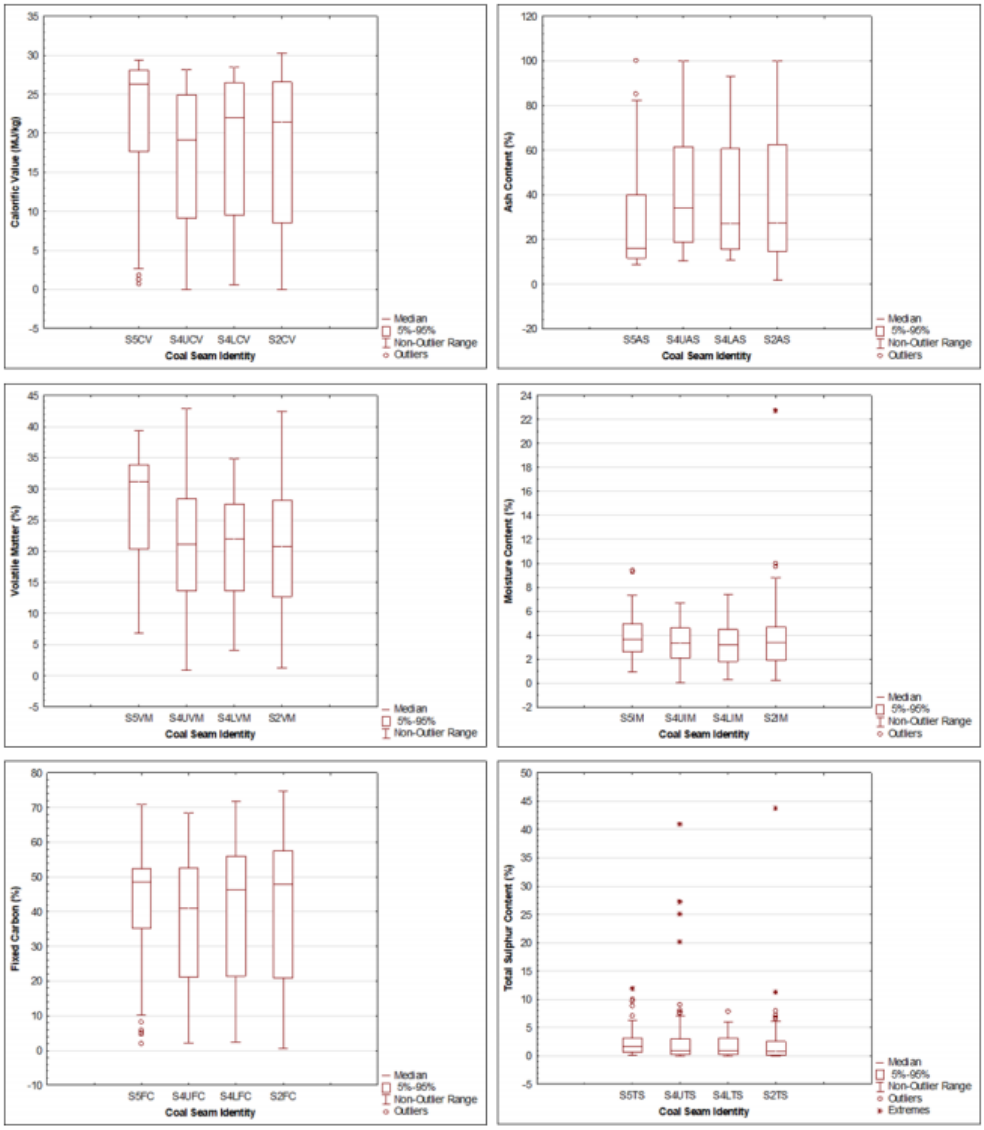

Figure 47: Box plots showing statistical summary of 5 Seam (S5), 4 Seam (S4) and 2 Seam (S2) assay.

Table 32: Statistical summary of 5 Seam proximate/ultimate analyses at Khutala exploration diamond drill hole assay database as of March 2021)

Area	Parameters	Caloric Value (MJ/kg)	Ash Content (%)	Volatile Matter (%)	Fixed Carbon (%)	Inherent Moisture (%)	Total Sulphur (%)
5 Seam Mining Project area	Valid N	69	69	69	69	69	69
	Mean	24	22	28	46	3.6	1.6
	Median	26	16	31	49	3.7	1.7

Area	Parameters	Caloric Value (MJ/kg)	Ash Content (%)	Volatile Matter (%)	Fixed Carbon (%)	Inherent Moisture (%)	Total Sulphur (%)
	Minimum	6.7	11	11	15	1.4	0.23
	Maximum	28	73	35	53	5.2	8.8
	5th Percentile	17	12	20	32	2.3	0.79
	95th Percentile	28	42	34	52	4.7	2.4.
	Standard Deviation	3.7	11	4.8	6.3	0.73	1.0
5 Seam Khutala Exploration Database	Valid N	2017	2019	1985	1985	1985	1989
	Mean	25	20	29	47	3.7	1.8
	Median	26	16	31	49	3.7	1.8
	Minimum	0.69	8.8	6.8	1.9	0.92	0.17
	Maximum	29	100	39	71	9.4	12
	5th Percentile	18	12	20	35	2.6	0.7
	95th Percentile	28	40	34	53	4.9	3.2
	Standard Deviation	3.8	11	4.7	6.6	0.72	0.87

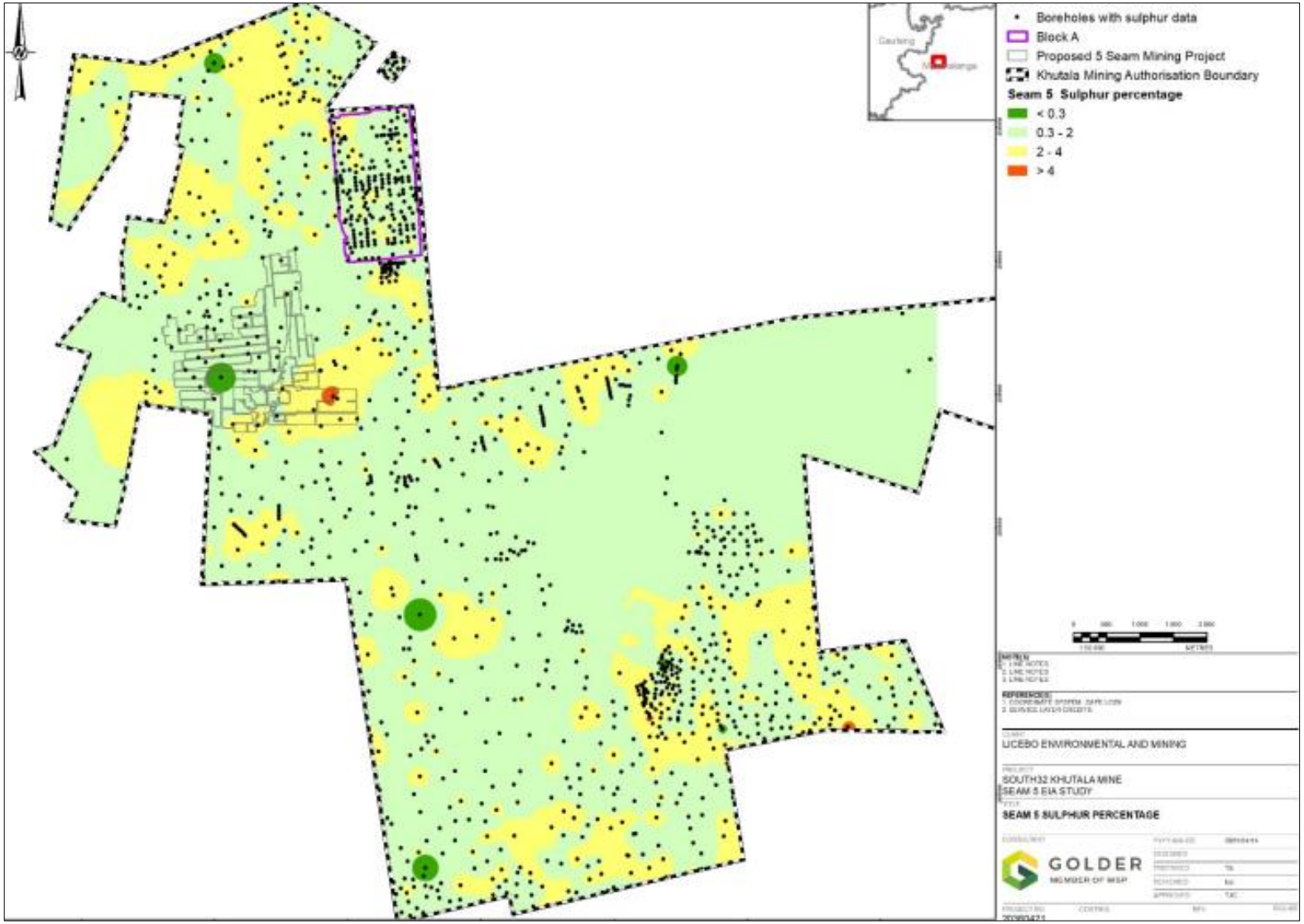

Figure 48: Khutala 5 Seam sulphur content distribution

10.8.2. Contamination plume

During the operational period the plume will be contained as a result of the water level drawdown. After closure, the plume will start moving along the groundwater gradient. Based on our understanding of the area and the existing groundwater model (Golder, 2020), The water levels in the proposed 5 Seam Mining Project area should be filling up to become flat. With the low hydraulic conductivities within the mining area, it is predicted that the contamination plume will not spread significantly but it is a function of the source concentration. Previous work (Golder, 2020) indicated that the source concentration changes over time and has a wide range:

- Sulphate has an average concentration of 934 mg/l, ranging from 183 mg/l to 2374 mg/l sulphate.
- TDS has an average concentration of 1618 mg/l, ranging from 346 mg/l to 4050 mg/l.

10.8.3. Conceptual Model

The proposed 5 Seam Mining Project area is indicated in **Figure 4**. Older mined out areas surrounding the proposed 5 Seam Mining Project area are:

- 5 Seam is mined out in the north (old Kendal 5 seam mining area)
- 4 Seam is entirely mined out directly below the 5 Seam Mining Project
- 2 Seam is mined out directly below the 5 Seam Mining Project in the south and east as indicated in **Figure 53.**

A cross section through the proposed mining area is shown in **Figure 54**. The simulated water level was taken from previous work (Golder, 2020) and indicate the simulated level for early 2021. The water level is lower than the natural water level due to extensive mining in the area. Due to the low hydraulic conductivity in the area, the cone of depression (drawdown) will have a high gradient and not extend much beyond the mining area (Figure 15). Therefore, impacts on boreholes in the shallow aquifer (< 40 mbgl) will be limited to close to the mining area. The inflows in the proposed 5 Seam Mining Project area are expected to be similar to the inflows in the old Kendal 5 seam area, which was 1.2 l/s (Golder, 2020).

10.8.4. Geochemistry of the 5 Seam Workings

In the absence of geochemical characterisation data for coal from the proposed mine workings, an assessment of the geochemical characteristics of the 5 Seam mine workings was based on information collected on the 5 Seam coal from Block A opencast area and coal from KSA pit during previous studies (L&W Environmental, 1999; Golder, 2015; Golder, 2018 and Golder, 2019). This was considered appropriate for this study as statistical summary of proximate/ultimate data from the diamond drillhole assay database for boreholes drilled in the proposed 5 Seam workings were comparable to that of boreholes drilled outside of the proposed 5 Seam workings within Khutala Mining right area (**Table 33**).

The available static geochemical data from previous studies is summarised in **Table 32**. The geochemical data for the old 5 Seam Plant slurry was included to provide an indication of drainage quality from coal stockpiled for prolonged time in the absence of kinetic testing data.

Table 33: Summary of available 5 Seam coal and slurry geochemistry data

Geochemical Tests		**Block A 5 Seam Coal**	**KSA Block 5 Seam Coal**	**Old 5 Seam Plant Slurry**
Minerology		No Data	1 Sample	1 Sample
Whole Rock chemistry		No Data	2 Samples	2 Samples
Acid Base accounting		9 Samples (Total Sulphur ONLY)	2 Samples	2 Samples
Short-Term Leach Testing	*ASLP Tests	No Data	2 Samples	2 Samples
	#NAG Tests	No Data	Not Done	Not Done
Stockpile Seepage/run-off		No Data	2 Samples	2 Samples
Kinetic Testing		Not Data	Not Data	Not Data
Ecotoxicological Studies		Not Done	1 Sample	1 Sample

**ASLP-Australian Standard Leaching Procedure*

#NAG – Net Acid Generation

10.8.5. Environmental Mineralogy

The mineralogical results of composite samples of 5 Seam coal and slurry collected from stockpiles at KSA pit and Block A during previous studies are presented in **Table 34** and **Figure 49**. It should be noted that the carbonaceous phases (organic matter or macerals) is represented by the phase “Organic C” in the samples.

Pyrite, a sulphide with potential of forming acid was identified as a minor 1 phase (4.6%) in 5 Seam coal and as a rare phase (0.2%) in coal slurry sample. The presence of gypsum as a minor phase in slurry indicates weathering and oxidation of pyrite in the stockpiles (**Table 34**).

Carbonate minerals including calcite, dolomite and siderite were rare (nil to 0.9%) in both 5 Seam coal and slurry apart from dolomite, which was an accessory phase (1.8%) in the slurry sample. Silicate minerals occurred as rare (plagioclase) to major (kaolinite) phases in coal and slurry samples. Some of the acid neutralising capacity of the 5 Seam coal and slurry may be provided by carbonates. In general, carbonates are the key minerals that can provide readily accessible buffering capacity under field conditions.

However, siderite does not have a net neutralisation capacity under aerobic conditions due to the oxidation and hydrolysis of iron, which produces equivalent acidity to that consumed by carbonates (MEND, 2009). Under anaerobic conditions the siderite would provide buffering in the pH range of 5.5-11 (Mend, 2009 and Blowell et.al, 2000). Silicate minerals provide buffering in the pH range of 2.2-5.1 as they are slow to very slow weathering minerals (Blowell et.al., 2000)

Table 34: Mineralogical results for 5 Seam Coal and slurry samples

Weathering rate	**Mineral**	**Chemical formula**	**KSA 5 Seam Coal (KSA5S)**	**5 Seam Slurry (KHT5SF)**
Fast reacting acid forming mineral	Pyrite	FeS_2	4.6	0.20
Neutralising minerals				

Weathering rate	Mineral	Chemical formula	KSA 5 Seam Coal (KSA5S)	5 Seam Slurry (KHT5SF)
Dissolving	Dolomite Calcite	$CaMg(CO_3)_2$ $Ca(CO_3)$	0.20 0.20	0.90 1.8
Fast Weathering	Siderite	$Fe(CO_3)$	Nil	0.10
Slow Weathering	Kaolinite	$Al_2SiO_5(OH)_4$	19.1	32.8
	Plagioclase	$(Na)AlSi_3O_8$	1.0	0.50
Very Slow Weathering	Microcline	$K(AlSi_3O_8)$	1.2	1.1
	Muscovite	$KAl_2(Si_3Al)O_{10}(OH)_2$	Nil	5.8
Inter Mineral	Quartz	SiO_2	8.7	9.4
Secondary Mineral	Gypsum	$Ca(SO_4)\cdot 2H_2O$	0.60	1.1
Organic C			64.2	46.2

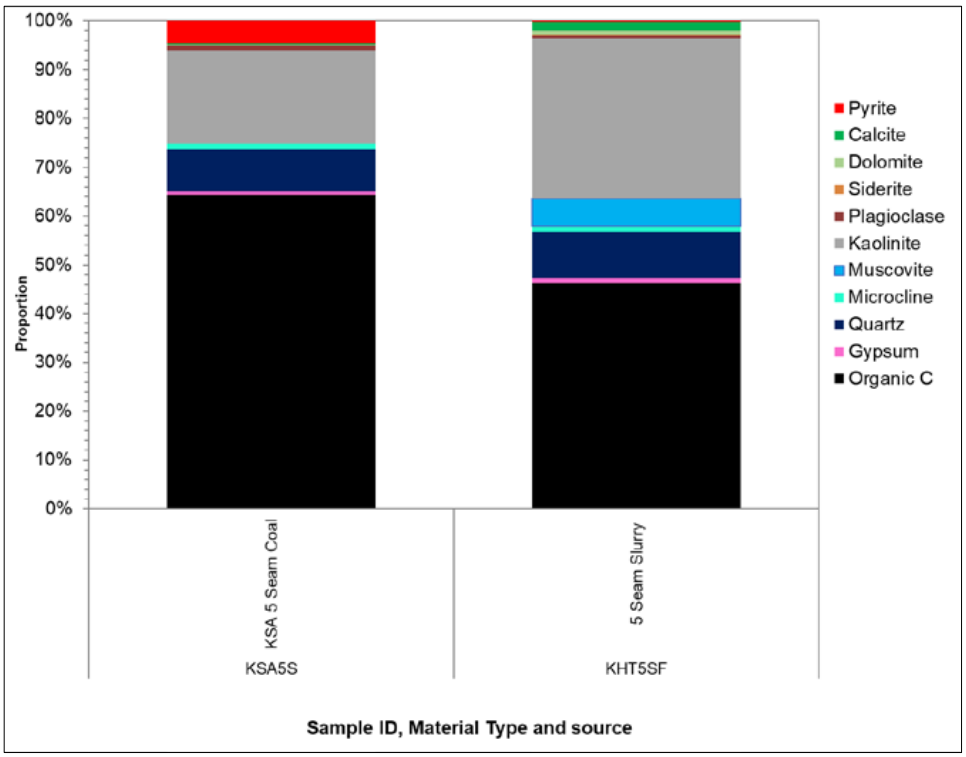

Figure 49: Mineralogical composition of 5 Seam coal and slurry samples

10.8.6. Acid Base Accounting

The ABA results of 5 Seam coal samples collected from Block A and KSA Block are presented in Table 6. The total sulphur content of the nine 5 Seam coal samples was variable (0.52%-5.2%). Sulphide content was not determined in the coal samples from Block A and it was variable (0.18% and 2.4%) in the two composite samples from KSA Block. Similar trends were observed for total sulphur-based acid potential (TAP). The total sulphur content was moderate (0.52% and 0.71%) in the two composite samples of 5 Seam slurry possibly due to depletion of sulphides over the years of stockpiling (**Table 35**).

The neutralisation potential (NP) was very low (<0.05 to 5.1 kg $CaCO_3$ eqv/t) in the nine coal samples and it was relatively high (31 and 36 kg $CaCO_3$ eqv/t) in the slurry samples **(Figure 50**). The paste pH was near-neutral to alkaline in most samples, indicating availability of sufficient reactive NP to buffer acidity generated by the initial oxidation of sulphides during the testing procedure. Exceptions were three 5 Seam coal samples, which had acidic paste pH (**Figure 51**).

The total sulphur-based acid potential (TAP) exceeded the NP in all coal samples resulting in highly variable negative (from -14 kg $CaCO_3$ eqv/t to -162 kg $CaCO_3$ eqv/t) net neutralisation values (TNNP). The Neutralising Potential Ratio (TNPR) was less than 1 in all the coal samples. This suggest that 5 Seam coal with properties similar to those tested is likely to have insufficient neutralisation capacity and therefore has the potential to generate acid and rock drainage (ARD) if left exposed to oxidising conditions and unmanaged. Though the TNNP was positive for the slurry composite samples (13 kg $CaCO_3$ eqv/t and 14 kg $CaCO_3$ eqv/t), the TNPR values were between 1 and 2 indicating an uncertain acid generating potential of material.

All the samples of 5 Seam coal samples were classified as potentially acid generating (PAG), and slurry samples had uncertain acid generating potential per guidelines of Morin and Hutt (2007) and MEND (2009) (**Figure 51**). Classification using the guidelines of Price et al. (1997) and Soregaroli and Lawrence (1997) shows that all 5 Seam coal samples have capacity to generate Acid Rock Drainage (ARD) due to elevated sulphur content whilst slurry samples were classified as possibly acid generating (**Figure 52**).

In conclusion, it is likely that 5 Seam coal has the potential to generate acid rock drainage, but certainty is low as most available data do not include sulphide sulphur content. This should be resolved by additional data collection as part of annual geochemical assessments.

Table 35: Acid Base Accounting Results

Source/Area	Sample Identity	Material Type	Paste pH	Total Sulphur	Sulphide Sulphur	Sulphate Sulphur	Sulphur (Other)	Carbon (total)	NP1	SAP2	TAP2	SNNP3	TNNP3	SNPR4	TNPR4
			s.u	%					kg CaCO3/t			None			
Block A	ZEMPR1-02	Coal	.	0.73	na	na	na	na	0.15	na	23	na	-23	na	0.007
	ZEMPR3-03	Coal	6.7	1.4	na	na	na	na	0.15	na	43	na	-42	na	0.004
	ZEMPR2-02	Coal	6.4	2.3	na	na	na	na	0.25	na	72	na	-71	na	0.003
	ZEMPR1-03	Coal	6.7	0.63	na	na	na	na	1.0	na	20	na	-19	na	0.049
	ZEMPR2-03	Coal	7.7	0.52	na	na	na	na	2.0	na	16	na	-14	na	0.122
	ZEMPR3-04	Coal	7.7	0.89	na	na	na	na	1.5	na	28	na	-26	na	0.054
	ZEMPR2-04	Coal	7.2	1.6	na	na	na	na	1.4	na	50	na	-49	na	0.027
	ZEMPR1-04	Coal	4.6	5.2	na	na	na	na	-1.2	na	161	na	-162	na	-0.007
	ZEMPR3-05	Coal	8.4	1.3	na	na	na	na	5.1	na	42	na	-37	na	0.12
	KSA11/14/COMP	Slurry	6.9	0.52	0.50	0.019	0.004	54.0	31	15	16	2.0	14	15.1	1.886
	5/SEAM/FINES	Slurry	7.3	0.71	0.15	nr	0.56	48.4	36	4.7	22	7.5	13	30.8	1.612
Block KSAa	KSA04/12/13/COMP	Coal	6.6	3.3	0.18	0.02	3.1	38.0	na	5.5	104	6.2	-92	2.1	0.00005
	KSA/5/SEAM	Coal	2.9	4.1	2.4	nr	1.8	66.4	0.005	74	129	0.0068	-129	-73.8	0.0005

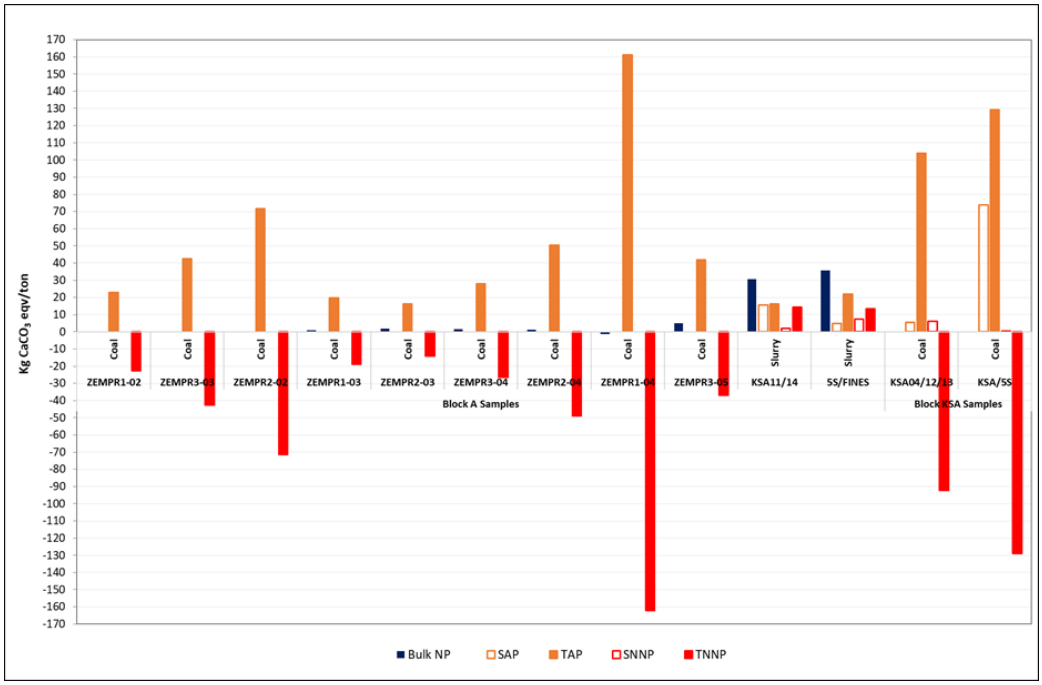

Figure 50: NP, acid potential and net neutralisation potential of 5 Seam coal and slurry samples

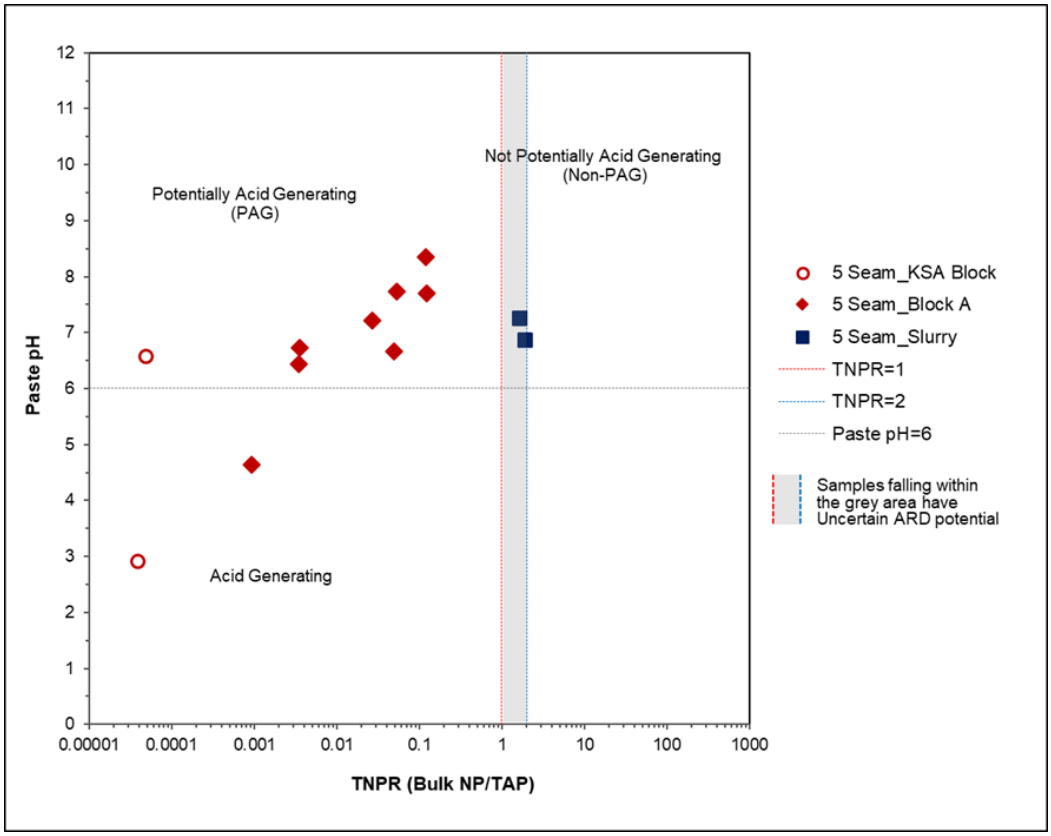

Figure 51: Plot of paste pH versus net potential ratio (TNPR) of 5 Seam coal and slurry

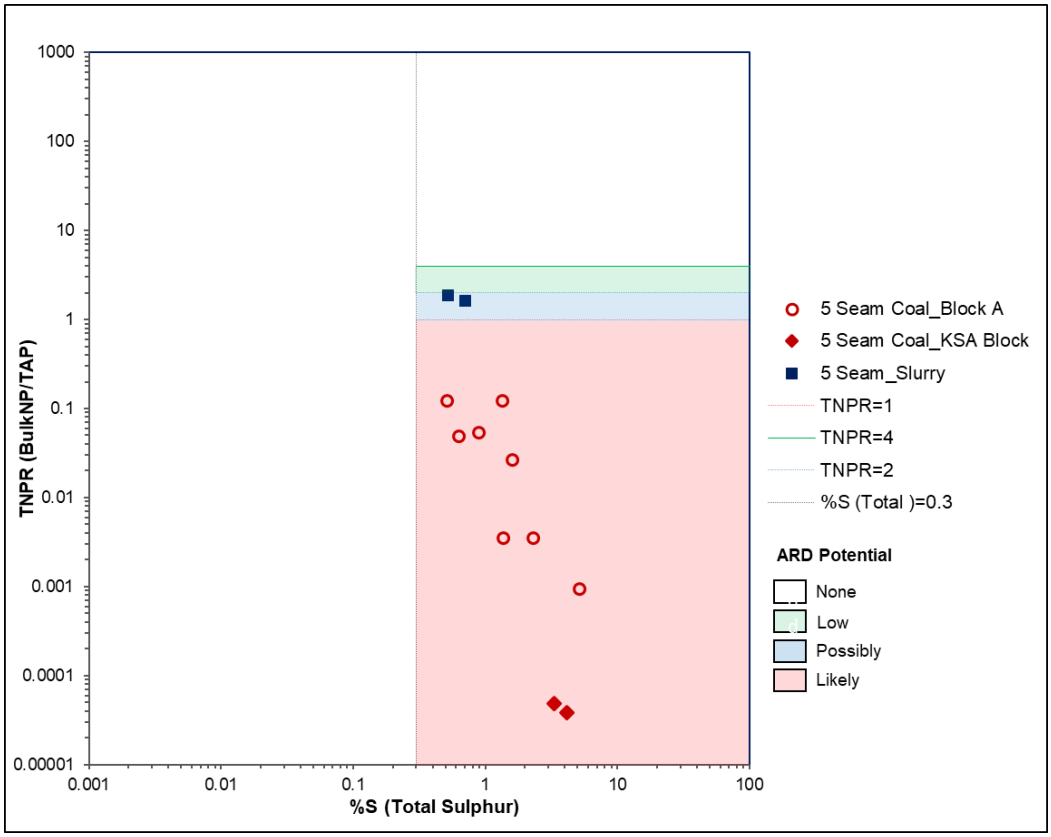

Figure 52: Plot of net potential ratio (TNPR) versus total sulphur content (%S) of 5 Seam coal and slurry

10.8.7. Drainage Chemistry

Australian Standard Leaching Procedure (ASLP) tests were carried out in order to obtain indications of the potential drainage quality and potential constituents of concern (PCOC) from mine workings and stockpiles at the mine. These short-term leach tests measure readily soluble components of geological materials but do not predict long term water quality. Water-rock interactions often develop over periods of time that are much greater than can be represented in an 18 to 24-hour extraction test (INAP, 2010). For this reason, kinetic tests or Nett Acid Generation (NAG) leach tests are required to determine the chemistry of leachate under conditions of maximum oxidation, that could develop in material stockpiled for months or much longer. In their absence, toe seepage and runoff from KSA Seam 5 coal stockpiles and slurry stockpiles were considered.

The two Seam 5 coal samples produced near neutral (pH=7.5) and highly acidic (pH=2.9) leachate that was non-compliant with water quality planning limits (WQPL) for the Witbank Dam and South African water quality guidelines (SAWQG) for domestic use levels for pH,

aluminium, calcium, manganese and lead, as well as SAWQG for irrigation and livestock use levels for iron. The samples of 5 Seam fines produced leachate that exceeded domestic use and irrigation water quality guidelines as well as the WQPL for the Witbank dam for manganese, domestic use water quality guideline and WQPL for the Witbank dam for calcium; and the WQPL for the Witbank dam for aluminium and nitrate (**Table 36**).

