Bank Colliery (Goedehoop North)

Coal Product Stockpile Expansion Project

Draft

Basic Assessment Report (BAR) and Environmental Management Programme (EMPr)

Compiled in terms of Appendix 1 and Appendix 4 of the amended Environmental Impact Assessment Regulations, 2014 (Government Notice No. 326) (EIA Regulations, 2014) and submitted as contemplated in Regulation 19 of Chapter 4 of the EIA Regulations, 2014
For
The application for an Environmental Authorization in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), Amended Environmental Impact Assessment Regulations 2014, Government Notice R327 - Listing Notice 1 of 2014

DMRE Reference No.: MP 30/5/1/2/2/ (143) MR

OCTOBER 2022

Basic Assessment Report (BAR) and Environmental Management Programme (EMPr)

Thungela Operations (Pty) Ltd:

Bank Colliery (Goedehoop North)

BAR AND EMPr FOR COAL PRODUCT STOCKPILE EXPANSION PROJECT

OCTOBER 2022

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EXECUTIVE SUMMARY

Goedehoop North, which is a Division of Thungela Operations (Pty) Limited, is an operational mine located 20 km south of Middelburg in the Nkangala District Municipal within the Mpumalanga Province. Goedehoop North had two mining operations i.e. Bank 2 Seam and Bank 5 Seam mining operations. Bank 2 Seam operations were opened in 1966 to produce Steam Coal and expanded to produce Low Ash Coal in 1977. The No. 5 Seam operations were originally opened as Blesbok Colliery in 1947 to produce Metallurgical coal. The two mining operations were merged in 1981 to form Bank Colliery (Goedehoop North). Currently, coal produced at Goedehoop North is sold to the export market. Bank Colliery (Goedehoop North) is operating under a converted old order mining right (reference number MP30/5/1/2/2/143 MR) under the Mineral and Petroleum Resources Development Act, Act 28 of 2002) and EMPR's and environmental authorisations approved and granted under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).

Due to the depth of the current target coal seams, Bank Colliery (Goedehoop North) conducts its mining operations mainly by means of underground mining methods. Bank Colliery (Goedehoop North) is currently mining the No.2 and 4 coal seams within their mining right area. The mine has one operational shaft (Simunye Shaft) and five decommissioned shafts, (South Shaft, Brown Shaft I, Five Shaft, East shaft and West shaft). R.O.M coal from the mining operation is processed at a washing plant (Bank 2 coal washing plant) and mineral residue produced from the washing plant is disposed of at a co-disposal facility (Bank 2 co- disposal site).

This document concerns changes at Goedehoop North mining area, i.e. expansion of the existing coal product stockpile facility. The expansion of the existing facility includes increasing the capacity of the current Coal Product stockpile facility. New infrastructure associated with the expansion will include water management structures (storm water diversion structures), access/haul roads and topsoil stockpile. The Coal Product stockpile facilities expansion will be conducted on portion 9 of the farm Bankfontein 340 JS.

In addition to the above, the National Environmental Management Act, 1998 (Act 107 of 1998), (NEMA), requires that any person or entity that intends to undertake activities listed in the NEMA listing notice regulations (Government Notices No. 983, 984 and 985) as amended in 2014 to obtain an environmental authorisation in terms of section 24D of the NEMA before undertaking such activities. Activities that will require an environmental authorisation in terms of the above-mentioned Act were identified and are listed in a table contained in this report.

According to the NEMA EIA Regulations 2014, an application for an environmental authorisation for the above triggered listed activities (environmental authorisation) must be submitted to a competent authority in line with the requirements of the above-mentioned regulations. The Department of Mineral Resources and Energy (eMalahleni Office) is the competent authority for the above-mentioned application.

Regulation 19 of the amended NEMA Regulations requires that if a BAR process must be applied to an application, the applicant must submit a basic assessment report and an EMPr to the competent authority which has been subjected to a public participation process and which reflects the incorporation of comments received, including any comments of the competent authority. In view of the above, this document (Draft BAR and EMPr), which concerns assessment of environmental impacts and a programme for management of the impacts for the proposed activities for the proposed

project, was compiled and is submitted in terms of the NEMA EIA Regulations, 2014 for review and commenting by the public including the competent authority.

PART A

SECTION ONE

Introduction

1 INTRODUCTION

1.1 WHO IS DEVELOPING THE BAR AND EMPR?

1.1.1 Name and contact details of the EAP who prepared the BAR and EMPr

EAP: Mr. Ornassis Tshepo Shakwane

Professional registration:

SACNASP: 117080

EAPASA: 2019/1763

IAIA Membership No.: 3847

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1.1.2 Expertise of the EAP who prepared the BAR and EMPr

Geovicon Environmental (Pty) Limited is a geological and environmental consulting company. The company was formed during 1996, and currently has twenty-five years' experience in the geological and environmental consulting field. Geovicon Environmental (Pty) Limited has successfully completed consulting areas in the Mining sector (coal, gold, base metal and diamond), Quarrying sector (sand, aggregate and dimension stone), Industrial sector and housing sector. Geovicon Environmental (Pty) Limited has undertaken contracts within all the provinces of South Africa, Swaziland, Botswana and Zambia. During 2001 Geovicon Environmental (Pty) Limited entered the field of mine environmental management and water monitoring.

Geovicon Environmental (Pty) Limited is a Black Economically Empowered Company with the BEE component owning 60% of the company. Geovicon Environmental (Pty) Limited has three members i.e., O.T Shakwane, J.M. Bate and T.G Tefu.

Mr. O.T Shakwane obtained his BSc (Microbiology and Biochemistry) from the University of Durban Westville in 1994, and completed his honours degree in Microbiology in 1995. Mr O.T Shakwane has also completed short courses on environmental law and environmental impact assessment with the University of North West's Centre for Environmental Management. He has worked with the three state departments tasked with mining and environmental management i.e. Department of Water and Sanitation (Gauteng and Mpumalanga Region), Department of Mineral Resources (Mpumalanga Region) and Department of Agriculture, Conservation and Environment (Gauteng Region). Mr.

Shakwane has been in the consulting field since 2004 and has completed various areas similar to the proposed Coal Product stockpile expansion project as an environmental assessment practitioner. Mr Shakwane is the environmental assessment practitioner for the environmental impact assessment for the proposed Coal Product stockpile expansion project. Mr Shakwane's Curriculum Vitae is attached in **Appendix A** to give further information on his academic career.

Over the past years Geovicon Environmental (Pty) Limited has formalised working relationships with companies that offer expertise in the following fields i.e. Geohydrology, Civil and Geotechnical Engineering, Geotechnical Consultancy, Survey and Mine Planning and Soil & Land Use Consultancy. Geovicon Environmental (Pty) Limited is an independent consulting company, which has no interest in the outcome of the decision regarding the Coal Product stockpile expansion project's basic assessment process.

1.2 WHO WILL EVALUATE AND APPROVE THE BAR AND EMPR?

Before the proposed project can proceed, an Environmental Assessment Practitioner (EAP) must compile an application for an environmental authorisation for the proposed project. An impact assessment (basic assessment process) must be undertaken in support of the application for an environmental authorisation. The basic assessment process will determine the potential environmental impacts that may result from the proposed project and an environmental management programme will be compiled to provide measures for mitigation against the identified impacts. The above-mentioned application must be made to the competent authority and in terms of section 24D (1) of NEMA. The Minister responsible for mineral resources is the responsible competent authority for this application. In view of the above, the application for the environmental authorisation for the proposed project was submitted to the Department of Mineral Resources and Energy (DMRE), Nkangala Regional Office for their consideration and decision making.

In the spirit of co-operative governance and in compliance with the requirements of NEMA and the MPRDA, the competent authority may, during the processing for the environmental authorisation application, consult with other organs of state that administers laws that relate to matters affecting the environment relevant to this application. Note that during the public participation process for the proposed project, the EAP will also consult with the below listed state authorities.

The organs of state that are to be consulted may include the following:

- Mpumalanga Tourism and Parks Agency (MTPA),
- Department of Water and Sanitation (DWS)
- Department of Forestry's, Fisheries and the Environment

Note however that this list is not exhaustive as more organs of state may be identified by the competent authority and EAP during the public participation process.

1.3 DETAILS OF THE APPLICANT

1.3.1 Name of the Applicant

Thungela Operations (Pty) Ltd (Bank Colliery - Goedehoop North)

1.3.2 Name of the Project

Coal Product Stockpile Expansion Project

1.3.3 Postal Address of Applicant

Bankfontein 340 JS

Portion 9

Steve Tshwete District (Middelburg)

Nkangala

Mpumalanga Province

1.3.4 Responsible Person

Maruschka Axsel

1.3.5 Contact Person

Cell No. 083 578 6046

Tell: 013 687 5458

Email: maruschka.axsel@thungela.com

1.4 DESCRIPTION OF THE PROPERTY (LOCATION OF THE PROJECT)

1.4.1 Regional Setting

Bank Colliery (Goedehoop North) is located 20 km south of Middelburg in the Steve Tshwete Local Municipality, Mpumalanga Province.

1.4.2 Physical Address and Farm Name of the Mining Permit Area

Coal Product stockpile project will be situated on portion 9 of the farm Bankfontein 340 JS, Middelburg, Mpumalanga.

1.4.3 Magisterial District & Regional Services Council

- Magisterial District of Middelburg, Mpumalanga
- District Municipality: Nkangala District Municipality
- Local Municipality: Steve Tshwete Local Municipality

1.4.4 Direction and Distance to Nearest Towns

Table 1: Direction and Distance to Nearest Towns from the mine.

TOWN	DIRECTION	DISTANCE (KM)
Middelburg	North	20 km
Witbank	North-West	25 km
Bethal	South	50 km
Kriel	West	37 km

1.4.5 Land Tenure and Use of Immediate and Adjacent Land

Land tenure for the properties covered by the proposed Coal Product stockpile expansion project is indicated on described in Table 2, Table 3 and Figure 2. The land on which the proposed project will be undertaken is owned by Thungela Operations Proprietary Limited. Land use within the proposed project area includes fallow land with impacted natural grassland. Table 3 gives detail of the landowners within and around the proposed Coal Product stockpile expansion project.

Table 2: Schedule of properties and surface ownership within Coal Product stockpile expansion project

FARM NAME AND NUMBER	21 DIGIT SURVEYOR GENERAL CODE	DESCRIPTION OF SUB-DIVISION	SURFACE OWNER
Bankfontein 340 JS	T0JS0000000003400009	Portion 9	Thungela Operations (Pty) Ltd

Table 3: Detail of the proposed project's immediate and adjacent property owners

FARM	PORTION	SURFACE OWNER	DIRECT/ ADJACENT
Bankfontein 340 JS	6	Daniel Solomon van Wyk	Adjacent
Bankfontein 340 JS	10	Thungela Operations (Pty) Ltd	Adjacent
Hartbeestfontein 339 JS	1	Thungela Operations (Pty) Ltd	Adjacent
Wolvenfontein 471 JS	14	Komatie Ontwikkelings Maatskappy (Pty) Ltd	Adjacent
Wolvenfontein 471 JS	18	Bleswolf Boerdery (Pty) Ltd	Adjacent
Wolvenfontein 471 JS	19	Bleswolf Boerdery (Pty) Ltd	Adjacent
Bank Colliery 608 IS	RE	Thungela Operations (Pty) Ltd	Adjacent
Blesbokvlakte 24 IS	10	Bleswolf Boerdery (Pty) Ltd	Adjacent

1.4.6 Locality Plan

Figure 1 represents the locality of proposed Coal Product stockpile expansion project.