Table 36: Coal and slurry Australian Standard Leach Procedure leachate (1:20 solid: liquid ratio) and runoff/seepage results compared to water quality guidelines and WQPL

Parameter	Units	ASLP Leachate				Stockpile runoff and seepage			DWAF (1996) South African Water Quality Guidelines (SAWQG)			WQPL for Witbank Dam
		KSA Pit 5 Seam Coal		Old 5 Seam Plant Slurry		Seam 5 Coal		Slurry				
		KSA04/12/ 13COMP/	KSA/5/ SEAM	KSA11/14/ COMP	5 SEAM FINES	KSA Run Off1	5 SEAM W2	5 Seam Stockpile3	Domestic use	Livestock	Irrigation	
pH	pH unit	7.46	**2.9**	7.85	7.8	7.9	**2.1**	7.9	6.0-9.0	ng	6.5-8.4	6.5-8.6
EC	mS/m	24	**72**	46	38	**62.4**	**1094**	**1032**	ng	ng	40	75
TDS	mg/l	158	424	346	300	**454**	**19530**	**14482**	450	1000	ng	400
M Alk.	mg/l $CaCO_3$	45	<0.6	59	23	95	<4	384	ng	ng	ng	120
P Alk.	mg/l $CaCO_3$	<0.6	<0.6	<0.6	<0.6	na	na	na	ng	ng	ng	nl
F-	mg/l	0.1	<0.1	0.38	0.35	na	0.80	**1.2**	1	2	2	0.7
Cl-	mg/l	<0.25	2.42	<0.25	<0.25	0.9	1.2	5.2	100	1500	ng	20
NO_2^-	mg/l	<0.2	<0.1	<0.2	<0.1	0.16	na	na	ng	10	ng	nl
NO_3-	mg/l	0.35	<0.3	**0.73**	<0.3	na	4.8	na	ng	100	ng	0.5
NO_3- as N	mg/l	0.08	<0.1	0.17	<0.1	2.3		<0.2	6	ng	ng	nl
PO_4^{3-}	mg/l	<0.8	<0.8	<0.8	<0.8	na	na	na	ng	ng	ng	0.02
SO_4^{2-}	mg/l	90	400	215	180	**260.1**	**13252**	**10714**	200	1000	ng	220
Ag	mg/l	<0.001	<0.001	<0.001	<0.001	na	na	na	ng	ng	ng	nl
Al	mg/l	0.042	3.5	**0.035**	0.023	<0.0020	**390**	<0.020	0.15	5	5	0.02

Parameter	Units	ASLP Leachate				Stockpile runoff and seepage			DWAF (1996) South African Water Quality Guidelines (SAWQG)			WQPL for Witbank Dam
		KSA Pit 5 Seam Coal		Old 5 Seam Plant Slurry		Seam 5 Coal		Slurry				
		KSA04/12/ 13COMP/	KSA/5/ SEAM	KSA11/14/ COMP	5 SEAM FINES	KSA Run Off1	5 SEAM W2	5 Seam Stockpile3	Domestic use	Livestock	Irrigation	
As	mg/l	<0.001	<0.001	<0.001	<0.001	<0.0025	0.034	<0.0025	0.01	1	0.1	nl
Au	mg/l	<0.001	<0.001	<0.001	<0.001	na	na	na	ng	ng	ng	nl
B	mg/l	0.077	0.042	0.14	0.058	na	0.14	**1.4**	ng	5	0.5	0.5
Ba	mg/l	0.25	0.073	0.14	0.074	0.082	na	na	ng	ng	ng	nl
Be	mg/l	<0.001	0.004	<0.001	<0.001	na	na	na	ng	ng	ng	nl
Bi	mg/l	<0.001	<0.001	<0.001	<0.001	na	na	na	ng	ng	ng	nl
Ca	mg/l	38	26	**88**	**74**	**84.3**	**645**	**569**	32	1000	ng	50
Cd	mg/l	<0.0001	0.0006	<0.0001	<0.0001	<0.0005	<0.0005	na	5	10	10	nl
Ce	mg/l	<0.001	0.026	<0.001	<0.001	na	na	na	ng	ng	ng	nl
Co	mg/l	0.01	0.031	0.0011	<0.001	<0.002	2.3	<0.002	ng	1	0.05	nl
Cr	mg/l	<0.001	0.003	<0.001	<0.001	<0.0015	**0.31**	na	ng	ng	ng	0.007
Cs	mg/l	<0.001	<0.001	<0.001	<0.001	na	na	na	ng	ng	ng	nl
Cu	mg/l	0.0014	0.034	0.001	<0.001	<0.007	1.2	<0.007	1	0.5	0.2	nl
Fe	mg/l	0.0062	**93**	0.02	0.002	<0.020	**1731**	<0.020	0.1	10	5	0.3
Ga	mg/l	<0.001	<0.001	<0.001	<0.001	na	na	na	ng	ng	ng	nl
Ge	mg/l	<0.001	<0.001	<0.001	<0.001	na	na	na	ng	ng	ng	nl
Hf	mg/l	<0.001	<0.001	<0.001	<0.001	na	na	na	ng	ng	ng	nl
Hg	mg/l	<0.0001	<0.0001	<0.0001	<0.0001	<0.001		<0.001	0.001	0.001	ng	nl

Parameter	Units	ASLP Leachate				Stockpile runoff and seepage			DWAF (1996) South African Water Quality Guidelines (SAWQG)			WQPL for Witbank Dam
		KSA Pit 5 Seam Coal		Old 5 Seam Plant Slurry		Seam 5 Coal		Slurry				
		KSA04/12/ 13COMP/	KSA/5/ SEAM	KSA11/14/ COMP	5 SEAM FINES	KSA Run Off1	5 SEAM W2	5 Seam Stockpile3	Domestic use	Livestock	Irrigation	
Ho	mg/l	<0.001	<0.001	<0.001	<0.001	na	na	na	ng	ng	ng	nl
Ir	mg/l	<0.001	<0.001	<0.001	<0.001	na	na	na	ng	ng	ng	nl
K	mg/l	1.4	0.69	0.64	0.53	5.9	<0.1	36.9	50	ng	ng	15
La	mg/l	<0.001	0.011	<0.001	<0.001	na	na	na	ng	ng	ng	nl
Li	mg/l	0.0092	0.011	0.0066	0.002	na	na	na	ng	ng	ng	nl
Mg	mg/l	9.7	6.4	15	11	24.8	**739**	**2256**	30	500	ng	40
Mn	mg/l	**0.32**	**0.34**	**0.13**	0.01	**0.124**	**34.7**	0.0002	0.05	10	0.02	0.02
Mo	mg/l	0.0011	<0.001	0.0021	0.001	na	<0.002	0.004	ng	0.01	0.01	nl
Na	mg/l	1.1	1	0.73	0.96	9.5	11	155	100	2000	70	40
Nb	mg/l	<0.001	<0.001	<0.001	<0.001	na	na	na	ng	ng	ng	nl
Nd	mg/l	<0.001	0.012	<0.001	<0.001	na	na	na	ng	ng	ng	nl
Ni	mg/l	0.017	0.035	0.0033	0.003	<0.002	2.4	0.010	ng	1	0.2	nl
Pb	mg/l	<0.001	0.017	<0.001	<0.001	<0.005	<0.005	<0.005	0.01	0.1	0.2	nl
Pt	mg/l	<0.001	<0.001	<0.001	<0.001	na	na	na	ng	ng	ng	nl
Rb	mg/l	0.0065	0.004	0.0008	<0.001	na	na	na	ng	ng	ng	nl
Sb	mg/l	0.00077	<0.001	0.00052	<0.001	na	na	na	ng	ng	ng	nl
Sc	mg/l	<0.001	0.005	0.00057	<0.001	na	na	na	ng	ng	ng	nl
Se	mg/l	0.0033	0.001	0.0044	0.001	0.008	<0.003	<0.003	0.02	50	0.02	nl

Parameter	Units	ASLP Leachate				Stockpile runoff and seepage			DWAF (1996) South African Water Quality Guidelines (SAWQG)			WQPL for Witbank Dam
		KSA Pit 5 Seam Coal		Old 5 Seam Plant Slurry		Seam 5 Coal		Slurry				
		KSA04/12/ 13COMP/	KSA/5/ SEAM	KSA11/14/ COMP	5 SEAM FINES	KSA Run Off1	5 SEAM W2	5 Seam Stockpile3	Domestic use	Livestock	Irrigation	
Si	mg/l	0.017	0.4	0.44	0.61	na	na	na	ng	ng	ng	nl
Sn	mg/l	<0.001	<0.001	<0.001	<0.001	na	na	na	ng	ng	ng	nl
Sr	mg/l	0.34	0.166	0.56	0.645	na	na	na	ng	ng	ng	nl
Ta	mg/l	<0.001	<0.001	<0.001	<0.001	na	na	na	ng	ng	ng	nl
Te	mg/l	<0.001	<0.001	<0.001	<0.001	na	na	na	ng	ng	ng	nl
Th	mg/l	<0.0001	0.0027	<0.0001	<0.0001	na	na	na	ng	ng	ng	nl
Ti	mg/l	0.0029	0.001	0.0044	<0.001	na	na	na	ng	ng	ng	nl
Tl	mg/l	<0.001	<0.001	<0.001	<0.001	na	na	na	ng	ng	ng	nl
U	mg/l	<0.0001	0.0019	0.00048	0.0002	na	na	na	ng	ng	0.01	nl
V	mg/l	2.4E-05	<0.001	0.00031	<0.001	na	na	0.0021	0.1	1	0.1	nl
W	mg/l	<0.001	<0.001	<0.001	<0.001	na	na	na	ng	ng	ng	nl
Y	mg/l	<0.001	0.008	<0.001	<0.001	na	16	na	ng	ng	ng	nl
Zn	mg/l	0.063	0.16	0.037	0.002	<0.003	na	0.06	3	20	1	nl
Zr	mg/l	<0.001	<0.001	<0.001	<0.001	na	na	na	ng	ng	ng	nl

Notes
[1]Coal stockpiled for more than 1 week *[2]Coal stockpiled for more than 1 month* *[3]Coal stockpiled for more than 1 year*
na – not analysed *ng- no guideline;* *no limit*
blue background – exceeds DWAF guideline for domestic use
brown background – exceeds DWAF guidelines for livestock and domestic use
green background – exceeds DWAF guidelines for irrigation and domestic use
Bold exceed WQPL for Witbank Dam

The quality of runoff/seepage from stockpiles was variable:

- Runoff from 5 Seam coal stockpiled for less than a week was classified as neutral mine drainage based on pH (7.8) and low concentrations of sulphate (260 mg/L), and it was characterised by low metal content. The runoff exceeded SAWQG and WQPL for electrical conductivity, TDS, sulphate, calcium, magnesium and manganese.
- The runoff/seepage sample from 5 Seam coal stockpiled for months was classified as ARD due to highly acidic pH (2.1) and was characterised by very high concentrations of total dissolved solids (19 530 mg/L), sulphate (13 252 mg/L), calcium, magnesium, aluminium, iron, manganese, arsenic, cobalt, nickel, zinc, fluoride, electrical conductivity, nitrate, chromium and total alkalinity which exceeded the guidelines, the WQPL limits, or both. This indicates that the stockpiled coal had insufficient buffering capacity to neutralise acidity formed during sulphide oxidation as shown by acid base accounting data.
- Seepage sample collected from toe of 5 Seam coal slurry stockpiled for a number of years was alkaline (pH=7.9) with elevated concentrations of TDS (14 482 mg/L), sulphate (10 714 mg/L), magnesium, fluoride, calcium and sodium that exceeded SAWQG and WQPL for Witbank Dam.

An assessment of the ASLP leachate data for the two 5 Seam samples against four levels of thresholds for leachable concentrations as per National Norms and Standards for the Assessment of Waste for Landfill Disposal (GN R.635 of 23 August 2013) indicated exceedance for lead in one of the two 5 Seam coal samples and no exceedances of leachable concentrations in the slurry samples (**Table 45).**

Table 37: Classification of 5 Seam coal and slurry samples based on leachable concentrations (deionised water leach 1:20 data)

PCOC	Units	GN R.635 levels of thresholds for leachable concentrations				Khutala Mine KSA Pit 5 Seam		Kutala Mine Old 5 Seam Plant Slurry	
		LCT0	LCT1	LCT2	LCT3	KSA/5/SEAM	KSA04/12/13/	5/SEAM/FINES	KSA11/14/COMP
Ag	mg/l	ng	ng	ng	ng	<0.001	<0.001	<0.001	<0.001
Al	mg/l	ng	ng	ng	ng	3.479	0.042	0.023	0.035
As	mg/l	0.01	0.5	1	4	<0.001	<0.001	<0.001	<0.001
Au	mg/l	ng	ng	ng	ng	<0.001	<0.001	<0.001	<0.001
B	mg/l	0.5	25	50	200	0.042	0.077	0.058	0.14

PCOC	Units	GN R.635 levels of thresholds for leachable concentrations				Khutala Mine KSA Pit 5 Seam		Kutala Mine Old 5 Seam Plant Slurry	
		LCT0	LCT1	LCT2	LCT3	KSA/5/SEAM	KSA04/12/13/	5/SEAM/FINES	KSA11/14/COMP
Ba	mg/l	0.7	35	70	280	0.073	0.25	0.074	0.14
Be	mg/l	ng	ng	ng	ng	0.0038	<0.001	<0.001	<0.001
Bi	mg/l	ng	ng	ng	ng	<0.001	<0.001	<0.001	<0.001
Ca	mg/l	ng	ng	ng	ng	26	38	74	88
Cd	mg/l	0.003	0.15	0.3	1.2	0.00061	<0.0001	<0.0001	<0.0001
Ce	mg/l	ng	ng	ng	ng	0.026	<0.001	<0.001	<0.001
Co	mg/l	0.5	25	50	200	0.031	0.0101	<0.001	0.0011
Cr	mg/l	0.1	5	10	40	0.0034	<0.001	<0.001	<0.001
Cs	mg/l	ng	ng	ng	ng	<0.001	<0.001	<0.001	<0.001
Cu	mg/l	2	100	200	800	0.034	0.0014	<0.001	0.001
Fe	mg/l	ng	ng	ng	ng	93	0.0062	0.0021	0.02
Ga	mg/l	ng	ng	ng	ng	<0.001	<0.001	<0.001	<0.001
Ge	mg/l	ng	ng	ng	ng	<0.001	<0.001	<0.001	<0.001
Hf	mg/l	ng	ng	ng	ng	<0.001	<0.001	<0.001	<0.001
Hg	mg/l	0.006	0.3	0.6	2.4	<0.0001	<0.0001	<0.0001	<0.0001
Ho	mg/l	ng	ng	ng	ng	<0.001	<0.001	<0.001	<0.001
Ir	mg/l	ng	ng	ng	ng	<0.001	<0.001	<0.001	<0.001
K	mg/l	ng	ng	ng	ng	0.7	1.4	0.5	0.64
La	mg/l	ng	ng	ng	ng	0.011	<0.001	<0.001	<0.001
Li	mg/l	ng	ng	ng	ng	0.0111	0.0092	0.0021	0.0066
Mg	mg/l	ng	ng	ng	ng	6.4	9.7	11	14.6
Mn	mg/l	0.5	25	50	200	0.34	0.32	0.01	0.13
Mo	mg/l	0.07	3.5	7	28	<0.001	0.0011	0.0011	0.0021
Na	mg/l	ng	ng	ng	ng	1	1.1	1	0.73
Nb	mg/l	ng	ng	ng	ng	<0.001	<0.001	<0.001	<0.001
Nd	mg/l	ng	ng	ng	ng	0.012	<0.001	<0.001	<0.001
Ni	mg/l	0.07	3.5	7	28	0.035	0.017	0.0034	0.0033
Pb	mg/l	0.01	0.5	1	4	0.017	<0.001	<0.001	<0.001
Pt	mg/l	ng	ng	ng	ng	<0.001	<0.001	<0.001	<0.001
Rb	mg/l	ng	ng	ng	ng	0.0036	0.0065	<0.001	0.0008
Sb	mg/l	0.02	1	2	8	<0.001	0.00077	<0.001	0.00052
Sc	mg/l	ng	ng	ng	ng	0.0047	<0.001	<0.001	0.00057
Se	mg/l	0.01	0.5	1	4	0.0014	0.0033	0.0015	0.0044
Si	mg/l	ng	ng	ng	ng	0.4	0.017	0.61	0.44
Sn	mg/l	ng	ng	ng	ng	<0.001	<0.001	<0.001	<0.001

PCOC	Units	GN R.635 levels of thresholds for leachable concentrations				Khutala Mine KSA Pit 5 Seam		Kutala Mine Old 5 Seam Plant Slurry	
		LCT0	LCT1	LCT2	LCT3	KSA/5/SEAM	KSA04/12/13/	5/SEAM/FINES	KSA11/14/COMP
Sr	mg/l	ng	ng	ng	ng	0.17	0.34	0.65	0.56
Ta	mg/l	ng	ng	ng	ng	<0.001	<0.001	<0.001	<0.001
Te	mg/l	ng	ng	ng	ng	<0.001	<0.001	<0.001	<0.001
Th	mg/l	ng	ng	ng	ng	0.0027	<0.0001	<0.0001	<0.0001
Ti	mg/l	ng	ng	ng	ng	0.0011	0.0029	<0.001	0.0044
Tl	mg/l	ng	ng	ng	ng	<0.001	<0.001	<0.001	<0.001
U	mg/l	ng	ng	ng	ng	0.0019	<0.0001	0.00021	0.00048
V	mg/l	0.2	10	20	80	<0.001	0.000024	<0.001	0.00031
W	mg/l	ng	ng	ng	ng	<0.001	<0.001	<0.001	<0.001
Y	mg/l	ng	ng	ng	ng	0.0078	<0.001	<0.001	<0.001
Zn	mg/l	5	250	500	2000	0.16	0.063	0.002	0.037
Zr	mg/l	ng	ng	ng	ng	<0.001	<0.001	<0.001	<0.001
pH	s.u	ng	ng	ng	ng	2.9	7.46	7.8	7.85
TDS	mg/l	1000	12500	25000	100000	424	158	300	346
EC	mS/m	ng	ng	ng	ng	72	24	38	46
P Alk.	mg/l CaCO3	ng	ng	ng	ng	<0.6	<0.6	<0.6	<0.6
M Alk.		ng	ng	ng	ng	<0.6	45	23.1	59
F^-	mg/l	1.5	75	150	600	<0.1	0.1	0.35	0.38
Cl^-	mg/l	300	15000	30000	120000	2.4	<0.25	<0.25	<0.25
NO_2-	mg/l	ng	ng	ng	ng	<0.1	<0.2	<0.1	<0.2
NO_3- as N	mg/l	11	550	1100	4400	<0.1	0.08	<0.1	0.17
PO_4^{3-}	mg/l	ng	ng	ng	ng	<0.8	<0.8	<0.8	<0.8
SO_4^{2-}	mg/l	250	12,500	25,000	100,000	400	90	180	215

Notes
Grey: > LCT0; Yellow: > LCT1; Orange > LCT2; Red: >LCT3

Table 38: Waste profile (leachable concentrations)

Facility	Leachable Concentration
KSA 5 Seam Coal Stockpile (composite samples from stockpile)	LCT0 < LC (Pb) < LCT1 in one of two samples
5 Seam slurry Stockpile (composite samples from stockpile)	LCT0 < LC (None) < LCT1 in two samples

10.8.8. ARD Risk Block Model

The ARD risk model methodology developed by Golder (2017: Report No. 1521005-13576-2) is based upon the total sulphur content of the coal seams (for which a large database is available), interpreted by expert judgement with the available net neutralisation potential (NNP) data (a much smaller database).

Five levels of ARD risk were developed, assigned to different geological materials at the mine based upon data available at that time.
The resulting block model for the proposed 5 Seam workings has been developed in GIS. The bulk of the mine workings shows ARD risk (level 3) with isolated hot spots and areas of high ARD risk (level 4) in the north, south and south-east. There is also a spot of low to moderate risk in the workings.

Note that the limited amount of NNP data means that the risk model can be refined, by additional data collection as part of annual geochemical assessments, potentially resulting in a lowering of risk ratings due to lower uncertainty.

Table 39 :ARD risk rating

No	ARD Risk
1	Non Acid-Generating
2	Uncertain / Low to Moderate Risk
3	Acid-Generating Risk
4	Acid-Generating – High Risk
5	Acid-Generating – Very High Risk

Table 40: ARD risk rating of Seam 5, Seam 4 and Seam 2 at Khutala Mine (Golder, 2017: Report No. 1521005-13576-2)

Component	NNP Underground Mine and Block A, Golder 2015			NNP Block A, Golder 2003 for EMPR			NNP Block A, Fraser Alexander (2014)			NNP Block A, EMPR (2001)	%S	Risk
	Min	Av	Max	Min	Av	Max	Min	Av	Max	Av		
No. 2 Seam	+13.2	+22.1	+30.1	-56.0	-20.6	+3.4	ns	ns	ns	-75	<0.3 0.3 - 2 2 - 4	1 2 2.5
No. 4 SeamL	+1.1	+15.3	+22.3	-55.4	-33.5	+5.6	ns	ns	ns	+15	<0.3 0.3 - 2 2 - 4 >4	1 2 3 4
No. 4 SeamU				-351.7	-96.1	-24.7	ns	ns	ns		<0.3 0.3 - 2 2 - 4 >4	1 2 3 4
Seam 5	ns	ns	ns	-162.3	-49.3	-14.2	ns	ns	ns	ns	<0.3 0.3 – 2 >2	2 3 4

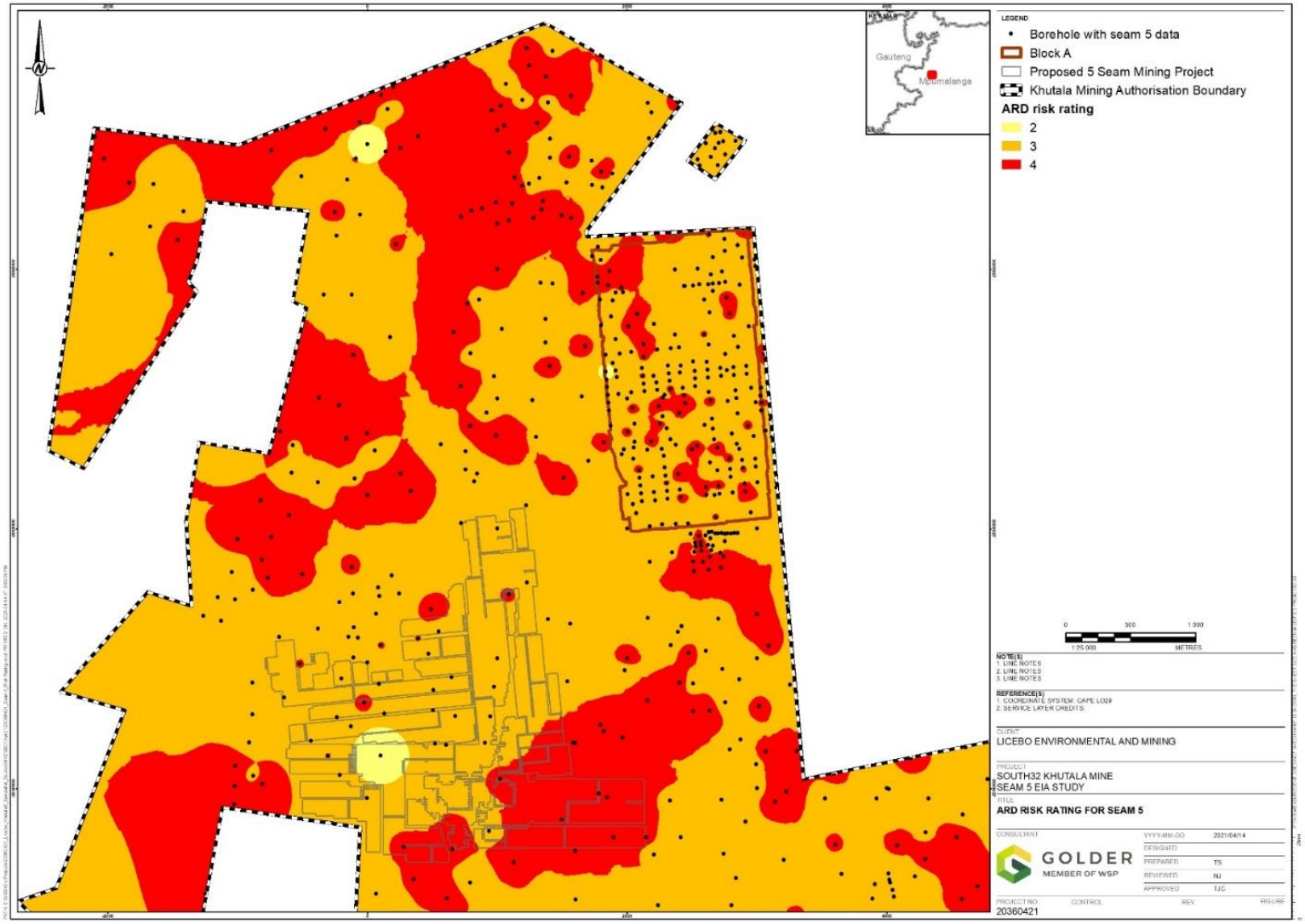

Figure 53: Khutala ARD Block Model: Proposed 5 Seam workings

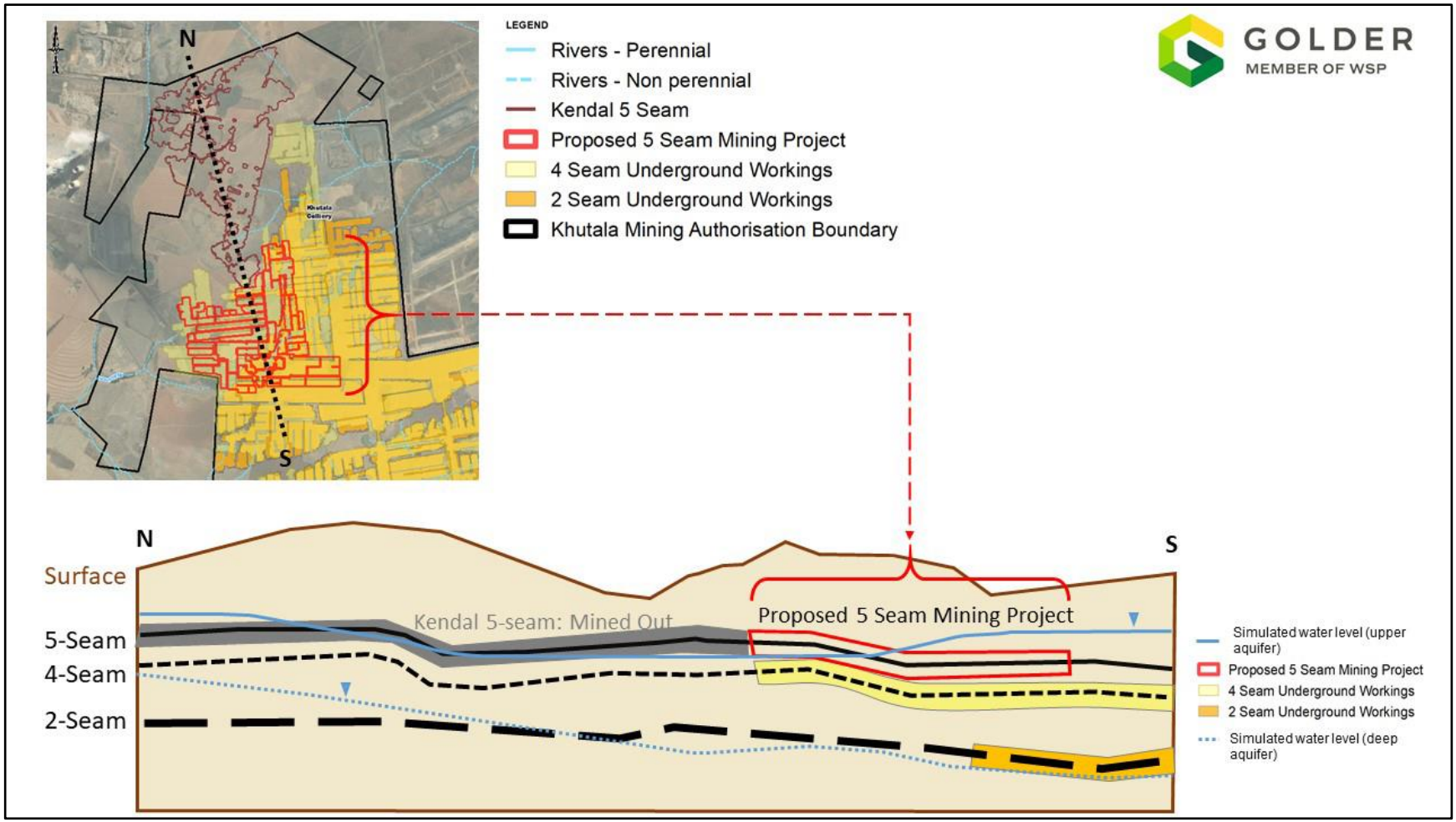

Figure 54: Conceptual understanding of the proposed 5 Seam Mining Project

10.9. Geotechnical

Refer to **Appendix 21** for the details of the geotechnical assessment that was undertaking at the proposed ROM Stockpile and the weigh-bridge area.

10.9.1. Fieldwork

The fieldwork for the geotechnical investigation comprised drilling 1 No. rotary core borehole and excavation of 6 No. test pits with an excavator. The test pitting was conducted on the 16th February 2021 and the rotary core borehole drilled on the 17th and 18th February 2021. The borehole was logged, and the test pits profiled, by a team of two comprising an engineering geologist and geotechnical engineer, according to the guidelines proposed by Brink and Bruin (2002). The excavator (DOOSAN DX225LCA) supplied by Kijima Construction has a maximum reach of the order of 5m.

A summary of soil and rock profile description terminology utilised in describing the soil/rock encountered during the investigation is provided in Appendix A. The test pits were excavated at predetermined locations at the proposed site and recorded using a hand-held GPS. The positions of the test pits and rotary core borehole are shown in Figure 6 and summarised in Table 1. Test pits SP-EX1, SP-EX2, SP-EX3 and SP-EX4 are located on the periphery of the stockpile area, whereas borehole BH01 is located at the centre of the proposed conical stockpile. Test pits EX3 and EX4 are located at the proposed weigh bridge location.

Figure 55: Site plan showing borehole and test pit positions at the ROM Stockpile

Table 41: Coordinates of boreholes and test pits

Test Pit/Borehole	Location				
	WGS84		LO29 Cape Datum		Description
	Latitude	Longitude	Y-Coordinates	X-Coordinates	
SP-EX1	26° 7'18.43"S	28°59'53.86"E	-142	-2890030	Stockpile area
SP-EX2	26° 7'19.43"S	28°59'54.58"E	-122	-2890061	Stockpile area
SP-EX3	26° 7'17.29"S	28°59'57.57"E	-39	-2889995	Stockpile area
SP-EX4	26° 7'16.44"S	28°59'56.85"E	-59	-2889969	Stockpile area
EX3	26° 7'16.77"S	28°59'54.15"E	-134	-2889979	Weighbridge area

Test Pit/Borehole	Location				
	WGS84		LO29 Cape Datum		Description
	Latitude	Longitude	Y-Coordinates	X-Coordinates	
EX4	26° 7'16.38"S	28°59'55.09"E	-108	-2889967	Weighbridge area
BH01	26° 7'18.28"S	28°59'54.86"E	-114	-2890025	Centre of stockpile cone

Stockpile area

10.9.2. Sampling and laboratory testing

The sampling consisted of an undisturbed (Shelby tube) sample from the borehole, two rock samples from the borehole, and disturbed samples from the test pits. These samples were submitted to SANAS-accredited laboratory (Soillab) for testing, which consisted of the following:

- 7 No. Foundation indicator tests, comprising Particle Size Distribution (sieve and hydrometer analyses) as well as determination of Atterberg Limits;
- 3 No. California Bearing Ratio (CBR) and Mod. AASHTO tests;
- 3 No. pH and conductivity tests;
- 1 No. Oedometer test on the undisturbed soil sample;
- 1 No. Consolidated Undrained (CU) triaxial test on the undisturbed soil sample;
- 2 No. Unconfined Compressive Strength (UCS) tests on the rock samples

10.9.3. Site Investigation Results

Soil Profile

The soil profile derived from the test pitting typically consisted of the following horizons:

• Made ground;

• Topsoil;

• Reworked residual dolerite;

• Ferruginised reworked residual dolerite;

- Residual / completely weathered dolerite; and
- Dolerite rock.

Table 42: Coordinates of boreholes and test pits

Location	Test pit / BH No	Depth below ground level (m)						Comments
		Topsoil	Made ground	Made ground	Reworked residual dolerite	Residual / completely weathered dolerite	Dolerite bedrock	
				Not Ferrug	Ferrug			
Stockpile area	SP-EX1	0 – 0.2	0.2 – 0.5	0.5 – 1.7	1.7 – 2.1	2.1 – 4.0	4.0 – 4.1+	Refusal at 4.1m on very soft rock dolerite.
	SP-EX2	0 – 0.2	0.2 – 0.4	0.4 – 2.2	2.2 – 2.7	2.7 – 4.3	4.3 – 4.4+	Refusal at 4.4m on very soft rock dolerite.
	SP-EX3	–	0 – 0.35	0.35 – 1.35	1.35 – 1.4	11.4 – 3.5	3.5 – 3.6+	Refusal at 3.6m on soft rock dolerite
	SP-EX4	–-	0 – 0.8	0.8 – 1.9	–-	1.9 – 3.6	3.6 – 3.7+	Refusal at 3.7m on soft rock dolerite
	BH01	–-	0 – 0.08	0.08 – 2.5	–-	2.5 – 3.4	3.4 – 10.04+	Rockhead from 3.4m
Weighbridge area	EX3	0 – 0.3–	–-	0.3 – 2.2	–-	2.2 – 4.5	–-	Near refusal at 4.5m on soft to hard rock dolerite
	EX4	0 – 0.1 –-	–-	0.1 – 2.0	–-	2.0 – 4.0	4.0 – 4.2+	Refusal at 4.2m on soft rock dolerite

10.9.4. Characterisation of the soil/rock

In addition to characterisation of the soil/rock profile and on-site conditions, the purpose of the investigation was to consider various geotechnical factors at the site which could have some influence on the proposed development. These various factors are discussed in the sections that follow.

10.9.4.1. Expansive soils

The foundation indicator results (see **Appendix 21** for the results) indicate that the reworked residual dolerite is plastic with a low to moderate potential expansiveness. However, the CBR swell test indicated that significant swell occurred in the order of 6.6% when saturated at 100% of modified AASHTO density. This material may therefore be susceptible to significant swelling when saturated.

The residual (completely weathered) dolerite has low plasticity and is characterised by low potential for expansiveness.

10.9.4.2. Collapsible / compressible soils

The made ground, topsoil, and reworked residual dolerite are all cohesive. Oedometer testing conducted on the reworked residual dolerite indicated that the constrained modulus was in the order of Eoed = 3.3MPa for vertical loading from 0 to 100kPa. This is considered a low stiffness and therefore this material is likely to be subject to compression (settlement) under loading when saturated.

The sandy residual (completely weathered) residual does not display any signs of voided or pinholed structure. Problems related to collapsible or compressible soils are not expected for this material.

10.9.4.3. Erodibility of the soil profile

The proposed site is relatively flat, and there is therefore a low risk of erosion.

10.9.4.4. Areas susceptible to flooding

No water courses or other surface drainage features occur in the immediate vicinity of the proposed site. Based on observations made during the fieldwork, the area where the weighbridge is situated in a localised depression which may be subject to accumulation of surface water during and after rainfall events.

10.9.4.5. Excavation characteristics

The made ground, topsoil, reworked residual dolerite and residual (completely weathered) residual from surface to a maximum of 4.2m classify as 'Soft Excavation', according to SANS 1200D. Hard rock dolerite corestones were occasionally encountered and is anticipated to occur within the dolerite bedrock, these may be classified as 'Boulder Excavation'.

According to SANS 1200D (1988), the classification of the bedrock may vary from 'Intermediate Excavation' or 'Hard Excavation'. An excavator and / or power tools may be required for the excavation of Intermediate material. Blasting may be required to excavate materials classified as Hard Excavation.

10.9.4.6. Steep / unstable natural slopes

The investigated areas are characterised by a flat terrain with not natural slopes present. Slope instability is therefore not expected to occur on site.

10.9.4.7. Undermined areas

Underground coal mining occurs in the vicinity of the investigated site, the extent of which is uncertain. Given the presence of undermining in the vicinity of the site, SACE's geology department is required to provide guidance on the viability of developing the site and assessing the potential risk of undermining on the proposed development. Future studies may be necessary to evaluate the risk associated of potential surface subsidence attributed to existing and future mining activities.

10.9.4.8. Stability of excavation side walls

Where excavations are required during construction, the fill, topsoil and residuum will require battering or shoring. It is recommended that all excavations are evaluated by a competent person to determine appropriate measures to ensure stability of excavations, particularly after periods of significant rain and where groundwater is prevalent. Care should be taken to ensure that berms are constructed around excavations preventing storm water ingress into the excavations.

10.9.4.9. The suitability of the local soil horizons in layer works

The reworked residual dolerite classifies as G10 (or worse) materials and therefore only suitable for landscaping purposes.

The residual (completely weathered) dolerite classifies as G7 to G8 material which is considered to be suitable for the construction of an engineered fill of low to moderate stiffness.

It should also be noted that dolerite corestones that occur within the dolerite bedrock may negatively affect the compaction and will need to be removed.

It is recommended that suitable construction materials be sourced commercially where engineered soil rafts, pavement layers or other selected materials are required.

10.9.4.10. Shallow Seepage/Groundwater

The groundwater level was measured at a depth of 3.71m below ground level one day after borehole drilling was completed and was measured at a depth of 4.60m approximately four days after drilling was completed. Measuring of the groundwater was done via dipping of the borehole cavity. Water is used to aid the drilling process and the measured groundwater levels measured in the borehole cavity are only indicative.

The investigations revealed the presence of ferricrete which is indicative of a perched/seasonal water table. Based on the indicative water levels measured in the borehole cavity and the presence of ferricrete it is recommended that provision is made for the removal groundwater when considering the design of foundations and pavement layers.

10.9.5. Geotechnical design and recommendations

Geotechnical design checks were conducted, and general recommendations provided for the stockpile area, trafficked areas around the stockpile area, gantry structure foundations and weighbridge location.

10.9.5.1. Stockpile Assessment

The stockpile is conical in shape with assumed characteristics listed below:

- Stockpile height = 15m
- Stockpile angle of repose = 38°

10.9.5.2. Settlement of Stockpile

Settlement of the stockpile was assessed in the software package Rocscience Settle3 (version 5.001). Settle3 is a software
package that calculates three-dimensional stresses due to surface loads, from which vertical displacements (settlement) are computed. It uses one of five stress computation methods, with the Boussinesq stress computation method applied in this case. The stockpile was modelled as a conical load with characteristic, Refer to **Appendix 21**.

Immediate settlement was considered for all layers using the derived Young's modulus (E). Additional consolidation settlement was considered for the reworked residual dolerite layer owing to its high fines (clay and silt) content, which was based on the mv value derived from the oedometer testing. Consolidation settlement of the reworked residual dolerite layer will occur if the soil becomes saturated prior to it being loaded (that is, if a shallow groundwater table is present at the time of construction or at the time of coal being loaded on the stockpile).

Considering that the position of the long-term water table is uncertain, and that the stockpile will be continuously unloaded and reloaded as coal is removed and added, consolidation settlement of the reworked residual dolerite layer was also calculated, and together with the immediate settlement portion was deemed to represent an upper bound estimation of the total settlement of the stockpile.

10.10. Noise

Information regarding Noise associated with the of 5 Seam Mining Project was obtained from the Noise Assessment report compiled LKS Consulting dated November 2020 and updated in February 2021. Report is attached **Appendix 14**.

10.10.1. Baseline assessment

The current ambient noise levels are generally comparable with the levels associated with farming activities, traffic on the national roads and haul roads, and mining related activities and blasting. Agricultural noise is more seasonal however, whereas mining activities generate noise levels all year round.

Measurements were carried out at several positions on the property boundaries in the vicinity of the 5 Seam Mining Project area. These positions and the noise levels recorded are depicted in

Table 43 and **Figure 56,** while sensitive receptors are shown on

Table 43 and **Figure 57** below.

Table 43: Noise Measurement Locations

Site ID	Farm/location	Category of Receiver	GPS Coordinates
P1	South of Khutala Main Plant Area	Rural	26° 7'35.31"S & 28°59'57.17"E
P2	Mr Van Der Merwe Farm	Rural	26° 6'47.78"S & 29° 0'18.08"E
P3	Cologne Farm – Mr Vos Breedt Residence	Rural	26° 7'32.05"S & 29° 0'57.30"E
P4	North-west of Khutala Main Plan Area.	Rural	26° 6'29.69"S & 28°58'59.34"E
P5	Wate treatment Plant – West of Main Plant Area	Rural	26° 7'8.59"S & 28°59'32.78"E
P6	Boundary of Mr Van Der Merwe farm	Rural	26° 6'10.56"S & 29° 0'27.07"E
P7	Prinsloo, Mulder & Erasmus Residence	Rural	26° 7'7.78"S & 29° 0'55.72"E

Table 44: Measurement Locations – Sensitive Receptor Areas

Station	Description	latitude	Longitude
S 1	Cologne Community	26° 7'33.89"S	28°59'34.62"E
S 2	Farmstead North-West of the Eskom Stockpile area	26° 6'29.46"S	28°58'31.83"E
S 3	Cologne Residence- South-East of Khutala Main Plant	26° 7'44.70"S	29° 0'58.35"E
S 4	Prinsloo, Mulder & Erasmus Residence	26° 6'55.11"S	29° 1'16.59"E
S 5	Mr Anslen Farm	26° 5'58.06"S	28°59'54.49"E

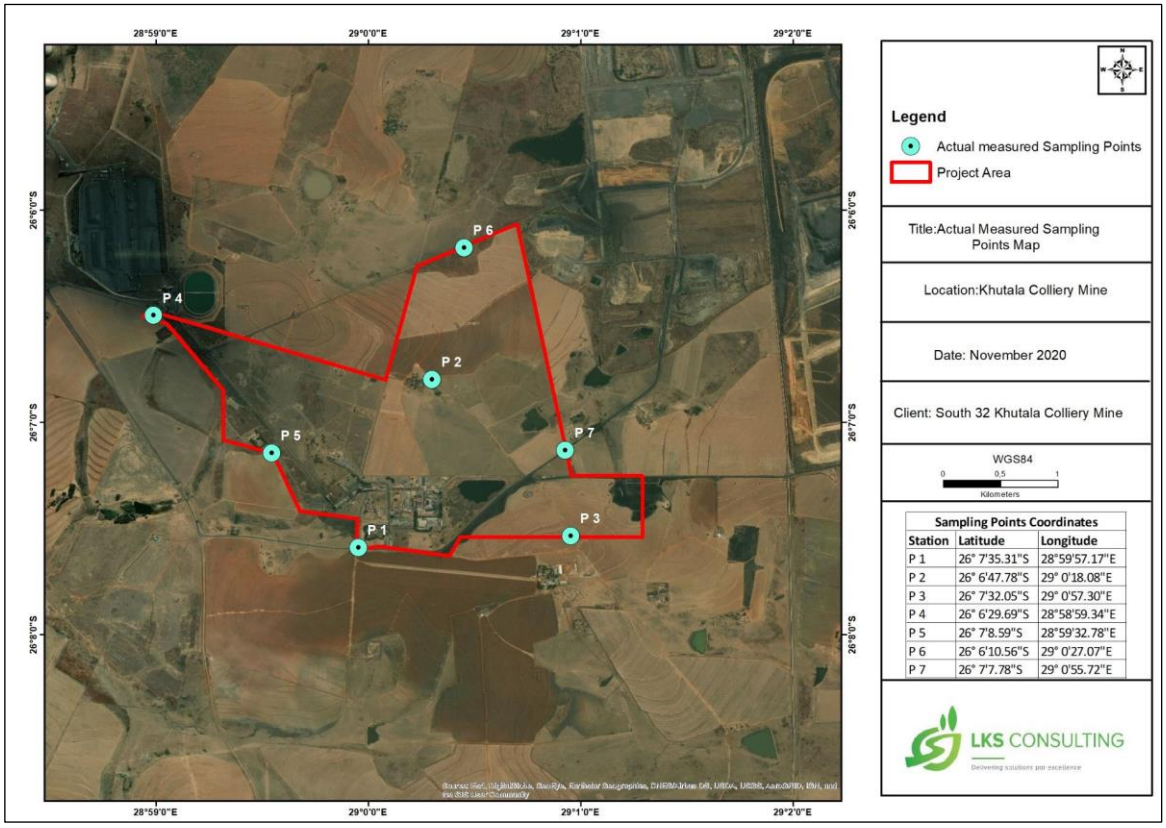

Figure 56: Actual Measured Sampling Point

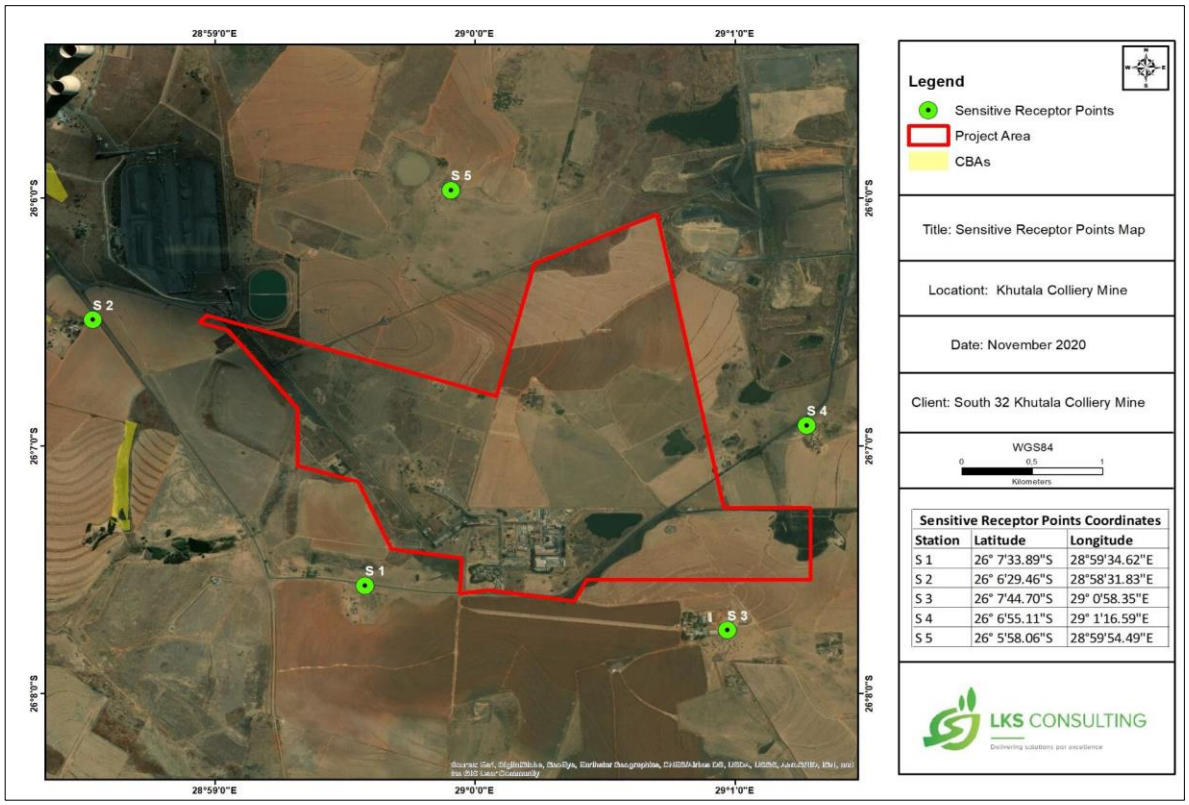

Figure 57: Sensitive Receptor Points.

10.10.2. Noise assessment Results

Noise monitoring results

Results obtained from the noise survey will be addressed per sample point. The results from the noise meter recordings for all the sampled points as well as the SANS rating limits are presented below. Day & Night-time measurements were undertaken both at the project application area & receptors surrounding Khutala Main Plant near Kendal Power station in the Mpumalanga Province. Sampling was conducted over a 2 X 10 -minute period interval from 10:00 to 03:00 Hrs.

Night-time results

Based on the daytime results from the noise measurements it is noted that the LAeqI levels measured above the SANS guideline for the maximum allowable outdoor daytime rating level for ambient noise in rural districts (53.8 dBA, 54.3dBA 51.8dBA , 55.1dBA , 58.2dBA , 55.6

dBA) at rural receptors P1, P2, P3, P4, P5 and P6. The night-time results comply according to SANS Ambient Noise District Classification.

Day-time results

In terms of the Noise Regulations, a noise disturbance is created when the prevailing ambient noise level is exceeded by 7.0 dB(A) or more. The LAeqI levels measured during day-time is also above the noise national standards.

Based on the baseline survey and the predictive noise calculations, the proposed 5 Seam Mining Project will comply with the relevant Noise Control Regulations, 1994 and SANS 10103 of 2008 provided that the mitigatory noise measures are in place and that the noise management plan is adhered to at all times. The results of the noise impact study indicate that the only significant noise impact on pre-development ambient noise levels will be on persons residing close to the main plant (project area) and farmstead identified within the 500 m & 1000m buffer zone; Noise monitoring will have to be carried out to determine the potential shift in the prevailing ambient noise levels on a monthly basis, after which the frequency of monitoring may change to a quarterly basis; Noise readings must be carried out at the measuring points stipulated in **Table 45** and shown in the Proposed Noise Monitoring Stations Map and public complaints and actions registry should be established, in order to capture public perceptions and complaints with regard to noise impacts, track investigation actions, and introduce corrective measures for continuous improvement.

Table 45: Baseline Measurement Results at Proposed Mining Area (Day – Time Monitoring)

Station	Date	Time	Criteria dB(A)	Noise Level DBA			Classification	Compliance	GPS Coordinates		Weather Data			
				LAeq Max	LAeq Min	LAeq AVE			Lat	Long	Temp	Wind Km/hr	Humidity	Wind Direction
P 1	4/11/20	09:53 – 10:03	70	52.8	51.8	51.9	F		26° 7'35.31"S	28°59'57.17"E	19ºC	13km	71%	NE
		10:04 – 10:14		55.3	51.6	55.2								
P2	4/11/20	11:44 – 11:54	70	57.7	53.2	53.6	F		26° 6'47.78"S	29° 0'18.08"E	23ºC	14km	70%	NW
		11:55 – 12:05		56.3	51.6	52.2								
P3	4/11/20	11:15 – 11:25	70	56.0	50.7	55.5	F		26° 7'32.05"S	29° 0'57.30"E	19ºC	12km	71%	NE
		11:26 – 11:36		60.8	50.8	58.2								
P4	4/11/20	16:00 – 16:10	70	56.0	52.5	52.0	F		26° 6'29.69"S	28°58'59.34"E	31ºC	18km	55%	ENE
		16:111 – 16:21		56.1	53.6	53.4								
P5	4/11/20	10:24 – 10:34	70	61.0	57.6	57.7	F		26° 7'8.59"S	28°59'32.78"E	19ºC	13km	71%	NE
		10:35 – 10:45		59.7	57.7	58.1								
P6	4/11/20	12:26 – 12:36	70	57.3	50.7	58.1			26° 6'10.56"S	29° 0'27.07"E	22ºC	13km	57%	NE
		12:37 – 12:47		57.3	50.7	52.3	F							
P7	4/11/20	13.00 – 13:10	70	63.4	52.3	53.3	F		26° 7'7.78"S	29° 0'55.72"E	22ºC	13km	57%	NE
		13:11 – 13:21		59.1	56.7	58.1	F							

Table 46: Baseline Measurement Results at Proposed Mining Area (Night – Time Monitoring)

Station	Date	Time	Criteria dB(A)	Noise Level DBA			Classification	Compliance	GPS Coordinates		Weather Data			
				LAeq Max	LAeq Min	LAeq AVE			Lat	Long	Temp	Wind Km/hr	Humidity	Wind Direction
P 1	19/11/20	23:31 – 23:41	60	57.3	52.2	53.8	F		26° 7'35.31"S	28°59'57.17"E	17ºC	13km	83%	NE
P2	19/11/20	22:30 – 22:40	60	55.1	50.1	54.3	F		26° 6'47.78"S	29° 0'18.08"E	19ºC	11km	65%	NE
P3	19/11/20	21:27 – 21:37	60	56.4	49.5	51.8	F		26° 7'32.05"S	29° 0'57.30"E	20ºC	10km	60%	NE
P4	19/11/20	20:34 – 20:44	60	58.3	54.9	55.1	F		26° 6'29.69"S	28°58'59.34"E	20ºC	8km	50%	NE
P5	19/11/20	23:50 – 00:00	60	62.8	55.4	58.2	F		26° 7'8.59"S	28°59'32.78"E	17ºC	13km	83%	NE
P6	19/11/20	22:01 – 22:11	60	59.2	49.7	55.6	F		26° 6'10.56"S	29° 0'27.07"E	19ºC	11km	65%	NE
P7	19/11/20		60				F		26° 7'7.78"S	29° 0'55.72"E				

Table 47: Baseline Measurement Results at Sensitive Receptors (Day – Time Monitoring)

Station	Date	Time	Criteria dB(A)	Noise Level DBA			Classification	Compliance	GPS Coordinates		Weather Data			
				LAeq Max	LAeq Min	LAeq AVE			Lat	Long	Temp	Wind Km/hr	Humidity	Wind Direction
P 1	19/11/30	17:16 – 17:26	70	61.0	59.9	52.7	F		26° 7'35.31"S	28°59'57.17"E	26ºC	14km	36%	NE
		17:27 – 17:37		59.9	50.6	57.2								
P2	19/11/30	17:44 – 17:54	70	59.4	52.2	54.8	F		26° 6'47.78"S	29° 0'18.08"E	19ºC	13km	37%	NE
		17:55 – 18:05		56.6	53.6	54.5								
P3	19/11/30		70				F		26° 7'32.05"S	29° 0'57.30"E	20ºC	10km	60%	NE
P4	19/11/30		70				F		26° 6'29.69"S	28°58'59.34"E				
P5	19/11/30	15:16 – 15:26	70	56.0	53.2	53.9	F		26° 7'8.59"S	28°59'32.78"E	31ºC	16km	25%	NE
		15:27 – 15:37		52.4	51.5	51.7								

	- Conforms to SANS Ambient Noise District Classification
	- Exceeds SANS Ambient Noise District Classification
	- Technical Issues During Sampling

Table 48: Baseline Measurement Results at Sensitive Receptors (Night – Time Monitoring)

Station	Date	Time	Criteria dB(A)	Noise Level DBA			Classification	Compliance	GPS Coordinates		Weather Data			
				LAeq Max	LAeq Min	LAeq AVE			Lat	Long	Temp	Wind Km/hr	Humidity	Wind Direction
P 1	20/11/20	00:19 – 00:29	60	54.9	51.8	52.6	F		26° 7'35.31"S	28°59'57.17"E	26ºC	14km	36%	
P2	20/11/20	00:34 – 00:44	60	59.3	54.9	57.9	F		26° 6'47.78"S	29° 0'18.08"E	19ºC	13km	37%	
P3	19/11/20		60				F		26° 7'32.05"S	29° 0'57.30"E	20ºC	10km	60%	
P4	19/11/20	22.57 – 23:07	60	51.8	44.6	49.3	F		26° 6'29.69"S	28°58'59.34"E	18ºC	13km	73%	
P5	19/11/20	20:04 – 20:14	60	55.0	51.5	52.8	F		26° 7'8.59"S	28°59'32.78"E	21ºC	10km	25%	

	- Conforms to SANS Ambient Noise District Classification
	- Exceeds SANS Ambient Noise District Classification
	- Technical Issues During Sampling

10.11. Heritage and Archaeological resources

A Heritage Impact Assessment (HIA) was undertaken Khutala Colliery, based on the available HIA records, one grave site is situated within the proposed 5 Seam project area (refer to **Figure 58**). The only site that has been identified to be within the study area is MHC045, which is a graveyard consisting of 8 stone-packed graves without any headstones as it was initial identified and recorded in 2007 by Matakoma Heritage (Fourie 2007).

The identified graveyard is outside the area proposed for the construction of the mining related infrastructure, but within the proposed 5 Seam underground mining area. The mine is not planning to construct any infrastructure in proximity to this graveyard. It is anticipated that none of these heritage resources will not be impacted by the proposed Project.

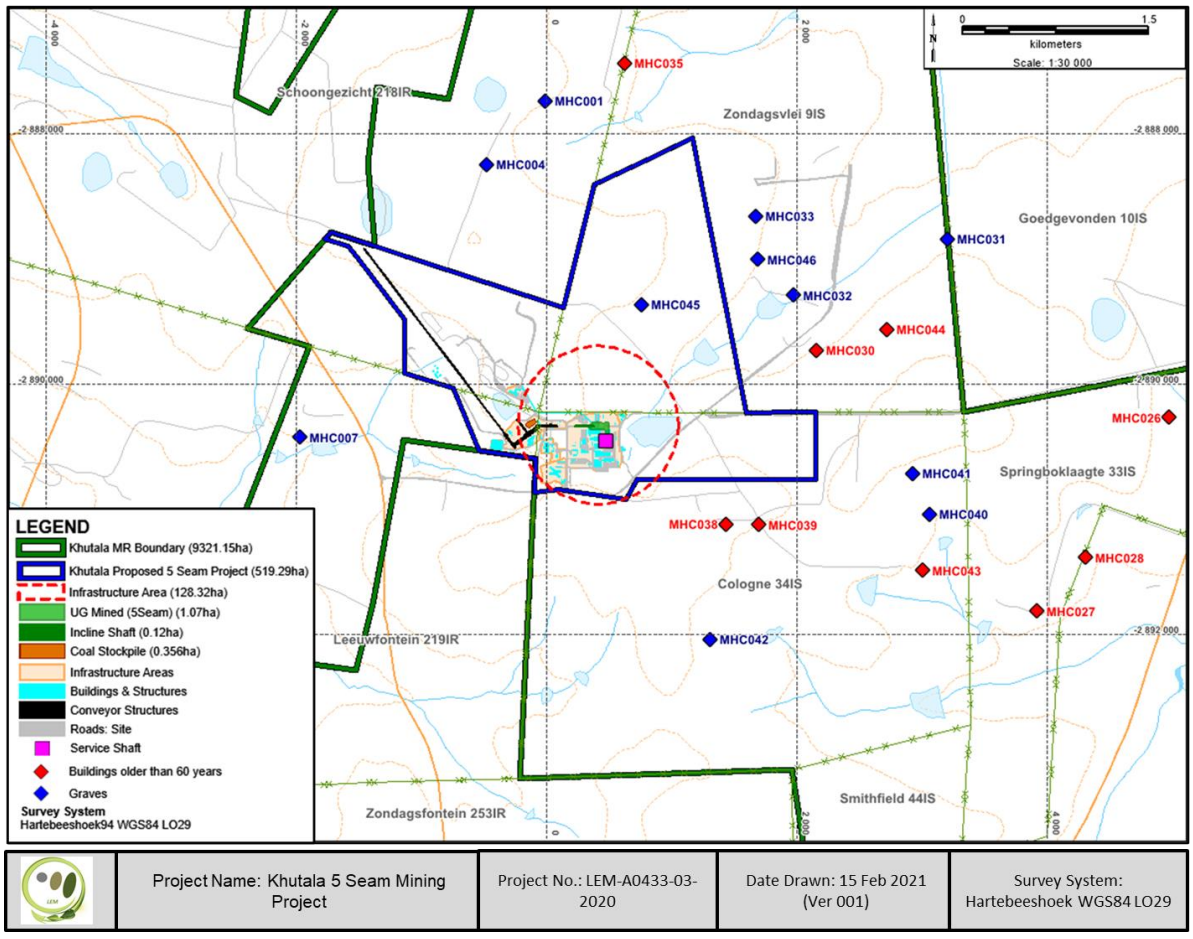

Figure 58: Graves with in the 5 Seam Mining Project area.

10.12. Socio-economic environment

Information regarding Socio-economic environment with the of 5 Seam Mining Project was obtained from the Social Impact Assessment report compiled LEM dated May 2021. Report is attached **Appendix 15**.

Khutala Colliery falls within the responsibility of the ELM which is situated in the western parts of the Nkangala District, and the north-central parts of Mpumalanga Province. The eMalahleni Municipal area consists inter alia of the towns of eMalahleni, Kwa-Guqa, Ga-Nala and Ogies. The collated total population (2011) of the Nkangala District is 1 308 129 constituting approximately 32.38% of Mpumalanga's population. The population growth rate of the District was 2.50% between the period 2001 and 2011. In the ELM area, the population grew by 3.58% annually from 2001 - 2011.

The population is made up of 52.8% females and 47.2% males, 81.3% Africans, 15.7% Whites, 1.7% Coloureds, 0.9% Asians and 0.4% others. Youth play an important role in the municipal area with 25.2% younger than 14 and 68.2% of the population being younger than 34 years of age.

Vulnerable groups within the municipal area are female-headed households (27.9%) and child headed (0-17 years) households (0.5%) in 2011.

The project area is located amongst existing towns and settlements and these are depicted in **Figure 1.**

Ogies is the nearest small town, other towns nearby are Kendal and eMalahleni. eMalahleni acts as the major regional centre at all commercial and industrial levels. Ogies services the farming community and the workers from neighbouring mining operations and power stations to a small extent.

The ELM has a high backlog in terms of water and sanitation. Informal settlements are also on the increase due to the existing housing backlog in the District.

10.12.1. Major economic activities and sources of employment

The main economic activities on a regional scale include various coal mines, power stations and economic farming activities. Minerals form 70% of eMalahleni's economic base. The associated activities are mining, production of electricity and basic ferro-manufacturing related to coal and energy. Exports from the area include coal (currently only 23% of that mined), steel and steel products. The major economic sectors that provide employment in the eMalahleni Magisterial District are shown in Table 49.

Table 49: Major economic activities

Activity	Percentage gross domestic product
Mining	30
Manufacturing	30

Electricity	10
Transport	0
Other	22

The coal mining industry employs approximately 90 000 people and 87% of whom are semi-skilled or unskilled. These people support an estimated 470 000 dependents. The conversion from traditional labour-intensive coal mining to capital-intensive machine and mining has increased unemployment among semi-skilled and unskilled workers.

10.12.2. Unemployment estimates for the area

Unemployment rate in eMalahleni has decreased since 2001.

Table 50: Labour indicators

Labour indicators	**2001**	**2011**	**Share of NDM 2011**
Working group	190 882	238 768	
Economically active population	124 371	190 662	
Number of employed	76 668	138 548	39%
Number of unemployed	47 703	52 114	34.2%
Unemployment rate (%)	38.4%	27.3%	
Youth unemployment rate (15 – 34 years)	50.2%	36%	

The leading industry in terms of employment is trade with 21.1%, followed by mining 20.6% and manufacturing 14.2%. Since 2001 there has been an increasing role/share of mining, construction, community services and finance as employer and a decrease in the role/share of trade, manufacturing, transport, agriculture, private households, and utility.