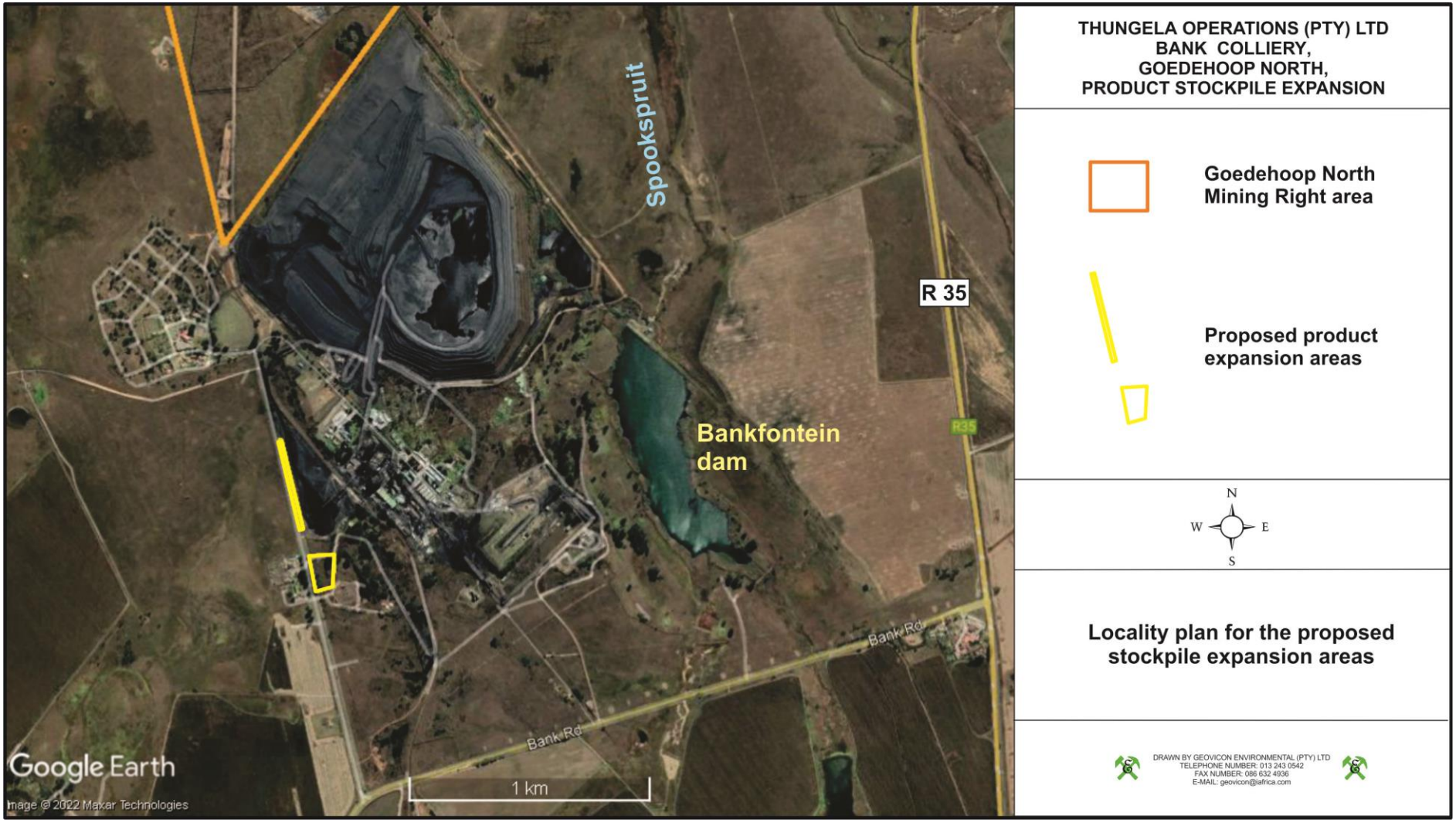


Figure 1: Locality Plan

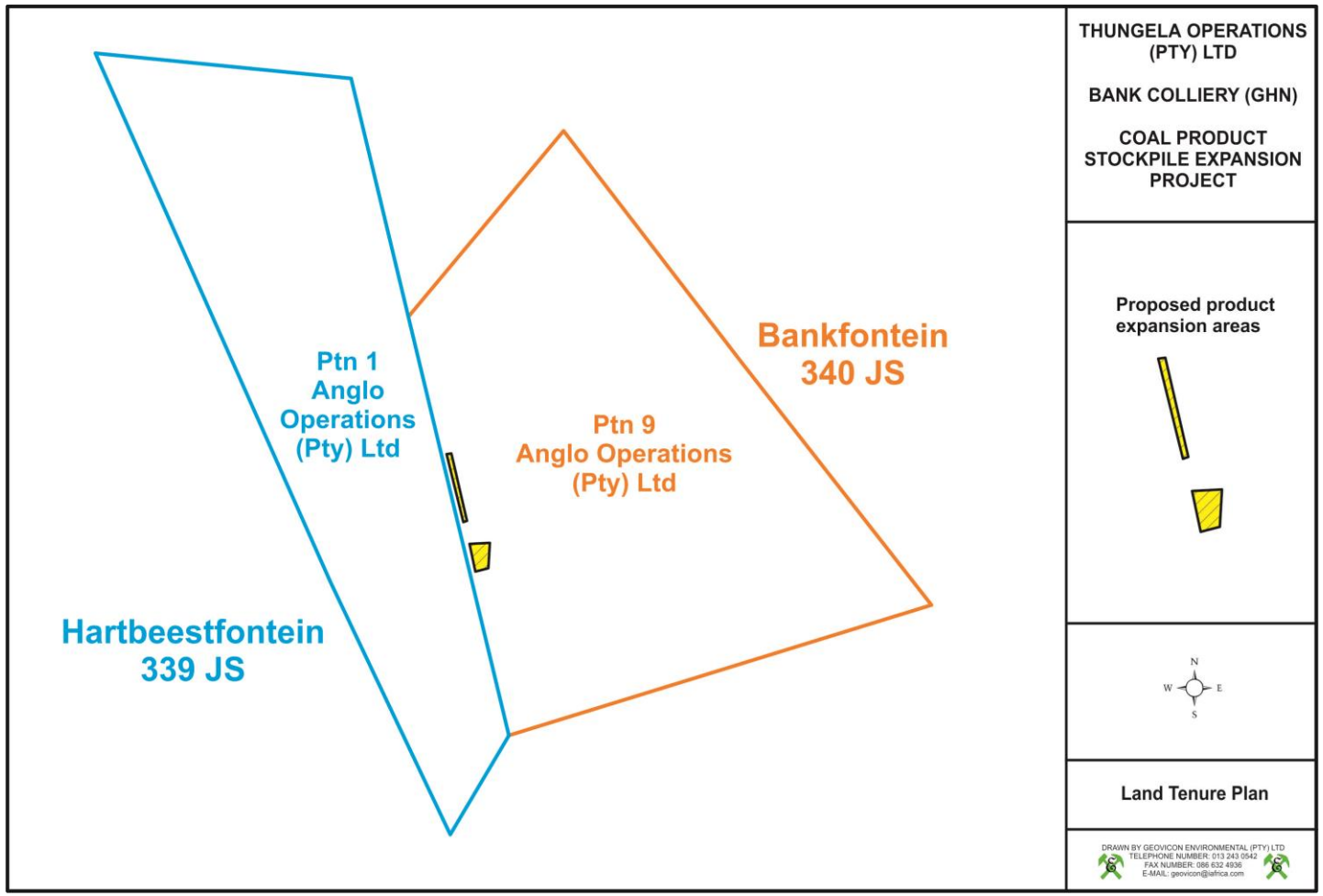


Figure 2: Land Tenure Plan

SECTION TWO

Description of the Scope of the proposed Project

2 DESCRIPTION OF THE SCOPE OF THE PROPOSED PROJECT

2.1 DESCRIPTION OF THE PROPOSED COAL PRODUCT STOCKPILE EXPANSION PROJECT

Bank Colliery (Goedehoop North), which is a Division of Thungela Operations (Pty) Limited, is an operational mine located 20 km south of Middelburg in the Nkangala District Municipality within the Mpumalanga Province. Run off mine coal produced at Bank Colliery (Goedehoop North) is washed and sold to the export market. Coal discard generated from the coal washing process is disposed at the mine's current MRD, and co-disposal facility. Product coal is stockpiled at the mine's coal product stockpile facility before being railed to the destined markets. Thungela Operations (Pty) Limited proposes to expand the current Coal Product stockpiling facilities at its Bank Colliery over portion 9 of the farm Bankfontein 340 JS, namely the Coal Product stockpile expansion Project. The expansion will allow the mine handle additional coal product generated from the coal washing plant.

The expansion of the Coal Product stockpile involves placement of Coal Product over the extension area of the facility. The Coal Product stockpile facility will be extended into the south-eastern portion of the facility. Access to the expansion site will be by existing road infrastructure. New stormwater management facilities will have to be constructed for separation of clean and dirty water. Topsoil removed from the clearance of the site will be stockpile adjacent to the extended coal product facility.

2.2 LISTED ACTIVITIES AND SPECIFIED ACTIVITIES

In terms of the NEMA, the proposed Coal Product stockpile expansion project will result in the conducting of activities that are considered as listed activities. In terms of the above-mentioned legislation, none of the above-mentioned listed activities can be conducted without an environmental authorisation. In view of the above, Thungela Operations (Pty) Limited Bank Colliery (Goedehoop North) has submitted an application for an environmental authorisation for all listed activities to be conducted at the proposed Coal Product stockpile expansion project area to the competent authority (DMRE).

This section will give a description of the listed activities that will be included in the application for an environmental authorisation. Table 4 is compiled as prescribed by the DMRE, BAR and EMPr template and reflects all project activities applied for.

Table 4: Proposed Coal Product stockpile expansion project listed Activities

NAME OF ACTIVITY **E.g., For prospecting** - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc. **E.g., For mining**, - excavations, blasting, stockpiles, discard dumps or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc.	**AERIAL EXTENT OF THE ACTIVITY** **(HA OR M²)**	**LISTED ACTIVITY** Mark with an **X** where applicable or affected	**APPLICABLE LISTING NOTICE** *GNR 983, GNR 984 or GNR 985*	**WASTE MANAGEMENT AUTHORISATION** Indicate whether an authorisation is required in terms of the Waste Management Act Mark with an **X** where applicable
National Environmental Management Act (Act No. 107 of 1998)				
The development of stormwater diversion structures exceeding 1 000 metres in length for the bulk transportation of clean and dirty storm water from the Coal Product Stockpile Expansion.	To be determined	☒ Activity 9	GNR 983	☐
The development and related operation of stormwater diversion structures exceeding 1 000 metres in length for the bulk transportation of waste water from the Coal Product stockpile Expansion.	To be determined	☒ Activity 10	GNR 983	☐
The clearance of an area with indigenous vegetation for the expansion of the Coal Product Stockpile Facility.	1.9 ha	☒ Activity 27	GNR 983	☐

NAME OF ACTIVITY **E.g., For prospecting** - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc. **E.g., For mining**, - excavations, blasting, stockpiles, discard dumps or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc.	**AERIAL EXTENT OF THE ACTIVITY** **(HA OR M²)**	**LISTED ACTIVITY** Mark with an **X** where applicable or affected	**APPLICABLE LISTING NOTICE** *GNR 983, GNR 984 or GNR 985*	**WASTE MANAGEMENT AUTHORISATION** Indicate whether an authorisation is required in terms of the Waste Management Act Mark with an **X** where applicable
The expansion of the existing Coal Product Stockpile area will result in the need for a water use licence in accordance with the National Water Act, 1998 (Act No. 36 of 1998) (NWA).	1.9 ha	☒ Activity 34	GNR 983	☐

2.2 COAL PRODUCT STOCKPILE EXPANSION SURFACE INFRASTRUCTURE DESCRIPTION

Existing and proposed surface infrastructure for the proposed Coal Product Stockpile Expansion project is shown on the surface layout plan attached **Appendix B**.

Below is the description of the surface infrastructure for the proposed Coal Product Stockpile Expansion project.

2.2.1 Workshops and Buildings

Aside from the main administrative buildings, located to the west of the Bank Colliery (Goedehoop North) Coal Processing Plant, the plant complex has its own administrative buildings. The buildings at Main (Bank Colliery (Goedehoop North) and those at the coal washing plant are permanent structures. The workshops at the Bank Colliery (Goedehoop North) Coal Processing Plant are more general in that they are associated with the maintenance of the plant and include wood, metal, electrical and engineering workshops.

In addition to the mine specific workshops, the Thungela Operations Coal Central Workshops (CWS) are also located on Bank Colliery (Goedehoop North)'s property. Machinery from all Thungela Operations Coal mines are sent there to be fixed/refurbished. Bank Colliery (Goedehoop North) stores are situated at Goedehoop North opposite the main gate. The proposed Goedehoop North Coal Product Stockpile Expansion will not require new workshops and office buildings, since the above-mentioned facilities are enough to service the extended Coal Product Stockpile.

2.2.2 Road Infrastructure

2.2.2.1 Existing Roads

Existing roads that connect to the current Coal Product Stockpile include the following:

- District Road No. 2359 and District Road No. 1697 that links Bank Colliery (Goedehoop North) to the R35 national road.
- A number of roads that connects this main haul road to the Coal Product Stockpile area itself.

Coal Product Stockpile Expansion will not require construction of new access roads.

2.2.3 Power Supply

Existing power supply will be used at the Coal Product Stockpile Expansion areas.

2.2.4 Telecommunication

Existing telephone cable will be used at the Coal Product Stockpile Expansion areas.

2.2.5 Water Supply

2.2.5.1 Raw Water Supply

Bank Colliery receives its total raw water requirement from the Komati Power Station. The raw water supply is used for domestic and industrial purposes. Raw water is pumped directly from the Komati Supply Dam and Pump Station and stored in the Blesbok 1 Reservoir raw water dam. The Blesbok 1 Reservoir provides raw water to Blesbok 2 Reservoir, Bank 2 water works and Bank 5 Water works then water is being distributed.

Regarding the proposed Coal Product Stockpile expansion project, no new raw water supply will be required.

2.2.5.2 Potable Water Supply

Coal Product Stockpile Expansion area will receive potable water supply from the Bank 2 Water Treatment Plant Reservoir, which is supplied by the old Bank 2 water and Bank 5 treatment plants.

2.2.5.3 Process Water Supply

The proposed project will not require a new system for the supply of process water.

2.2.6 Waste Management

2.2.6.1 Non-Mineral Waste Management

This section of the report will describe the type of waste that may be generated at the proposed Coal Product Stockpile expansion area and how the waste will be managed. The different types of both general and hazardous waste to be generated from the site are discussed below.

Note that all general and hazardous waste generated from the proposed Coal Product Stockpile Expansion project area will be transported to the existing Bank Colliery (Goedehoop North) waste collection system and disposed of at registered waste disposal sites. Bank Colliery (Goedehoop North) has an existing contract with a waste collection company for the collection and disposal of the generated waste. The same company will be used for the collection and disposal of any waste generated at the proposed Coal Product Stockpile Expansion project.

General Waste Management

General waste to be generated from the Coal Product Stockpile expansion area may include domestic waste, paper waste, scrap waste, scrap metal and scrap rubber. This waste generally consists of plastic, food waste, glass, polystyrene, old stationary, garden waste and discarded PPE. Paper waste will consist of paper and cardboard. Recycled waste will consist of material which has a residual monetary value if collected, stored and accumulated in suitable quantities. These include scrap metal and scrap rubber where scrap metal includes all metal objects, equipment, old rollers, roof bolts, screens from the plants, pipes, broken pumps, old pick heads, old tyre rims, gratings, etc. Scrap rubber will include scrap tyres, scrap cable, pieces of conveyor belt and other pieces of rubber. The

current waste management facilities will be used for the collection and disposal of the waste that may be generated from the expanded coal stockpile facility.

Hazardous Waste Management

Hazardous waste from the Coal Product Stockpile expansion project area will include hydrocarbon waste (form major hydrocarbon spillages). The current waste management system will be used for the collection and disposal of this waste. The system is described below.

Any other chemical waste is removed by a permitted waste disposal contractor for treatment and disposal at a licensed hazardous waste disposal site. Batteries are removed by a permitted waste disposal contractor for recycling or treatment and disposal at a licensed hazardous waste disposal site. Fluorescent tubes are disposed of in PVC bags (uncrushed) removed by a permitted waste disposal contractor for treatment and disposal at a licensed hazardous waste disposal site.

2.2.7 Polluted Water Management Facilities

2.2.7.1 Sewage Handling

Existing workshop and office complexes at the plant, which is equipped with its own ablution facilities, will be used for the Coal Product Stockpile Expansion project area. No new sewage treatment plant or facility will be constructed as a result of the proposed Goedehoop North Coal Product Stockpile Expansion project.

2.2.7.2 Pollution Control Dams

The mine water system is made up of a single Return Water Dam, the Bankfontein Dam, Bank 5 Lapa Dam, five smaller dams (Erickson Dams 1 and 2 (below Bankfontein Dam), Simunye 4 Seam Erikson Dam, Simunye Erickson Dam 2 and the Underground Dam “G4 Dam”), as well as two underground workings – the Simunye 2 and 4 Seam workings. The return water dam receives runoff from the R.O.M. and Product Stockpiles, Bank 2 Plant, Bank 2 MRD and the Simunye Shaft as well as wash down water from Bank 2 Plant and return water from the recycled slurry. Water for dust suppression is supplied from the Return Water Dam. Erickson Dam 1 and Erickson Dam 2 receives water from the Return Water Dam.

Bankfontein Dam lies within the Bankfontein Spruit and receives inflows in the form of;

- Treated domestic sewage effluent from the Bank 2 Sewage Treatment Works.
- Clean runoff from its clean catchment.
- Runoff and seepage from the rehabilitated Bank 5 MRD and plant area.
- Overflow from the Bank 5 Lapa Dam.

Erickson Dam 1 and Erickson Dam 2 situated at Bankfontein dam pump station receives water from the Return Water. Erikson dam 1 supplies water from the Return Water Dam Water Works Reservoir and the Clarifier Main Feed.

The return water dam will also receive runoff from the Coal Product Stockpile Expansion project area.

2.2.8 Storm Water Management Facilities

Storm water management entails the prevention of runoff from clean areas from entering dirty areas and also the prevention of runoff from dirty areas from entering clean water areas. The above will hence prevent clean water from being contaminated and contaminated water from contaminating clean water. This section will indicate how storm water at the proposed Coal Product Stockpile Expansion project will be managed.

The proposed Goedehoop North Coal Product Stockpile Expansion project is situated within the catchment of the Bankfontein Dam and therefore has a potential to have an impact on the Spook Spruit. The proposed Goedehoop North Coal Product Stockpile Expansion project is also situated within the existing Bank 2 coal washing plant, Bank 2 MRD and the coal stockpiling areas storm water management system.

In view of the above and in order to protect the surrounding water resources from potential pollution, the proposed Coal Product Stockpile Expansion project will be equipped with a designed and properly constructed storm water management system. The system has been designed to separate clean and dirty storm water from the catchment of the expanded Coal Product Stockpile and its associated infrastructure and will connect the current storm water management system of the mine.

Clean storm water generated from the expanded Coal Product Stockpile area and the associated infrastructure will be diverted via storm water drains and berms towards the nearby stream. Dirty water from the Goedehoop North Coal Product Stockpile Expansion project area plant will be diverted via diversion drains to the Return Water Dam.

2.3 COAL PRODUCT STOCKPILE EXPANSION METHOD STATEMENT

In terms of the DMRE, BAR and EMPr template, Thungela Operations (Pty) Limited must describe the methods and technology to be employed for the proposed project. In view of the above, a method statement for each phase of the proposed project has been provided. This identifies all actions, activities or processes associated with the proposed project.