Table 51: Employment Sector

Employment Sector	2001	2011
Agriculture	3.8%	2.4%
Mining	17.0%	20.5%
Manufacturing	15.%	14.2%
Utilities	4.4%	3.1%
Construction	5.4%	7.0%
Trade	24.1%	21.1%
Transport	4.9%	4.7%
Finance	5.2%	6.7%
Community Service	12.8%	14.0%
Private households	7.3%	6.1%

10.12.3. Housing

No employees will be housed at the proposed project area. Most of the workers come from the neighbouring towns such as Ogies, Phola, Kriel, and eMalahleni and Middelburg.

10.12.4. Social infrastructure

The towns of Ogies, Phola, Kriel and eMalahleni owe their existence to the mining and agricultural activities in the area. The towns boast several pre-schools, primary and secondary schools. Sport and recreational facilities have been established in the towns and are enjoyed by the local population. The shopping centres are adequate to supply all requirements. The security forces and civil defence structures (Police and Fire Departments) are well established in the towns. There is one provincial hospital and one private hospital as well as a wide range of municipal health care services in eMalahleni.

Several state departments have regional offices in eMalahleni, the most relevant being:

- The Department of Labour
- The Department of Environmental Affairs and Tourism
- The Department of Mineral Resources
- The Department of Agriculture (Directorate concerned with Extension Services)

Cultural and recreational facilities include a theatre, civic centre, cinema complex within the Highveld Mall Shopping Complex, a library, various cultural clubs and charitable organisations, a recreational resort (Witbank Dam) and a Nature Reserve (located on the Oliphant's River). There are churches of various denominations.

10.12.5. Education

eMalahleni has an estimated 5.8% of the population who are aged 20 years and above with no schooling. Out of those who attended school 45.3% have Matric or higher. The education indicators for the area are presented in **Table 52**.

Table 52: Education indicators

Education indicators	2001	2011
Population 20+ with no schooling (%)	14.5%	5,8%
Population 20+ with matric and higher (%)	31.9%	45.3%
Functional literacy rate (%)	73.9%	86%

10.12.6. Household Income

Per capita personal income in the eMalahleni area is higher than within the district and is second highest in the province. Apart from this, it is still lower than the average for the country. The household income distribution is tabled in **Table 53**.

Table 53: eMalahleni area household income

Household income	2011
No income	13,5%
R1 - R4,800	3,2%
R4,801 - R9,600	5%
R9,601 - R19,600	11,1%
R19,601 - R38,200	16,8%
R38,201 - R76,4000	17,5%
R76,401 - R153,800	13,5%
R153,801 - R307,600	10,5%
R307,601 - R614,400	6,1%
R614,001 - R1,228,800	2%
R1,228,801 - R2,457,600	0,5%
R2,457,601+	0,3%

10.12.7. Water supply

ELM is responsible for supplying water to Ogies and Phola. No potable water is required from the ELM supply for mining activities. The mine receives on average 2 622 m^3/day potable

water from Kendal Power Station and this water system is primarily for domestic use with the option of make-up for industrial water use.

10.12.8. Power supply

Eskom supplies electricity to Khutala Colliery via means of 22/11 kV substations and the newly installed 132 kV Eskom power line.

10.13. Palaeontological Impact Assessment

Information regarding Palaeontology associated with the of 5 Seam Mining Project was obtained from the Palaeontological Impact Assessment (PIA) report compiled by Dr H. Fourie dated October 2020. The PIA Report is attached **Appendix 18**.

10.13.1. Geological Setting

Large areas of the southern African continent are covered by the Karoo Supergroup (**Figure 59**). It covers older geological formations with an almost horizontal blanket. Several basins are present with the main basin in the central part of south Africa and several smaller basins towards Lebombo, Springbok Flats and Soutpansberg. An estimated age is 150 – 180 Ma. And a maximum thickness of 7000 m is reached in the south. Three formations overlie the Beaufort Group, they are the Molteno, Elliot and Clarens Formations. The Elliot Formation is also known as the Red Beds and the old Cave Sandstone is known as the Clarens Formation. At the top is the Drakensberg Basalt Formation with its pillow lavas, pyroclasts, etc. (Kent 1980, Snyman 1996). The Beaufort Group is underlain by the Ecca Group which lies on the Dwyka Group.

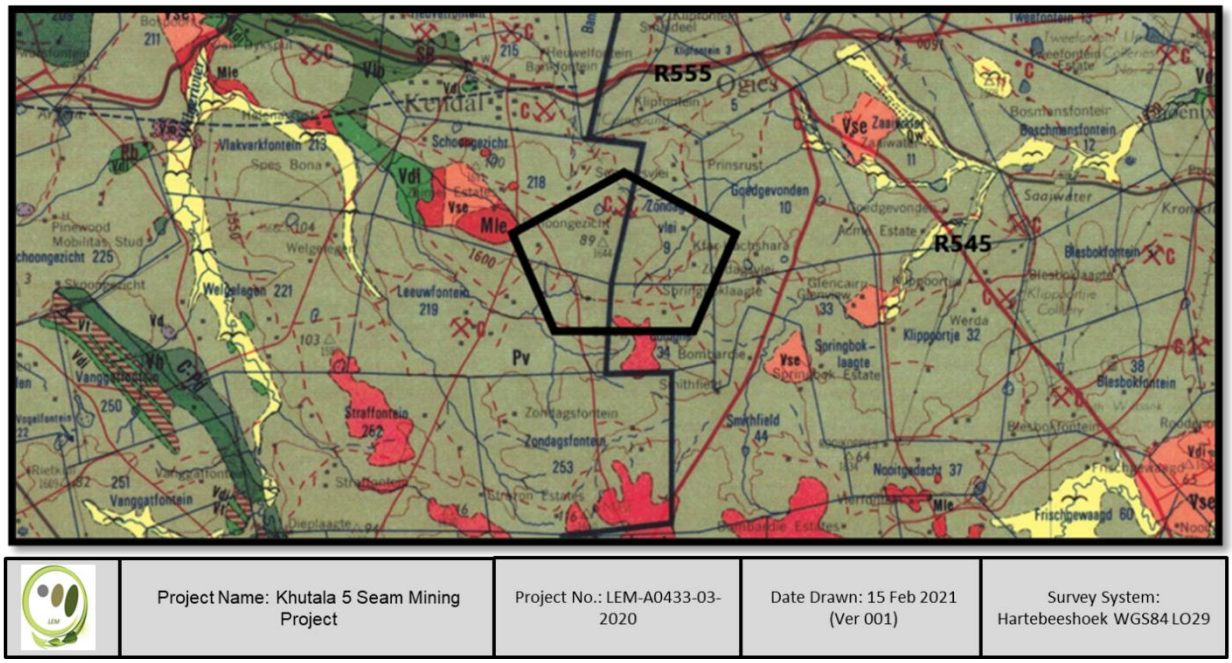

Figure 59: Geology of the development area

Legend to Map and short explanation.

Vdi – Diabase (green). From Vaalian to post-Mokolian.

Pv – Shale, shaly sandstone, grit, sandstone, conglomerate and coal in places near base and top, oil shale beds (grey). Vryheid Formation, Ecca Group, Karoo Supergroup. Permian.

Vse –Porphyritic rhyolite with interbedded mudstone and sandstone (amber). Selons River Formation, Transvaal Supergroup. Vaalian.

Mle – Medium-grained porphyritic granite, red, coarse-grained biotite granite (red). Lebowa Granite Suite, Bushveld Complex. Mokolian.

The Ecca Group is early to mid-Permian (545-250 Ma) in age. Sediments of the Ecca group are lacustrine and marine to fluvio-deltaic (Snyman 1996). The Ecca group is known for its coal (mainly the Vryheid Formation) (five coal seams) and uranium. Coalfields formed due to the accumulation of plant material in shallow and large swampy deltas. The Ecca Group conformably overlies the Dwyka Group and is conformably overlain by the Beaufort Group, Karoo Supergroup. It consists essentially of mudrock (shale), but sandstone-rich units occur towards the margins of the present main Karoo basin in the south, west and north-east, with coal seams also being present in the north-east (Kent 1980, Johnson 2009).

The Vryheid Formation is named after the type area of Vryheid-Volksrust. In the north-eastern part of the basin the Vryheid Formation thins and eventually wedges out towards the south, southwest and west with increasing distance from its source area to the east and northeast (Johnson 2009). The Vryheid Formation consists essentially of sandstone, shale, and subordinate coal beds, and has a maximum total thickness of 500 m. It forms part of the Middle Ecca (Kent 1980). This formation has the largest coal reserves in South Africa. The pro-delta sediments are characterised by trace and plants fossils (Snyman 1996).

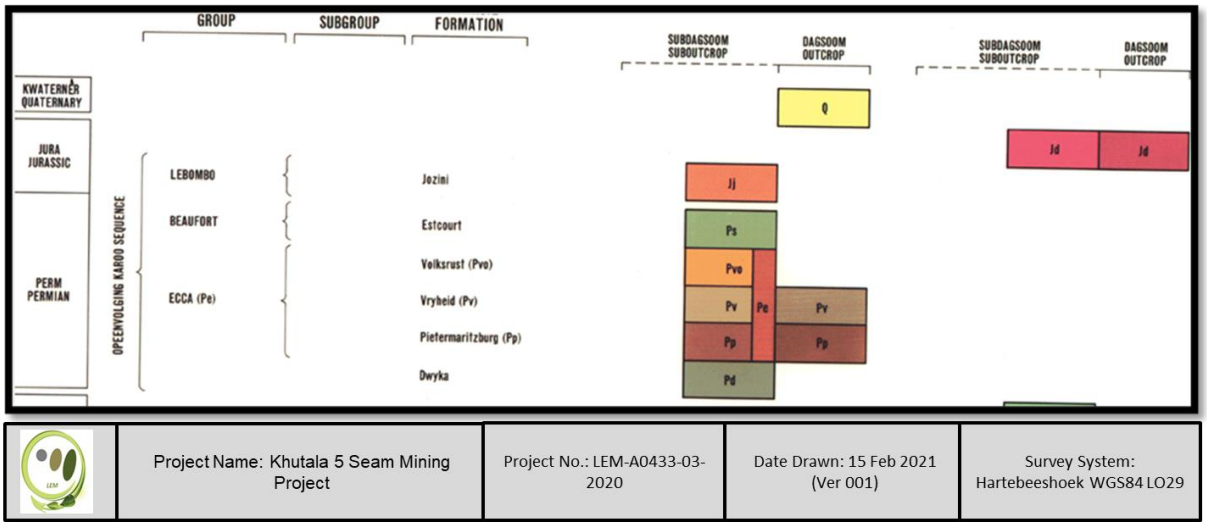

Figure 60:Lithostratigraphic column of the development area (Mbabane map).

Coal has always been the main energy source in industrial South Africa. It is in Mpumalanga, south of the N4, that most of the coal-fired power stations are found. Eskom is by far the biggest electricity generator in Africa. Thick layers of coal just below the surface are suited to open-cast mining and where the overlying sediments are too thick, shallow underground mining. In 2003, coal was South Africa's third most valuable mineral commodity and is also used by Sasol for fuel- and chemicals-from-coal (Norman and Whitfield 2006). Grodner and Cairncross (2003) proposed a 3-D model of the Witbank Coalfield to allow easy evaluation of the sedimentary rocks, both through space and time. Through this, one can interpret the environmental conditions present at the time of deposition of the sediments. This can improve mine planning and mining techniques. The Vryheid Formation is underlain by the Dwyka Group and is gradually overlain by mudstones (and shale) and sandstones of the Volksrust Formation. The typical colours for the Vryheid Formation are grey and yellow for the sediments and black for the coal seam. The thickness of the grey shale can vary and this is interlayered with the also variable yellow sandstone and coal seams.

Ecca rocks are stable and lend themselves well to developments. It is only unstable in or directly above mining activities (Snyman 1996). The site itself is partly situated on the flat-lying Vryheid Formation, Ecca Group, Karoo Supergroup. Dolerite dykes occur throughout the Karoo Supergroup. Structural geological features such as dykes and faults can have a measurable influence on ground water flow and mass transport. The Vryheid Formation sediments may attain a thickness of 120 – 140 m. A typical profile includes soil and clay, sandstone and siltstone, shale, 2 upper seam, shale, 2 seam, sandstone, no 1 seam, shale and dolomite at the bottom. The typical colours for the Vryheid Formation are grey and yellow for the sediments and black for the coal seam. The thickness of the grey shale can vary and this is interlayered with the also variable yellow sandstone and coal seams.

Dolerite dykes (Jd) occur throughout the Karoo Supergroup. Structural geological features such as dykes and faults can have a measurable influence on ground water flow and mass transport.

The Bushveld Complex (small outcrop) is a massive body of igneous origin and it is intrusive in the Transvaal Supergroup (Kent, 1980). The Bushveld Complex extends over 440 km east-west, from Burgersfort to Nietverdiend; and for nearly 350 km north-south from Villa Nora to Bethal. It covers an area of 65 000 km² and is chrome and platinum rich (Visser, 1989). The age is Vaalian (2,100 – 1,920 Ma). The layered rocks of the Bushveld Complex are generally believed to be the result of crystals settling out of magma during slow cooling consisting of an igneous intrusion with anorthosite, hybrid gabbro, gabbro, diabase, epidiorite, pyroxenite, and norite rocks. The magmatic events petrogenetically related to and generally considered part of the whole magmatic evolution of the Complex are, the diabase sills and the Rooiberg Group. The Complex consists of three main units or suites of which the Rustenburg Layered Suite is one (Kent, 1980), the other two are the Rashoop Granophyre Suite (Mr) and Lebowa Granite Suite (Visser, 1989). The region will be covered by 'Bushveld' vegetation. The weathering product is known as 'black turf' (Kent, 1980; Visser, 1989). There is a presence of mining past and present with iron ore and the Merensky Reef. Magnesite mines provide magnesium carbonate for making heat-resistant bricks (Norman and Whitfield 2006). The Layered Suite, the source of an immense wealth of platinum, chrome and vanadium, comprises six quite distinct zones. It is here that iron ore and the Merensky Reef are found (Norman and Whitfield 2006).

The Transvaal Supergroup fills an east-west elongated basin in the south-central part of the old Transvaal (now North – West, Gauteng and Mpumalanga) as far south as Potchefstroom. It is Vaalian in age, approximately 2600 Ma to 2100 Ma. A maximum thickness of the Transvaal Supergroup reaches 2000 m in the north-eastern section. The east-west elongated basin is filled with clastic, volcanic and chemical sedimentary rocks. Three groups based on lithological differences have been established: they are the Rooiberg, Pretoria and Chuniespoort Groups as well as other smaller groups such as the Groblersdal Group, Buffelsfontein Group, Wolkberg Group and the Black Reef Formation (Kent 1980, Snyman 1996). It is the Bushveld Complex that is responsible for the tilting of the Transvaal sediments and the heat of its intrusion having created andalusite crystals (Norman and Whitfield 2006). This Supergroup is underlain by the Ventersdorp, Witwatersrand and Pongola Supergroups, and the Dominion Group. Three prominent ridges are present from the oldest to the youngest, the Time Ball Hill, Daspoort and Magaliesberg Formations (Norman and Whitfield 2006).

The Rooiberg Group is a 2500-6000m thick succession of feldspathic quartzites, arkoses and shales, with interbedded volcanics and felsites. It consists of two formations, the lower Damwal (Vdr) and the upper Selons River (Vs), restricted in its distribution to the central part of the basin (Kent 1980, Snyman 1996). The Selons River Formation has either a sandstone or a quartzite at its base and mainly consists of red rhyolite. It (Selons River) was further subdivided into the lower Doornkloof Felsite Member and an upper Klipnek Felsite Member (Kent 1980, Visser 1989) and west of Warmbath (Bela Bela) it is again subdivided into two units, the Kwaggasnek Formation and the Schrikkloof Formation. A layer of amygdaloidal rhyolite is present close to the top of the Kwaggasnek Formation. It rests on the Smelterskop sediments at Rooiberg and is intruded by Nebo granite. The Schrikkloof Formation in the Nylstroom area is conformably overlain by sediments from the Waterberg Group in an ash-flow sheet. Together with the Kwaggasnek Formation it reaches thicknesses of 6000 m as is equivalent to the Selonsrivier Formation. This group has an estimated age of 2,150 Ma (Visser 1989).

10.13.2. Description of significant fossil occurrences

Fossils likely to be found are mostly plants (**Figure 61)** such as ‘Glossopteris flora’ of the Vryheid Formation. The aquatic reptile Mesosaurus and fossil fish may also occur with marine invertebrates, arthropods and insects. Trace fossils can also be present. During storms a great variety of leaves, fructifications and twigs accumulated and because they were sandwiched between thin films of mud, they were preserved to bear record of the wealth and the density of the vegetation around the pools. They make it possible to reconstruct the plant life in these areas and wherever they are found, they constitute most valuable palaeobotanical records (Plumstead 1963) and can be used in paleoenvironmental reconstructions.

Details of the location and distribution of all significant fossil sites or key fossiliferous rock units are often difficult to be determined due to thick topsoil, subsoil, overburden and alluvium. Depth of the overburden may vary a lot.

The threats are:- earth moving equipment/machinery (front end loaders, excavators, graders, dozers) during construction, the sealing-in or destruction of fossils by development, vehicle traffic, and human disturbance.

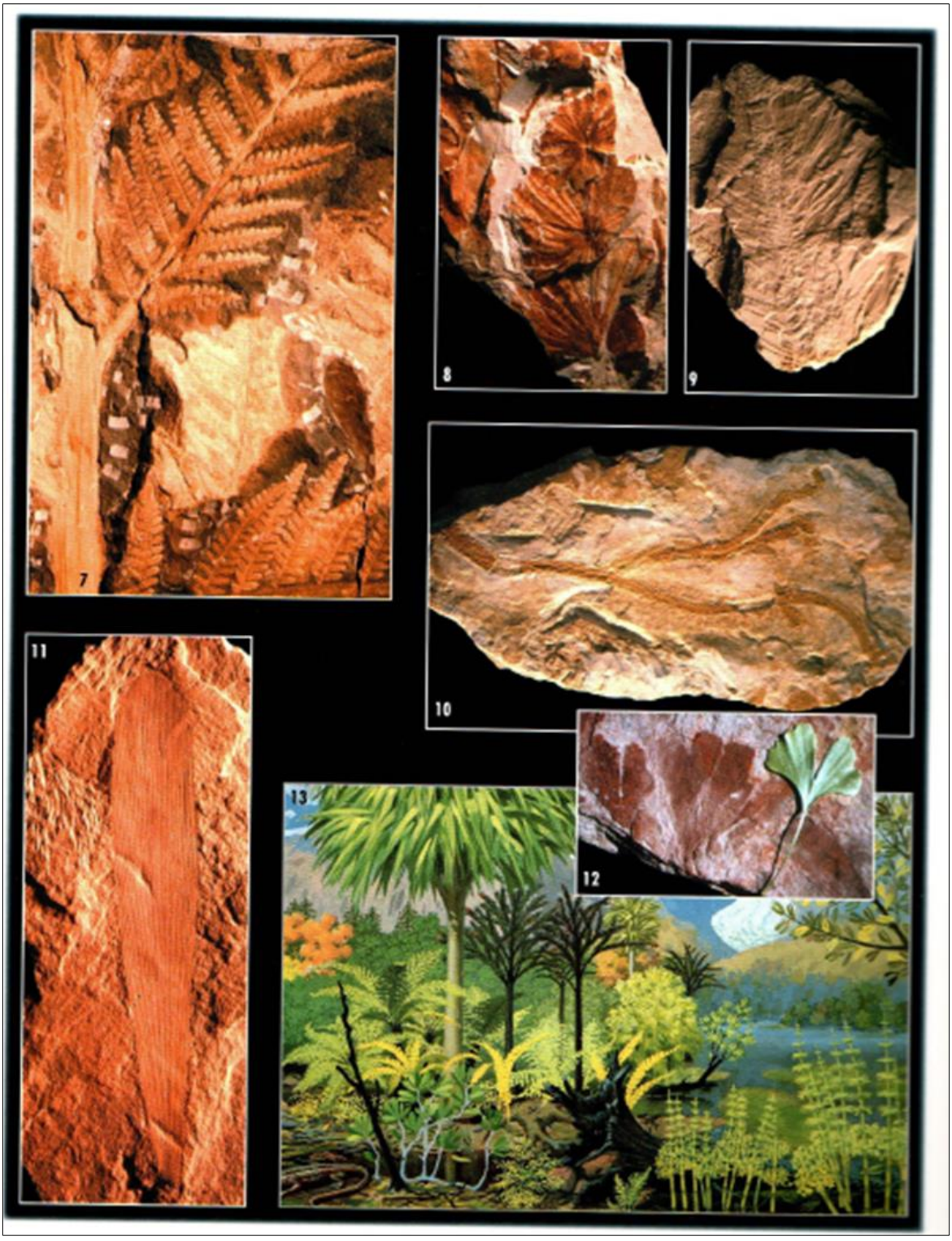

Figure 61: Example of Vryheid Formation Fossils (MacRae 1999)

10.14. Blasting

Information regarding Blasting associated with the of 5 Seam Mining Project was obtained from the Blasting Impact Assessment (BIA) report compiled by Blast Management & Consulting May 2021. The BIA Report is attached **Appendix 20**.

10.14.1. Structure profile

As part of the baseline, all possible structures in a possible influence area are identified. The project area was reviewed using Google Earth imagery. Information sought during the review was to identify surface structures present above and near the planned #5 seam operations – 100 m radius considered, e.g. houses, general structures, power lines, pipelines, reservoirs, mining activity, roads, shops, schools, gathering places, possible historical sites, etc. A list was prepared of all structures in the vicinity of the project area. The list includes structures and points of interests (POIs) within the 100 m boundary – see **Table 55** below. A list of structure locations was required in order to determine the allowable ground vibration limits. **Figure 62** shows an aerial view of the project area and surroundings with POIs. The type of POIs identified is grouped into different classes. These classes are indicated as "Classification" in **Table 54**. The classification used is a BM&C classification and does not relate to any standard or national or international code or practice. **Table 54** shows the descriptions for the classifications used.

Table 54: POI Classification used

Class	Description
1	Rural Building and structures of poor construction
2	Private Houses and people sensitive areas
3	Office, High-rise buildings and Industrial buildings / Infrastructure
4	Ruins
5	Animal related installations and animal sensitive areas
6	Industrial installations
7	Earth like structures – no surface structure
8	Heritage sites (buildings, infrastructure, activity)
9	Graves
10	Water Borehole
11	Water Resources Surface
12	Pipelines Buried
13	Powerlines / Telephone Lines / Towers
14	Road Infrastructure

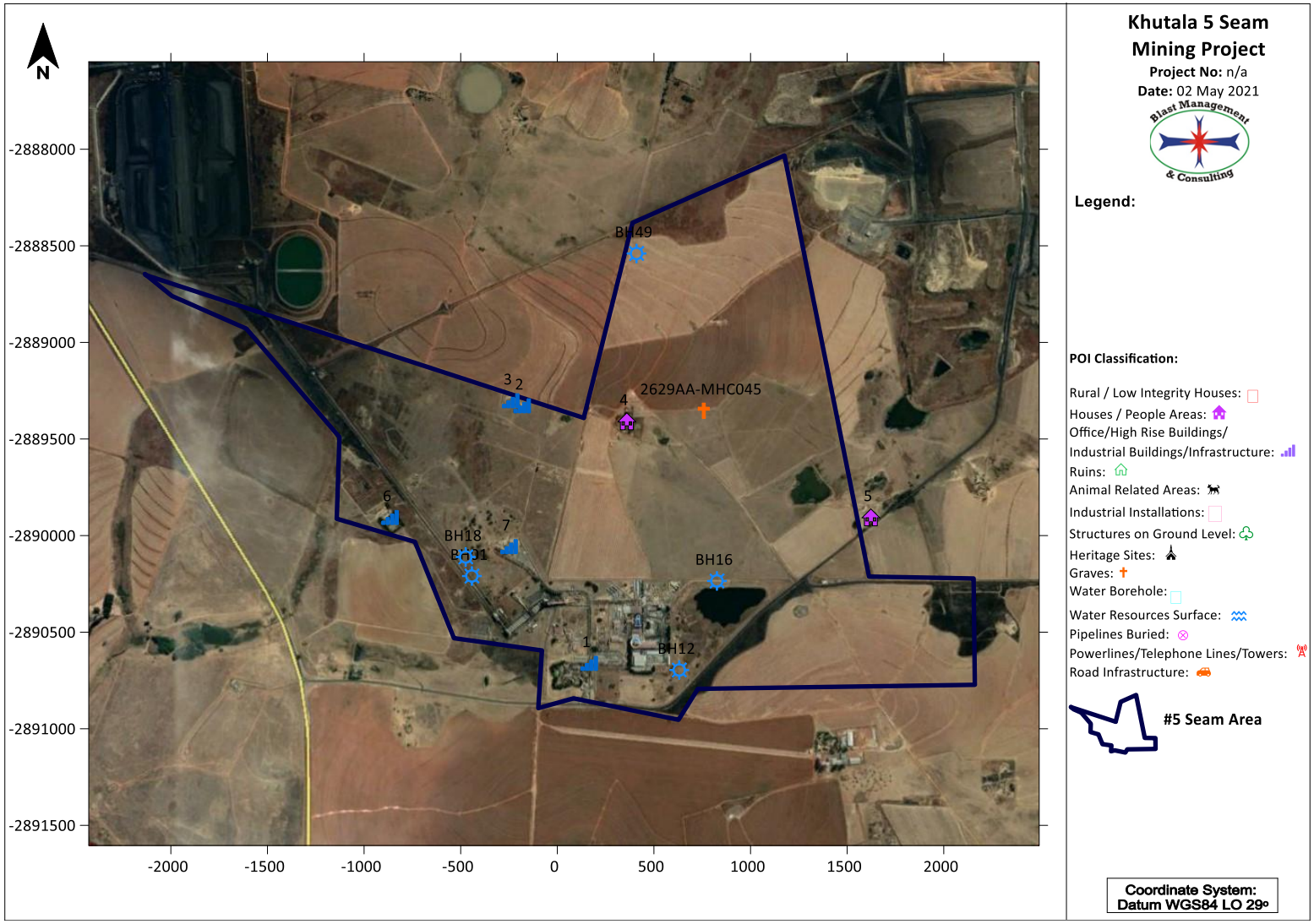

Figure 62: Aerial view of the 5 Seam Mining Project area with points of interest identified

Table 55: List of points of interest identified (WGS84 – LO 29°)

Tag	Description	Classification	Y	X
1	Khutala Colliery	3	-165.12	2890661.78
2	Tower	3	181.91	2889328.40
3	Reservoir	3	241.11	2889302.21
4	Farmstead	2	-359.70	2889408.54
5	Farmstead	2	-1622.83	2889905.74
6	Water works	3	865.80	2889906.31
7	Offices	3	249.89	2890057.36
2629AA-MHC045	Informal Cemetery	9	-758.17	2889353.74
BH01	1559 SP8	10	442.07	2890210.13
BH12	1642 KTL13	10	-631.07	2890696.51
BH16	1647 KTL18	10	-826.12	2890235.63
BH18	BH next to Soccer Field	10	474.08	2890111.53
BH49	BHUG 1	10	-410.02	2888540.42

10.14.2. Blasting Operations

Two different types of blasting were identified that will be applicable. Coal panel blasting and when intersection with dykes is experienced – Dyke blasting. Short description and explosive parameters are provided below. The information from these blasts is used for predicting the expected levels of ground vibration. The blasting of dykes will require more blastholes than coal blast. Considering that dyke blasts are only done when required and coal blasts will be regularly done, the coal blast information is applied for evaluation of expected levels of ground vibration. A comparison of expected levels from both blast types is also provided.

10.14.2.1. Underground Coal Blast

Underground coal blasting consists of blast holes drilled into the face. A maximum of 800gr of permitted explosive is charged in a blast hole for underground coal mines in South Africa. The arrangement of blast holes drilled could typically be as shown in figure 6. The two rows of blast holes where blastholes in a row are initiated simultaneously yielding a total mass of explosives detonating at 3.2 kg. The expected ground vibration levels from underground

blasting are 50% less than that of surface blasting for the same charge mass and distance. This is caused by mainly body waves generated from blasting underground instead of surface and body waves in surface blasting.

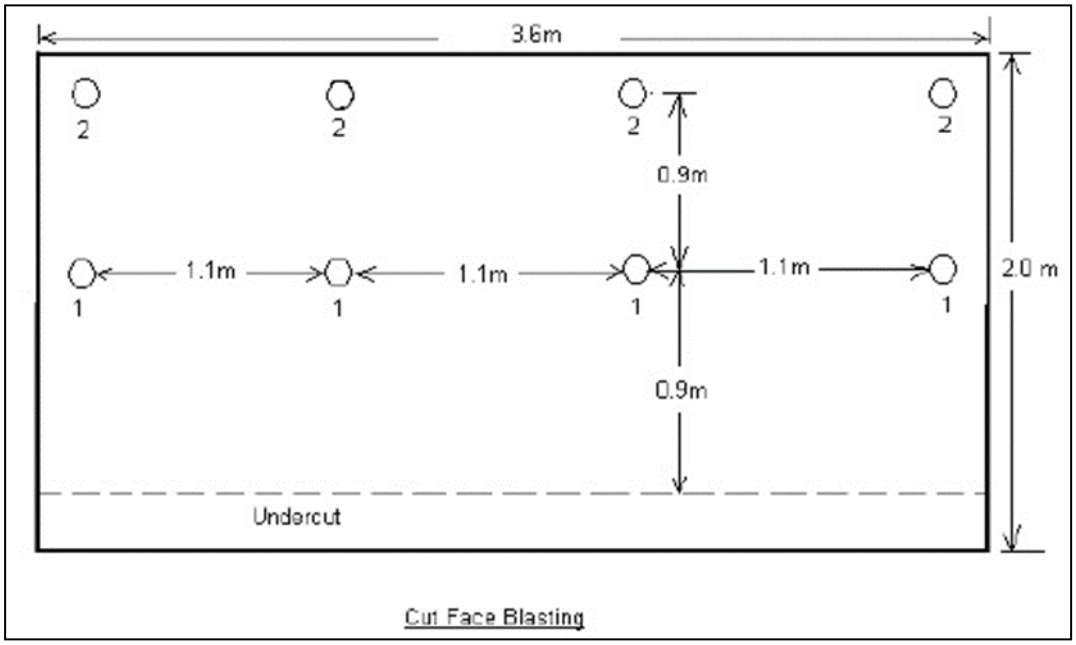

Figure 63: Underground coal blast round

Simulation of a typical coal blast is presented below. A blast with 800gr explosive per blasthole, 8 blastholes for a panel and timed as indicated in figure above was constructed. The simulation shows the expected maximum charge per delay and maximum number of blastholes detonating simultaneously. Four blastholes detonates simultaneously yielding 3.2 kg per delay.

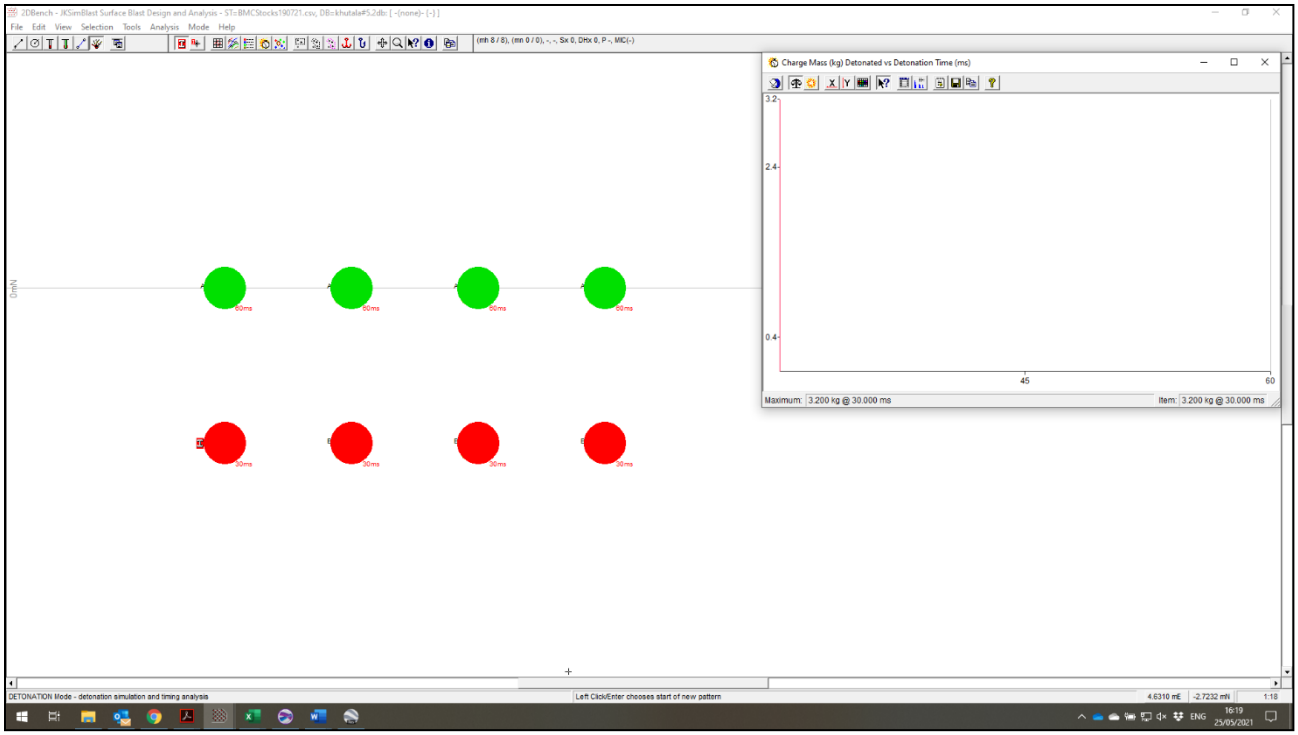

Figure 64: Simulation showing maximum charge mass per delay – 3.2 kg

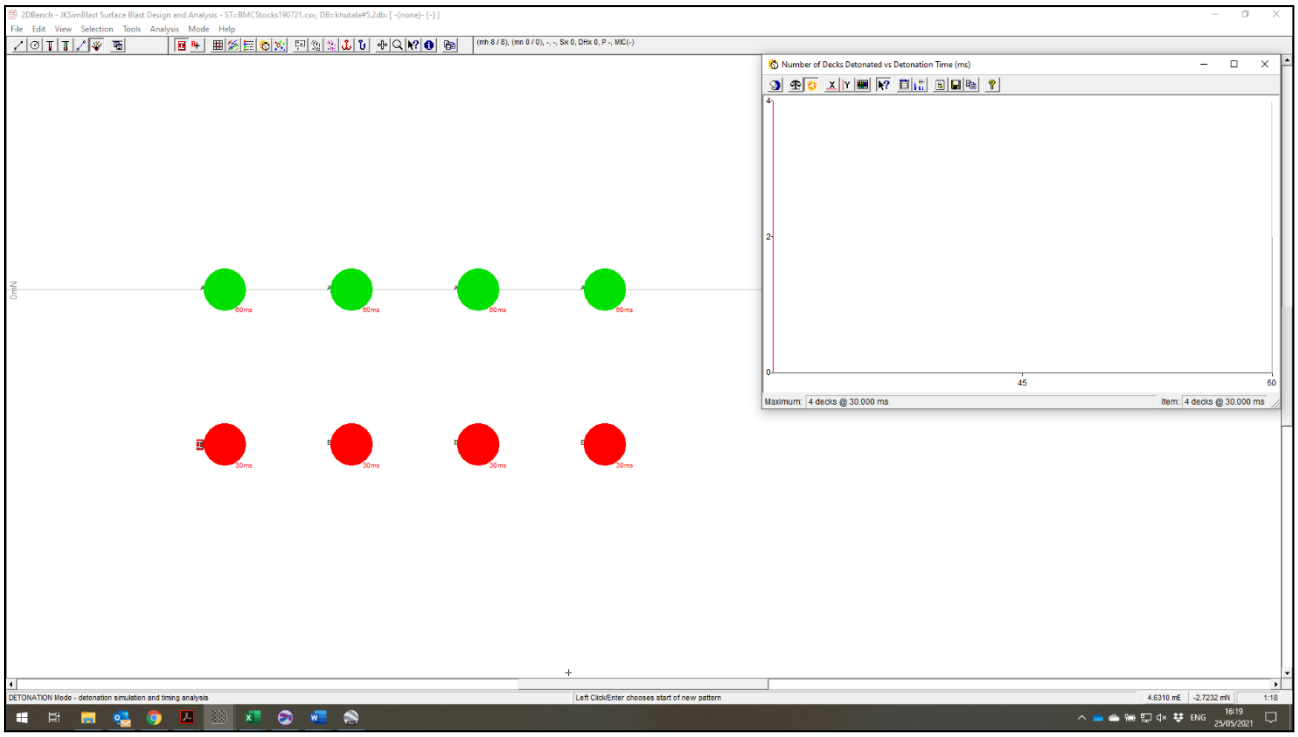

Figure 65: Simulation showing maximum number blastholes detonating – 4

10.14.2.2. Underground Dyke Blast

During the mining operations intercepts with dykes may be experienced. A specific (COP) on the mine is applicable for dyke blasting. A maximum of 800 gr of permitted explosive is charged in a blast hole for underground coal mines in South Africa. The arrangement of blast holes drilled for dyke blasting could typically be as shown in **Figure 66**. The two rows on opposite sides of the centre line are initiated using the same delay. The delays increase progressively away from the centre line. A maximum 12 blastholes could be detonated simultaneously yielding a total mass of explosives detonating at 9.6 kg. The expected ground vibration levels from underground blasting are 50% less than that of surface blasting for the same charge mass and distance. This is caused by mainly body waves generated from blasting underground instead of surface and body waves in surface blasting. It must be noted that dyke blasting is not done continuously. Only where and when required. The exact location of possible dyke blasting cannot be provided now.

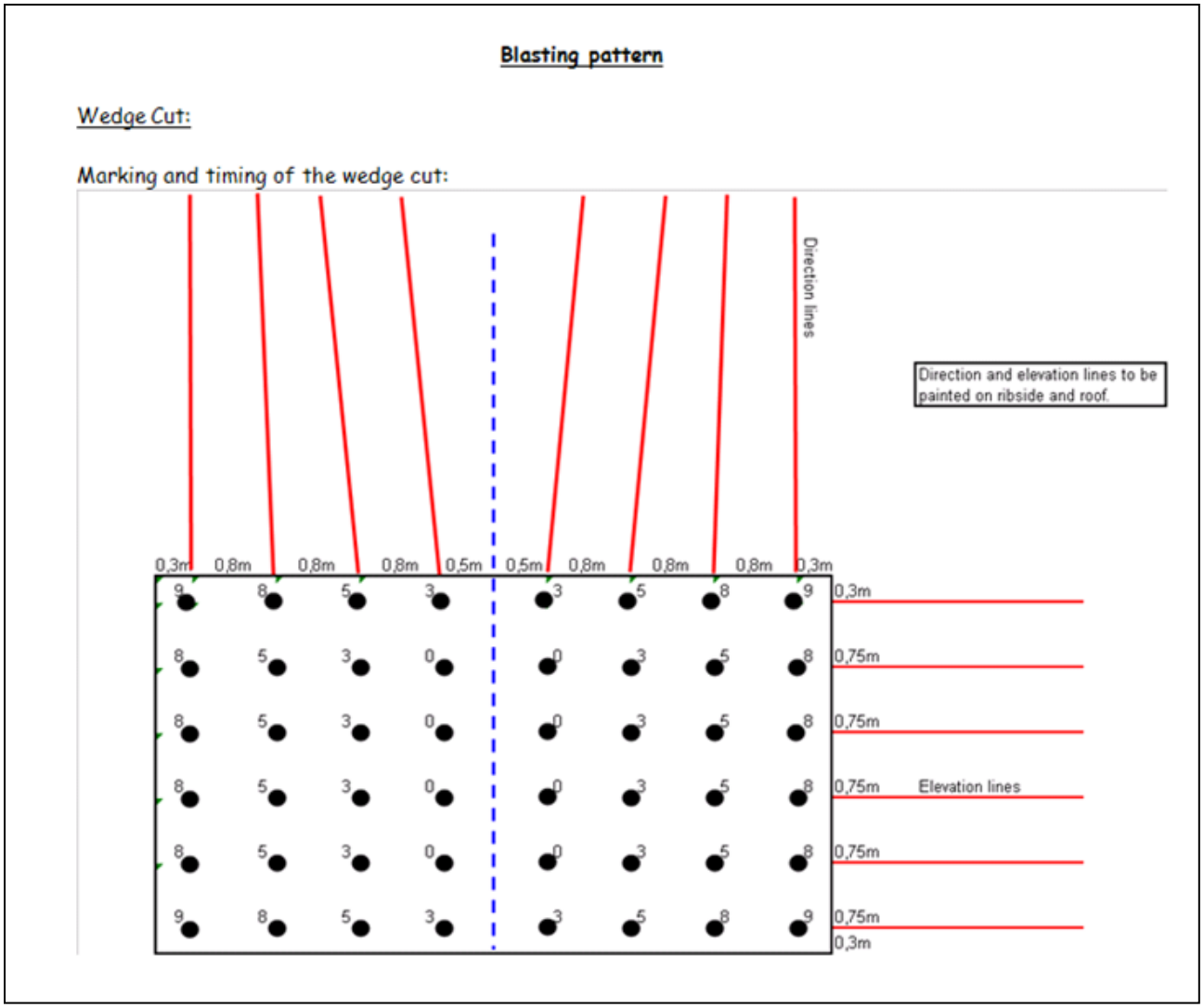

Figure 66: Underground dyke blast round

Simulation of a typical dyke blast is presented below. A blast with 800 gr explosive per blasthole, 8 blastholes for a panel and timed as indicated in figure above was constructed. The simulation shows the expected maximum charge per delay and maximum number of blastholes detonating simultaneously. Twelve blastholes detonates simultaneously yielding 9.6 kg per delay.

The simulation shows the expected maximum charge per delay and maximum number of blastholes detonating simultaneously.

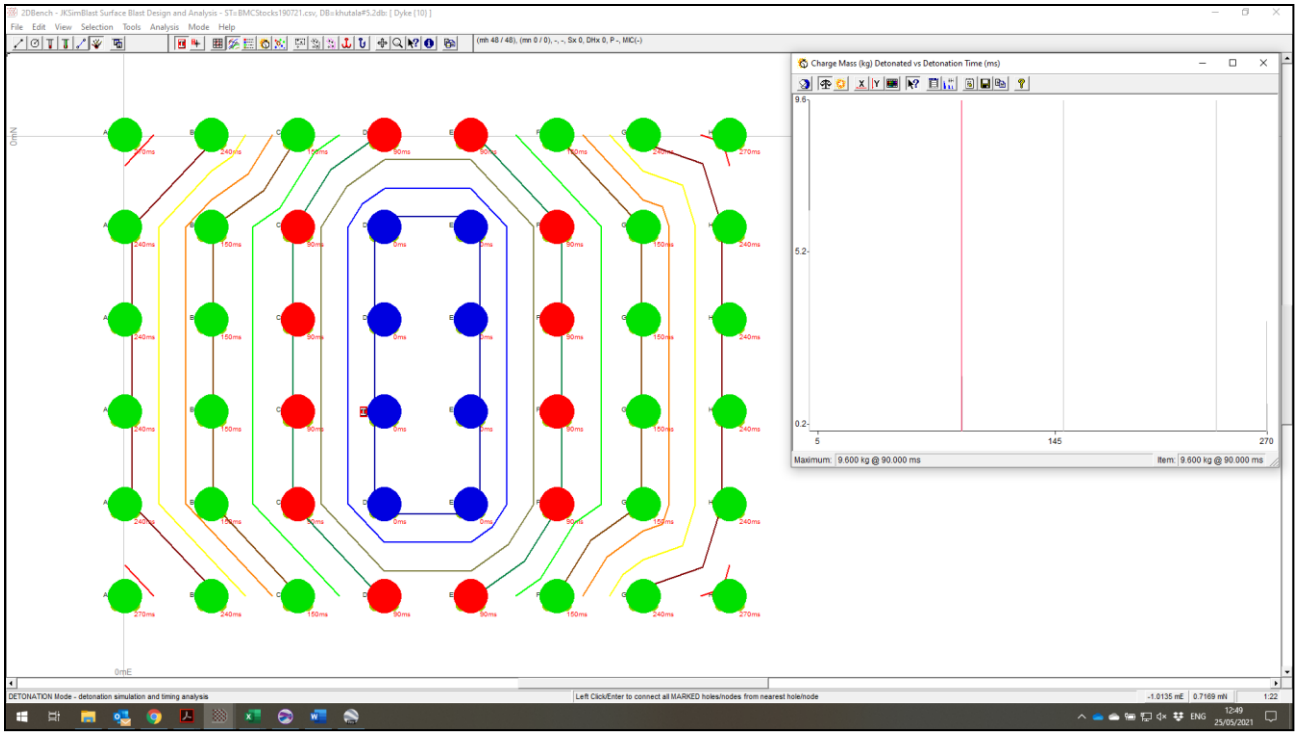

Figure 67: Simulation showing maximum charge mass per delay – 9.6 kg

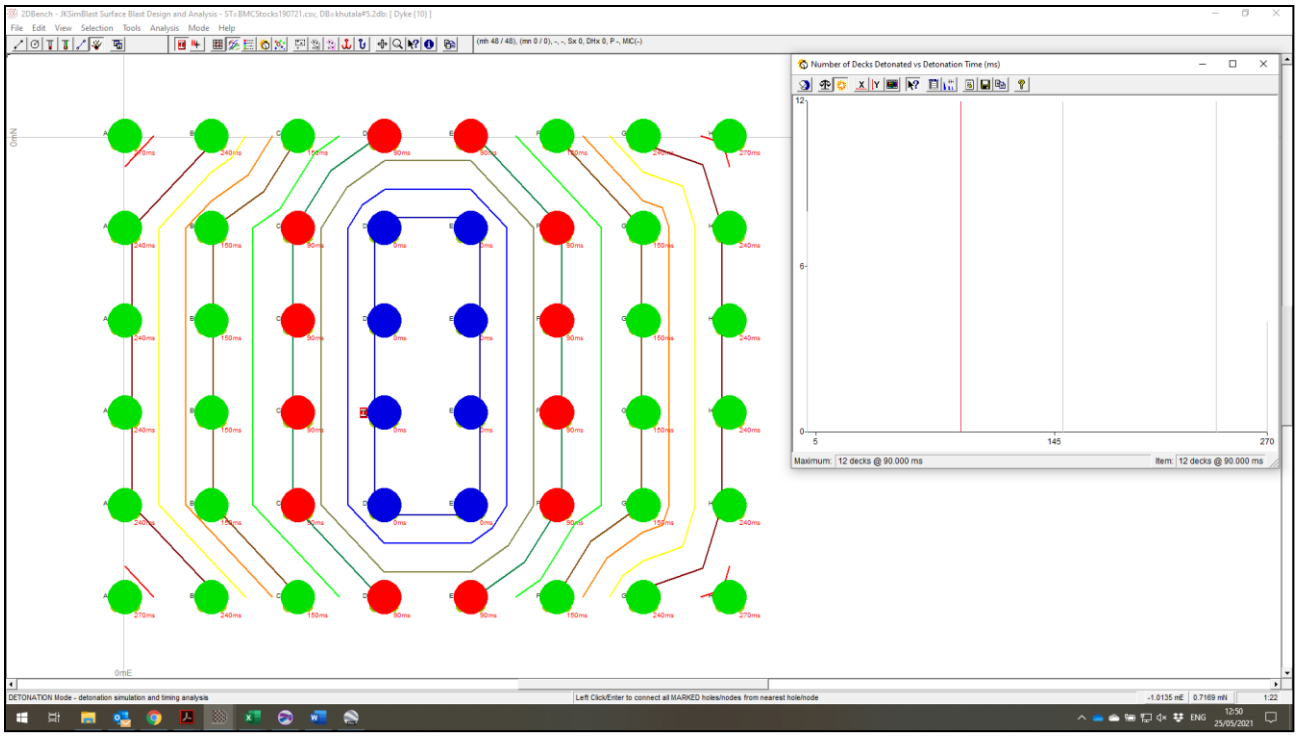

Figure 68: Simulation showing maximum number blastholes detonating – 12

10.14.3. Ground Vibration

Predicting ground vibration and possible decay, a standard accepted mathematical process of scaled distance is used. The equation applied (Equation 1) uses the charge mass and distance with two site constants. The site constants are specific to a site where blasting is to be done. In the absence of measured values an acceptable standard set of constants is applied.

Equation 1:

$$PPV = a(\frac{D}{\sqrt{E}})^{-b}/2$$

Where:

PPV = Predicted ground vibration (mm/s)

a = Site constant

b = Site constant

D = Distance from source (m)

E = Explosive Mass (kg)

Applicable and accepted factors a & b for new operations is as follows:

a = 1143

b = -1.65

Utilizing the abovementioned equation and the given factors, allowable levels for specific limits and expected ground vibration levels can then be calculated for various distances.

Review of the type of structures that are found within the possible influence zone of the proposed mining area and the limitations that may be applicable, different limiting levels of ground vibration will be required. This is due to the typical structures and installations observed surrounding the site and location of the project area. Structure types and qualities vary greatly and this calls for limits to be considered as follows: 6 mm/s, 12.5 mm/s levels and 25 mm/s at least.

Table 56 shows expected levels of ground vibration for various distances from the underground blasting – coal and dykes.

Table 56: Expected Ground Vibration at Various Distances from Charges Applied in this Study

Distance (m)	Coal Blast Charge PPV (mm/s)	Dyke Blast Charge PPV (mm/s)
5.0	104.8	259.5
10.0	33.4	82.7
15.0	17.1	42.3
20.0	10.6	26.3
25.0	7.4	18.2
30.0	5.5	13.5
35.0	4.2	10.5
40.0	3.4	8.4
45.0	2.8	6.9
50.0	2.3	5.8
55.0	2.0	5.0
60.0	1.7	4.3
65.0	1.5	3.8
70.0	1.3	3.3
75.0	1.2	3.0
80.0	1.1	2.7
85.0	1.0	2.4
90.0	0.9	2.2
95.0	0.8	2.0
100.0	0.7	1.9

11. DESCRIPTION OF SPECIFIC ENVIRONMENTAL FEATURE AND INFRASTRUCTURE ON THE SITE.

Two primary Hydrogeomorphic Unit (HGM) types were found to occur in association with the proposed 5 Seam Mining area, namely:

- Unchanneled Valley bottom wetlands; and
- Hillslope seeps;

Previous wetland assessment studies undertaken within the Khutala Mining Right area including the proposed study area showed that historical opencast and underground mining activities have been taking place in the vicinity of the study area since 1986, with impacts to water quality and fragmentation of the wetland systems observed.

Surface infrastructure development such as offices, the mining complex, roads, trenches and stockpiles have resulted in direct losses of wetland habitat over the years, and impacts to the natural hydrological setting, as well as the creation of preferential flow paths and altered water retention and distribution profiles.

11.1. Environmental and current land use map

The land use of the of the 5 Seam Mining Project area is dominated by mining area, grazing, residential area, open space/wildlife, plantation and cultivation agriculture. The dominate Land Use of the proposed 5 Seam Mining Project is open area and cultivation followed by mining and infrastructural development. **Figure 16** illustrated the different land uses on the proposed 5 Seam Mining Project study area.

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

12.1. Methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential impacts and risks

Impact Ranking Criteria to be used

The criteria used for assessing the assessing the significance of the impacts are given in **Table 57**.

The impact assessment method takes into account the current environment, the details of the proposed project and the findings of the specialist studies. Cognizance has been given to both positive and negative impacts that may result from the development. The significance of the impact is dependent on the consequence and the probability that the impact will occur.

Impact significance = (consequence x probability)

Where:

Consequence = (severity + extent)/2

and

Severity = [intensity + frequency + duration]/3

Each criterion is given a score from 1 to 5 based on the definitions given in **Table 57** although the criteria used for the assessment of impacts attempts to quantify the significance, it is important to note that the assessment is generally a qualitative process and therefore the application of this criteria is open to interpretation. The process adopted will therefore include the application of scientific measurements and professional judgement to determine the significance of environmental impacts associated with the project. The assessment thus largely relies on experience of the environmental assessment practitioner (EAP) and the information from the specialists' studies for the EIA.

Where the consequence of an event is not known or cannot be determined, the "precautionary principle" will be adhered to and the worst-case scenario assumed. Where possible, mitigation measures to reduce the significance of negative impacts and enhance positive impacts will be recommended. The detailed actions, which are required to ensure

that mitigation is successful, will be provided in the Environmental Management Programme report, which will form part of the EIR Phase.

Consideration will be given to the phase of the project during which the impact occurs. The phase of the development during which the impact will occur, will be noted to assist with the scheduling and implementation of management measures.

Table 57: Criteria for assessing the impact significance

SEVERITY CRITERIA

INTENSITY = MAGNITUDE OF IMPACT	**RATING**
Insignificant: impact is of a very low magnitude	1
Low: impact is of low magnitude	2
Medium: impact is of medium magnitude	3
High: impact is of high magnitude	4
Very high: impact is of highest order possible	5

FREQUENCY = HOW OFTEN THE IMPACT OCCURS	**RATING**
Seldom: impact occurs once or twice	1
Occasional: impact occurs every now and then	2
Regular: impact is intermittent but does not occur often	3
Often: impact is intermittent but occurs often	4
Continuous: the impact occurs all the time	5

DURATION = HOW LONG THE IMPACT LASTS	**RATING**
Very short-term: impact lasts for a very short time (less than a month)	1
Short-term: impact lasts for a short time (months but less than a year)	2
Medium-term: impact lasts for the for more than a year but less than the life of operation.	3
Long-term: impact occurs over the operational life of the proposed extension.	4
Residual: impact is permanent (remains after mine closure)	5

EXTENT

EXTENT = SPATIAL SCOPE OF IMPACT/ FOOTPRINT AREA / NUMBER OF RECEPTORS	**RATING**
Limited: impact affects the mining area	1
Small: impact extends to the neighbouring farmers	2
Medium: impact extends to surrounding farmers beyond the immediate neighbours	3
Large: impact affects the area covered by the municipal area	4

Very Large: The impact affects an area larger than the municipal area	5

PROBABILITY

PROBABILITY = LIKELIHOOD THAT THE IMPACT WILL OCCUR	RATING
Highly unlikely: the impact is highly unlikely to occur	0.2
Unlikely: the impact is unlikely to occur	0.4
Possible: the impact could possibly occur	0.6
Probable: the impact will probably occur	0.8
Definite: the impact will occur	1

IMPACT SIGNIFICANCE

NEGATIVE IMPACTS

≤1	Very low	Impact is negligible. No mitigation required.
>1≤2	Low	Impact is of a low order. Mitigation could be considered to reduce impacts. But does not affect environmental acceptability.
>2≤3	Moderate	Impact is real but not substantial in relation to other impacts. Mitigation should be implemented to reduce impacts.
>3≤4	High	Impact is substantial. Mitigation is required to lower impacts to acceptable levels.
>4≤5	Very High	Impact is of the highest order possible. Mitigation is required to lower impacts to acceptable levels. Potential Fatal Flaw.

POSITIVE IMPACTS

≤1	Very low	Impact is negligible.
>1≤2	Low	Impact is of a low order.
>2≤3	Moderate	Impact is real but not substantial in relation to other impacts.
>3≤4	High	Impact is substantial.
>4≤5	Very High	Impact is of the highest order possible.

Table 58: Impact Significance rating

Activity Number	Activity Description	Aspect	Impact	Significance Rating Before Mitigation Measures								Significance	Mitigation Measures	Significance Rating after Mitigation Measures								Significance
				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
1	Employment of workers and procurement of materials	Social	Creation of employment	4	5	5	2	1	4,7	3,3	3,3	Positive High	• Emphasis to employ local individuals must be maximised, reducing the need for migrant labour; • Construction contractors should prioritise employment of the local community members and contracts must include employment targets as part of their contractual agreements; • Employment requirements should be broadly publicised to ensure that job-seekers do not have unrealistic job expectations; • Liaison structures with the local police and community policing forums must be established and development of informal settlements within the proposed mining areas to be communicated to the forums for potential monitoring and addressing; and • Seriti should liaise with the ELM to ensure that population influx is taken into account in infrastructure development planning of the ELM.	4	5	5	2	1	4,67	3,3	3,3	**Positive High**
2	Transportation of construction material to site.	Air Quality	Dust generation emanating from the Khutala 5 Seam Mining Project area including the KPS/KHU Link Road.	3	5	4	1	0,8	4	2,5	2	Moderate	• Ensure that dust suppressants are applied to gravel or unpaved roads that are in use; • Vehicles will obey speed limits; and • Bulk delivery of materials should be maximised to reduce the frequency of deliveries. • Ensure that dust suppressants are applied to gravel or unpaved roads that are in use; • Vehicles will obey speed limits; and • Bulk delivery of materials should be maximised to reduce the frequency of deliveries.	2	5	4	1	0,8	3,7	2,3	2,0	Low
		Topography and Visual Environment.	Topographical change Negative visual impact caused by vehicular activity to transport construction material.	3	5	4	1	0,8	4	2,5	2	Moderate	• Ensure liaison with the local authorities for the maintenance and upkeep of roads; • Ensure that dust suppressants are applied to gravel or unpaved roads that are in use; and • Vehicles will obey speed limits.	2	5	5	2	0,6	4	3	1,8	Low

Activity Number	Activity Description	Aspect	Impact	Significance Rating Before Mitigation Measures								Significance	Mitigation Measures	Significance Rating after Mitigation Measures								Significance
				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
		Surface Water	Negative impacts on surface water resources as a result of hydrocarbon spills.	2	5	4	1	0.8	3, 7	2,3	2	Moderate	• All potential hydrocarbon spillages and leaks must be cleaned up immediately and the soils remediated; • Spillage control kits will be readily available on site to contain the mobilisation of contaminants and clean up spills; • All vehicles and machinery to be serviced in a hard park area or at an off-site location; • Storage of hydrocarbons and explosives must be managed according to the Hazardous Substances Act, 1973 (Act No. 15 of 1973); • Hydrocarbons and explosives storage facilities must be in a hard park bunded facility; and • Vehicles with leaks must have drip trays in place.	2	5	5	2	0,6	4	3	1,8	Low
		Traffic	The degradation of the road structures	2	4	4	1	0.6	3,3	2,2	1,4	Low	• Adhere to the Mine's Traffic Management Plan; and • Gravel roads used must be graded and compacted regularly, should the roads remain unpaved.	1	4	4	1	0,4	3	2	0,8	Very low
3.	Use and storage of construction fuel and lubricants.	Soil	Soil contamination and degradation.	4	4	5	2	0.8	4,3	3,2	2,5	Moderate	• In case whereby contractors bring on site mobile bowsers and lubricants, these are to be stored in a bunded area when parked at the construction areas; • All potential hydrocarbon spillages and leaks must be cleaned up immediately and the soils remediated; • Spillage control kits will be readily available on site to contain the mobilisation of contaminants and clean up spills; • All vehicles and machinery to be serviced in a hard park area or at an off-site location; • Storage of hydrocarbons must be managed according to the Hazardous Substances Act, 1973 (Act No. 15 of 1973); and • Vehicles with leaks must have drip trays in place.	2	5	5	2	0,6	4	3	1,8	Low

Activity Number	Activity Description	Aspect	Impact	Significance Rating Before Mitigation Measures								Significance	Mitigation Measures	Significance Rating after Mitigation Measures								Significance
				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
		Surface Water	Impacts on surface water resources as a result of hydrocarbon spills.	3	4	5	2	0,8	4	3	2,5	Moderate	• In case whereby contractors bring on site mobile bowsers and lubricants, these are to be stored in a bunded area when parked at the construction areas; • All potential hydrocarbon spillages and leaks must be cleaned up immediately and the soils remediated; • Spillage control kits will be readily available on site to contain the mobilisation of contaminants and clean up spills; • All vehicles and machinery to be serviced in a hard park area or at an off-site location; • Storage of hydrocarbons must be managed according to the Hazardous Substances Act, 1973 (Act No. 15 of 1973); and • Vehicles with leaks must have drip trays in place.	1	5	4	1	0,8	3,3	2,5	2	Moderate
		Groundwater	Groundwater contamination	4	5	5	2	1	4, 7	3,3	3,3	High	• In case whereby contractors bring on site mobile bowsers and lubricants, these are to be stored in a bunded area when parked at the construction areas; • All potential hydrocarbon spillages and leaks must be cleaned up immediately and the soils remediated; • Spillage control kits will be readily available on site to contain the mobilisation of contaminants and clean up spills; • All vehicles and machinery to be serviced in a hard park area or at an off-site location; • Storage of hydrocarbons must be managed according to the Hazardous Substances Act, 1973 (Act No. 15 of 1973); and • Vehicles with leaks must have drip trays in place.	4	4	5	2	0,8	4,3	3,2	2,5	Moderate
4	Site clearance and topsoil removal as a result of the proposed Project.	Air Quality	Dust generation emanating from the activities associated with the Khutala 5 Seam Mining Project areas	4	4	5	2	0,8	4,3	3,2	2,53	Moderate	• The area of disturbance must be restricted to the required footprint size; • Ensure that only vegetation within the designated areas is removed; • The drop heights used during the loading of the cleared soils into trucks should be minimised as far as possible; and • Dirt roads to be wetted by a water browser and/or any applicable dust suppressant so as to reduce dust plumes.	2	5	5	2	0,6	4	3	1,8	Low

Activity Number	Activity Description	Aspect	Impact	Significance Rating Before Mitigation Measures								Significance	Mitigation Measures	Significance Rating after Mitigation Measures								Significance
				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
		Topography and Visual Environment	Topographical change and the disruption of surface water flow. Soil erosion and topsoil loss. Visual impact caused by vegetation and topsoil removal.	3	4	4	1	0,6	3,7	2,3	1,4	Low	• Ensure vegetation and topsoil is only be cleared when necessary and within the demarcated areas; • Ensure topsoil stockpiles are vegetated as soon as possible; and • Ensure topsoil stockpiles are contoured and have a steepness of less than 18° to prevent slope failure and erosion and aid in vegetation establishment. • Topsoil stockpiles that will be kept for more than a year are to be vegetated to sustain ecological components and further prevent dust emissions and growth of alien vegetation.	1	4	4	1	0,4	3	2	0,8	Very low
		Soil	Soil contamination and degradation during soil stripping and management	3	5	4	1	0,8	4	2,5	2	Moderate	• Excavation and long-term stockpiling of soil should be limited within the demarcated areas as far as practically possible; • Ensure all stockpiles (especially topsoil) are clearly and permanently demarcated and located in defined no-go areas; • Restrict the amount of mechanical handling, as each handling event increases that compaction level and the changes to the soil structure; • Soil stripping should be done in line with a topsoil stripping plan; • Where possible, separate stockpiling of different soil to obtain the highest post-mining land capability; • Stockpiles should be revegetated to establish a vegetation cover as an erosion control measure. These stockpiles should also be kept alien vegetation free at all times to prevent loss of soil quality; and • Temporary berms can be constructed, around stockpile areas whilst vegetation cover has not established to avoid soil loss through erosion.	2	5	5	2	0,6	4	3	1,8	Low
			Soil erosion and generation of dust.	3	5	4	1	0,9	4	2,5	2	Moderate		2	5	5	2	0,6	4	3	1,8	Low
			Soil compaction.	3	5	4	1	0,1	4	2,5	2	Moderate	• If possible, vegetation clearance and commencement of mining related activities (construction of haul road), can be scheduled to coincide with low rainfall conditions when soil moisture is anticipated to be relatively low such that the soils are less prone to compaction; • The movement of heavy vehicle should be limited to existing roads and be limited to areas where construction of haul road is to take place.	2	5	5	2	0,8	4	3	1,8	Low