2.3.1 Construction Phase

2.3.1.1 Coal Product Stockpile Expansion area

- Clearance of topsoil and unusable subsoil and the vegetation of the Goedehoop North Coal Product Stockpile Expansion area.
- Stockpiling of removed topsoil and subsoil and a topsoil/subsoil stockpile.
- The underlying soil will be ripped, re-compacted and graded before installation of a barrier system as per the approved civil designs.
- Construction of a series of clean storm water cut-off berms and trenches around the expansion area and along the access road to direct clean surface run off away from the Coal Product Stockpile Expansion area, dirty water facilities.
- Construction of access/haul riads that connects to the existing road networks
- Construction of a new perimeter fence (to Thungela specifications and standards) be installed around the perimeter of the expanded coal product stockpile facility.

- Establishment of a topsoil/subsoil stockpiling facility or use of existing topsoil/subsoil stockpile facilities.

2.3.2 Operational Phase

The following activities will be undertaken during the operational phase of the proposed Goedehoop North Coal Product Stockpile Expansion project:

Coal Product Stockpile Expansion project

Stockpiling of the Coal Product on the expanded stockpiling area.

Storm water management

Storm water drains, i.e. fresh water cut-off drains, are placed around all the dirty water areas. These measures are taken to divert clean storm water away from polluted areas. Dirty water drains will be used to drain dirty storm water into the Return Water Dam.

2.3.3 Decommissioning phase

During decommissioning of the Goedehoop North Coal Product Stockpile Expansion project the following activities will be undertaken:

- Removal of all mine infrastructures;
- Ripping of all infrastructure areas (concrete slabs, floors and foundations);
- Final shaping of the rehabilitated area;
- Ripping and rehabilitating of all stormwater facilities; *and*
- Seeding of ripped and rehabilitated surfaces.

Monitoring and reporting

The water quality monitoring program will be continued, until it can be shown that water quality (surface and groundwater) is both stable and within acceptable guidelines and limits, as determined by the relevant State Departments. Frequency of monitoring will remain monthly for the surface water monitoring points and three-monthly for groundwater monitoring points for the first three years after closure. Thereafter, the frequency for surface water monitoring points will decrease to 3-monthly and the groundwater monitoring points to 6-monthly. This will again be reviewed after a further 2 years.

SECTION THREE

Policy and legislative context

3 POLICY AND LEGISLATIVE CONTEXT

3.1 CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA (ACT NO. 108 OF 1996)

Section 24 of the Constitution of the Republic of South Africa (Act No. 108 of 1996) states that 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

() secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

In terms of Section 24 of the Constitution of the Republic of South Africa (Act No. 108 of 1996), everyone has the right to an environment that is not harmful to their health or well-being. In addition, people have the right to have the environment protected, for the benefit of present and future generations, through applicable legislations and other measures that prevent pollution, ecological degradation and promote conservation and secure ecological sustainable development through the use of natural resources while prompting justifiable economic and social development. The needs of the environment, as well as affected parties, should thus be integrated into the overall project in order to fulfil the requirements of Section 24 of the Constitution. In view of the above, a number of laws pertaining to environmental management were promulgated to give guidance on how the principles set out in section 24 of the Constitution of the Republic of South Africa (Act No. 108 of 1996) would be met. Below are laws applicable to the proposed project that were promulgated to ensure that section 24 of the Constitution of the Republic of South Africa (Act No. 108 of 1996) is complied with.

3.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT

Section 24(1) of the NEMA states:

“In order to give effect to the general objectives of integrated environmental management laid down in this Chapter [Chapter 5], the potential consequences for or impacts on the environment of listed activities or specified activities must be considered, investigated, assessed and reported on to the competent authority or the Minister of the Department of Mineral Resources, as the case may be, except in respect of those activities that may commence without having to obtain an environmental authorisation in terms of this Act.”

In order to regulate the procedure and criteria as contemplated in Chapter 5 of NEMA relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to environmental impact assessment, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto, Regulations (EIA Regulations, 2014) were promulgated. These Regulations took effect from the 4th of December 2014.

In addition to the above, Section 28 of the NEMA includes a general "Duty of Care" whereby care must be taken to prevent, control and remedy the effect of significant pollution and environmental degradation. This section stipulates the importance to protect the environment from degradation and pollution irrespective of the operations taking places or activities triggered / not triggered under GN983, GN984 and GN985.

In view of the above, an environmental impact assessment is being undertaken to comply with the requirements of the NEMA and the NEMA EIA Regulations, 2014. The NEMA EIA Regulations of December 2014 determines requirements to be met in order to obtain an environmental authorisation. This report has therefore been compiled in compliance with the above regulations.

3.3 NATIONAL ENVIRONMENTAL MANAGEMENT AIR QUALITY ACT

The National Environmental Management: Air Quality Act (Act No.39 of 2004) (NEM: AQA) focuses on reforming the law regulating air quality in South Africa in order to protect the environment through the provision of reasonable measures protecting the environment against air pollution and ecological degradation and securing ecological sustainable development while promoting justifiable economic and social developments. This Act provides national norms and standards regulating air quality management and control by all spheres of government. These include the National Ambient Air Quality Standards (NAAQS) and the National Dust Control Regulations (NDCR). The standards are defined for different air pollutants with different limits based on the toxicity of the pollutants to the environment and humans, number of allowable exceedances and the date of compliance of the specific standard.

On 22 November 2013 the list of activities which result in atmospheric emissions which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage was published under GN R893 in Governmental Gazette No 37054, in terms of Section 21(1)(b) of the NEM: AQA.

The proposed project will not trigger any of the activities listed under the above-mentioned Regulations, however Bank Colliery must ensure that emissions from their activities complies with the standards as set in the above-mentioned regulations.

3.4 THE NATIONAL HERITAGE RESOURCES ACT

The National Heritage Resources Act (Act No. 25 of 1999) (NHRA) focuses on the protection and management of South Africa's heritage resources. The governing authority for this act is the South African Heritage Resources Agency (SAHRA). In terms of the NHRA, historically important features such as graves, trees, archaeology and fossil beds are protected as well as culturally significant symbols, spaces and landscapes. Section 38 of the NHRA stipulates the requirements a developer must undertake prior to development. In terms of Section 38 of the NHRA, SAHRA can call for a Heritage Impact Assessment (HIA) where certain categories of development are proposed.

A Heritage Impact Assessment (HIA) is the process to be followed in order to determine whether any heritage resources are located within the area to be developed as well as the possible impact of the proposed development thereon.

The Act also makes provision for the assessment of heritage impacts as part of an EIA process and indicates that if such an assessment is deemed adequate, a separate HIA is not required. A Heritage Impact Assessment has not been undertaken for the proposed project.

3.5 NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT (ACT 10 OF 2004) (NEMBA)

The National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA) provides for the management and protection of South Africa's biodiversity within the framework established by NEMA. The Act aims to legally provide for biodiversity conservation, sustainable, equitable access and benefit sharing and provides for the management and control of alien and invasive species to prevent or minimize harm to the environment and indigenous biodiversity. The Act imposes obligations on landowners (state or private) governing alien invasive species as well as regulates the introduction of genetically modified organisms. The Act encourages the eradication of alien species that may harm indigenous ecosystems or habitats. The NEMBA ensures that provision is made by the site developer to remove any aliens which have been introduced to the site or are present on the site.

The NEMBA also provides for listing of threatened or protected ecosystems, in one of four categories: critically endangered, endangered, vulnerable or protected. The purpose of listing protected ecosystems is primarily to conserve sites of exceptionally high conservation value.

The Act supports South Africa's obligations under sanctioned international agreements regulating international trade in specimens of endangered species, and ensures that the utilization of biodiversity is managed in an ecological sustainable way.

The BAR and EMPr has been complied to ensure that all applicable requirements prescribed in the NEMBA are complied with.

3.6 MPUMALANGA NATURE CONSERVATION ACT (ACT 10 OF 1998)

The Mpumalanga Nature Conservation Act, No. 10 of 1998, aims to consolidate and amend the laws relating to nature conservation within the province and to provide for matters connected therewith. Provincial legislation relevant to biodiversity conservation comprises of two Provincial Acts, the Mpumalanga Nature Conservation Act (Act 10 of 1998) and the Mpumalanga Tourism and Parks Agency Act (Act 5 of 2005). In relation to nature conservation, the province has developed the Mpumalanga Biodiversity Sector Plan (MBSP). This plan has been jointly developed by the Mpumalanga Tourism and Parks Agency (MTPA) and the Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA). The MBSP takes its mandate from the South African Constitution, the National Biodiversity Act (10 of 2004) and the Mpumalanga Nature Conservation Act 10 of 1998. Areas identified under the MBSP as sensitive were identified and where applicable measures will be proposed for ensuring that the areas are not degrade by the proposed project activities.

3.7 MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT (MPRDA): ACT 28 OF 2002

The Department of Mineral Resources and Energy (DMRE) is responsible for regulating the mining and minerals industry to achieve equitable access to the country's resources and contribute to sustainable development. The Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) (MPRDA) requires that an EIA be conducted and that the EMP be drafted for the mitigation of impacts identified during the environmental impact assessment for a mining project. During December 2014, the "One Environmental System" was implemented by Government which initiated the streamlining of the licensing processes for mining, environmental authorisations and water use. Under

the One Environmental System, the Minister of Mineral Resources, will issue environmental authorisations and waste management licences in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), and the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEMWA), respectively, for mining and related activities. The Minister of Environmental Affairs will be the appeal authority for these authorisations. In view of the above the application for the environmental authorisation for the proposed project was submitted to the Department of Mineral Resources and Energy as the competent authority.

3.8 NATIONAL WATER ACT (NWA): ACT NO. 36 OF 1998

The National Water Act (Act No. 36 of 1998) (NWA) is the primary regulatory legislation, controlling and managing the use of water resources as well as the pollution thereof in South Africa. The NWA recognises that the ultimate aim of water resource management is to achieve sustainable use of water for the benefit of all users and that the protection of the quality of water resources is necessary to ensure sustainability of the nation's water resources in the interests of all water users. The NWA presents strategies to facilitate sound management of water resources, provides for the protection of water resources, and regulates use of water by means of Catchment Management Agencies, Water User Associations, Advisory Committees and International Water Management. The National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest. Further, an industry can only be entitled to use water if the use is permissible under the NWA. The enforcing authority on water users is the Department of Water and Sanitation (DWS).

Further, Regulation 704 of the NWA deals with the control and use of water for mining and related activities aimed at the protection of water resources.

An integrated water use licence application and an application for an exemption to comply with some of the requirements under the GN704 will be submitted to the Department of Water and Sanitation for their consideration.

3.9 NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT (ACT NO. 59 OF 2008)

The National Environmental Management: Waste Act (NEMWA) requires that all waste management activities must be licensed. According to Section 44 of the NEMWA, the licensing procedure must be integrated with an EIA process in terms of the NEMA.

The objectives of NEMWA involve the protection of health, wellbeing and the environment. The NEMWA provides measures for the minimisation of natural resource consumption, avoiding and minimising the generation of waste, reducing, recycling and recovering waste, and treating and safely disposing of waste.

Waste management activities are not triggered by the proposed project, hence the application in terms of the NEMWA was not submitted to the Department of Mineral Resources and Energy.

3.10 EIA GUIDELINES

A number of national and provincial EIA guidelines were published by different departments. These guidelines are mainly aimed at assisting relevant stakeholders by providing information and guidance and giving recommendations on a number of aspects relating to the environmental impact

assessment process. The guidelines can be used by the competent authority, applicant and the EAP during the EIA process. It is therefore important that the EAP and the person compiling a specialist report must have relevant expertise when conducting the environmental impact assessments.

A number of guidelines were consulted during the compilation of this report and these include amongst them the following i.e. Guidelines on the Need and Desirability, Department of Environmental Affairs and Tourism Integrated Environmental Management Guidelines, Department of Water and Sanitation's Best Practice Guidelines and the Western Cape Provincial Department of Environmental Affairs and Development Planning Guidelines on Public Participation.

SECTION FOUR

Need and desirability of the proposed activities

4 NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES

In terms of the EIA Regulations the need and desirability of any development must be considered by the relevant competent authority when reviewing an application. The need and desirability must be included in the reports to be submitted during the environmental authorisation application processes.

The section of the BAR and EMPr will indicate the need and desirability for the proposed Coal Product Stockpile Expansion Project, which was compiled in terms of the 2010 guideline on need and desirability, integrated environmental management guideline series 9, Department of Environmental Affairs.

Thungela Operations (Pty) Limited's Bank Colliery is situated within the Steve Tshwete Local Municipality in the Mpumalanga Province. A Basic Assessment Report (BAR) for the proposed project has been undertaken and results thereof BAR and EMPr will be submitted to the Department of Mineral Resources as the competent authority. As part of the requirements of the compilation of the BAR and EMPr, the applicant must determine the Need and Desirability of the proposed project. This section of the BAR and EMPr will be therefore compiled in order to comply with the requirements of the guideline on need and desirability promulgated on the 20th October 2014 under Government Notice 891 of 2014, which in turn will comply with the requirements of the EIA Regulations, 2014.

To undertake the 'needs and desirability assessment' the following will be considered in accordance with the NEMA Environmental Impact Assessment Regulations; Guideline and Information Document Series; Guideline on Need and Desirability (2014).

- The spatial development framework plans for the Steve Tshwete Local Municipality.
- The integrated Development Plans for the Steve Tshwete Local Municipality.
- Where possible the environmental management framework for the Steve Tshwete Local Municipality.
- Existing industrial and commercial development and the anticipated impact on other similar developments in reasonable proximity within Bank Colliery.
- Specialist Studies' outcome for the proposed Coal Product Stockpile Expansion project.

The need and desirability determination for the propose Coal Product Stockpile project will hence be structured such that it determines how the ecological attributes of the area, spatial development of the area, socio-economic profile of the communities within the study area and the project's financial viability fits together in ensuring that the proposed project becomes a success for the region.

The need and desirability as mentioned above will be provide in the final BAR to be submitted to the DMRE.

SECTION FIVE

Motivation for the preferred development footprint

5 MOTIVATION FOR THE PREFERRED DEVELOPMENT FOOTPRINT

5.1 CONSIDERATION OF ALTERNATIVES

The National Environmental Management Act 107 of 1998, Environmental Impact Assessment Regulations, 2014 requires a Scoping Report to identify alternatives for projects applied for. In terms of the above-mentioned regulations an alternative in relation to a proposed activity, refers to different means of meeting the general purpose and requirements of the activity, which may include alternatives to the (a) the property on which or location where it is proposed to undertake the activity; (b) the type of activity to be undertaken; (c) the design or layout of the activity; (d) the technology to be used in the activity; (e) the operational aspects of the activity; and (f) the option of not implementing the activity.

The Coal Product stockpile facility of the Thungela Operations (Pty) Limited at Bank Colliery (Goedehoop North) is slowly approaching its capacity. In order to continue with the mining operations unhindered, it was necessary that Thungela Operations (Pty) Limited take measures that will ensure that additional volumetric space is made available for the placement of coal product once the current facility reaches its capacity.

5.1.1 Location Alternatives

No alternatives identified, Expansion of the product stockpile can only be conducted from the position of the current existing stockpile.

5.1.2 Design/Layout Alternatives

The design and layout alternatives for the proposed project involved the determination of the best possible surface infrastructure layout. The following alternatives were considered:

Water Management Options

Two alternatives were identified for the design and layout. These included the use of the existing dirty water dams for the management of the additional water emanating from the coal product expansion area and construction of a new pollution control dam.

In view of the topographical and drainage settings within the project area and the amount of storm water runoff from the expand facility, the use of the existing dirty water dams is preferred. This will eb confirmed by the civil engineer.

Coal Product Expansion Design/Layout

Two alternatives for the design of the expansion layout were considered and include the construction of the new coal product stockpiling area or expansion of the current facility.

Based on the environmental impacts that will emanate from the new facility the expansion of the current facility was opted for.

5.1.3 Technology Alternatives and In put Material Alternatives

Based on the policies of the Department of Water and Sanitation, the local municipalities and the mine itself, it was determined that the only feasible technological way of undertaking the proposed activities

would be to use energy currently available to the mine, water from the existing mine water reticulation system (Bank Colliery (GHN) water purification plant or recycled water from the coal beneficiation plant) and existing waste management facilities for the operation of the proposed project. In view of the above, no technology alternatives were considered for this project. Note that no new building facilities will be constructed at the expansion site since existing facilities will be used for the proposed project.

5.1.4 No Go Option

The Bank Colliery (Goedehoop North) Coal Product stockpile expansion will ensure Bank Colliery (Goedehoop North)'s is able continue with the mining and washing of the coal from the mine. Should the project not commence, the following will result i.e.:

The mine will, due to the inability to stockpile ~~of~~ the generated coal product, result in unnecessary stoppages which may eventually results in a premature closure. This will result in the current labour force losing their employment and all support that the mine provides to the local businesses will also cease. The support that Bank Colliery (Goedehoop North) provides through its proposed Social and labour plan to the local communities, which include implementation of upliftment programmes for the previously disadvantaged persons residing in close proximity to the mine, will cease. This will have an adverse effect on the economic viability of the local community, since some of the projects have economic benefit for the local community. This will eventually undermine and slowdown the efforts that local economic policies promulgated by the state, has had on the community.

The Coal Product Stockpile expansion area is within the Bank Colliery (Goedehoop North) mining and surface right area, which has been affected by previous mining activities. As such, Bank Colliery (Goedehoop North) is the only mine that can exploit this land for the expansion of the Coal Product with the least environmental damage. The mine has further committed to ensuring that environmental impacts are further minimised by conducting environmental investigations using independent specialists and consultants. These investigations will provide the mine with measures that must be undertaken to minimise the impacts.

Bank Colliery (Goedehoop North) has current supply contracts for the type of coal that is available in these reserves, hence should the mine come to a premature end, the mine will not be able to honour their supply contracts. This will have serious impacts on the ability of the mine and Thungela Operations (Pty) Limited to continue with their business.

Accordingly, the consequences of not proceeding with the proposed project will have a detrimental impact on the current and future labour force, the surrounding previously disadvantaged communities, the owners of the mine, and the coal export market. This may ultimately have an impact on the region as a whole, due to a loss of revenue and due to a loss in taxes.

5.2 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED AND RESULTS THEREOF

Public participation is the cornerstone of any EIA process. The principles of the NEMA govern many aspects of EIA's, including public participation. The general objectives of integrated environmental management laid down in the NEMA include to "ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment". The National Environmental Management Principles include the principle that "The participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to

develop the understanding, skills and capacity necessary to achieve equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured", which basically means that the person responsible for the application (EAP) must ensure that provision of sufficient and transparent information on an ongoing basis to stakeholders are made to allow them to comment, and to ensure that the participation of previously disadvantaged people like women and the youth are undertaken.

In terms of the EIA Regulations, 2014, when applying for environmental authorisation, the Environmental Assessment Practitioner managing the application must conduct at least a public participation process where all potential or registered interested and affected parties, including the competent authority, are given a period of at least 30 days to submit comments on each of the basic assessment reports, EMPr, scoping report and environmental impact assessment report, and where applicable the closure plan. In this case a Basic Assessment Report (BAR) is considered.

This section of the BAR and EMPr will give an explanation of the public participation process taken in order to comply with the above-mentioned requirements. A number of public participation guidelines were published in a bid to assist persons responsible for the environmental authorisation applications. As much of the available guidelines were used in determining the public participation process, in guiding the public participation process of the proposed project.

Thungela Operations (Pty) Limited is applying for an integrated environmental authorisation for the proposed Coal Product Stockpile Expansion project. The application for the environmental authorisation is undertaken in terms of the process as laid out in part 3 of Chapter 4 under the NEMA

EIA Regulations, 2014. The above-mentioned regulations requires that an applicant for an environmental authorisation submit a BAR and EMPr report to the competent authority after having subjected the reports to a public participation process.

In view of the above, a public participation process was initiated for the proposed Coal Product Stockpile Expansion project. The public participation process for the proposed project is designed to provide sufficient and accessible information to interested and affected parties (I&APs) in an objective manner to assist them to:

- raise issues of concern and make suggestions for enhanced benefits;
- contribute local knowledge and experience;
- verify that their issues have been captured;
- verify that their issues have been considered in the technical investigations; and
- comment on the findings of the EIA.

The following were conducted in undertaking of the public participation process for the proposed project.

5.2.1 Registration and BAR Phase

The public participation process commenced with the provision of potential Interested and affected parties (I&AP's) 30 days to register as interested and affected parties and to comment on the draft BAR and EMPr. The registration and commenting process started on the 24th of October 2022 and ended on the 22nd of November 2022.

5.2.1.1 Notification of potential interested and affected parties

The following methods of notification were used to notify the potential interested and affected parties of the opportunity to register during the public participation process for the proposed project:

- On the 24th of October 2022, notices were fixed at two sites i.e. on the fence of the property where the proposed project will be undertaken and at a public place conspicuous to and accessible to the public. The notices were compiled to comply with the requirements of Regulation 41(3) of the EIA Regulations, 2014.
- Written notices were also sent to all the owners and lawful occupiers of the land on which the proposed project will be undertaken, owners/lawful occupiers of land immediately adjacent to the proposed project area, the municipal councillors of the ward in which the proposed project is situated and the municipality which has jurisdiction in the proposed project area (Steve Tshwete Local Municipality). The written notices were compiled to comply with the requirements of Regulation 41(3) of the EIA Regulations, 2014.
- Landowners and settlements within and immediately surrounding the proposed project area, such as Bank Village are automatically registered as interested and affected parties.
- Notices inviting the public to register as interested and affected parties were published in a local newspaper (Middelburg Observer) on the 21st of October 2022. The newspaper notices were published in English. The notices were compiled to comply with the requirements of Regulation 41(3) of the EIA Regulations, 2014.
- A public meeting will be held on the 3rd of November 2022.

5.2.1.2 Registered Interested and Affected Parties

The following authorities are currently registered as interested and affected parties for the Coal Product Stockpile Expansion project:

- Department of Mineral Resources, Mpumalanga Regional Office (Competent Authority),
- Department of Water and Sanitation, Mpumalanga Regional Office (Commenting Authority)
- Department of Agriculture, Rural Development, Land and Environmental Affairs, Mpumalanga Provincial Office (Commenting Authority)
- National Department of Agriculture, Forestry and Fisheries, Mpumalanga Regional Office (Commenting Authority)
- Mpumalanga Tourism and Parks Agency (Commenting Authority)
- South African Heritage Resources Agency (Commenting Authority)
- Landowners (Direct and Immediately Adjacent Landowners)

5.2.1.3 Proof of Consultation

Proof of the above-mentioned consultation and results will be attached in the final BAR.

5.2.1.4 Finalisation of Interested and Affected Party Database

On expiry of registration period, the database of interested and affected parties will be finalised. All parties who indicated the interest of being registered as interested and affected parties will be added to the list of interested and affected parties.

Note: All organs of state, which have jurisdiction in respect of any aspect of the proposed project and the competent authority, were automatically registered interested and affected parties.

5.2.2 Draft Basic Assessment Report

The draft BAR and EMPr was made available for comment to all relevant stakeholders during the above-mentioned registration phase of the proposed project's public participation process.

5.2.2.1 Comments, Issues and Responses on the Draft Basic Assessment Report

The comments and issues raised by the interested and affected parties will be addressed and will be included in the final BAR and EMPr as prescribed by the DMRE.

5.3 ENVIRONMENTAL ATTRIBUTES (BASELINE INFORMATION)

5.3.1 Geology

5.3.1.1 Geological Setting

Description of the rock units:

Large areas of the southern African continent are covered by the Karoo Supergroup (Figure 2). 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.

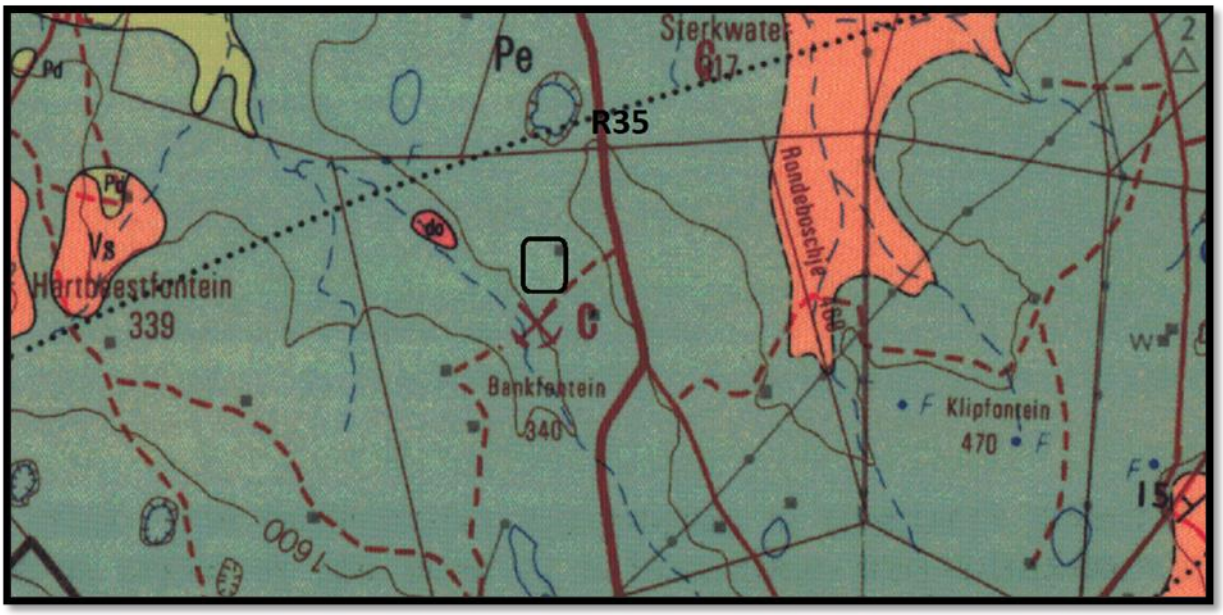


Figure 3: Geology of the development area

Legend to Figure and short explanation

Do – Dolerite (pink). Jurassic.

Pe – Sandstone, shale and grit with coal and oil-shale beds (grey). Vryheid Formation, Ecca Group, Karoo Supergroup. Permian.

…… – (black) Lineament (Possible dyke).

------ - Concealed geological boundary.

--f— Fault.

⊥**15**˚ - Strike and dip.

□ **–** Approximate position of stockpile expansion (blocked in black).

Mining Activities on Figure:

C – Coal.

Mining past and present have an influence on the project.

Dolerite dykes (Jd/do) 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. Permian sediments are extensively intruded and thermally metamorphosed (baked) by sub-horizontal sills and steeply inclined dykes of the Karoo Dolerite Suite. These early Jurassic (183 Ma) basic intrusions baked the adjacent mudrocks and sandstones to form splintery hornfels and quartzites respectively. Thermal metamorphism by dolerite intrusions tends to reduce the palaeontological heritage potential of the adjacent sediments.

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).

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). 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.

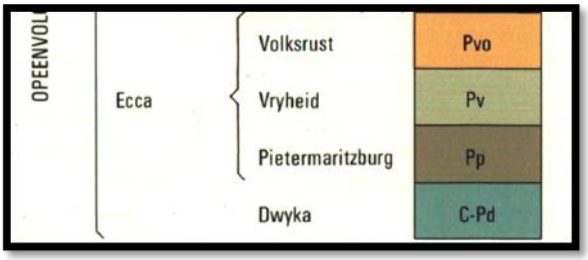


Figure 4: Lithostratigraphic column of the development area (Vryheid 2730)

5.3.2 Climate

5.3.2.1 Regional Climate

Bank Colliery is located in the Mpumalanga Province of South Africa and the Eastern Plateau Highveld climate zone. The province is characterised by a mild to warm summer rainfall climate and cool to cold winters. Sharp frost is a common occurrence during winter. The hottest months in the region have been measured in December and January, whilst the coldest months are June and July.

The days during summer are generally warm, but a substantial drop in temperature occurs during the winter nights.

5.3.2.2 Mean Monthly Rainfall and Evaporation

The mean annual precipitation of the site is 687 mm. The mean annual evaporation of the site is 1522 mm (S-Pan). The monthly average rainfall, rainfall days, and evaporation rates are presented in Table 5. The Mpumalanga Highveld has distinct wet and dry seasons. 91% of the Colliery's mean annual rainfall falls between October and April inclusively. 61% of the area's mean annual evaporation occurs in this period (Midgley et al., 1990).

Table 5: Mean monthly rainfall, rain days and evaporation data for the site

Month	Ave Rainfall (mm)	Ave rain days	Ave Evaporation (mm-S-Pan)
October	67.8	7.0	172.4
November	112.6	10.4	162.6
December	110.6	10.3	179.1
January	116.5	10.4	175.9
February	96.3	7.8	146.6
March	74.8	7.1	144.7
April	42.8	4.5	111.3
May	16.3	2.1	93.7
June	7.6	1.2	76.1
July	6.6	0.9	83.3
August	6.9	1.0	110.3
September	24.2	2.8	143.0
Mean Annual	**687***		**1599**

5.3.2.3 Peak Rainfall Data

5.3.2.3.1 Maximum Monthly Rainfall Data

The maximum monthly rainfall data was distilled from the daily rainfall record and is presented in Table 6.

Table 6: Maximum monthly rainfall data (mm)

Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
202.7	250.7	308	360.5	345.9	184	144.5	143.8	104.1	75.7	37.8	135.5

5.3.2.3.2 Peak 24-hr Rainfall Data

The peak 24-hr rainfall depths are presented in Table 7.

Table 7: Peak 24-hr rainfall depths for the site

Recurrence Interval (year)	24 hour rainfall depth (mm)
2	52
10	79
20	94
50	116
100	136
200	160

5.3.2.4 Mean monthly temperature

Table 8: Mean monthly temperature data for 0515320 (Witbank)

Month	Daily Max. ºC	Daily Min. ºC	Daily Mean. ºC
January	27,2	13,7	20,5
February	26,8	13,4	20,1
March	26,0	11,4	18,7
April	23,9	7,4	15,7
May	21,3	2,2	11,7
June	18,5	-1,8	8,3
July	18,4	-1,7	8,3

August	21,4	0,8	11,1
September	24,0	5,3	14,7
October	26,0	10,1	18,0
November	26,2	11,8	19,0
December	27,1	13,2	20,1

5.3.2.5 Wind direction and Speed at the Mine

During the summer months the wind direction is generally northerly and easterly, at speeds ranging from 5 to 25km/h. During July (winter conditions), the winds are somewhat more southerly and westerly at speeds ranging from 5 to 48km/h. The period August to November is the period when wind speeds are at their greatest (aside from the periods associated with local thunderstorms), with wind speeds in excess of 40 km/hr having been recorded (Table 9).