Activity Number	Activity Description	Aspect	Impact	Significance Rating Before Mitigation Measures								Significance	Mitigation Measures	Significance Rating after Mitigation Measures								Significance
				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
			Loss of land capability and land use potential	2	5	5	2	0,7	4	3	1,8	Low	• Any compacted soils must be ripped to alleviate compaction; • Stored topsoil should be replaced (if any) and the footprint graded to a smooth surface; • The landscape should be backfilled and reprofiled to mimic the natural topography for potential agricultural activities and grazing opportunities post mining. If possible, ensure a continuation of the pre mining surface drainage pattern; • Slopes of the backfilled surface should change gradually since abrupt changes in slope gradient increase the susceptibility for erosion initiation; • The soil fertility status to be determined by soil chemical analysis after levelling (before seeding/re-vegetation). • Soil amelioration should be completed, if necessary, according to recommendations by a soil specialist, to correct the pH and nutrition status before revegetation; and • The footprint should be re-vegetated with a grass seed mixture as soon as possible, preferably in spring and early summer to stabilise the soil and prevent soil loss during the rainy season.	2	4	4	1	0,6	3, 3	2,3	1,4	Low
			Loss of vegetation communities.	2	5	5	2	0,7	4	3	1,8	Low	• Ensure site clearing is restricted to the footprint of the designated areas to limit the degradation and destruction of natural habitats; • Vegetate open and exposed areas to prevent soil erosion and the establishment of alien invasive vegetation; • Restrict access and avoid areas of identified faunal and floral SSC, that are adjacent to the mining activities; • Floral and faunal SSC within the mining activities must be rescued and relocated; • Restrict access and avoid sensitive landscapes, such as wetlands and ridges, that are adjacent to the mining operations; and • Topsoil that will be used for rehabilitation within one year must be stockpiled according to the Rehabilitation Plan. Compaction of stockpiled topsoil must be avoided to ensure the seed bank is viable.	2	4	4	1	0,6	3,3	2,3	1,4	Low
			Influx and establishment of alien invasive vegetation.	2	5	5	2	0,7	4	3	1,8	Low	• Alien invasive vegetation to be identified and removed throughout the LoM.	2	4	4	1	0,6	3,3	2,3	1,4	Low

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				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
		Wetlands and Aquatic Ecology	Sedimentation of wetland areas downstream of the stockpiles.	3	5	4	1	0,1	4	2,5	2	Moderate	• Ensure soil management programme is implemented and maintained to minimise erosion and sedimentation; • Active rehabilitation, re-sloping, and re-vegetation of disturbed areas immediately after construction; • Implement and maintain alien vegetation management programme; • Appropriate sanitary facilities must be provided for the duration of the construction activities and all waste must be removed to an appropriate waste facility.	2	5	5	2	0,6	4	3	1,8	Low
			Contamination of soils as a result of the ingress of hydrocarbons	3	5	4	1	0,1	4	2,5	2	Moderate	• Ensure soil management programme is implemented and maintained to minimise erosion and sedimentation; • Active rehabilitation, re-sloping, and re-vegetation of disturbed areas immediately after construction; • Implement and maintain alien vegetation management programme; • Limit the footprint area of the construction activities to what is absolutely essential in order to minimise impacts as a result of vegetation clearing and compaction of soils; • All erosion noted within the construction footprint should be remedied immediately and included as part of an ongoing rehabilitation plan; • • All delineated watercourses and their associated 100 m zones of regulation in terms of GN704 should be designated as “No-Go” areas and be off limits to all unauthorised vehicles and personnel, with the exception of approved construction and operational areas unless authorised as part of the IWUL; • No unnecessary crossing of the watercourses should take place and wherever possible, existing infrastructure should be utilised; • Suitably designed culverts should be installed under road crossings where any watercourses are anticipated to be crossed; • The number of culverts installed should be suitable for the gradient, width and flow profiles of the watercourses being crossed so as to avoid upstream inundation, erosion and incision, and alterations to the natural channel; • Crossings should make use of existing roads wherever possible and should either utilise or be constructed downgradient of barriers associated with impoundments on the affected systems; • No material may be dumped or stockpiled within delineated watercourses;	2	5	5	2	0,6	4	3	1,8	Low

Activity Number	Activity Description	Aspect	Impact	Significance Rating Before Mitigation Measures								Significance	Mitigation Measures	Significance Rating after Mitigation Measures								Significance
				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
													• No vehicles or heavy machinery may be allowed to drive indiscriminately within any delineated watercourses. All vehicles must remain on demarcated roads and within the construction footprint; • All vehicles must be regularly inspected for leaks; • Re-fuelling must take place on a sealed surface area away from wetlands to prevent ingress of hydrocarbons into topsoil; • All spills should be immediately cleaned up and treated accordingly; and.									
			Loss of catchment yields and surface water recharge, potential loss of biodiversity, impaired water quality, potential loss of instream integrity, potential impacts to freshwater resources further downstream of this point.	3	5	4	1	0,1	4	2,5	2	Moderate	• Ensure that as far as possible all infrastructures are placed outside of delineated watercourse areas and their associated zones of regulation; • Ensure that sound environmental management is in place during the planning phase; • Design of infrastructure should be environmentally and structurally sound and all possible precautions taken to prevent spillage and/or seepage to the surface and groundwater resources present; • It must be ensured that the design and construction of all infrastructures prevents failure.	2	5	5	2	0,6	4	3	1,8	Low
			Destruction of natural habitat and animal life within the development area and to maintain ecological connectivity to neighbouring sites and, where possible, to regional ecological corridors.	2	5	4	1	0,8	3, 7	2,3	2	Moderate	• Environmental awareness training must include the prohibition of any harm or hindrance to any indigenous fauna species and the consequences of such actions. • Allow unhindered movement of fauna to allow them the opportunity to freely leave activity areas. • Ensure safe speed limits in the development area and no open fires. • Do not feed wild life and ensure that all food and food waste, including domestic waste, is placed in sealed containers and not exposed on site. • Ensure that the outside areas are kept clean and tidy and provide adequate waste removal services to prevent the attraction of rats and other alien scavenging species to the site. • •Regularly (daily) inspect the haul road and clear coal spills and clear coal fines to reduce coal dust contamination to the neighbouring wetland areas.	2	5	5	2	0,6	4	3	1,9	Low

Activity Number	Activity Description	Aspect	Impact	Significance Rating Before Mitigation Measures								Significance	Mitigation Measures	Significance Rating after Mitigation Measures								Significance
				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
		Flora	Loss of vegetation and/or declining species, alteration, and loss of microhabitats, altered vegetation cover, increased erosion and contamination of soil and groundwater due to localised destruction / removal of vegetation and vegetated topsoil.	2	5	5	2	0,6	4	3	1,9	Low	• Keep the clearing of vegetation / impacts to vegetation for any activity to a minimum and locate such activities in already modified areas or secondary grassland. • No building of temporary infrastructure should be allowed in moist grasslands without a WUL. • Prevent spillage of hazardous material and other pollutants, contain, and treat any spillages immediately, strictly prohibit any pollution/littering according to the relevant EMPr • After any above ground activities within the site, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land must be left in a condition as close as possible to that prior to the activity. • No off-road driving beyond designated areas may be permitted, especially not in natural vegetation. • Strict speed control measures must be implemented for any vehicles driving within the mining rights area to reduce dust. Refer to existing mine control measures. • There is zero tolerance of the destruction or collecting of any indigenous biodiversity or part thereof by anybody working for or on behalf of the mine. • Monitor the establishment of invasive species and remove as soon as detected, whenever possible before regenerative material can be formed • Monitor all sites disturbed by localised activities for colonisation by exotics or invasive plants and control these as they emerge. Monitoring should continue for at least two years after such activities cease.	2	4	4	1	0,6	3,3	2,3	1,4	Low

Activity Number	Activity Description	Aspect	Impact	Significance Rating Before Mitigation Measures								Significance	Mitigation Measures	Significance Rating after Mitigation Measures								Significance
				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
			The destruction or degradation of watercourse vegetation.	2	5	5	2	0,6	4	3	1,9	Low	• Ensure the flow of water through the moist grassland areas remain unchanged. • Monitor the presence of hydrophytes and species with an affinity for moist soils within the moist grasslands. Should such species decrease of be replaced by terrestrial species, then it is likely that the hydrological regime on the site has changed. • If moist grasslands are found to become drier, the Crinum species must be relocated to suitable habitat. • Input of sediment due to any related mining activities should be prevented at all cost. • Pollution of the surface and groundwater. Mitigation for this potential impact includes: o In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water Affairs must be informed immediately; o Store all litter carefully so it cannot be washed or blown into the water course; o Storage of potentially hazardous materials should be above any 100-year flood line or the functional wetland boundary (and its associated buffer zone). These materials include fuel, oil, cement, bitumen etc.; o Surface water draining off contaminated areas containing oil and petrol would need to be channelled towards a sump which will separate these chemicals and oils; o No uncontrolled discharges of water from the mine to any surface water resources shall be permitted. Any discharge points need to be approved by the relevant authority.	2	4	4	1	0,6	3,3	2,3	1,4	Low

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				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
			Destruction of vegetation.	2	5	5	2	0,7	4	3	1,8	Low	An independent Environmental Control Officer (ECO) should be appointed to oversee construction activities and ensure the following: • Keep the development footprint in Medium categories as small as possible. • A temporary fence or demarcation must be erected around the construction area (include the actual footprint, as well as areas where material is stored) to prevent access to adjacent sensitive vegetation. • Maintain site demarcations in position until the cessation of construction work. • Only remove vegetation where necessary and retain vegetation in place for as long as possible prior to removal. • Prohibit vehicular or pedestrian access into natural areas beyond the demarcated boundary of the construction area. • Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas. • Implement a vegetation rehabilitation plan to ensure areas that can be rehabilitated post construction are adequately vegetated with indigenous grass species. • After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land must be left in a condition as close as possible to that prior to construction.	2	4	4	1	0,6	3,3	2,3	1,6	Low

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				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
			Erosion and subsequent sedimentation or pollution of proximate moist grassland (watercourse).	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• Make use of existing roads and tracks where feasible, rather than creating new routes through grassland areas. • Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area. • Runoff from access roads must be managed to avoid erosion and pollution problems. • Ensure that runoff from compacted or sealed surfaces is slowed down and dispersed sufficiently to prevent accelerated erosion from being initiated (erosion management plan required) • Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. The grassland can be removed as sods and re-established after construction is completed. • Colonisation of the disturbed areas by plants species from the surrounding natural vegetation must be monitored to ensure that vegetation cover is sufficient within one growing season. If not, then the areas need to be rehabilitated with a grass seed mix containing species that naturally occur within the study area. • Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas. • Prevent spillage of construction material, oils or other chemicals, strictly prohibit other pollution. Ensure there is a method statement in place to remedy any accidental spillages immediately. • After construction clear any temporarily impacted areas of all foreign materials, re-apply and/or loosen topsoils and landscape to surrounding level.	3	5	4	1	0,1	4	2,5	2	Moderate
			Alien invasive plant species.	3	5	4	1	0,1	4	2,5	2	Moderate	• Areas cleared of invasive to be monitored in the growing season (summer). • If re-sprouting or reseeding is noted, follow-up control to be initialised. • Cleared and denuded areas to be rehabilitated as soon as possible with indigenous grass species. • Monitor the establishment of invasive species and remove as soon as detected, whenever possible before regenerative material can be formed. • Monitor all sites disturbed by localised activities for colonisation by exotics or invasive plants and control these as they emerge.	2	5	5	2	0,6	4	3	1,8	Low

Activity Number	Activity Description	Aspect	Impact	Significance Rating Before Mitigation Measures								Significance	Mitigation Measures	Significance Rating after Mitigation Measures								Significance
				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
													• Monitoring should continue for at least two years after such activities cease.									
		Surface Water	Siltation of surface water resources.	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• Ensure site clearing is limited to the designated areas, and • Implement Stormwater Management designs to prevent erosion and divert dirty water to the appropriate storage dams (PCDs).	2	4	4	1	0,6	3,2	2,3	1,4	Low
			Contamination of groundwater resources	4	5	5	2	1,0	4,7	3,3	3,3	High	• Ensure that a stormwater management plan is in place to separate clean and dirty water; and • Groundwater monitoring of the water quality and levels must take place quarterly, especially for the water supply boreholes to ensure a sustainable resource and identify impacts on local users.	4	4	5	2	0,8	4,3	3,2	2,5	Moderate
		Noise	Noise emanating from the construction machinery and vehicles impacting on surrounding sensitive receptors.	2	4	4	1	0,6	3,3	2,2	1,6	Low	• Ensure site clearing activities are only undertaken during daylight hours; • Mining related machines and vehicles should be serviced on a regular basis to ensure noise suppression mechanisms are effective (e.g., installed exhaust mufflers); and • Ensure equipment and machinery is switched off when not in use.	2	4	4	1	0,6	3,2	2,3	1,4	Low
5.	Construction Surface Infrastructure (Including KPS/KHU Link Road, Ventilation Shaft, Transfer Chute and associated Water Management Infrastructure)	Air Quality	Fugitive dust generation emanating.	2	5	4	1	0,8	3,7	2,3	2	Moderate	• Ensure that the areas of disturbance are minimised and restricted to the required footprint areas; and • Ensure that dust suppressants are applied to exposed surfaces.	2	5	5	2	0,6	4	3	1,9	Low
		Topography and Visual Environment	Topographical change and disruption of surface water flow. Soil erosion. visual impact caused by the construction of surface infrastructure	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• Limit the footprint areas of the of the surface infrastructure, where possible, especially the width of the link road to be within the servitude; • Ensure that access and haul roads are contoured to limit erosion from surface runoff, preventing further alteration to the topography; • Establish vegetation, where possible, to aid in screening infrastructure; • Surface infrastructure should be painted natural hues so as to blend into the surrounding landscape; and • Limit construction activities at night and down lighting must be used to minimise light pollution.	2	5	5	2	0,6	4	3	1,9	Low
		Soils	Soil contamination and degradation.	2	5	4	1	0,8	3,7	2,3	2	Moderate	• Ensure soils are stripped and stockpiled prior to the excavation of infrastructure areas; and • Implement Stormwater Management designs to prevent erosion.	2	4	4	1	0,6	3,3	2,3	1,6	Low

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				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
		Fauna and Flora	Loss of vegetation communities.	2	5	5	2	0,6	4	3	1,9	Low	• Vegetate open and exposed areas to prevent soil erosion and the establishment of alien invasive vegetation; • Ensure a Storm Water Management Plan is implemented; and • Alien invasive vegetation to be identified and removed throughout the LoM.	2	4	4	1	0,6	3,3	2,3	1,6	Low
			Influx and establishment of alien invasive vegetation.	2	5	5	2	0,6	4	3	1,9	Low		2	4	4	1	0,6	3,3	2,3	1,6	Low
		Fauna	Destruction of natural habitat and animal life within the development area and to maintain ecological connectivity to neighbouring sites and, where possible, to regional ecological corridors.	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• Environmental awareness training must include the prohibition of any harm or hindrance to any indigenous fauna species and the consequences of such actions. • Allow unhindered movement of fauna to allow them the opportunity to freely leave activity areas. • Ensure safe speed limits in the development area and no open fires. • Do not feed wild life and ensure that all food and food waste, including domestic waste, is placed in sealed containers and not exposed on site. • Ensure that the outside areas are kept clean and tidy and provide adequate waste removal services to prevent the attraction of rats and other alien scavenging species to the site. • Regularly (daily) inspect the haul road and clear coal spills and clear coal fines to reduce coal dust contamination to the neighbouring wetland areas.	2	5	5	2	0,6	4	3	1,9	Low
		Flora	Alien invasive plant species.	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• Areas cleared of invasive to be monitored in the growing season (summer). • If re-sprouting or reseeding is noted, follow-up control to be initialised. • Cleared and denuded areas to be rehabilitated as soon as possible with indigenous grass species. • Monitor the establishment of invasive species and remove as soon as detected, whenever possible before regenerative material can be formed. • Monitor all sites disturbed by localised activities for colonisation by exotics or invasive plants and control these as they emerge. • Monitoring should continue for at least two years after such activities cease.	2	5	5	2	0,6	4	3	1,9	Low

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				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
		Wetlands and Aquatic Ecology	Contamination and sedimentation of the wetland systems and aquatic ecosystems.	2	5	4	1	0,8	3,7	2,3	2	Moderate	• Ensure soil management programme is implemented and maintained to minimise erosion and sedimentation; • Active rehabilitation, re-sloping, and re-vegetation of disturbed areas immediately after construction; • Implement and maintain alien vegetation management programme; • Appropriate sanitary facilities must be provided for the duration of the construction activities and all waste must be removed to an appropriate waste facility.	2	5	5	2	0,6	4	3	1,9	Low
		Surface Water	Siltation of surface water resources.	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• Ensure soil management programme is implemented and maintained to minimise erosion and sedimentation; • Active rehabilitation, re-sloping, and re-vegetation of disturbed areas immediately after construction; • Implement and maintain alien vegetation management programme; • Limit the footprint area of the construction activities to what is absolutely essential in order to minimise impacts as a result of vegetation clearing and compaction of soils; • All erosion noted within the construction footprint to be remedied immediately and included as part of an ongoing rehabilitation plan; • All delineated watercourses and their associated 100 m zones of regulation in terms of GN704 must be designated as “No-Go” areas and be off limits to all unauthorised vehicles and personnel, with the exception of approved construction and operational areas; • No unnecessary crossing of the watercourses to take place and wherever possible, existing infrastructure should be utilised; • Suitably designed culverts to be installed under road crossings where any watercourses are anticipated to be crossed; • The number of culverts installed must be suitable for the gradient, width and flow profiles of the watercourses being crossed so as to avoid upstream inundation, erosion and incision, and alterations to the natural channel; • Crossings to make use of existing roads wherever possible and should either utilise or be constructed downgradient of barriers associated with impoundments on the affected systems; • No material may be dumped or stockpiled within delineated watercourses;	2	4	4	1	0,6	3,3	2,3	1,6	Low

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				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
		Noise	Noise emanating from the construction machinery and vehicles impacting on surrounding sensitive receptors.	5	4	4	3	0,8	4,3	3,7	2,9	Moderate	• Ensuring that all construction equipment operators receive proper training in the use of the equipment and that the equipment is serviced regularly. • All blasting and piling driving, if required, should only occur during the day. • An environmental noise monitoring survey should be conducted during the construction phase to assess the impact and recommend further actions if required. • A public complaints and actions registry should be established to capture public perceptions and complaints regarding noise impacts, track investigation actions, and introduce corrective measures for continuous improvement. • Noise complaints should be reported through the community liaison officer and include an effective follow-up process. • Noise reduction techniques should be considered as additional mitigation measures to the project design • Selecting equipment with lower sound power levels. • Installing silencers on fans. • Ensure construction activities are only undertaken during daylight hours; • All the diesel-powered equipment should be of high quality and well maintained. • Equipment should be switched off when not in use. • It is recommended that noise measurement monitoring continues during construction and operation phases. This will assist in formulating mitigation measures should noise complaints be received from surrounding residents or communities. Additional monitoring points should be included in the vicinity if required/requested. • Regular maintenance schedules should include a check for noise emissions, e.g., the functional state of all intake and exhaust noise attenuators and effectiveness of enclosures in accordance with standard operating procedures; and • Construction related machines and vehicles should be serviced on a regular basis to ensure noise suppression mechanisms are effective (e.g., installed exhaust mufflers).	4	4	4	3	0,6	4	3,5	2,1	Moderate

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				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
6	Construction of RoM Stockpile and associated Water Management Infrastructure.	Air Quality	Fugitive dust generation emanating the RoM Stockpile construction activities.	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• Ensure that the areas of disturbance are minimised and restricted to the required footprint areas; • Public complaints and actions registry should be established to capture public perceptions and complaints regarding increased air quality impacts; • Dust fallout monitoring must be conducted throughout the life of operation of Khutala Colliery to confirm model predictions. • Reduce, control and manage the height of material drops (e.g., Transfer chute to RoM Stockpile); and • Increase moisture content of material by using water sprays prior to or during conveying, crushing, and screening material.	2	5	5	2	0,6	4	3	1,9	Low
		Topography and Visual Environment	Topographical change and disruption of surface water flow. Soil erosion and topsoil loss. visual impact caused by stockpiling of coal.	2	5	5	2	0,6	4	3	1,9	Low	• Ensure that the stockpile is constructed with the planned disturbed areas; • Operate, manage and maintain the stockpile in line with the design plans, as-built plans and operating and maintenance manual.	2	3	3	1	0,6	2,7	1,8	1,1	Low
		Soils	Soil degradation.	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• Minimise topsoil stockpile heights as far as possible; • Ensure soils are stripped and stockpiled prior to the excavation of infrastructure foundations; • Ensure stockpiles are maintained in a fertile and erosion free state by sampling and analysing for macro nutrients and pH on an annual basis; • Traffic and access to the stockpiles will be restricted; • Ensure that the topsoil stockpiles are vegetated to prevent soil erosion and to reinstitute the ecological processes within the soil; and • Implement Stormwater Management designs to prevent erosion.	2	5	5	2	0,6	4	3	1,8	Low
		Fauna and Flora	Loss of vegetation communities	2	5	5	2	0,6	4	3	1,9	Low	• Vegetate open and exposed areas to prevent soil erosion and the establishment of alien invasive vegetation; • Ensure a Storm Water Management Plan is implemented; and • Alien invasive vegetation to be identified and removed throughout the LoM.	2	4	4	1	0,6	3,3	2,3	1,6	Low

Activity Number	Activity Description	Aspect	Impact	Significance Rating Before Mitigation Measures								Significance	Mitigation Measures	Significance Rating after Mitigation Measures								Significance
				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
		Wetlands and Aquatic Ecology	Contamination and sedimentation of the wetland systems and aquatic ecosystems.	2	5	4	1	0,8	3,7	2,3	2	Moderate	• Ensure the statutory buffers are implemented from the wetlands systems and watercourses, unless otherwise stated in the IWUL; • Ensure a Storm Water Management Plan is implemented; and • Implement a biannual Aquatic Monitoring Programme to monitor potential impacts and implement corrective actions, should it be required.	2	5	5	2	0,6	4	3	1,9	Low
		Surface Water	Siltation of surface water resources.	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• Ensure that the topsoil stockpiles are vegetated to prevent soil erosion; • Implement Stormwater Management designs to prevent erosion and divert dirty water to the appropriate storage dams (PCDs); and • The design, construction, operation and maintenance of water management facilities must be in accordance with GN R 704 capacity requirements.	2	4	4	1	0,6	3,3	2,3	1,6	Low
		Groundwater	Contamination of groundwater resources	4	5	5	2	1	4,7	3,3	3,3	High	• A groundwater monitoring system must be implemented and test the water on a quarterly basis for changes in water quality and water levels. Should impacts be identified, management measures must be implemented based on the contaminant or water level change; • Implement a Surface Water Management Plan to minimise the volume of dirty water produced, as well as the effectiveness of the containment of dirty water, thereby reducing the probability of contamination of groundwater from infiltration of dirty surface water; • Refine and update the conceptual and numerical models annually for the first four years and thereafter every five years based on groundwater monitoring results. This will help to better quantify impacts to water quantity and quality; and • All contaminant, waste and hazardous waste storage facilities and other contaminated water storage areas (PCD) must be lined to pro-actively prevent infiltration of contaminated seepage water.	4	4	5	2	0,8	4,3	3,2	2,5	Moderate
7	Development of the 5 Seam underground mining activities.	Air Quality	Fugitive dust generation emanating from the development of the 5 Seam workings.	2	5	4	1	0,8	3,7	2,3	2	Moderate	• Development activities will be undertaken from the existing 4 Seam workings. That is within the existing underground workings and no surface disturbance and dust generation will take place.	2	5	5	2	0,6	4	3	1,9	Low

Activity Number	Activity Description	Aspect	Impact	Significance Rating Before Mitigation Measures								Significance	Mitigation Measures	Significance Rating after Mitigation Measures								Significance
				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
		Topography and Visual Environment	Topographical change and disruption of surface water flow.	4	4	5	2	0,8	4,3	3,2	2,53	Moderate	• Developmental activities will be undertaken from the existing 4 Seam workings. That is within the existing underground workings and no surface disturbance and dust generation will take place.	2	5	5	2	0,6	4	3	1,9	Low
		Surface Water	Siltation of surface water resources from the drilling of the ventilation shaft.	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• Implement Stormwater Management designs to prevent erosion and divert dirty water to the appropriate storage dams (PCDs); and • The design, construction, operation and maintenance of the water management facilities must be in accordance with GN R 704 capacity requirements.	2	4	4	1	0,6	3,3	2,3	1,6	Low
		Groundwater	Contamination of groundwater resources due to hydrocarbon spillages.	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• Ensure that all potential hydrocarbon spillages and leaks are cleaned up immediately and the soils remediated; • Spillage control kits will be readily available on site to contain the mobilisation of contaminants and clean up spills; • All contractors' construction vehicles and machinery to be serviced in a hard park area or at an off-site location; and • Groundwater monitoring of the water quality and levels must take place quarterly; and.	2	4	4	1	0,6	3,3	2,3	1,6	Low
			Impacts of dewatering on local users including the users' boreholes.									No impact.	• Implement a groundwater monitoring programme to assess changes in water levels to monitor the development of the dewatering cone.									No impact.
		Noise	Noise emanating from the construction and mining machinery and vehicles impacting on surrounding sensitive receptors.	2	4	4	1	0,6	3,3	2,2	1,6	Low	• Ensure construction activities are only undertaken during daylight hours; • Mining related machines and vehicles should be serviced on a regular basis to ensure noise suppression mechanisms are effective (e.g., installed exhaust mufflers); and • Ensure equipment and machinery is switched off when not in use.	2	4	4	1	0,6	3,3	2,3	1,4	Low
		Surface infrastructure including heritage resources, farmstead, offices and etc.	Ground vibrations from impacting on sensitive receptors and from damaging the integrity of structures due to underground blasting activities.	4	5	5	2	1	4,7	3,3	3,3	High	• Reduce the charge mass per delay over decreasing distances towards the points of interest of concern; • Specific blast designs to be undertaken to ensure the levels of ground vibration are within limits; • Ground vibration levels must be monitored.	4	4	5	2	0,6	4,3	3,2	2,53	Moderate

Activity Number	Activity Description	Aspect	Impact	Significance Rating Before Mitigation Measures								Significance	Mitigation Measures	Significance Rating after Mitigation Measures								Significance
				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
			Blast from impacting on the structural integrity of surface infrastructure such as houses, power generation, roads and buildings.	4	5	5	2	1	4,7	3,3	3,3	High	• Reduce the charge mass per delay over decreasing distances towards the points of interest of concern; • Air blast levels must be monitored during blasting activities; • Adequate stemming controls should be implemented; • Ground vibration levels must be monitored; and • Conduct annual crack surveys of the affected areas (within the mining areas).	4	4	5	2	0,6	4,3	3,2	2,5	Moderate
			Damaging of surface structures, including roads and heritage resources (graves).	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• Controls must be implemented for the management of stemming lengths; and • Specific blast designs to be compiled and implemented for the blasting to be undertaken.	2	4	4	1	0,4	3,3	2,3	1,6	Low
			Noxious fumes from impacting on employees and contribution to climate change	2	5	4	1	0,8	3,7	2,3	2	Moderate	• The correct explosive products must be utilised; • Quality control systems must be implemented to ensure the correct quantities of additives to the explosives; • Ground vibration levels must be monitored; • Monitor the underground emissions; • A competent person to undertake and declare safe the blasting activities; and • The charge and blast must be undertaken on the same day.	2	5	5	2	0,4	4	3	1,9	Low
9	Operation of the 5 Seam underground mining activities.	Surface and groundwater	Lowering of the water level as a result of undermining activities.	3	5	4	3	1	4	3.5	3.5	High	• Continue with water quality monitoring at the existing sample at the current monitoring locations and frequency; • Allow natural water level to recover after mining; and • Monitoring should continue, and safety measures should be put in place where subsidence is observed.	3	5	4	3	1	4	3.5	3.5	High
		Groundwater	Contamination of groundwater aquifer									No impact	• Dewatering of the workings will be taking place.									No impact
			Surface subsidence.	3	2	5	1	0,8	3,3	2,2	1,7	Low	• Bord and pillar mining; and • Care to be taken when mining the areas that are shallower than 40m. Ensure that the size of the pillars that will be left behind are adequate to prevent subsidence; • Subsidence inspection to be undertaken on an annual basis; and • Safety measures should be put in place where subsidence is observed including fencing of the subsided areas.	2	2	5	1	0,6	3	2	1,2	Low

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				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
			Impacts of dewatering on local users including the Prinsloo Farmstead boreholes.	4	5	5	2	1	4,7	3,3	3,3	High	• Implement a groundwater monitoring programme to assess changes in water levels to monitor the development of the dewatering cone; • An alternate water supply source to be supplied to affected parties (if required); and • Refine and update the conceptual and numerical models annually for the first four years and thereafter every five years based on groundwater monitoring results.	5	5	5	2	1	4,7	3,2	3,5	High
		Surface infrastructure including heritage resources, farmstead, offices and etc	Ground vibrations from impacting on sensitive receptors and from damaging the integrity of structures due to underground blasting activities.	4	5	5	2	1	4,7	3,3	3,3	High	• Reduce the charge mass per delay over decreasing distances towards the points of interest of concern; • Specific blast designs to be undertaken to ensure the levels of ground vibration are within limits; • Ground vibration levels must be monitored.	4	4	5	2	0,6	4,3	3,2	2,5	Moderate
			Air Blast from impacting on the structural integrity of surface infrastructure such as houses, power generation, roads and buildings.	4	5	5	2	1	4,7	3,3	3,3	High	• Reduce the charge mass per delay over decreasing distances towards the points of interest of concern; • Air blast levels must be monitored during blasting activities; • Ground vibration levels must be monitored; and • Conduct annual crack surveys of the affected areas (within the mining areas).	4	4	5	2	0,6	4,3	3,2	2,5	Moderate
			Damaging of surface structures, including roads and heritage resources (graves).	4	4	5	2	0.8	4,3	3,2	2,5	Moderate	• Controls must be implemented for the management of stemming lengths; and • Specific blast designs to be compiled and implemented for the blasting to be undertaken. • The correct explosive products must be utilised; • Quality control systems must be implemented to ensure the correct quantities of additives to the explosives; • Ground vibration levels must be monitored; • Monitor the underground emissions; • A competent person to undertake and declare safe the blasting activities; and • The charge and blast must be undertaken on the same day.	2	5	5	2	0,6	4	3	1,9	Low
10	Storage, use and control of fuel and lubricants to be used for the underground mining activities.	Soil	Soil contamination and degradation	4	4	5	2	0,8	4,3	3,2	2,53	Moderate	• All potential hydrocarbon spillages and leaks must be cleaned up immediately and the soils remediated; • Spillage control kits will be readily available on site to contain the mobilisation of contaminants and clean up spills; • Il vehicles and machinery to be serviced in a hard park area or at an off-site location;	2	4	4	1	0,6	3,3	2,3	1,6	Low