Table 9: Average Wind Speed and Direction

Month	N		NE		E		SE		S		SW		W		NW	
	n	v	n	v	n	v	n	v	n	v	n	v	n	v	n	v
Jan	67	4.3	142	4.0	119	4.5	92	5.1	40	4.6	47	4.3	45	3.8	149	3.8
Feb	48	4.1	108	3.8	139	4.1	135	4.9	61	4.5	48	3.9	41	3.5	91	3.7
Mar	53	3.9	99	3.7	16	3.7	99	4.5	50	4.1	56	4.1	43	3.5	111	3.9
Apr	50	4.0	88	3.5	94	4.0	55	4.2	45	4.3	71	4.4	71	4.5	129	4.0
May	54	4.4	66	3.7	61	3.9	62	4.5	47	4.2	79	4.5	67	4.7	116	4.1
Jun	48	4.1	66	3.7	64	4.1	42	4.8	46	4.7	99	4.5	76	4.3	115	4.3
Jul	43	4.1	66	3.7	64	4.1	62	4.9	54	4.6	84	4.5	57	4.2	121	4.1
Aug	80	4.9	96	4.4	97	4.3	33	5.6	35	4.9	75	4.9	65	4.9	192	4.7
Sept	115	4.8	134	4.8	101	5.0	48	5.7	32	4.1	53	5.1	59	5.0	203	4.8
Oct	115	4.5	139	4.7	116	5.4	58	5.6	41	4.9	54	4.7	47	4.8	223	4.8
Nov	105	4.4	135	4.4	110	5.0	56	5.3	37	4.9	45	4.6	55	4.3	229	4.7
Dec	91	4.2	138	4.1	102	4.8	55	4.9	35	4.5	47	4.9	55	4.2	194	4.2

Avg	**72**	**4.4**	**103**	**4.1**	**98**	**4.4**	**66**	**4.9**	**44**	**4.5**	**64**	**4.5**	**57**	**4.4**	**156**	**4.4**

5.3.2.6 Mean Monthly Evaporation

The mean monthly evaporation for the region obtained from Bethal is presented in Table 10. The gross average 'A' pan evaporation recorded amounts to 1774 mm, with the maximum evaporation occurring during the summer months, from October to January, due to high summer temperatures. If the mean annual rainfall is compared to the mean annual evaporation there is a net monthly deficit throughout the year. This results in an annual water deficit of approximately 1102 mm.

Table 10: Mean Monthly Evaporation for the region

Month	Evaporation (mm)
January	192
February	64
March	164
April	122
May	113
June	94
July	107
August	149
September	190
November	181
December	196

5.3.2.7 Extreme weather conditions

Hail: Occurs 4 to 7 times per year

Drought: ± every 6 years

Frost: Can occur from end of April to September

5.3.3 Topography

The southern and central subareas, as well as the southern part of the northern subarea of the proposed extension area is situated on a wide, level to very gently sloping topographic crest, covered by deep, well-drained terrestrial soils. Towards the north, the narrow (less than 20 m wide), elongated

part of the northern subarea is situated on a somewhat steeper midslope, still covered by terrestrial soils. Further north, the midslope grades downslope into a gentle footslope. The latter is covered, by what might be termed a hillslope seep, with seasonal wetland soils exhibiting water tables within the solum. Downslope, outside the study area, the footslope grades into an unchanelled bottomland with poorly drained soils. In this area, the water table was at the surface at the time of survey.

5.3.4 Soil

The soil types encountered in the proposed extension areas are shown in Figure 4 and described in Table 11.

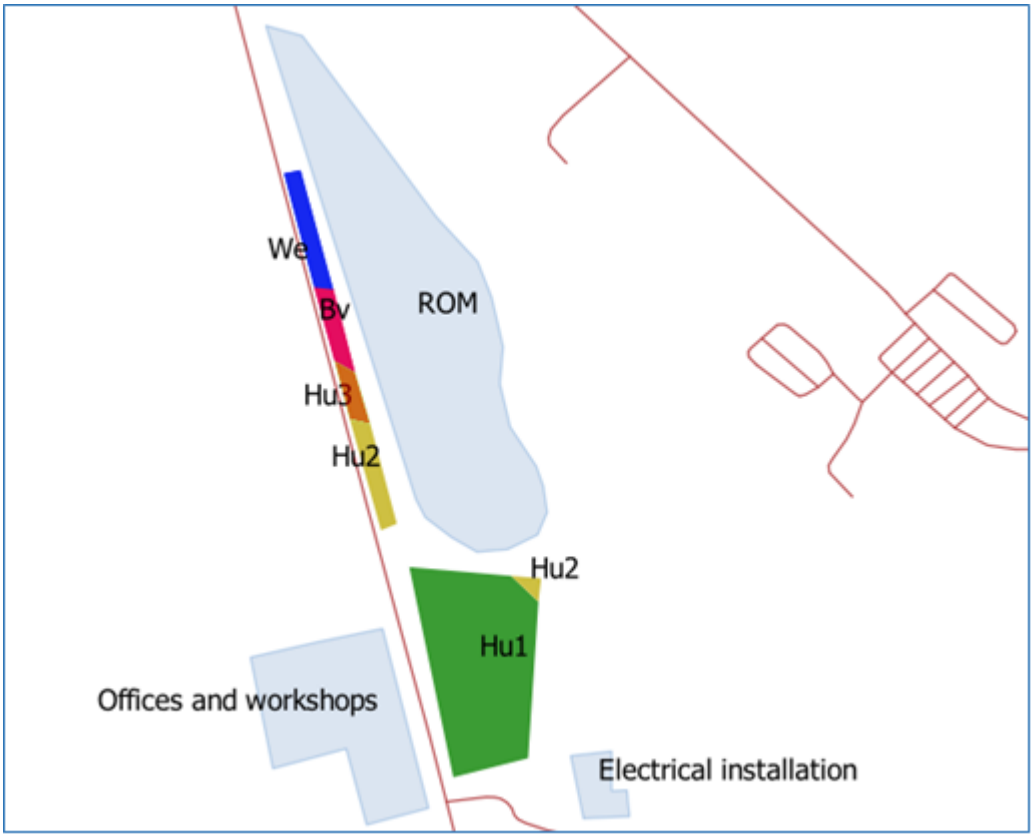


Figure 5: Soil types with surrounding infrastructure

Table 11: Description of the soil types

MAP UNIT	LANDFORM COMPONENT	SOIL COMPONENT	AREA (ha)	CORRE-LATION WITH 2018 EDITION
Hu1	Level to gently sloping crest (1-2% slope)	Deep (>120 cm) well drained, red, apedal, sandy clay loam of the Hutton form	1.84	Hutton 2110
Hu2		As for Hu1 but containing iron-manganese concretions in the lower subsoil	0.22	
Hu3	Gently sloping upper midslope (3% slope)	As for Hu1 but with an overburden of dark grey sandy loam or sandy clay loam 15-20 cm thick	0.10	

Bv	Gently sloping lower midslope and upper footslope (2-3% slope)	Deep (>120 cm) somewhat poorly drained, red, apedal, sandy clay loam, mottled in lower subsoil, of the Bainsvlei form	0.13	Bainsvlei 2210
We	Gently sloping lower footslope and bottomland (1-2% slope)	Deep, with shallow effective depth, poorly drained, grey-brown, structureless, sandy clay loam, with mottled subsoil, of the Westleigh form	0.32	Westleigh 2200
		Total	2.61	

5.3.5 Land capability

All the terrestrial soils listed above occupy terrain and climatic settings that are highly favourable for the production of rainfed summer field crops such as maize and soya. These soils all have good physical properties such as water-holding capacities and low to moderate erosion susceptibilities. Although the natural fertility is modest (natural pH values of 5.0-5.5, as displayed by modal profiles in the national soil profile database of the ARC-Institute for Soil, Climate and Water), they are responsive to fertilization and liming. The Hutton soils (Hu1, Hu2 and Hu3 in Figure 4) are also suitable for irrigated agriculture.

The “soil capability” of the terrestrial soils might be classified as very high, but climatic factors, mainly the frosty winters, but also the less than ideal rainfall, precludes a very high land capability rating. This study thus confirms the screening tool land capability assessment of “high”.

The above being stated, recognition has to be given to the fact that degradation in the form of salinization has been taking place in the vicinity of the existing ROM facility. This degradation can be reversed through leaching, however.

The northern part of the northern subarea (soil unit We) is situated in seasonal wetland terrain and is thus a sensitive area for surface water recharge, biodiversity and unjudicial agricultural land use.

5.3.6 Current Land Use

Most of the surveyed area had been transformed by mining-related activities. The latter include the construction (and demolishing in places) of infrastructure such as buildings, roads, sewage works, water runoff and seepage management structures etc. Non-transformed land is largely restricted to the western and southern edges of the surveyed area and to parts of the golf course.

Land use over the proposed Coal Product Stockpile Expansion project area is impacted natural grassland.

5.3.7 Natural Vegetation/Plant Life

Mucina et al., (2005) which is the most recent vegetation map for South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2007), describes the study area as ‘Eastern Highveld Grassland’. This vegetation type is endemic to Mpumalanga, where it occurs on slightly too moderately undulating plains with some low hills and pan depressions. The climate is temperate with strongly seasonal summer rainfall and very dry, cold winters.

Local Natural Environment

According to Acocks (1988) the area of interest falls within the False Grassveld vegetation biome and the veld type is known as Bankenveld, (type no. 61). Three variations are recognised, namely: the Central, Eastern and Western Variations. The area of interest falls within the Eastern Variation which has sandy plains and is wetter than the Western Variation. A more recent classification of the vegetation types of South Africa by Low and Rebelo (1996) calls this the "Moist Sandy Highveld Grassland" (type no. 38) and lists "Northeastern Sandy Highveld" (A57) and "Eastern Bankenveld" (A61c) as synonyms. According to Mucina and Rutherford (2006) the area of interest falls within the Eastern Highveld Grassland.

Habitat/ Vegetation Types

A total of seven habitat units were delineated in Bank Colliery (Goedehoop North), topographic features were the primary consideration for the delineation of the various units. These features included the location of the habitat type in the landscape, influence of available soil type, influence of available moisture, gradient and aspect. The above-mentioned factors have an effect on the habitat type in isolation and in conjunction with each other.

Secondly, anthropogenic activities were also considered to assist with the delineation of vegetative and/or habitat types. Owing to the presence of maize farming activities within the area together with exotic tree areas and homesteads the landscape has been altered to such an extent that obvious divisions are noticeable. As is the case with natural factors, anthropogenic factors could have an effect in isolation or in conjunction with other factors.

Below is the summary of the types of habitat encountered at Bank Colliery (Goedehoop North):

Primary Grassland

This habitat type exhibited the least effected biota with regards to anthropogenic activities and was found to be the natural vegetation type from which the remaining habitat types were formed. Impacts such as fencing accompanied by grazing, unplanned burning and agriculture were responsible for the formation of secondary grasslands, alien trees and human induced habitats. The remaining natural areas within this habitat type were providing refuge to plant species.

- Habitat type is declining because of anthropogenic impacts.
- Conservation efforts should concentrate on this habitat type.
- Management for smaller areas (fenced) will be needed.

Secondary Grassland

The secondary grasslands are the areas where the impacts on the natural grasslands can be seen. These areas are currently being utilised for agricultural activities, predominantly grazing and maize plantations.

- These areas still have remnants of natural grassland that make up their composition; these areas must be conserved and rehabilitated.

River and Riparian

This habitat type had variances within the study area, these were seasonal marsh wetlands and pan wetlands.

Seasonal Marsh Wetlands: The seasonal marsh wetlands were found in the valley bottoms where the water runoff accumulates.

- These areas are excellent for the creation of corridors, however then livestock will have to exclude from utilising the areas, at least temporarily by means of rotational grazing.

- These areas are sought after for agricultural activities due to the nutrient rich soil, and must be conserved before it they get over exploited.
- The pan wetlands areas found on the Bank Colliery area had high water levels due to the recent rain. This meant the vegetation that will be visible when the water level is low, is not visible and the vegetation associated with the specific pans will be similar to the surrounding vegetation type.
- These areas are sought after for agriculture, these areas must be protected from overutilization.

Rocky Habitats

The rocky habitat areas were few in comparison with other natural areas. These areas were not impacted on by agriculture directly due to its unsuitable nature for ploughing. However unplanned burning and over grazing still play a part in the current condition. This area provides refuge to plant species.

- These are very limited areas and not suitable for agriculture.
- Because of the small size conservation efforts must be applied immediately.

Alien trees/ Plantations

Alien trees that were encountered during the field survey were found in a variety of habitat types, however the extent of the infestation allows for a separate habitat type to be addressed. The alien trees were found in large numbers in the secondary grassland areas as well as the primary grassland areas. Evidence of previous effort of eradication was evident in certain areas however these attempts were un-successful due to various factors.

- These areas pose a massive threat to the natural vegetation type, the aggressive nature of these plants means they will colonise new areas.
- Follow up programs must be implemented to ensure eradication procedures were successful.

Human-induced Habitats

The human induced habitats were areas where natural habitat was removed to accommodate buildings and infrastructure, a process which opens up areas for alien vegetation infestation. These areas are of no value from a biodiversity aspect.

- These areas were found to be areas where alien invasive species could readily establish themselves due to open and un-colonised ground being present.

Monitoring and aftercare in the form of re-planting must be applied.

Plant Species Recorded

148 plant species were recorded. These species included three tree, six shrub, one reed, six sedge, 28 grass and five herb or bulb species. From a grass perspective six decreaser grasses were observed at Bank Colliery (Goedehoop North). Six grasses are increaser I species, with 12 climax grasses occurring at Bank Colliery (Goedehoop North), these are known to occur in underutilised veld (van Oudtshoorn, 1999). Furthermore, nine increaser II grasses were recorded at Bank Colliery (Goedehoop North), these species are abundant in over utilised veldt and therefore increase with excessive grazing. There was one increaser III grasses species observed at Bank Colliery (Goedehoop North). Three grasses recorded at Bank Colliery (Goedehoop North) were exotics, weed or alien invasive.

Endangered or Rare Species

A number of red data species were encountered at the study area. These include the Boophane distichaand and the Hypoxis hemerocallidea. Boophane disticha Declining (Raimondo et al. (2009) or Poison Bulb: This

extremely toxic bulb is used extensively throughout Africa for traditional medicine, and its medicinal uses have been extensively documented. It is very popular in the muthi markets and amongst urban and rural healers. The bulbs are usually VERY large and always present in the muthi markets. Threat: Harvesting. Hypoxis hemerocallidea Declining (Raimondo et al. (2009) or Star flower: The corm is consistently heavily harvested for the medicinal plant trade throughout the country. Threat: Harvesting. The above mentioned two plant species were encountered in the Primary Grassland and Secondary Grassland vegetation types.

Declared Invader Plant Species

Six declared invader species were observed at Bank Colliery (Goedehoop North).

Environmental viz.

Pampas grass	Cortaderia selloana Category 1 declared invader)
Thorn apple	Datura stramonium (Category 1 declared invader
Red river	gum Eucalyptus camaldulensis (Category 2 declared invader)
Patula pine	Pinus patula (Category 2 declared invader)
Grey poplar	Populus x canescens (Category 2 declared invader)

Weeping willow Salix babylonica (Category 2 declared invader).

Cat. 1 = Category 1 declared weeds and invader plants. These plants shall not occur on any land or on any inland water surface. Such plants shall be eradicated (Regulation 15 and 16 of the Conservation of Agricultural Resources Act – Act 43 of 1983).

Cat. 2 = Category 2 declared weeds and invader plants. These plants may only occur or may be established on areas demarcate for that purpose viz. plantations. The spreading of seed or any other propagating material must be reduced. If category 2 invader plants occur on any land or water surface outside the demarcate areas, they will be eradicated. (Regulation 15 and 16 of the Conservation of Agricultural Resources Act – Act 43 of 1983).

Medicinal Plant Species

Five medicinal plant species were observed in the area of investigation viz. Hypoxis hemerocallidea (African potato), Pelargonium luridum (Wild malva), Gomphocarpus fruticosus (Milkweed), Typha capensis (Bulrush) and Datura stramonium (Thorn apple – Category 1 declared invader). All these plant species are widespread although African potato is declining.

5.3.8 Animal Life

Bank Colliery (Goedehoop North), due to its location, is regarded as being disturbed, with a high influence coming from the existing Mine Residue Deposit, as well as the numerous buildings on the study area. Most of the buildings on the study area have been demolished.

Although a desktop study of historical avifaunal, mammalian, invertebrate and reptilian occurrences in the area has been done, no significant populations, or occurrences are expected to occur in the area. This is directly attributed to the disturbance of the study area and its surroundings.

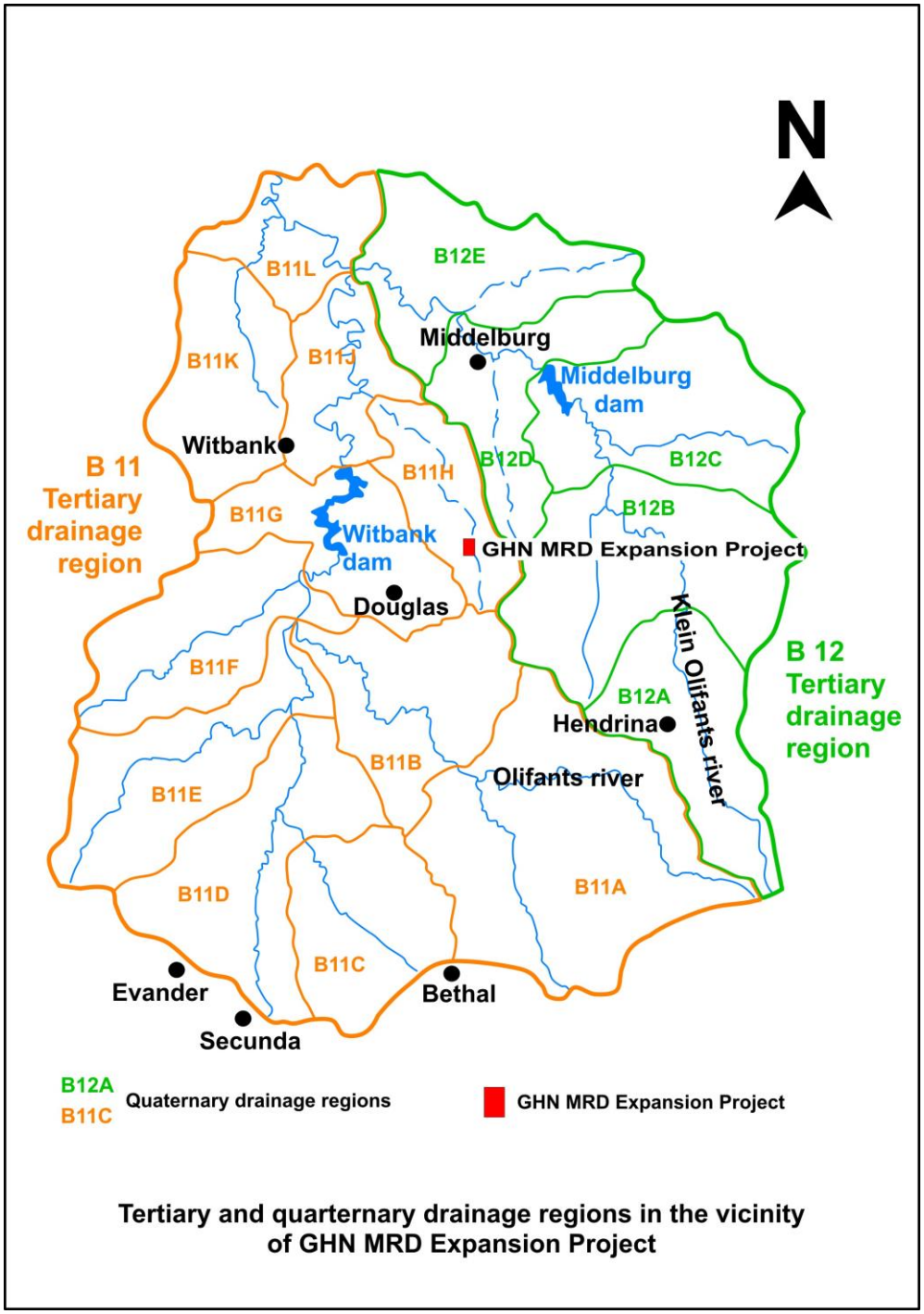
5.3.9 Surface Water

The mining right area of Bank Colliery in relation to the major catchments and the natural surface streams are shown on Figure 5 and Figure 6 respectively. A number of streams have their

headwaters within and around the Bank Colliery's mining right area. These streams can be divided into two groups i.e. those that drain into the Olifants River upstream of the Witbank Dam (Koringspruit and those draining into the Olifants River just downstream of the Witbank Dam and upstream of the Loskop Dam).

In terms of the new DWEA catchment delineation, Bank Colliery falls within the B11 and B12 drainage regions, see Figure 7.

The upper Olifants River catchment upstream of the Witbank Dam affected by Bank Colliery is illustrated in Figure 5. This catchment area subsequently falls within the B11 drainage area. The upper Olifants River catchment encloses an area of approximately 3 256 km² with a mean annual runoff (under virgin conditions) of 125.1 x 106 m³ per annum. This river catchment forms one of the two major drainage valleys into the Witbank Dam.



Tertiary and quarternary drainage regions in the vicinity of GHN MRD Expansion Project

Figure 6: Bank Colliery (Goedehoop North) Quaternary Catchment

Figure 7: Streams within the Bank Colliery (Goedehoop North) area

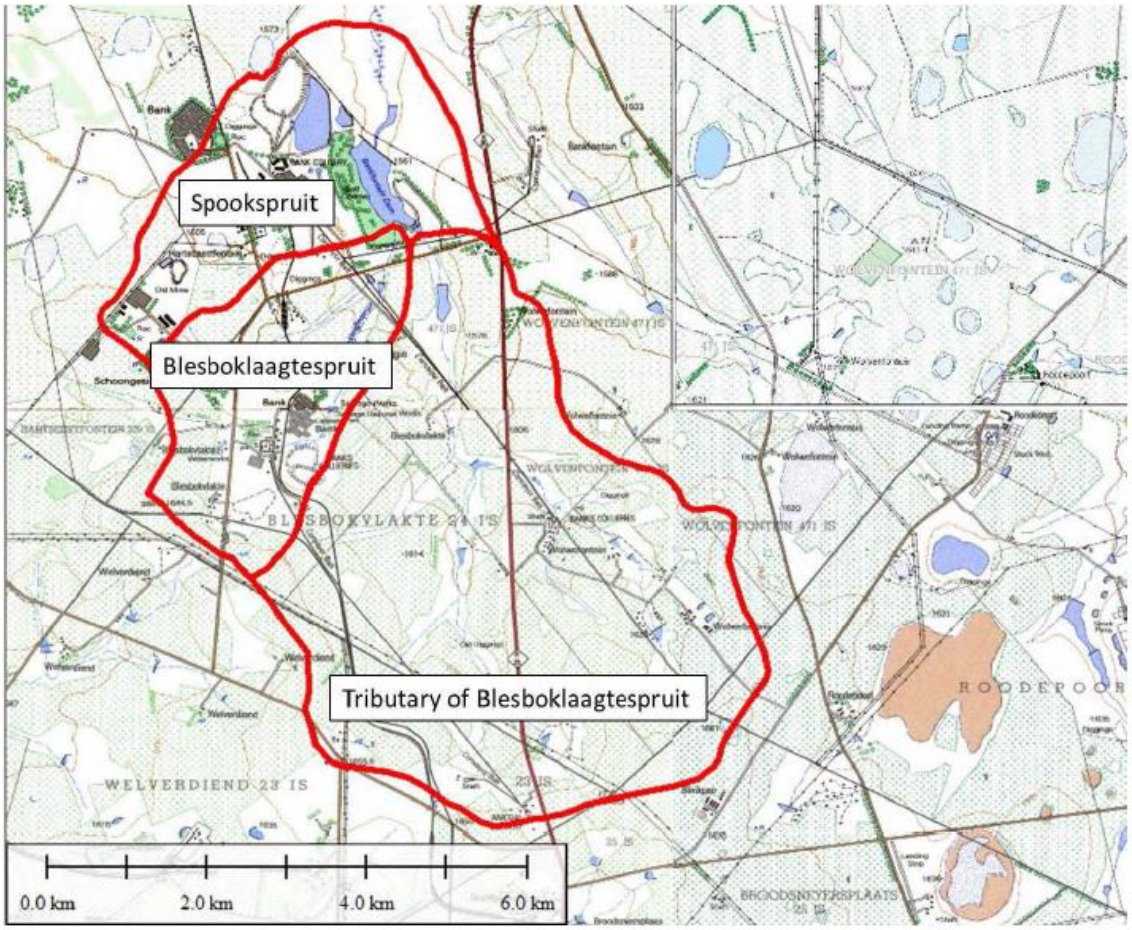


Figure 8: Sub-catchment Delineation at the Bank Colliery (Goedehoop North) Plant and Offices area

5.3.9.1 Regional Catchment Description

Bank Colliery, is located within the upper reaches of the Olifants River catchment. Bank Colliery is located in the upper reaches of the Loskop and Flag Boshielo Dam catchments. The Loskop and Flag Boshielo dams are located downstream of Witbank Dam, on the Olifants River, and are an important source of domestic, irrigation and industrial water to their surrounding areas. The Olifants River is an international river, flowing through the Kruger National Park and into Mozambique.

The Loskop Dam catchment measures 12 285 km2. The mean annual precipitation in this catchment is fairly uniform varying between 670 mm and 700 mm. The mean annual evaporation (S-Pan) varies between 1 520 mm in the southern regions of the catchment and 1 700 mm in the northern regions of the catchment.

5.3.9.1.1 Local Catchment Description

The majority of surface infrastructure, including the plant, office and coal product Stockpile areas, are situated in quaternary catchment B11H (See Figure 5). It is located next to the R35, approximately 12 km North of Komati village and the Komati power station.

The natural vegetation in the Bank Colliery (Goedehoop North) mining right area is predominantly grassland. Extensive irrigated and dry-land agricultural activities are prevalent. Various forms of livestock farming also exist in the catchment.

Two streams flow in a northerly direction. The most western stream is the Blesboklaagtespruit. The most eastern stream merges with the Blesboklaagtespruit in Bankfontein Dam. The outflow of Bankfontein Dam becomes the Spookspruit. The Blesboklaagtespruit is also known locally as the Bankfonteinspruit. These streams and dams are shown in Figure 6.

There are numerous small dams located on the streams within the study area. There is little development in the catchments, with a few farmsteads scattered throughout the catchments. The catchments can be considered as rural.

The catchments of the above-mentioned streams were delineated using the Surveyor General's 5 m contours. The catchment sizes are shown in Table 12.

Table 12: Sub Catchment Sizes

Catchment	Size
Spookspruit (at study area boundary)*	41.71 km²
Blesboklaagtespruit	7.45 km²
Tributary of Blesboklaagtespruit	25.4 km²

5.3.9.2.2 Normal Dry Weather Flow

The normal dry weather flows are based on the average monthly flows documented in the Water Resources of South Africa, 2005 Study (Middleton and Bailey, 2009) for quaternary catchment B11H. The flows were scaled based on relative catchment size. The dry weather flows for the three streams that flow through the study area are presented in Table 18. The dry weather flows have been highlighted in bold text.

5.3.9.2 Surface Water Quality

Bank Colliery samples water quality on various surface water bodies on and outside of their property. Sampling frequency is generally monthly as per authorised Water Use License.

Surface Water Users

The Blesboklaagte Spruit and its tributary flow into Bankfontein Dam which discharges into the Spook Spruit. The Spook Spruit is a tributary of the Olifants River, joining the Olifants River just downstream of the Witbank and Doornpoort Dams. The confluence is upstream of the Loskop and Flag Boshielo Dams. These dams are an important source of domestic, irrigation and industrial water to their surrounding areas. The Olifants River is an international river, flowing through the Kruger National Park and into Mozambique.

The flow in the Spook Spruit is small in comparison to the flow in the Olifants River. The Olifants River is a highly impacted river system. Impacts are largely caused by coal mining, similar to impacts that are likely to be found in the Spook Spruit. Water quality of the Olifants River is likely to dominate the water quality once the Spook Spruit and the Olifants Rivers converge. The downstream users were therefore considered in the Spook Spruit. The downstream usage classes are evaluated below:

- Domestic users – farm labourers and local inhabitants may consume this river water.
- Recreational users – it is likely that farm labourers and local inhabitants will swim in the streams and will use the water for washing.

- Industrial users – there are mining activities downstream of the proposed operations. However, these operations are not sensitive to poor quality water.
- Aquatic users – the catchments are heavily impacted by agriculture and mining, and sensitive aquatic users are unlikely to be present
- Irrigation users – the river water is likely to be used for small-scale or informal irrigation
- Livestock watering – the river water is likely to be used for livestock watering

The water quality guidelines considered are therefore the Domestic, Irrigation, Livestock watering and Recreational water quality guidelines.

5.3.9.3.1 Sample Locations

During the January 2022 to March 2022 quarterly period, all fifteen (15) surface water localities of the Goedehoop North section (S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, S21, S22 and S23) were located and sampled (Table 13).

The water quality of these localities will be evaluated with respect to water quality limits as stipulated in the WULA: 2021 (Table 6 for S1 and S2 and Table 9 for the remaining surface water localities). The average water quality results of the sampling localities are presented in Tables 14 and 15.

The quarterly average physico-chemical water quality of these localities could be described as neutral (S4 is slightly acidic) while in terms of salinity (TDS) the quarterly average ranged from non-saline to very saline (S6, S7 and S12). Localities S1 and S2 are compared against the quality of water to be disposed guidelines as presented in Table 20 of the amended Water Use Licence. Average concentrations of acidity, F, Mn and total nitrogen exceeded this guideline at S1 while total alkalinity, Mg and total nitrogen exceeded at S2. The average EC value exceeded the General Limit (Section 21f and h, 2013) at S2. This therefore implies water from these localities are not suitable to be discharged as adverse effects may occur to the receiving environment.

The sample locations are shown in Figure 8.

The remaining North surface water localities were compared against the Resource Quality Objectives Resource Unit 11 (RU11) guidelines as presented in Table 9 of the amended Water Use Licence. The average EC values and concentrations of SO4, NO3-N, NH4-N and TON exceeded this guideline at selected localities (Table 15) except at S3, S5, S8, S9, S10, S21 and S22.

The average NH3-N, total nitrogen and PO4-P concentrations exceeded the aquatic ecosystems guideline at all the north surface water localities as well as NO3-N, total oxidised nitrogen, Al and Mn at selected localities. The domestic use guidelines were also exceeded at all the localities in terms of at least one of the following parameters pH (S4 only), EC, TDS, Ca, Mg, Na, SO4, NO3-N (S11 only), Al, Fe and Mn.

For all of the localities, pH values were within the range 6 – 8.5, with S1 and S2 below the IWUL pH limit throughout the quarterly period. A decreasing pH trend can be observed S1 and S2 while S4 show an increasing trend. The rest remained somewhat constant from January 2022 to March 2022.

High concentrations of TDS and SO4 as well as EC values are usually recorded at these localities with few localities measuring above the stipulated guideline with fluctuating concentrations during the quarterly period. During the quarterly period, S6, S7, S12 and S23 reveal increasing trends of EC, TDS and SO4. Decreasing EC trends can be observed at S4, S21 and S23.

In the past S4 usually records acidic water conditions with high sulphate (SO4), Mn, Fe and Al concentrations which was indicative of acid rock drainage and was not implausible as S4 is located downstream of Bank 5 discard dump and liquids that drain from coal waste tips are known to be highly

acidic. However, the current water quality at S4 has improved even though SO4 exceeds the limit and pH is slightly acidic. Metal concentrations were measured below detection limit with a non-acidic (neutral) pH during most of the quarterly period. Acid mine drainage interaction with alkaline material may provide metal removal by precipitation in solution. Water with high SO4 and low iron levels can indicate a previous presence of acid mine drainage but which have been controlled over time. In a bid to remediate the current pollution a phytoremediation project has been established downstream of the Bank 5 MRD facility.