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				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
													• Storage of hydrocarbons and explosives must be managed according to the Hazardous Substances Act, 1973 (Act No. 15 of 1973); • • Hydrocarbons and explosives storage facilities must be in a hard park bunded facility; and • • Vehicles with leaks must have drip trays in place.									
		Groundwater	Groundwater contamination	5	5	5	3	1	5	4	3.9	High	• All potential hydrocarbon leaks must be repaired immediately and spillages be cleaned up immediately and the soils remediated; • Spillage control kits will be readily available on site to contain the mobilisation of contaminants and clean up spills; • All vehicles and machinery to be serviced in a hard park area or at an off-site location; • Storage of hydrocarbons and explosives must be managed according to the Hazardous Substances Act, 1973 (Act No. 15 of 1973); • Hydrocarbons and explosives storage facilities must be in a hard park bunded facility; and • Vehicles with leaks must have drip trays in place; and • Groundwater monitoring of the water quality and levels must take place quarterly especially for the water supply boreholes to ensure a sustainable resource and identify impacts on local users.	5	5	4	2	0,8	4,7	0.8	2.7	Moderate
11	Operation of the RoM Stockpile and associated Water Management Infrastructure.	Air Quality	Fugitive dust generation emanating the RoM Stockpile operational activities.	2	3	4	1	0,8	3	2	2	Moderate	• Ensure that the areas of disturbance are minimised and restricted to the required footprint areas; • Public complaints and actions registry should be established to capture public perceptions and complaints regarding increased air quality impacts; • Dust fallout monitoring must be conducted throughout the life of operation of Khutala Colliery to confirm model predictions; • control and manage the height of material drops (e.g., Transfer chute to RoM Stockpile); and • Increase moisture content of material by using water sprays prior to or during conveying, crushing, and screening material.	2	5	5	2	0,6	4	3	1,9	Low
		Topography and Visual Environment	Topographica change and disruption of surface water flow; To minimise soil erosion and topsoil loss;	4	4	5	2	0,8	4,3	3,2	2,53	Moderate	• Ensure that the stockpile is constructed within the proposed planned disturbed areas; • Operate, manage and maintain the stockpile in line with the design plans, as-built plans and operating and maintenance manual.	2	5	5	2	0,6	4	3	1,9	Low

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				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
			Soil degradation.	3	3	3	1	0,1	3	2	2	Moderate	• Minimise topsoil stockpile heights as far as possible; • Ensure soils are stripped and stockpiled prior to the excavation of infrastructure foundations; • Ensure stockpiles are maintained in a fertile and erosion free state by sampling and analysing for macro nutrients and pH on an annual basis; • Traffic and access to the stockpiles will be restricted; • Ensure that the topsoil stockpiles are vegetated to prevent soil erosion and to reinstitute the ecological processes within the soil; and • Implement Stormwater Management designs to prevent erosion.	2	5	5	2	0,6	4	3	1,8	Low
		Fauna and Flora	Loss of vegetation communities. Influx and establishment of alien invasive vegetation.	2	3	3	2	0,6	2,7	2,3	1,9	Low	• Vegetate open and exposed areas to prevent soil erosion and the establishment of alien invasive vegetation; • Ensure a Storm Water Management Plan is implemented; and • Alien invasive vegetation to be identified and removed throughout the LoM.	2	4	4	1	0,6	3,3	2,3	1,4	Low
		Wetlands and Aquatic Ecology	Contamination and sedimentation of the downstream wetland systems and aquatic ecosystems.	3	3	4	1	0,1	3,3	2,2	2	Moderate	• Ensure the statutory buffers are implemented from the wetlands systems and watercourses, unless otherwise stated in the IWUL; • Ensure a Storm Water Management Plan is implemented; and • Implement a biannual Aquatic Monitoring Programme to monitor potential impacts and implement corrective actions, should it be required.	2	4	4	1	0,6	3,3	2,3	1,5	Low
		Surface Water	Siltation of downstream surface water resources.	4	4	5	2	0,8	4,3	3,2	2,53	Moderate	• Ensure that the topsoil stockpiles are vegetated to prevent soil erosion; • Implement Stormwater Management designs to prevent erosion and divert dirty water to the appropriate storage dams (PCDs); and • The design, construction, operation and maintenance of water management facilities must be in accordance with GN R 704 capacity requirements.	2	5	5	2	0,6	4	3	1,8	Low

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				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
		Groundwater	Contamination of groundwater resources	5	5	5	3	1	5	4	3.9	High	• A groundwater monitoring system must be implemented and test the water on a quarterly basis for changes in water quality and water levels. Should impacts be identified, management measures must be implemented based on the contaminant or water level change; • Implement a Surface Water Management Plan to minimise the volume of dirty water produced, as well as the effectiveness of the containment of dirty water, thereby reducing the probability of contamination of groundwater from infiltration of dirty surface water; • Refine and update the conceptual and numerical models annually for the first four years and thereafter every five years based on groundwater monitoring results. This will help to better quantify impacts to water quantity and quality; and • All contaminant, waste and hazardous waste storage facilities and other contaminated water storage areas (PCD) must be lined to pro-actively prevent infiltration of contaminated seepage water.	4	4	5	2	0,8	4,3	3,2	2,5	Moderate
12	Transportation of coal via the KPS/KHU Link Road	Air Quality	Fugitive dust generation emanating.	2	5	4	1	0,8	3,7	2,3	2	Moderate	• Ensure the area of disturbance during the mining activities is restricted to the to the identified mining strips; • Ensure that dust suppressants are applied to gravel or unpaved roads that are in use; • Cover the road going trucks from the tip to KPS with a tarpaulin to prevent coal dust generation; and • Vehicles will obey speed limits. Maintenance equipment and heavy vehicle speeds should be reduced, where possible, to prevent dust emissions.	2	5	5	2	0,6	4	3	1,9	Low
		Topography and Visual Environment	Topographical change and disruption of surface water flow	2	5	5	2	0,6	4	3	1,9	Low	• Ensure that access and haul roads are contoured to limit erosion from surface runoff, preventing further alteration to the topography; • Ensure that dust suppressants are applied to gravel or unpaved roads that are in use; and • Vehicles will obey speed limits.	2	4	4	1	0,6	3,3	2,3	1,6	Low

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				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
		Soil	Soil contamination and degradation.	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• All potential hydrocarbon spillages and leaks must be cleaned up immediately and the soils remediated; • Spillage control kits will be readily available on site to contain the mobilisation of contaminants and clean up spills; • All vehicles and machinery to be serviced in a hard park area or at an off-site location; • Storage of hydrocarbons and explosives must be managed according to the Hazardous Substances Act, 1973 (Act No. 15 of 1973); • Hydrocarbons and explosives storage facilities must be in a hard park bunded facility; and • Vehicles with leaks must have drip trays in place.	2	4	4	1	0,6	3,3	2,3	1,6	Low
		Fauna and Flora	Loss of biodiversity and minimise impacts on floral species	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• Ensure that dust suppressants are applied to gravel or unpaved roads that are in use; • Cover the road going trucks from the tip to KPS with a tarpaulin to prevent coal dust generation; and • Vehicles will obey speed limits.	2	5	5	2	0,6	4	3	1,9	Low
		Wetlands and Aquatic Ecology	Contamination and sedimentation of the wetland systems and aquatic ecosystems	2	2	4	3	1	2,7	2,8	2,8	Moderate	• Ensure a Storm Water Management Plan is implemented; • Ensure that dust suppressants are applied to gravel or unpaved roads that are in use and exposed surfaces; • Cover the road going trucks from the tip to KPS with a tarpaulin to prevent coal dust generation; • Vehicles will obey speed limits; and • Implement a biannual Aquatic Monitoring Programme to monitor potential impacts and implement corrective actions, should it be required.	2	4	4	1	0.6	3,3	2,3	1,5	Low
		Surface Water	Contamination and sedimentation of clean water resources.	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• Ensure that dust suppressants are applied to gravel or unpaved roads that are in use and exposed surfaces; • Cover the road going trucks from the tip to KPS with a tarpaulin to prevent coal dust generation; • Vehicles will obey speed limits; and • Monitor surface water resources up and downstream of the Project area to identify potential contamination.	2	5	4	1	0,8	3,7	2,3	1,9	Low

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				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
		Noise	noise emanating from mining and vehicular activities impacting on surrounding sensitive receptors.	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• Mining related machines and vehicles should be serviced on a regular basis to ensure noise suppression mechanisms are effective (e.g., installed exhaust mufflers); and • Ensure equipment and machinery is switched off when not in use. • The gravel roads must be graded and compacted on a regular basis and as when required, should the roads remain unpaved; and • Adhere to the set speed limit in accordance to the Traffic Management Plan.	2	4	4	1	0,8	3,3	2,2	1,7	Low
		Traffic	Degradation of the road structures resulting in potential health and safety risks and soil erosion.	3	4	5	2	0,8	4	3	2,4	Moderate	• The gravel roads must be graded and compacted on a regular basis and as when required, should the roads remain unpaved; and • Adhere to the set speed limit in accordance to the Traffic Management Plan.	2	3	3	2	0,8	2,7	2,3	1,9	Low
13	Dirty water management.	Wetlands and Aquatic Ecology	Contamination of the wetland systems and aquatic ecosystems	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• Ensure a Stormwater Management Plan is implemented; • Ensure that no incision and canalisation of the watercourses; • Dirty water from the infrastructure areas must be diverted by channels and berms and separated from clean water. The dirty water must be stored in the existing PCDs; • No waste and/or contaminated material may be dumped or stockpiled within any watercourses; • The operation and maintenance of the PCD must be in accordance with the NWA Regulations set out in GN R704 and must have a minimum freeboard of 0.8 m and be able to contain a 1:50 year, 24-hour storm event; and • Implement a biannual Aquatic Monitoring Programme to monitor potential impacts and implement corrective actions, should it be required.	3	3	4	2	0,8	3,3	2,7	2,1	Moderate
			Contamination of clean water resources.	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• Continue with water quality monitoring at the existing sample at the current monitoring locations and frequency. Increase monitoring frequency for those monitoring points that show constant non-compliances; • The water levels in the Surface Main PCD and the Main Underground dams must be constantly monitoring and recorded for evaluation of additional future capacity and/or treatment requirements; • Pipelines used for dewatering activities need to be sized based on the dewatering rates and volumes;	3	3	4	2	0,6	3,3	2,7	1,6	Low

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				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
													• The operation and maintenance of the existing PCD must be in accordance with the NWA Regulations set out in GN R704 and must have a minimum freeboard of 0.8 m and be able to contain a 1:50 year, 24-hour storm event; • Monitor the dirty water management facilities on a monthly basis to identify potential leaks and implement management measures to rectify potential issues; and • Monitor surface water resources up and downstream of the Project area to identify potential contamination.									
		Groundwater	Contamination of the aquifer.	5	5	5	3	1	5	4	4	High	• Ensure that pipelines and diversion channels and berms are monitored for potential leaks and structure failures; • Potential leaks and spills must be contained and cleaned up immediately, as well as the leakage location repaired; • The mine should supply the users with an alternative source of water in case the boreholes are dewatered; • Specifically, the Prinsloo Farmstead (Located on Portion 6 of the farm Zondagsvlei 9 IS); • Monitor and control the potential decant of dirty water from the workings; • Ongoing monitoring to measure the water level in the proposed 5 Seam Mining area. The water level should be managed to stay well below the decant level of 1594 mamsl through pumping; • Monitor the borehole water quality and if the quality deteriorates, it is recommended to start pumping to contain the plume; • Ensure that a stormwater management plan is in place to separate clean and dirty water; and Groundwater monitoring of the water quality and levels must take place quarterly especially for the water supply boreholes to ensure a sustainable resource and identify impacts on local users.	2	2	2	2	0,6	1,7	1,8	1,1	Low
14	Waste and sewage generation and disposal.	Topography and Visual Environment	Topography change	2	3	3	2	0,8	2,7	2,3	1,9	Low	• Waste must be stored away from surface water and drainage lines; and • General and hazardous waste must be removed and disposed of frequently at a registered disposal site.	3	3	4	2	0,6	3,3	2,7	1,6	Low

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				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
		soil	Degradation and contamination of soil	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• Burying of any waste including rubble, domestic waste, empty containers on the site must be strictly prohibited; • Proper waste storage facilities should be available and used for the correct separation and storage of waste prior to collection and disposal; and • Generated waste must be removed to an approved disposal facility.	3	3	4	2	0,6	3,3	2,7	1,6	Low
		Surface Water	Contamination of clean water resources.	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• The sewer waster collected from the workings must be disposed of at a licensed sewage treatment facility; • Monitor surface water resources up and downstream of the Project area to identify potential contamination; • Ensure that a stormwater management plan is in place to separate clean and dirty water; and • Waste must be separated at source and stored in appropriately designated areas for disposal at a licensed facility or by a reputable contractor.	3	3	4	2	0,6	3,3	2,7	1,6	Low
16	Demolition of infrastructure	Air Quality	Fugitive dust generation emanating from the Project activities.	2	5	4	1	0,8	3,7	2,3	2	Moderate	• The area of disturbance must be restricted to the required footprint size; • Demolition activities should be undertaken with care during windy periods; and • The area of disturbance must be minimised to limit the area exposed to wind conditions.	3	3	4	2	0,6	3,3	2,7	1,6	Low
		Topography and Visual Environment	Visual impact caused by the construction of infrastructure.	3	3	4	2	0,8	3,3	2,7	2,1	Moderate	• Demolish all unnecessary infrastructure; • Ensure that all demolished infrastructure is removed from site's surface; and • Ensure that rehabilitated areas are rehabilitated and vegetated.	2	2	4	2	0,6	2,7	2,3	1,4	Low
		Fauna and Flora	Loss of vegetation communities. Influx and establishment of alien invasive vegetation.	4	4	5	2	0,8	4,3	3,2	2,5	Moderate	• Ensure that demolished infrastructure is removed off-site and disposed of by a reputable contractor; • All potential hydrocarbon spillages and leaks must be cleaned up immediately and the soils remediated; • Spillage control kits will be readily available on site to contain the mobilisation of contaminants and clean up spills; • All vehicles and machinery to be serviced in a hard park area or at an off-site location; and • Vehicles with leaks must have drip trays in place.	3	3	4	2	0,6	3,3	2,7	1,6	Low

Activity Number	Activity Description	Aspect	Impact	Significance Rating Before Mitigation Measures								Significance	Mitigation Measures	Significance Rating after Mitigation Measures								Significance
				I	F	D	E	P	S	C	IS			I	F	D	E	P	S	C	IS	
		Wetlands and Aquatic Ecology	Contamination and sedimentation of the wetland systems and aquatic ecosystems.	2	5	4	1	0.8	3,7	2,3	2	Moderate	• Restrict vehicles and machinery to existing roads and designated areas to prevent vegetation destruction; • All potential hydrocarbon spillages and leaks must be cleaned up immediately and the soils remediated; • Spillage control kits will be readily available on site to contain the mobilisation of contaminants and clean up spills; • All vehicles and machinery to be serviced in a hard park area or at an off-site location; and • Implement a biannual Aquatic Monitoring Programme to monitor potential impacts and implement corrective actions, should it be required.	3	3	4	2	0,6	3,3	2,7	1,6	Low
		Surface water	Impacts on surface water resources as a result of hydrocarbon spills.	2	5	4	1	0,8	3,7	2,3	2	Moderate	• Reputable and accredited contractors will be used for the transport and disposal of wastes and demolished material off-site; • All potential hydrocarbon spillages and leaks to be cleaned up immediately and the soils remediated; • Spillage control kits will be readily available on site to contain the mobilisation of contaminants and clean up spills; and • Vehicles with leaks must have drip trays in place.	3	3	4	2	0,6	3,3	2,7	1,6	Low

13. 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.

Table 59: Positive and negative impacts regarding project alternatives

Positive Impacts	**Negative impacts**
Mining alternatives	
Underground Mining (Preferred Method)	
• Minimal impacts on surface water and wetland systems. • No Loss of agricultural land due to mining. • Minimal visual impacts as result of mining. • Minimal dust fall-out. • Minimal impacts on run off water. • Minimal surface clearance for development of mining sections. • Minimal noise to surrounding farmers and households due to construction and operational vehicles.	• Risk associated with fall of roof. • Potential sinkholes and surface instabilities. • Potential formation of groundwater cone of depression, resulting in loss of water resource to surrounding borehole users
Open cast mining (Alternative)	
• Greater number of employment opportunities for people living in surrounding areas. • Removal of the entire reserve will extend the life of the operation, by virtue of having more coal and thus a longer lifespan for the mine.	• Decrease in agricultural area for farmers in the immediate vicinity of the area. • Removal of vegetation and decrease in associated wetland areas, resulting in the loss of biodiversity and wetland functionality.

Positive Impacts	Negative impacts
	• Decrease of surface water runoff due to open pit capturing rain water. • Potential formation of groundwater cone of depression, resulting in loss of water resource to surrounding borehole users. • Potential for acid mine drainage due to contamination of groundwater and surface water. • Increased dust fallout onto surrounding farmers and households due to open cast blasting and operations. • Increased noise generation to surrounding farmers and households due to construction and operational vehicles. • Significant impact on visual – as the opencast spoils will be extreme, due to the volume of overburden to remove in order to access the coal. • High technical complexity – in terms of opencast mining at that depth (i.e., more chance of something going wrong).
Transportation of Coal from Khutala to Klipspruit using KHU/KPS Link road	
• Employment and Business opportunities for coal transporting companies.	• Noise generation during construction and operation of road link from super link trucks.

14. CUMULATIVE IMPACTS

Cumulative impacts are defined as impacts arising from the combined effects of two or more Projects or actions. The importance of identifying and assessing cumulative impacts stems from the fact that the whole is more than the sum of its parts, implying that the total effect of multiple stressors or change processes acting simultaneously on a system may be greater than the sum of their effects when acting in isolation.

The aim of this section is to highlight the nature of the cumulative impacts that are expected to occur as a result of the combined effect of the proposed Project and other current or planned operations in the region. The cumulative impacts, per receiving environment, are detailed in **Table 60**.

Table 60: Potential cumulative impacts

Receiving Environment	**Cumulative Impact Description**
Topography and Visual Environment	The region is characterised by agriculture, mining and industry, with limited natural grassland vegetation remaining. The numerous adjacent and nearby mines and power stations have altered the agricultural sense of place of the region to one of mining and industry. The impact of the existing and surrounding mining activities already has a high negative effect on the visual environment and landscape of the area. The physical presence of the proposed Project will increase the visibility of the mining activities and will therefore contribute to the negative impact on the landscape aesthetics of the area.

Receiving Environment	Cumulative Impact Description
Air Quality	Emissions from sources need to be assessed in terms of the cumulative impacts in an area. The Code of Practice for Air Dispersion Modelling in Air Quality Management in South Africa (DEA, 2014) outlines the following for sources influenced by background concentrations, e.g., in urban areas and priority areas: • Annual averages, sum of the highest predicted concentration, and background concentration must be less than the national ambient air quality standards, no exceedances allowed. • For short-term averages (24 hours or less), sum of the 99th percentile concentrations and background concentration must be less than the national ambient air quality standards. Wherever one year is modelled, the highest concentrations shall be considered. The HPA was declared a priority area by the Minister of Environmental Affairs and Tourism on 23 November 2007 under the National Environmental Management Air Quality Act (Act No. 39 of 2004) (NEM: AQA) (Government Gazette, No. 30518 of 23 November 2007). A Priority Area is usually associated with elevated ambient concentrations of criteria air pollutants such as PM_{10}, $PM_{2.5}$, SO_2, and NO_x. Generally, a high number of emitters (industrial and non-industrial) are also concentrated in these areas. In order to meet the requirements of the NEM: AQA, an AQMP was compiled for the PA and provides a management tool that can be used and implemented by departments and industry to ensure effective air quality management within the area. The emissions that will be generated as part of this project will be contributing to the HPA ambient air.

Receiving Environment	Cumulative Impact Description
Soils, Land Use and Land Capability	The total area of productive arable soils in Mpumalanga Province is estimated at 933 300 ha and accounts for 46.4% of the total high potential arable soils within South Africa. It is estimated that one third of the available cultivated land is occupied by current mining activities. In addition, 44% of the available arable land having been approved for prospecting activities. The quality of rehabilitated land cannot emulate pre-mining land capability in the short term, potentially impacting on food security as a result of land that is lost to mining activities. The major impact associated with the open-pit mining activities is the disturbance of naturally occurring soil profiles consisting of soil horizons. Rehabilitation of open-pit areas aims to restore the land capability; however, the South African experience is that the post mining land capability usually decreases. The soil formation is determined by a combination of five interacting soil formation factors: time, climate, slope, organisms and parent material. Soil formation is an extremely slow process and, this, soil can be considered as a non-renewable resource. Soil quality deteriorates during stockpiling and the replacement of these soil materials into the soil profile during rehabilitation cannot imitate the pre-mining soil quality properties. The soil quality deterioration and resultant compaction during rehabilitation activities and machinery lead to a net loss of land capability. A change in land capability forces a change in land use, with Mpumalanga's arable land capability tending to alter to grazing land capability following the mining activities.

Receiving Environment	Cumulative Impact Description
Vegetation	Increase in modified areas and fragmentation of natural open spaces will lead to loss of functionality of the vegetation within the watercourse and spread of alien invasive plant species. Several invasive species are present within the area that the proposed development is situated in. Therefore, if mitigation measures to limit and prevent the spread of alien species are not implemented, the cumulative impact could lead to remaining natural vegetation transformed by alien plant species. The removal and sustained low or no infestation with alien invasive species will have a positive cumulative impact as the seed source of these species within the area will be reduced. Failed rehabilitation and soil compaction associated with the development could lead to a cumulative invasion by alien invasion plant species from the surrounding transformed vegetation that can easily spread into the compacted soils.
Flora	Indiscriminate and uncontrolled activities within the upstream areas could cause sedimentation and contamination of the downstream rivers and dams, alter the aquatic environment and impact on downstream environments. Sedimentation could alter drainage patterns within the downstream aquatic ecosystems, reduce water holding capacity and increase water temperature in the long term. This would compromise aquatic habitats and associated neighbouring terrestrial habitats and alter species dynamics, especially those of water birds. As long as the sensitive areas remain undeveloped and intact then no cumulative impacts are expected on terrestrial fauna species which will have habitat available for retreat. The destruction of any TOPS (or prey-base of TOPS) could cause a cascade affect on populations and, in extreme circumstances, local extinctions.

Receiving Environment	Cumulative Impact Description
Wetlands and Aquatic Ecology	The Olifants River system services large and intensive industry and is readily acknowledged as one of South Africa's most stressed water systems. Significant impacts have accrued within the system due to agricultural, urban, power generation and mining activities. Additional coal mining operations, along with the potential destruction of the head water reaches and associated wetlands are likely to impact further on the water systems. Wetlands are responsible for filtering and trapping metals and toxins and these functions may be lost due to widespread mining, agricultural and land clearing activities.
Surface Water	Water quality impacts are already evident at upstream locations on the Saaiwaterspruit (Olifants River Catchment) and Leeuwfonteinspruit (Wilge River Catchment), as a result of current and historic mining activities, as well as other anthropogenic activities. In addition, there are numerous mining activities located in the upstream catchments of the Wilge River and Olifants River that have contributed to the deterioration of water quality. The water quality is expected to deteriorate further due to the proposed development of additional mining operations within these head waters. The cumulative impacts result from the contamination of surface water resources and water run-off from carbonaceous material, as well as decant from historic mines, being washed into the downstream water resources. The cumulative impacts include the increase of TDS, alkalinity, sulphates, calcium, magnesium, sodium, manganese and electrical conductivity. The potential cumulative impacts to the Wilge River and Olifants River can be prevented by ensuring that there is zero discharge of dirty water into the catchment.

Receiving Environment	Cumulative Impact Description
Groundwater	**Acid Rock Drainage (ARD)** The cumulative impacts of AMD development from mining activities will only be fully understood once decant commences from all of the decommissioned mines in the region. Decant of mine affected water will vary depending on the geochemistry of the individual mines, the mining methods implemented, and the rehabilitation and treatment methods utilised by the respective operations. Any decant of contaminated water post-closure will need to be managed through pumping. **Dewatering** Dewatering od the local aquifer are not limited to the Project requirements but can be compounded by the presence of surrounding mines, such as KPS, Zibulo, Matla, Homelands and Glencore Goedgevonden as an example. Combined dewatering of the aquifer by the mines in the region could potentially result in a loss of water supply to shallow groundwater boreholes and springs. As a result of dewatering, groundwater users reliant on the aquifers may be impacted upon. Also, the dewatering of the groundwater aquifer will result in impacting the water supply of external users boreholes.

Receiving Environment	Cumulative Impact Description
Noise	The predominant existing noise source in the surrounding areas of the Project area are as a result of vehicular activity on the surrounding roads, such as the R555 and N12. Frequent heavy vehicle activity is also a source of existing noise sources as the heavy vehicles are utilised on the surrounding operations mines. The proposed 5 Seam Mining Project Project is not expected to have a significant cumulative impact on the existing noise sources because the noise propagation is expected to be lower than the existing noise levels and will, therefore, not increase the ambient noise levels. The construction, operational, and decommissioning phases as it will be below the threshold value of 7.0 dBA. The potential noise increase from the proposed 5 Seam can be mitigated by screening measures, muzzle field equipment, noise management principles, and compliance with the Local Noise Regulations. The proposed mitigation measures must be implemented during the construction and operational phases so as to identify any noise increase on a pro-active basis. These mitigations measures must be incorporated into the 5 Seam Project Environmental Management Plan.

Socio-economic	Several socio-economic cumulative impacts were identified: **Job creation and benefit to the local economy** Several nearby mining and industrial operations employ substantial numbers of people, with other proposed mines planned for the area also to potentially add to the number of people employed. The contribution of mining and coal related industries (such as power stations) to job creation will be enhanced through the proposed Project. In addition, the increased employment will result in numerous economic benefits for the local communities through direct and multiplier effects. These effects are stimulated by wages, local and regional procurement spend and investment into skills development. **Population influx** The local area has already experienced a significant influx of people in search of employment opportunities, with the Project likely to exacerbate the impact. Population influx will increase the pressure on local services and infrastructure; a significant impact on service delivery and housing will take place. The capacity of service delivery infrastructure is under threat in the region, particularly in Ogies, Phola, Kendal and eMalahleni. The influx of jobseekers, combined with the presence of an operational workforce and the already existing populace, will place substantial pressure of local infrastructure, especially roads, water supply and electricity. In addition, the availability of schooling, healthcare and houses and land is under severe pressure. The low-income housing market is already too highly priced for the lower socio-economic groups and their spending power is limited. Combined with the influx of people, the housing demand and pricing will increase, resulting in an increase of informal housing developments as a larger proportion of the communities may not be able to afford formal accommodation. The growth of mining activities has resulted in the reduction of available land for housing developments. This is further exacerbated by the population influx in the region. The growth of mining activities has also resulted in the reduction of available agricultural land, potentially placing strain on the agricultural activities to sustain the population.

Receiving Environment	Cumulative Impact Description
	Dependency on Mining to Sustain the Local Economy The local economy is heavily dependent on the mines in the area; mines create more job opportunities than the services sector, mine workers earn better salaries than other sectors, as well as Power Stations being entirely dependent on coal to generate electricity. Mines, however, have an infinite lifespan and, once scaled down and decommissioned, an economic slump in the region is likely unless considerable investment is made into economic diversification.

15. MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED.

Alternatives have been considered for this project; details of Alternatives considered are discussed above in **Section 8**.

16. STATEMENT MOTIVATING THE ALTERNATIVE DEVELOPMENT LOCATION WITHIN THE OVERALL SITE.

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

The current position for the proposed 5 Seam Mining Project area (including associated infrastructure) was influenced by the following factors:

- Existing Khutala Colliery infrastructure;
- Position of coal resource;
- Depth of coal resource; and
- Avoidance of environmental sensitive areas such as rivers and wetlands.

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

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

All the anticipated impacts and risks, as well as significance for the proposed project during the life of the project have been included in Section 12. Mitigation measures associated with each impact and risk are also included in **Table 58.**

Impacts and risks were identified using a standardised method that forms part of methodology that the EAP utilised for the EIA and EMP. This process involved:

- Observations based on the site visits;
- Input from the specialist surveys, baseline assessments and recommendations;
- Input from public participation;
- Input from the desktop analysis of relevant sector plans and available land use planning tools;
- Consultation and discussions with the project team; and

- Application of previous knowledge and experience by the EAP for these types of projects in Mpumalanga Highveld region.

Additionally, the EAP has provided inputs into the AOL planning process and continued to do so during the EIA process. This included the identification and discussion of project risks from various disciplines involved in the project. Environmental and Social risks have been incorporated into this process throughout the duration of the EIA process. Currently this process has resulted in a positive influence on the design and proposed layout based on environmental and social risks.

The first stage of risk/impact assessment was the identification of environmental activities, aspects and impacts. This was supported by the identification of receptors and resources, which allows for an understanding of the impact pathway and an assessment of the sensitivity to change. The definitions used in the impact assessment are given below:

- An activity is a distinct process or task undertaken by an organization for which a responsibility can be assigned. Activities also include facilities or pieces of infrastructure that are controlled by an organisation;
- An environmental aspect is an element of an organisation's activities which can interact with the environment. The interaction of an aspect with the environment may result in an impact;
- Environmental risks/impacts are the consequences of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. Receptors can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as aquifers, flora and palaeontology. In the case where the impact is on human health or well-being, this should be stated. Similarly, where the receptor is not anthropogenic, then it should, where possible, be stipulated what the receptor is;
- Receptors comprise, but are not limited to made structures;
- Resources include components of the biophysical environment;
- Frequency of impact refers to the frequency proposed activity will take place;
- The receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact; controversy potential and precedent setting; threat to environmental and health standards;
- Spatial scope refers to the geographical scale of the impact and;

- Duration refers to the length of time over which the stressor will cause a change in the resource.