Table 13: Monitoring localities at Goedehoop North sampled ion the quarterly period

SAMPLING REGISTER: QUARTERLY						
PROJECT NAME:	Thungela Goedehoop Colliery					
MONTH:	January 2022 to March 2022					
Thungela Goedehoop Colliery						
Locality	Description	Coordinates		Sample dates		
		Latitude	Longitude	Jan-22	Feb-22	Mar-22
Monitoring Localities						
S1	Bankfontein Dam	S25.97170	E29.46459	•	•	•
S2	Bank 2 Return Water Dam	S25.96908	E29.46339	•	•	•
S3	Bank 2 SW discharge	S25.97366	E29.46103	•	•	•
S4	Bankfontein Dam Inlet from Blesbokspruit	S25.97978	E29.47082	•	•	•
S5	Bankfontein Dam Inlet from Bankfonteinspruit Blesbokspruit	S25.98276	E29.47296	•	•	•
S6	Bankfontein Dam Outlet	S25.97025	E29.46626	•	•	•
S7	Bankfontein Dam Outlet Upstream of S6	S25.97000	E29.46580	•	•	•
S8	Bankfonteinspruit upstream of Bankfontein dam	S26.00738	E29.48104	•	•	•
S9	Spookspruit upstream of Bank Old Bricks Works	S25.94732	E29.47030	•	•	•
S10	Spookspruit downstream of Brownshaft next to Main Road	S25.96168	E29.47718	•	•	•
S11		S25.95326	E29.46448	•	•	•
S12	Sppokspruit locality between S6 and S9	S0	E0	•	•	•
S21	Spookspruit Bank Old Bricks Works	S25.94539	E29.47113	•	•	•
S22	Spookspruit Downstream of Bank Old Bricks Works	S25.94087	E29.46319	•	•	•
S23	Bank 2 Lapa	S0	E0	•	•	•
Thungela Goedehoop Colliery						
BH0	Below bank 5 return water dam	S25.97183	E29.46108	Quarterly Sampled		•
BH2	Bank 2 Dump	S25.96146	E29.46413			•
BH3	Bank 2 Dump	S25.96723	E29.46404			•
BH5	Below bank 2 return water dam	S25.97064	E29.46274			•
BH6	Bank 2 Dump	S25.96786	E29.46428			•
BH7	Bank 2 Dump	S25.96355	E29.46056			•
BH8	Bank 2 Dump	S25.95846	E29.45888			•
BH9	Below bank 2 return water dam	S25.96805	E29.46641			•
BH21R	Water Monitoring Borehole at Bank 5 Dump	S26.00469	E29.462123			•
BH25R	Water Monitoring Borehole at Bank 5 Dump	S26.00417	E29.46237			•
BH28	BH28	S25.67814	E29.94488			•
UG6	Bankfontein Dam	S25.97613	E29.46917			•

Table 14: Average water quality results for water monitoring localities S1 and S2.

AVERAGE DATA TABLE: January 2022 to March 2022					
PROJECT NAME	Thungela Goedehoop Colliery				
ASSESSMENT SET 1	Quality of Water to be disposed into Dirty Water Containment Facilities				
ASSESSMENT SET 2	General Authorisation Limit, Section 21f and h, 2013				
			Value exceeds the assessment set 1		
VARIABLE	UNITS	ASSESSMENT 1	ASSESSMENT 2	S1	S2
pH @ 25°C	pH	8.41	5.5/9.5	7.41	8.16
Electrical conductivity (EC) @ 25°C	mS/m	-	150	92.8	354
Total dissolved solids (TDS)	mg/l	3823	-	681	3362
Total alkalinity	mg CaCO3/l	199	-	75.6	209
Acidity pH 8.3	mg CaCO3/l	35.2	-	15.4	20.8
Calcium (Ca)	mg/l	556	-	89.4	469
Magnesium (Mg)	mg/l	292	-	58.2	323
Sodium (Na)	mg/l	151	-	33.1	143
Potassium (K)	mg/l	26.5	-	9.95	17.7
Fluoride (F)	mg/l	0.591	1	0.434	0.451
Chloride (Cl)	mg/l	30.1	-	9.93	21.2
Sulphate (SO4)	mg/l	2657	-	426	2243
Nitrate (NO3) as N	mg/l	1.69	15	0.215	0.753
Ammonium (NH_4) as N	mg/l	0.155	6	0.076	0.153
Nitrite (NO_2) as N	mg/l	1.69	-	*0.048*	*0.053*
Ammonia (NH_3) as N	mg/l	-	-	*0.003*	0.009
Total Kjeldahl Nitrogen (TKN)	mg/l	-	-	1.75	2.87
Combined Nitrate plus Nitrite	ratio	-	-	*0.5*	*0.5*
Total oxidised nitrogen as N	mg/l	-	-	0.268	0.815
Total Nitrogen	mg/l	1.69	-	2.09	3.84
Orthophosphate (PO4) as P	mg/l	-	10	*0.014*	*0.014*
Boron (B)	mg/l	0.83	1	*0.013*	*0.049*
Aluminium (Al)	mg/l	0.001	-	*0.001*	*0.001*
Iron (Fe)	mg/l	0.001	0.3	*0.002*	*0.002*
Manganese (Mn)	mg/l	0.04	0.1	*0.083*	*0.037*
Total suspended solids (TSS)	mg/l	-	25	9.7	12
Temperature	°C	-	-	22.6	22.5

Table 15: Average water quality results for the Goedehoop North Surface water monitoring localities (excluding S1 and S2).

AVERAGE DATA TABLE			
PROJECT NAME	Thungela Goedehoop Colliery	DATE COMPILED	18 April 2022
ASSESSMENT SET 1	Resource Quality Objectives Resource unit 11 (RU11)	SELECTED DATE	January 2022 to March 2022
ASSESSMENT SET 2	General Authorisation Limit, Section 21f and h, 2013	COMPILED BY	Immaculata Famah

Value exceeds the assessment set 1

VARIABLE	UNITS	ASSESSMENT 1	ASSESSMENT 2	MONITORING LOCALITIES												
				S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S21	S22	S23
pH @ 25°C	pH	-	5.5/9.5	7.95	5.76	7	7.98	7.87	7.43	7.44	7.5	7.5	7.74	7.48	7.57	7.52
Electrical conductivity (EC) @ 25°C	mS/m	111	150	104	106	31.8	235	234	42.1	59.2	18.7	24.1	130	59.5	56.1	61.2
Total dissolved solids (TDS)	mg/l	-	-	808	768	211	2033	2083	288	435	123	157	1027	422	392	446
Total hardness	mg CaCO3/l	-	-	544	491	111	1381	1492	195	278	69	89	692	291	251	326
Total alkalinity	mg CaCO3/l	-	-	156	*61.8*	58.9	101	81.9	130	107	57	47.8	118	104	104	102
Acidity pH 8.3	mg CaCO3/l	-	-	17.8	76.2	10.7	17	14.3	18.8	16.8	11.9	11.2	17.9	18.7	20.2	16.3
Calcium (Ca)	mg/l	-	-	110	85.1	20.8	212	250	41.6	46.4	13.7	13.9	118	50.2	41.9	73.8
Magnesium (Mg)	mg/l	-	-	65.7	67.6	14.4	207	211	22.1	39.5	8.58	13.2	96.4	40.3	35.5	34.3
Sodium (Na)	mg/l	-	-	48.4	33.4	24.6	98.2	103	18.2	29.1	12.5	9.85	53.8	28	27.5	13.6
Potassium (K)	mg/l	-	-	7.32	8.03	5.01	8.71	9.53	11.2	7.65	6.21	9.54	10.8	7.34	6.93	9.86
Fluoride (F)	mg/l	-	1	*0.233*	*0.348*	*0.233*	*0.233*	*0.233*	*0.314*	*0.233*	*0.233*	*0.233*	*0.327*	*0.233*	*0.347*	*0.323*
Chloride (Cl)	mg/l	-	-	24.4	10.1	26	21.3	20.7	11.8	13.5	11.7	20.9	14.9	13.9	13.7	5.81
Sulphate (SO_4)	mg/l	500	-	439	507	63.5	1409	1421	87.2	222	27.8	3.97	653	208	191	237
Nitrate (NO_3) as N	mg/l	4	15	0.554	*0.23*	*1.58*	*0.23*	*0.23*	*0.353*	*0.23*	*0.23*	9.47	*0.23*	*0.318*	*0.31*	*0.23*
Ammonium (NH_4) as N	mg/l	0.1	6	*0.036*	0.133	0.091	0.105	0.084	0.095	0.046	0.049	0.06	0.058	0.05	0.04	*0.104*
Total Kjeldahl Nitrogen (TKN)	mg/l	-	-	1.43	1.66	2.9	1.7	1.28	2.24	*1.41*	3.76	12.4	*1.94*	1.85	1.91	2.3
Combined Nitrate plus Nitrite	ratio	-	-	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.939*	*0.5*	*0.5*	*0.5*	*0.5*
Ammonia (NH_3) as N	mg/l	-	-	*0.008*	*0.052*	*0.008*	*0.008*	*0.008*	*0.008*	*0.008*	*0.008*	*0.008*	*0.008*	*0.008*	*0.008*	*0.008*
Total oxidised nitrogen as N	mg/l	4	-	0.645	*0.23*	*1.65*	*0.23*	*0.23*	*0.515*	*0.308*	*0.23*	9.55	*0.23*	*0.33*	*0.322*	*0.23*
Total Nitrogen	mg/l	-	-	2.12	2.06	4.71	2.05	1.62	2.9	1.86	4.07	22	2.31	2.3	2.33	2.65
Nitrite (NO_2) as N	mg/l	4	-	*0.092*	*0.058*	0.118	*0.054*	*0.054*	0.177	*0.06*	*0.05*	*0.077*	*0.088*	*0.06*	*0.052*	*0.055*
Orthophosphate (PO4) as P	mg/l	0.125	10	*0.101*	*0.02*	*0.025*	*0.017*	*0.017*	*0.122*	*0.019*	*0.018*	*0.017*	*0.017*	*0.017*	*0.017*	*0.016*
Boron (B)	mg/l	-	1	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*
Aluminium (Al)	mg/l	-	-	*0.003*	*8.45*	*0.155*	*0.003*	*0.003*	*0.164*	*0.003*	*0.039*	*0.003*	*0.003*	*0.003*	*0.003*	*0.029*
Iron (Fe)	mg/l	-	0.3	*0.005*	*1.27*	*0.073*	*0.005*	*0.005*	*0.186*	0.084	0.396	*0.005*	*0.08*	*0.055*	*0.086*	*0.029*
Manganese (Mn)	mg/l	-	0.1	*0.002*	*4.94*	*0.226*	*0.171*	*0.069*	0.475	0.163	0.089	*0.001*	*0.053*	*0.17*	0.286	*0.002*
Total suspended solids (TSS)	mg/l	-	25	*6.4*	13	*17*	*7.6*	*8.3*	14	*8.9*	*3.8*	*8.5*	*11*	*11*	*10*	*8.2*
Temperature	°C	-	-	22.4	22.7	22.8	22.8	22.8	22.8	22.9	22.6	22.7	22.8	22.7	22.8	22.8

Figure 9: Goedehoop North Surface water monitoring localities

5.3.9.3 Water Authority

The Olifants river basin upstream of the Loskop Dam is a government water-controlled catchment. The authority in charge is the Department of Water and Sanitation (Mpumalanga Regional Office).

5.3.10 Groundwater

Since mining activities can potentially impact on the groundwater, a description of the current groundwater conditions is required. The purpose of this section is, therefore to describe the current prevailing groundwater conditions, predict the environmental impact of the proposed mining activity on the geohydrological regime of the area, and forecast the effect of the underground on the receiving environment and to compile all the relevant data and recommendations. This will serve as a reference baseline for quantifying potential mining impacts on the existing groundwater regime. Bank Colliery undertakes groundwater monitoring within the vicinity of the proposed Coal Product Stockpile expansion area.

5.3.10.1 Regional Geohydrology

According to the 1:50 000 General hydrogeological Map (Johannesburg 2526) groundwater resources are widespread but limited with borehole yields generally between 0.1 and 0.5l/s. Groundwater occurrence is better developed along aquifers associated with the contact zones of the dolerite intrusions where yields of 0.5 – 2.0 l/s are likely to occur. The aquifer represents important source for base flow into the streams draining the area. The hydrogeology of the area can be described in terms of the saturated and unsaturated zones. From the previous studies, the summary below of the aquifer system is given.

The aquifer represents an important source for base flow into the streams draining the area. The hydrogeology of the area can be described in terms of the saturated and unsaturated zones:

Saturated Zone

In the saturated zone, at least four aquifer types may be inferred from knowledge of the geology of the area:

- A shallow aquifer formed in the weathered zone, perched on the fresh bedrock.
- An intermediate aquifer formed by fracturing of the Karoo sediments.
- Aquifers formed within the more permeable coal seams and sandstone layers.
- Aquifers associated with the contact zones of the dolerite intrusives.

Although these aquifers vary considerably regarding geohydrological characteristics, they are seldom observed as isolated units. Usually they would be highly interconnected by means of fractures and intrusions. Groundwater will thus flow through the system by means of the path of least resistance in a complicated manner that might include any of these components.

Shallow perched aquifer

A near surface weathered zone is comprised of transported colluvium and in-situ weathered sediments and is underlain by consolidated sedimentary rocks (sandstone, shale and coal). Groundwater flow patterns usually follow the topography, often coming very close to surface in topographic lows, sometimes even forming natural springs. Experience of Karoo geohydrology indicates that recharge to the perched groundwater aquifer is relatively high, up to 3% of the Mean Annual Precipitation (MAP).

Fractured Karoo rock aquifers

The host geology of the area consists of consolidated sediments of the Karoo Supergroup and consists mainly of sandstone, shale and coal beds of the Vryheid Formation of the Ecca Group. Most of the groundwater flow will be along the fracture zones that occur in the relatively competent host rock. The geology map does not indicate any major fractures zones in this area, but from experience it can be assumed that numerous major and minor fractures do exist in the host rock. These conductive zones effectively interconnect the strata of the Karoo sediments, both vertically and horizontally into a single, but highly heterogeneous and anisotropic unit

Aquifers associated with coal seams

The coal seam forms a layered sequence within the hard rock sedimentary units. The margins of coal seams or plastic partings within coal seams are often associated with groundwater. The coal itself tends to act as an aquitard allowing the flow of groundwater at the margins.

Aquifers associated with dolerite intrusives

Dolerite intrusions in the form of dykes and sills are common in the Karoo Supergroup, and are often encountered in this area. These intrusions can serve both as aquifers and aquifuges. Thick, unbroken dykes inhibit the flow of water, while the baked and cracked contact zones can be highly conductive. These conductive zones effectively interconnect the strata of the Ecca sediments both vertically and horizontally into a single, but highly heterogeneous and anisotropic unit on the scale of mining. These structures thus tend to dominate the flow of groundwater. Unfortunately, their location and properties

are rather unpredictable. Their influence on the flow of groundwater is incorporated by using higher than usual flow parameters for the sedimentary rocks of the aquifer.

Unsaturated Zone

Although a detailed characterization of the unsaturated zone is beyond the scope of this study, a brief description thereof is supplied.

The unsaturated zone in the proposed mining area is in the order of between 1 and 10 metres thick (based on static groundwater levels measured in the existing boreholes) and consists of colluvial sediments at the top, underlain by residual sandstone/siltstone/mudstone of the Ecca Group that becomes less weathered with depth.

5.3.10.2 Ground Water Quality

Twelve (12) boreholes were monitored during the quarterly period and their positions are indicated in Figure 9. The water quality for the quarterly period is presented in Table 16.

The physico-chemical groundwater quality for the Goedehoop north boreholes is generally described as neutral to acidic (BH21R and BH25R), non-saline to extremely saline. The EC value and concentration SO4 and NH4-N exceeded the amended WUL: 2021 limits for groundwater (Ref: 04/B11J/AGJ/4134 (amended 04/B11H/AFGJ/633) Table 9) at the majority of the Goedehoop north groundwater localities sampled. All the locality BH0, NO3-N and TON exceeded the WUL: 2011 limits for groundwater as well as PO4-P at BH21R and UG6.