18. SUMMARY OF SPECIALIST REPORTS.

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

LIST OF STUDIES UNDERTAKEN	**RECOMMENDATIONS OF SPECIALIST REPORTS**	**SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT. (**Mark with X where applicable)	**REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.**
Hydropedology	Monitor soil compaction to ensure bulk density does not increase above 1.5 kg/m^3. If compaction rises above 1.5 kg/m^3, the soil should be ripped, regardless of depth. Rip replaced soils when it reaches a depth of 500 mm, and again once all soil has been replaced. Use specific tracks for the tipping trucks when restoring the topsoil, to diminish the compacted soil area.	X	Table 58
Terrestrial Biodiversity (Vegetation) Assessment	Monitor the establishment of invasive species and remove as soon as detected, whenever possible before regenerative material can be formed. Monitor all sites disturbed by localised activities for colonisation by exotics or invasive plants and control these as they emerge. Monitoring should continue for at least two years after such activities cease. Monitor the flow of water through the moist grassland areas.	X	Table 58

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT. (Mark with X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	Monitor the presence of hydrophytes and species with an affinity for moist soils within the moist grasslands. Should such species decrease of be replaced by terrestrial species, then it is likely that the hydrological regime on the site has changed.		
Wetlands	Vegetation transect monitoring of the various HGM units should take place on an annual basis by a suitable wetland specialist with a strong botanical background to monitor any changes to the vegetation structure of the wetlands as a result of subsidence or moisture stress. Monitoring is recommended every two years until the system is deemed appropriately rehabilitated. If monitoring results necessitate corrective action in terms of re-profiling of areas affected by subsidence, alien vegetation removal and erosion control, these corrective measures should be implemented immediately. The Environmental Management Officer (EMO) must be present on-site during decommissioning and	X	Table 58

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT. (Mark with X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	rehabilitation phases and must ensure that the wetland areas and their associated zones of regulation are clearly demarcated and that no unnecessary clearing of vegetation takes place.		
Air Quality	A public complaints and actions registry should be established to capture public perceptions and complaints regarding increased air quality impacts. Dust fallout monitoring must be conducted throughout the life of operation of Khutala Colliery to confirm model predictions. The sites selected for the dust fallout monitoring programme are the most appropriate localities to provide a reliable and representative indication of air quality impacts associated with the proposed project, as per the atmospheric dispersion modelling outcomes as well as the existing dust fall out monitoring programmes. Daily site inspections by environmental personnel must be conducted to provide an indication of	X	Table 58

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT. (Mark with X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	the effectiveness of the dust control measures. Visual monitoring must be conducted for activities expected to generate the most dust if not managed effectively.		
Terrestrial Fauna Biodiversity Impact Assessment	Underground mining must be conducted in line with the geological mine plan designed to reduce the risk of surface subsidence in line with standard safety guidelines. Any cracks and holes on surface must be filled and rehabilitated according to best practices. Drilling must proceed very discretely through the Medium SEI areas and all sites within the Medium SEI areas must be rehabilitated to pre-drilling status. Recommendations of the flora, wetland, surface water and groundwater specialist must be implemented on site. The mitigation measures in this report and that of the flora report must be included within the environmental	X	Table 58

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT. (Mark with X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	management plan report and implemented on site.		
Visual Impact Assessment Report	Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the site. Avoid high pole top security lighting along the periphery of the site and use only lights that are activated on illegal entry to the site. Minimise the number of light fixtures to the bare minimum, including security lighting. With the construction of the proposed project components security lighting should only be used where necessary and carefully directed, preferably away from sensitive viewing areas.	X	Table 58
Noise Impact Assessment	A public complaints and actions registry should be established, in order to capture public perceptions and complaints with regard to noise impacts, track investigation actions, and introduce corrective measures for continuous improvement.	X	Table 58

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT. (Mark with X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	Noise complaints should be reported through the community liaison officer and include an effective follow-up process. Ensuring building walls are at least 200mm thick with an Rw55-60. Bushy dense vegetation can also be considered on the plant-side of the berm if noise levels at sensitive receptors are still excessive, as this will assist in absorbing noise. The existing vegetation should be left untouched as far as reasonably possible to assist with this. Botanists should be consulted to ensure adequate, non-invasive species are utilised. Noise reduction techniques should be considered as additional mitigation measures to the project design ➢ Selecting equipment with lower sound power levels. ➢ Installing silencers on fans. ➢ Installing suitable mufflers on exhausts and compressor components.		

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT. (Mark with X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	➢ Installing acoustic enclosures for equipment to stop noise at the source. ➢ Improving the acoustic performance of buildings by applying sound insulation where possible. ➢ Installing vibration isolation products for mechanical equipment. ➢ High-pressure gas or liquid should not be ventilated directly to the atmosphere but through an attenuation chamber or device. A noise barrier in the form of a berm should be constructed on the boundary of the plant and pit areas. This is particularly important as it affects the sensitive receivers identified. The berm will help with the attenuation of noise produced by the plant, mining activities, and trucks along haul roads. All the diesel-powered equipment should be of high quality and well maintained.		

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT. (Mark with X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	Equipment should be switched off when not in use. Regular maintenance schedules should include a check for noise emissions, e.g., the functional state of all intake and exhaust noise attenuators and effectiveness of enclosures in accordance with standard operating procedures. Future mining-related machinery and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective (e.g., installed exhaust mufflers). This is particularly important as it will affect the nearby sensitive receptors. Fixed noise-producing sources such as generators, pump stations, and crushers should be either be housed in enclosures or barriers put up around the noise source. The barriers should be installed between the noise source and sensitive noise receptor, as close to the noise source as possible. In this case, the noise source is expected to be the plant		

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT. (Mark with X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	areas/pits during blasting and excavation. Blasting experts should be consulted to assist with blasting procedures that would have the least impact to the surroundings. Regardless, all nearby receptors must be given a schedule of blasting (appropriate frequency to be determined between parties) and a means of being notified of blasts prior to blasting (usually conducted by means of a siren, notice boards, and/or SMSs). It is recommended that day and night noise monitoring be performed biannually along the site's boundaries to ensure conformity with the regulations and indicate relevant corrective measures to be implemented. The measurements should be performed by an independent third party, in accordance with procedures stipulated in the South African National Standard (SANS) Code of Practice: SANS 10103:2004		

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT. (Mark with X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
Surface Water Impact Assessment	Increased erosion and sedimentation load are a recurring impact associated with many activities within the construction and operational phases of the project. Frequent maintenance of the existing storm water infrastructure. Maintenance will include excavation of sediments, reinstatement of channels eroded out during storms, removal of washed down vegetation, refuse, etc. Implement adequate temporary storm water measures during construction as required to prevent the movement of sedimentation to the surface water resource. Conduct an integrated water balance for the Khutala site including the new proposed 5 seam mining to determine water management impacts and requirements. Evaluate the requirement for additional site storage capacity and/or treatment as part of an integrated system.		
Geotechnical Report	It is recommended that the trestle foundations be founded on the residual / completely weathered dolerite horizon, which is at a depth	X	Table 58

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT. (Mark with X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	ranging between 2m and 2.7m below ground level. Alternatively, the foundations can be placed on an engineered soil raft of G7 quality or better (with the reworked residual dolerite removed and replaced with the imported G7 quality material). The estimated allowable bearing capacity for the trestle foundations on the residual / completely weathered dolerite is 230kPa and the estimated settlement 9mm based on the applied loading provided by Zutari's structural engineering team. The reworked residual layer encountered at the subgrade level in the trafficked areas around the stockpile does not meet the requirement of a G10 quality material (according to the TRH14 guidelines). It is recommended that selected fill be imported to replace the reworked residual layer. It is recommended that provision is made for the removal of groundwater when considering the design of foundations and pavement layers and that a subsurface drainage system is installed to mitigate elevated		

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT. (Mark with X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	groundwater levels. Owing to the prevalent flat topography of the site, consideration must be given to raising of the imported layers to aid groundwater drainage. Alternatively a combination of sumps and sump pumps may be required to effectively manage groundwater. it is recommended that the foundations for the weighbridge be placed on the residual / completely weathered dolerite horizon or on dolerite bedrock. It is recommended that more specialised chemical testing (DIN and BRE tests) be conducted during subsequent studies to determine the potential for corrosion of the reworked residual dolerite and completely weathered / residual dolerite horizons on buried ferrous and concrete services.		

19. ENVIRONMENTAL IMPACT STATEMENT

19.1. Summary of the key findings of the environmental impact assessment

The predominant impacts on the biophysical environment during the Construction Phase are associated with the site clearing activities. Such activities could lead to soil erosion and contamination, loss of biodiversity and habitats, as well as the contamination and sedimentation of wetlands on site.

The potential impacts on soils are low due to the limited disturbance that will take place as part of this Project. Most of the surface disturbance will be associated with the construction activities of the KPS/KHU Link Road. Although the soil related impacts will be low, the potential contamination from hydrocarbon spillages, erosion due to vegetation clearance, exposure of soil surfaces and stockpiling and degradation due to compaction, could all lead to the overall loss of soil resources. The loss of soil resources impacts on the sustainability of the soil and the land capability, which will limit the final land use of the site following rehabilitation, as well as require costly remediation practices. The removal of vegetation and presence of disturbed areas will be a likely contributor for the establishment of alien invasive vegetation.

Numerous faunal and floral SSC are present within the Project area. The clearing of vegetation, especially natural areas such as grasslands and wetlands, will directly impact on floral species and SSC must be identified and relocated. The removal of vegetation will result in the destruction of available habitats for faunal species, resulting in the relocation of animals in search of available habitats.

The generation of fugitive dust is most significant along haul roads within the Project area, as well as during the transport of ROM coal in between KPS and Khutala. The dust generated is not expected to exceed the National Ambient Air Quality standards at sensitive receptors; however, the generated dust is likely to inhibit evapotranspiration of vegetation, as well as lead to potential sedimentation of wetlands and surface water resources.

The intensity of impact is predicted to be low (during construction and operational phases) on sensitive views for the following reasons:

- The proposed Project will have a low negative effect on the visual quality of the landscape and is compatible with the patterns that define the study area's landscape. The study area is characterised by mining activities and the proposed project will be located within the existing Khutala Colliery site; the project is therefore not contrasting to the existing land uses.
- The proposed Project will have a low effect on sensitive viewing areas (farmsteads and local roads). The proposed Project will always be viewed with the existing Khutala Colliery as the backdrop, together with the other mines and the Kendal Power Station. Most of the sensitive viewers (farmsteads) are located outside the Zone of Potential Influence and the viewers travelling on the local roads are already exposed to mining activities.

The presence and operation of the Khutala 5 Seam Project is likely to have numerous negative impacts of minor to moderate significance, largely associated with population influx. Such impacts include increased pressure on local resources and services, community conflict, and an increase in social pathologies.

Positive socio-economic impacts are associated with the Project and include the limited direct, as well as indirect, employment opportunities during the Construction and Operational Phases of the Project and the downstream economic impacts associated with the Project. The implementation of the mine's Social and Labour Plan will benefit the community as local economic development initiatives will be undertaken.

Heritage environment and Palaeontological resources impacts are rated as low since there are no heritage and palaeontological resources that will be directly affected by this project. The potential damage and destruction of the graves on site will be limited within the study area and the impacts for these is low. Mitigation measures will need to be implemented to ensure that the graves are not damaged or alternatively relocated after consultation and due process has been followed. In addition, restriction of access to the graves, as well as potential health and safety risks associated with the visiting of the graves, will have a moderate negative impact.

Mitigation and management measures have been recommended to prevent, avoid and reduce the significance of the potential impacts of the Project.

The proposed 5 Seam Mining Project mining will have a negative impact on the water level as it will be lowered. Mitigation will be to allow the water levels to recover after mining. Contamination of the aquifer, due to the dewatering during mining, there will be a cone of depression and contamination will be contained. Therefore, the contamination of the aquifer was not rated for the operational phase. As a mitigation to the lowering of the water level, the Prinsloo Farmstead (Located on Portion 6 of the farm Zondagsvlei 9 IS) should be supplied with an alternative source of water as a permanent measure from the start of mining. Impact on borehole water supply and quality, boreholes that are in the 5 Seam Mining Project area will be impacted. The boreholes will most likely dry up during mining and be impacted after mining. This is a negative impact with a very high intensity. The frequency is continuous, the duration long-term and the extent small. Seepage through and runoff from the coal stockpile may cause pollution to the groundwater and surface water resources. The stockpile may have a negative impact, but the intensity is expected to be medium. The frequency is continuous, the duration long-term and the extent small.

The mitigation is to supply the users with an alternative source of water. Specifically, the Prinsloo Farmstead (Located on Portion 6 of the farm Zondagsvlei 9 IS) should be supplied with an alternative source of water as a permanent measure from the start of mining.
The mitigation is to line the stockpile area (according to class C requirements) and to construct runoff trenches around it to route the dirty water runoff to a pollution control dam. Although it will still be a negative impact, the mitigation will reduce the impact to a very low rating.
Surface subsidence of the 5 Seam workings is said to be prone to areas that are approximately 40 m below surface and with the area already undermined, there is a low subsidence risk. Subsidence will have a negative impact, but the intensity is expected to be medium. Conversely, enhancement measures will be implemented to increase the significance of the potential positive impacts for the Project. Should the mitigation and management measure be correctly implemented, the potential impacts will reduce in their significance.

The proposed activities requiring Environmental Authorisation are critical for the mining activities and the prevention of pollution of the environment, as well as to ensure the efficient and successful operation of the Project. With the implementation of the recommended

mitigation measures to manage potential impacts, it is recommended that the proposed Project be granted an Environmental Authorisation.

The Environmental Impact Statement is utilised to summarise the potential environmental impacts identified during each phase of the proposed Project. The significance of the impacts associated with the biophysical environment during the LoM, pre-mitigation and post-mitigation as indicated as part of the risk assessment.

The key impacts that relate to the proposed 5 Seam Mining Project, and are rated as having a high significance, are included in **Section 12** describes all impacts identified in detail and includes mitigation measures to reduce the significant ratings.

19.2. Final Site Map

The final site map of the 5 Seam Mining Project is attached as **Appendix 2.**

19.3. Refinement to Layout Plan

The original layout plan indicated sizes and shapes of facilities based on the proposed infrastructure designs and plans. The link road has been refined from Khutala to Klipspruit South boundary fence. The initial plan showed link road from Khutala to KPS, following engagements with the Project Team, it was decided that Klipspruit Colliery will decide on the route that will be utilized within their mining area to ensure that the proposed road does not interfere with mining activities at Klipspruit Southern section.

20. FINAL PROPOSED ALTERNATIVES.

Proposed alternatives are detailed above in **Section 8** and the positive and negative impacts of the alternatives and preferred option have been described in **Figure 7.** The preferred infrastructure option is shown in **Figure 5.**

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

The following assumptions and limitations have been identified with regards to the environmental baseline, impacts and mitigation measures:

All the technical data, project description and information provided by the proponent to the EAP and specialists is pre-concept level. The EAP and specialists have identified all possible impacts based on the information provided and these have been assessed and rated accordingly:

Assumption and Limitations applicable to individual specialist studies

Wetland and Aquatic Specialist Report

- To obtain a comprehensive understanding of the dynamics and diversity of the wetlands/watercourses present within the study area and its immediate surrounds, studies should include investigations through the different seasons of the year, over a number of years, and extensive sampling of the area. This is particularly relevant where seasonal limitations to biodiversity assessments exist for the area of the proposed activity. Due to project time constraints inherent with Environmental Authorisation application processes, such long-term research is seldom feasible, and information contained within this report is based on a single field survey conducted during a single season as well as review of biodiversity-related studies conducted by the mine over the years. Where possible, additional information was added from available sources and previous studies conducted in the area.
- Furthermore, detailed assessment of the wetlands/watercourses within and in the vicinity of the study area was not carried out as part of this assessment and historical wetland studies and delineations were reviewed, scrutinised and amended based on the observations of the brief site visit carried out on 20th of October 2020. It is therefore possible that some discrepancies in the delineation and data provided may occur in some places.

Soil, Land Use, Land Capability and Land Potential

- Both desktop and field assessments are confined to the project areas and do not include the neighbouring and adjacent properties;
- Sampling by definition means that not all areas are assessed, and therefore some aspects of soil, land and land capability and land potential may have been overlooked in this assessment. However, it is the opinion of the professional specialist that this assessment was carried out with sufficient sampling and in sufficient detail to enable the applicant, the Environmental Assessment Practitioner

and the regulating authorities to make an informed decision regarding the proposed activities;

- Land Potential was classified according to current soil restrictions, with respect to prevailing climatic conditions on site. However, it is virtually impossible to achieve 100% purity in soil mapping. The delineated soil map units could include other soil forms, as the boundaries between the mapped soils are not absolute, but rather form a continuum and gradually change from one type to another. Therefore, soil mapping and the findings of this assessment were extrapolated from individual observation points;
- Soil fertility status was not considered a limitation, seeing as inherent nutrient deficiencies and/or toxicities would be rectified by appropriate liming and/or fertilization prior to cultivation; and
- Soil sampling for chemical analysis was not conducted as part of this study, as it did not form part of the scope of work since the areas will be mined as part of underground operations.

Terrestrial Biodiversity (Vegetation) Assessment

- Vegetation studies should be conducted during the growing season of all plant species that may potentially occur. This may require more than one season's survey with two visits undertaken preferably during November and February. This report relied on a single site visit undertaken on the 25th of November 2020 for the mining areas and in March 2021 for the Link Road, after good summer rains commenced.
- Due to intense grazing on most the site, the grass layer was short, and several grass species could not be identified. The list of grasses identified are thus limited and not a true reflection of the diversity likely present.

Terrestrial Fauna Biodiversity Impact Assessment

- Specialist studies are conducted to certain levels of confidence, and in all instances known and accepted methodologies have been used and confidence levels are generally high. This means that in most cases the situation described in the report is accurate at high certainty levels, but there exists a low probability that some aspects have not been identified / captured during the studies. Such situations cannot be avoided simply due to the nature of field work.

- Almost every grassland unit had patches of wetland vegetation and the full classification and extent of these must be ascertained from the wetland study. In terms of this report, they have not been further mapped and are only generally included in discussions as needed.

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

22.1. Reasons why the activity should be authorized or not.

No fatal flaws that could not be mitigated have been identified thus far through the EIA process. However, several environmental and social impacts are envisaged from construction phase through to post-closure, which will require careful mitigation and monitoring. This includes the concern in respect to the potential loss and damage of the wetland areas, fauna and flora and reductions of groundwater.

It is the opinion of the EAP that all major impacts have been identified and have been assigned appropriate management measures. Most HIGH negative impacts with mitigation, are reduced to a MEDIUM or LOW significance, and can be managed accordingly.

It is recommended by the EAP that the proposed project could be authorised, on the assumption that the environmental and social management commitments included in this EIR and EMPr as recommended by the specialists are implemented and adhered to, the project description remains as per the description provided in this document and considering the identified positive social impacts associated with the project.

22.2. Conditions that must be included in the authorisation

The following conditions should be included in the environmental authorisation:

- Appointing of a suitably qualified individual (Environmental Officer) to oversee implementation of the EMPr during all phases of the project;
- Appointing a suitably qualified Environmental Control Officer to undertake audits on a regular basis throughout the construction phase of this project; and
- The rezoning of the land from agriculture to mining as identified in the EIR and as required in terms of the eMalahleni and Victor Khanye Local Municipalities Municipal By-Law on Spatial Planning and Land Use Management, refer to Section 6.

To ensure that all staff, contractors and sub-contractors are aware of and understand the requirements of the EMPr and environmental issues in relation to their individual areas of work by:

- Developing an induction and training program covering the EMPr, environmental awareness, dealing with environmental incidents and waste management; and
- Advising staff commissioned during pre-construction and construction, including sub-contractors, of EMPr requirements through the induction program as well as on notice boards at the contractor's camps during construction and notice boards during operation. These notice boards should cover the EMPr, environmental awareness, dealing with emergencies and waste management.
- Incorporating the 5 Seam Mining Project as part of the Khutala's Environmental Emergency Preparedness and Preparedness Plan to ensure that emergency situations are managed and controlled. This plan is to be implemented in emergency situations such as PCDs spills, dam failures, hydrocarbon spills (such as oil or fuel leaks) and spills, fires, sewage spillage. The Emergency preparedness procedure must include requirements to contact the Specialist Environment following an emergency or incident and reporting within the legally specified period to the authorities.
- Potential impacts identified should be monitored during all phases of the 5 Seam Mining Project area. Monitoring will form an important aspect of the mine's operations. Management measures will be amended to address the impacts if analysis of monitoring trends indicates this may be necessary. Monitoring of the operations, in accordance with their operating plans and protocols, will also form an important activity to ensure their long-term sustainability.
- Through internal auditing and reporting processes and environmental audits (as per the requirements of NEMA EIA Regulations, 2014 as amended) and other legislated reporting, Seriti should continue to examine the proposed management commitments for the life of mine with a view to continually improve and reduce negative impacts and enhance positive impacts where achievable.
- Demarcate all sensitive floral habitat areas and ensure that these areas are off-limits to construction, operational vehicles and all personnel.
- Develop programs monitoring to monitor environmental aspects that will be impacted by the proposed development as per the recommendations of the specialist.
- Khutala Colliery will need to apply for re-zoning of the affected farms portions with the eMalahleni and Victor Khanye Local Municipalities Town Planning Departments.

22.3. Rehabilitation requirements

The requirements of the final rehabilitation, decommissioning and mine closure plan, as they are stated in **Appendix 4** of the NEMA Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations (GN R 1147), are to identify a post mining land use that is feasible through the following:

- Providing the vision, objectives, targets and criteria for final rehabilitation, decommissioning and closure of the project;
- Outlining the design principles for closure;
- Explaining the risk assessment approach and outcomes and link closure activities to risk rehabilitation;
- Detailing the closure actions that clearly indicate the measures that will be taken to mitigate and/or manage identified risks and describes the nature of residual risks that will need to be monitored and managed post closure;
- Committing to a schedule, budget, roles and responsibilities for final rehabilitation, decommissioning and closure of each relevant activity or item of infrastructure;
- Identifying knowledge gaps and how these will be addressed and filled;
- Detailing the full closure costs for the life of project at increasing levels of accuracy as the project develops and approaches closure in line with the final land use proposed; and
- Outlining, monitoring, auditing and reporting requirements.

22.4. Period for which the Environmental Authorisation is required.

Environmental authorisation will be required for a period of 25 years the following periods:

- Construction = 3 years
- Operation and decommissioning = 17 years
- Closure = 5 years

23. UNDERTAKING

The EAP undertakes that the information provided in PART A is correct, and that the comments and inputs from stakeholders and Interested and Affected parties have been correctly recorded in the report. This is applicable to this EIR and EMPr document as a basic assessment process was not applicable and was not undertaken for the type of the identified listed activities. The identified activities required the scoping and environmental impact report process to be followed.

Refer to Part B, Section 2 for the EAP's signed undertaking and declaration.

24. FINANCIAL PROVISION

This financial provision has been assessed and calculated as required in terms of the requirements of the National Environmental Management Act, No. 107 of 1998 (NEMA) General Notice Regulation (GNR) 1147 "Regulations pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations" (GNR1147 and proposed GNR 667).

The financial provision will be made available to the DMRE by Seriti in the form of a guarantee from a financial institution to ensure that adequate rehabilitation will be undertaken following the LoM for the proposed Project. The financial provision was calculated based on the previous assessment that was undertaken by Jones and Wagener in March 2019.

The financial provision was calculated according to Regulation 6 of the Financial Provision Regulations (2015) which prescribe the minimum content requirements.
The financial provision estimate was calculated based on the Financial Provision Regulations (GNR. 1147 and proposed GN R 667). The estimated financial provision required for the rehabilitation and closure of the activities associated with the Khutala 5 Seam Mining Project is **R 2 789 390,49** as at March 2021 including Preliminary and General, Professional Fees and Contingencies but excluding the 15% VAT. This consists of the proposed infrastructure which includes the surface rehabilitation associated with the KPS/KHU Link Road and the RoM Stockpile, plus the demolishing, plugging and surface rehabilitation of the proposed shaft. It should be indicated that the 5 Seam Mining Project will be using most of the existing infrastructure from the Khutala Main Office Complex. Refer **Table 61** and **Table 62.**

Table 61: Khutala 5 Seam Mining Project Closure Costs Review - Closure Summary Spreadsheet as at March 2021

Khutala 5 Seam Mining Project Closure Costs Review – Closure Summary Spreadsheet – March 2021					
Infrastructure and Related Aspects		**Unit**	**Quantity**	**Rate**	**Total**
1	General surface rehabilitation (KPS/KHU Link Road)	Sum	1,00	R 1 351 463,22	R 1 351 464,22

Khutala 5 Seam Mining Project Closure Costs Review – Closure Summary Spreadsheet – March 2021					
Infrastructure and Related Aspects		**Unit**	**Quantity**	**Rate**	**Total**
2	General surface rehabilitation (5 Seam RoM Stockpile)	Sum	1,00	R 125 567,33	R 125 568,33
3	Proposed 5 Seam Ventilation Shaft	Sum	1,00	R 620 252,54	R 620 253,54
	SUB-TOTAL 1				**R 2 097 286,08**
4	**ADDITIONAL ALLOWANCES**				
4.1	Preliminary and General (12% of sub-total 1)				R 251 674,33
4.2	Contingencies (10% of sub-total 1)				R 209 728,61
4.3	Engineering and Project Management (5% of sub-total 1)				R 104 864,30
4.4	Management/staff cost (6% of sub-total 1)				R 125 837,17
	SUB-TOTAL 2 (Additional allowances)				**R 692 104,41**
	GRAND TOTAL (SUB-TOTAL 1+2)				**R 2 789 390,49**

Table 62: Detailed inventory of the closure cost assessment for the proposed Khutala 5 Seam Mining Project as end March 2021

Mining Liability Area	Inventory Item	Work Subsection	Work Item	Notes	Unit	Quantity	Rate (2019 J&W)	Total Amount (2019)	Total (LEM 2021)	Amount Total (LEM 2021)
Khutala 5 Seam Mining RoM Stockpile (4165 m^2)										
Khutala 5 Seam Mining RoM Stockpile	General Surface Rehabilitation	Establish vegetation	Supply, deliver and spread topsoil (large quantities)	Assume 500 mm thick topsoil	m^3	2082,5	R38,40	79 968,00	R41,15	R85 700,52
	General Surface Rehabilitation	All earthworks	Rip previously compacted areas		m^2	4165	R3,92	16 326,80	R4,20	R17 497,19
	General Surface Rehabilitation	Establish vegetation	Fertilize areas		m^2	4165	R1,95	8 121,75	R2,09	R8 703,96
	General Surface Rehabilitation	Establish vegetation	Vegetate areas - seed mix with slopes less than 1:5		m^2	4165	R1,95	8 121,75	R2,09	R8 703,96
	General Surface Rehabilitation	Post closure maintenance	Maintenance cost fully inclusive per hectare per year	5 years	ha.yr	2,0825	R2 223,20	4 629,81	R2 382,57	R4 961,70
Total KPS/KHU Link Road										**R125 567,33**
KPS/KHU Link Road (2242m x 20m)										
KPS/KHU Link Road	General Surface Rehabilitation	Establish vegetation	Supply, deliver and spread topsoil (large quantities)	Assume 500 mm thick topsoil	m^3	22420	R38,40	860 928,00	R41,15	R922 643,75

Mining Liability Area	Inventory Item	Work Subsection	Work Item	Notes	Unit	Quantity	Rate (2019 J&W)	Total Amount (2019)	Total (LEM 2021)	Amount Total (LEM 2021)
	General Surface Rehabilitation	All earthworks	Rip previously compacted areas		m^2	44800	R3,92	175 616,00	R4,20	R188 205,06
	General Surface Rehabilitation	Establish vegetation	Fertilize areas		m^2	44800	R1,95	87 360,00	R2,09	R93 622,41
	General Surface Rehabilitation	Establish vegetation	Vegetate areas - seed mix with slopes less than 1:5		m^2	44800	R1,95	87 360,00	R2,09	R93 622,41
	General Surface Rehabilitation	Post closure maintenance	Maintenance cost fully inclusive per hectare per year	5 years	ha.yr	22,4	R2 223,20	49 799,68	R2 382,57	R53 369,58
Total KPS/KHU Link Road										**R1 351 463,22**
Proposed Ventilation Shaft										
Shafts and Fans Area	Proposed 5 Seam Ventilation Shaft	Rehabilitate shafts	Concrete plug HT33	Assume 1m thick plug	m^3	36,9	R11 671,83	430 690,53	R12 508,53	R461 564,64
	Proposed 5 Seam Ventilation Shaft	Demolish buildings and structures	Reinforced concrete foundations	Plinths from Vent fan (A085)	m^3	88,4	R805,91	71 242,44	R863,68	R76 349,47
	Proposed 5 Seam Ventilation Shaft	Rehabilitate shafts	Remove and preserve main vent fan		No.	1	R52 569,13	52 569,13	R56 337,56	R56 337,56
	Proposed 5 Seam	Rehabilitate shafts	Design of concrete plug & other		Sum	1	R17 895,88	17 895,88	R19 178,75	R19 178,75

Mining Liability Area	Inventory Item	Work Subsection	Work Item	Notes	Unit	Quantity	Rate (2019 J&W)	Total Amount (2019)	Total (LEM 2021)	Amount Total (LEM 2021)
	Ventilation Shaft									
	Proposed 5 Seam Ventilation Shaft	Demolish fencing, walls and gates	2,4 m High security fence complete		m	162,6	R39,15	6 365,79	R41,96	R6 822,12
Total Proposed Ventilation Shaft										R620 252,54
Total Rehab Costs										**R2 097 283,08**

CPI % Used	
2020	**4,33%**
2021 (9-month equivalent)	**2,72%**

24.1. Explain how the aforesaid amount was derived.

The approach followed for the determination of the demolition and dismantling of the proposed infrastructure as part of this closure costs assessment is as follows, this is also based on the 2019 J&W report:

- Review of existing information towards gaining an understanding of the closure components and the corresponding activities required in terms of previous work done, regulations, guidelines and standards, as well as civil engineering construction standards and EAP's experience in similar projects.
- Compiling an itemised register of infrastructure/facilities to be demolished and/or rehabilitated or mitigated;
- Associating demolition, rehabilitation and mitigation activities with each item in the register and dividing these activities into industry construction-related categories.
- Applying realistic rates to the demolition, rehabilitation and remediation activities;
- Determining the quantities of all related items to be demolished, rehabilitated and/or mitigated; and
- Compiling an itemised cost spreadsheet with a detailed breakdown of the costs.

24.2. Confirm that this amount can be provided for from operating expenditure.

Seriti confirmed that the financial provision detailed on **Appendix 19** will be provided by a combination of a bank guarantee and trust account as part of its overall mine provision for the rehabilitation of mining disturbed areas.

25. DEVIATIONS FROM THE APPROVED SCOPING REPORT AND PLAN OF STUDY.

25.1. Deviations from the methodology used in determining the significance of potential environmental impacts and risks.

No deviations from the approved scoping report have been made. The plan of study as detailed on the accepted Final Scoping Report has been implemented.

25.2. Motivation for deviation

Not applicable.

26. OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

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

26.1.1. Impact on socio-economic conditions of any directly affected person

Refer to **Appendix 15** for the copy of the socio-economic impact assessment report.

26.1.2. Impact on any National State referred to in section 3 (2) of the National Heritage Resources Act

There is no significant impact on National Heritage Resources, except for the site that are described below and identified to be located on surface above the proposed mining areas. The mining depth within the area where the graveyards are positioned. Refer to **Appendix 18** for the Heritage Impact Assessment and Palaeontological Impact Assessment report.

27. CONCLUSION

This report outlines the Draft EIR for the proposed Khutala 5 Seam Mining Project as part of the approval process required by Seriti in terms of the NEMA in order to develop the underground mining project to exploit the available 5 Seam coal within Khutala Colliery mining rights area. It provides a description of the proposed project area and information on the affected environment, the details of the potential environmental impacts and the proposed mitigation measures to prevent, minimise and manage the related impacts. This information together with issues raised and/or will be raised by I&APs as part of this draft EIR, as well as consultation with the regulatory authorities will then be incorporated as part of the Final EIR and EMPr.

The draft specialist studies will be finalised upon the completion of the Draft EIR Phase to ensure that the proposed impact assessment and recommended mitigation measures can then be accepted and implemented for the project. The EIR Phase has allowed for an in-depth assessment of the impacts, potential mitigations and further recommendations with regards to the proposed Project. Registered I&APs will still be consulted and informed throughout the EIR approval process.

The environmental authorisation process followed to date meets the requirements of applicable legislation to ensure that the regulatory authorities will receive sufficient information to enable them to make an informed decision to make an informed decision about the EIR and EMPr process followed.

The Draft EIR will be made available for 30 days commenting period as indicated in **Section 9**. All comments received during DEIR will be captured on Public Participation Report as part of the Comment and Response Register (CRR) attached as **Appendix 5**.