The domestic water use guidelines were exceeded by pH (BH21R, BH25R), EC, Cl, Ca, Mg, Na, SO4, NO3-N (BH0), Al (BH21R, BH25R), Fe (BH21R, BH25R) and Mn (BH21R, BH25R) at majority of the boreholes.

Figure 10: Goedehoop North Groundwater monitoring localities

Table 16: Water quality data for the Goedehoop North Groundwater monitoring localities

AVERAGE DATA TABLE			
PROJECT NAME	Thungela Goedehoop Colliery	DATE COMPILED	18 April 2022
ASSESSMENT SET 1	Resource Quality Objectives Resource unit 11 (RU11)	SELECTED MONTH	March 2022
ASSESSMENT SET 2	DWAF (1996) SAWQG TWQGR for Domestic Water Use	COMPILED BY	Immaculata Famah

Value exceeds the assessment set 1

VARIABLE	UNITS	ASSESSMENT 1	ASSESSMENT 2	MONITORING LOCALITIES											
				BH0	BH2	BH3	BH5	BH6	BH7	BH8	BH9	BH21R	BH25R	BH28	UG6
pH @ 25°C	pH	-	6.0/9.0	6.16	5.99	7.27	6.71	6.25	6.76	6.17	7.53	3.82	3.6	6.95	6.75
Electrical conductivity (EC) @ 25°C	mS/m	111	70	115	301	480	68.2	284	314	157	418	583	840	72.9	17.5
Total dissolved solids (TDS)	mg/l	-	450	1067	3408	5464	555	3239	3619	1420	4774	7660	10689	490	128
Total alkalinity	mg CaCO3/l	-	-	56.5	46.5	96.5	99.6	81.3	147	65.1	184	<6.00	<6.00	43.4	31.4
Acidity pH 8.3	mg CaCO3/l	-	-	53.9	20.9	23.8	20.9	70.4	36.5	56.6	33.6	2134	3137	36.1	1302
Chloride (Cl)	mg/l	-	100	31.7	21.2	57.2	48.8	22.8	29	17.5	26	11.4	13.4	215	9.54
Sulphate (SO4)	mg/l	500	200	642	2524	3974	242	2319	2482	983	3335	6375	8896	60.4	45.1
Fluoride (F)	mg/l	-	1	0.536	<0.466	<0.466	<0.466	<0.466	<0.466	<0.466	<0.466	<0.466	<0.466	<0.466	<0.466
Calcium (Ca)	mg/l	-	32	107	250	424	16.5	342	586	141	554	300	425	20.3	16
Magnesium (Mg)	mg/l	-	30	96.5	475	656	25.5	345	266	126	505	806	1235	11.7	7.24
Sodium (Na)	mg/l	-	100	58	76.5	286	111	136	130	87.6	212	38	67.7	135	8.69
Potassium (K)	mg/l	-	50	5.31	9.07	1.87	6.25	11.2	16.2	10.6	16.3	26.2	30.9	5.06	3.78
Nitrate (NO3) as N	mg/l	4	6	9.13	<0.459	<0.459	0.739	<0.459	0.747	<0.459	0.54	<0.459	<0.459	<0.459	1.16
Ammonium (NH_4) as N	mg/l	0.1	-	<0.023	0.278	0.192	<0.023	0.22	0.056	0.21	0.377	0.806	0.81	0.148	2.17
Nitrite (NO_2) as N	mg/l	4	-	<0.069	0.117	<0.069	<0.069	0.077	0.072	0.08	0.219	0.086	0.069	0.14	0.185
Total Kjeldahl Nitrogen (TKN)	mg/l	-	-	12.1	1.68	2.07	2.6	2.01	2.28	1.98	2.83	14.1	3.75	1.67	6.01
Total oxidised nitrogen as N	mg/l	4	-	9.19	<0.459	<0.459	0.798	<0.459	0.819	<0.459	0.759	<0.459	<0.459	<0.459	1.35
Ammonia (NH_3) as N	mg/l	-	-	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Combined Nitrate plus Nitrite	ratio	-	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Nitrogen	mg/l	-	-	21.3	2.25	2.5	3.41	2.6	3.16	2.62	3.96	15.2	4.88	2.09	9.53
Orthophosphate (PO4) as P	mg/l	0.125	-	<0.014	<0.014	<0.014	0.038	<0.014	<0.014	<0.014	<0.014	2.26	<0.014	<0.014	0.187
Boron (B)	mg/l	-	-	<0.042	<0.042	<0.042	<0.042	<0.042	<0.042	<0.042	0.054	<0.042	<0.042	<0.042	<0.042
Aluminium (Al)	mg/l	-	0.15	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	405	88.5	<0.005	<0.005
Iron (Fe)	mg/l	-	0.1	0.292	<0.009	0.029	0.188	<0.009	<0.009	<0.009	<0.009	9.14	832	<0.009	<0.009
Manganese (Mn)	mg/l	-	0.05	0.1	0.013	1.13	0.032	1.09	0.743	0.864	0.009	308	452	0.719	0.207
Total suspended solids (TSS)	mg/l	-	-	11	20	42	<7.6	11	11	<7.6	14	440	149	93	9

5.3.11 Sensitive Landscapes

Wetland areas in association with Spook Spruit as well as seepage and channelled valley bottom wetlands were identified. The wetland FEPAs were considered for a desktop delineation of the wetland areas within the project area. In order to ground truth these findings, the wetland areas were delineated in accordance with the DWS (2005) guidelines, whereby features such as soil, vegetation and topography were considered.

General functionality of the wetlands

The identified wetland units were screened at a desktop level to establish whether these systems are likely to be providing any hydrological benefits. The hydrological benefits that are likely to be provided by the wetland system in the particular HGM types are summarised below:

Valley bottom wetlands with channels

- A key benefit is the enhancement to the quality of water.
- Contribute less towards flood attenuation and sediment trapping.
- Offer some nitrate and phosphate removal potential.

Hillslope seepage wetlands

- Contributes to the release of water to the stream system during low flow periods.
- Remove excess nutrients and inorganic pollutants.
- Relatively high removal potential for nitrogen in particular.

Functionality of wetlands within the study area

Wetlands are described in terms of their position in the landscape, and the classification was thus done according to the hydrogeomorphic setting. The assessment of the Ecosystem Services supplied by the identified wetland units was conducted according to the guidelines as described by Kotze et. al. 2009 (WET-EcoServices - A technique for rapidly assessing ecosystem services supplied by wetlands). The Ecological Importance and Sensitivity was determined according to the Manual for the Rapid Ecological Reserve Determination of Inland Wetlands (Version 2) by the Department of Water Affairs, January 2013 (now the Department of Water and Sanitation). It includes a score sheet that utilises information regarding the current state of the ecology of the wetland area and score sheets regarding the hydro-functional importance and the Direct Human Benefits taken from the WET-EcoServices determinations. The Present Ecological State (PES) was determined using the method described by Macfarlane et. al. 2009. Level 2 Hydrological, Geomorphological and Vegetation assessments are conducted separately after which an overall wetland PES is determined (WET-Health - A technique for rapidly assessing wetland Health). The results are shown in Table 17.

Table 17: Current PES and EIS of the wetlands around the proposed project area

Name of Wetland Area	Current PES	Current EIS
Northern Channelled Valley Bottom	F (8.31)	Low/ Marginal (4.6)
Southern Seepage Wetland (S Seep)	F (8.06)	Low/ Marginal (4.27)

Western Seepage Wetland (W Seep)	E (6.5)	Low/ Marginal (4.27)
Spook Spruit Channelled Valley Bottom Wetland	E	D
Spook Spruit Seepage Wetland	D	D

5.3.12 Air Quality

Dust fallout monitoring at Goedehoop Colliery is currently conducted at four monitoring locations. Particulate matter monitoring is conducted at the Bank 2 Village monitoring location. Table 18 and Table 19 presents the site descriptions, site classifications and coordinates for each dust fallout unit and the continuous particulate matter monitoring trailer, respectively. Figure 10 graphically illustrates the location of all dust fallout units and the continuous particulate matter monitoring trailer.

The nearby sensitive receptors, which include a commercial area and a small informal settlement are located east of the proposed project.

Table 18: Dust fallout site descriptions and classifications

Description	Classification	Latitude (S)	Longitude (E)	Bucket Type
Andru Mining	Non-residential	26°06'21.08"	29°25'14.13"	Single
Dominee	Residential	26°05'17.30"	29°25'50.00"	Single
Bank Village	Residential	25°58'13.50"	29°26'44.80"	Single
Mahlathini Village	Residential	26°06'54.17"	29°24'39.27"	Single

Table 19: Goedehoop particulate matter monitoring location

TOPAS	Latitude (S)	Longitude (E)
Bank 2 Village	25°58'13.50"	29°26'44.80"

Figure 11: Dust fallout monitoring locations at Goedehoop Colliery

Table 20: Dust fallout results for the past twelve months

Sample Location	Classification	Dust Fallout (mg/m²/day)												Compliant over the past 12 months
		May-21	Jun-21	*Jul-21	Aug-21	Sep-21	Oct-21	**Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	
Andru Mining	Non-residential	-(1)	-(1)	-(1)	-(1)	-(1)	-(1)	-(1)	-(1)	-(1)	-(1)	-(1)	-(1)	Yes
Dominee House	Residential	383	314	700	538	344	310	472	266	169	97	242	1,037	Yes
Bank Village	Residential	411	231	809	240	573	394	353	300	180	215	506	99	Yes
Mahlathini Village	Residential	-(1)	-(1)	-(1)	-(1)	-(1)	-(1)	-(1)	-(1)	-(1)	-(1)	384	109	Yes
Notes:	(1) Mahlathini Village and Andru Mining were temporarily decommissioned. * July 2021 monitoring period exposed for 39 days due to social unrest and restricted movement in the country. ** November 2021 monitoring period exposed for only 24 days due to site work scheduling requirements. At the minimum, the previous four years of data (as required by the Draft National Dust Control Regulations) is presented in **Appendix D.** Values in red represent exceedances of the relevant standard.													

5.3.13 Noise

The eMalahleni/ Middelburg area is a region of major coal mining, heavy metallurgical industries and power generation. Even though noise attenuation occurs exponentially with distance from source the industries surrounding Bank Colliery (Douglas Colliery, Koornfontein & Blinkpan Collieries and the Komati Power Station) all have the potential to contribute to the ambient noise levels of the region.

The noise sources, which were identified as having the potential to be of significant strength to cause interference to the external environment, were the following:.

- Washing Plant: This facility generates a relatively strong low frequency noise that experiences relatively little attenuation in excess of geometric dispersal.
- Ventilation Fans: This machinery constitutes a wide band source of low frequency noise, which is characterised by a pronounced directivity.
- Conveyors: These facilities constitute a line source for sound generation, the sound pressure level generated by these sources is characterised by a relatively slow rate of decline with distance.
- Locomotives and trains: These are characterised by strong low frequency emissions, audible over large distances. Periodic high frequency noise emissions are also recorded which have an extensive distribution.
- Discard Facilities: These are characterised by low frequency emissions typical of heavy vehicle and machinery. Emissions are audible over long distances, especially due to the source generally being elevated above the surrounding topography.

Secondary sources include earth moving equipment and locomotives

5.3.14 Visual Aspects

The Witbank/Middelburg area is dominated by extensive coal mining, metallurgical and power generation activities, all requiring extensive surface infrastructure to operate. The implication of this is that the “sense of place” of the region is already severely negatively impacted by these large-scale activities.

5.3.14.1 Visibility

Critical views are from the access road off the R35 and the R35 itself. Critical views are also from the few surrounding farmsteads, the informal settlement at the R35 intersection and the mine village.

5.3.14.2 Landscape Diversity

Landscape diversity within the study area is primarily based on the topographical features as well the vegetation, namely grasslands and the existing land uses. The greater the diversity, the greater is the potential for the proposed development to blend with the surrounding landscape.

The surrounding vegetation, a mixture of grasslands and mealie fields, is relatively uniform in texture and height. The existing land uses in the vicinity are mainly arable and pastoral farming activities and mining. The mining provides the moderate landscape diversity in the form of mining infrastructure that varies in scale, colour and height. However, the proposed development takes place within an already diverse immediate setting, namely the mine area itself. The expansion will not significantly intrude on the surrounding landscape with its low visual diversity much more than what the existing Coal Product Stockpile already does.

Notwithstanding this variation in diversity, the general landscape exhibits a moderate low diversity.

5.3.14.3 Landscape Character

The spirit, or sense of place, is that quality imparted by the aspects of scale, colour, texture, landform, enclosure, and in particular, the land use. According to K. Lynch (1992) ‘it is the extent to which a person can recognise or recall a place as being distinct from other places as having a vivid, or unique, or at least a particular character of its own’.

The quality of Genius Loci is a function of attributes such as the scenic beauty or uniqueness and distinctive character of the built and cultural landscape

The study area falls within a region that is rural agriculture in character but one that has been highly altered by coal mining and power generation activities which is industrial in character.

These areas exhibit a relatively low visual quality due to the industrial activities and developed infrastructure. The surrounding undulating to flat and open farming area is also regarded as having a relatively low visual quality due to the lower visual interest

5.3.15 Socio-Economic Status

5.3.15.1 General Description of the Study Area

The broader region surrounding the study area is a coal mining area that accommodates a number of power stations and large industries such as Columbus Steel and Eskom. Once a major farming hub, land has since been rapidly bought by mining companies for industrial purposes. Environmental and economic impacts and various criminal activities and land invasions have over the last number of years discouraged several land owners to farm at a scale that was previously done. Main agricultural activities include dry land crops (mealies, soya) and livestock farming.

Bank Colliery

A number of land uses occurs within and around the vicinity of Bank Colliery and they include: Agricultural land uses i.e. private land within Bank Colliery's mining right area owned by individuals, industry and business; cultivated land (dry land crops); commercial and subsistence livestock (cattle and goats) and poultry farming;

Industrial land uses that include mining (underground and opencast), large scale industries, such as Eskom; and small-scale industries mainly supportive to agriculture and mining.

Commercial land uses include a small centre with a general dealer, mosque, petrol station and vehicle services (tyres etc.) situated adjacent to the R35 east of the project area. A formal residence and informal settlement are also located here.

Roads include the R35 that traverse and dissects Bank Colliery in an east and west section. A number of smaller tar and gravel roads occur. The road conditions vary from good to relatively poor.

Formal settlements have been established in and around the mine. These are associated with the mines and power stations. Bank 2 Village, which is partly rehabilitated, is located north-west of Bank 2 Plant. Bank 5 Village has been decommissioned and rehabilitated.

Informal settlements. Informal settlements in Bank Colliery are generally fewer in number and smaller in size than informal areas that occur in Goedehoop Colliery. There is an informal settlement adjacent to the small commercial centre east of the project site.

Current and Proposed Expansion of the Coal Product Stockpile Facility

The surrounding land use is mainly mining related and some agricultural activities still occur.

Roads include the R35 carries high volumes of traffic and runs in a north-south direction east of the study area. An unnamed/unidentified paved road with low traffic volumes traverses the area south of the site in an east to west direction. This is the main access road from the R35 to the existing Coal Product Stockpile facility and will be used by construction vehicles to gain access to the site.

Commercial land uses include the small commercial centre east of the site has the following features:

- General dealer and services to the motor industry
- Petrol station
- Mosque
- Residential (formal and informal)

A small informal settlement is situated near (west) the above-mentioned commercial centre.

5.3.15.2 Municipal background

Bank Colliery is situated in the Nkangala District Municipality, which comprises of six local Municipalities. It is situated in the two local municipalities (Steve Tshwete Municipality and Emalahleni Municipality) in Mpumalanga. The Coal Product Stockpile Expansion Project is located within the Steve Tshwete Local Municipality (STLM) in the Nkangala District Municipality (NDM) of Mpumalanga Province. In 1994, Middelburg and Mhluzi, as well as Hendrina and Kwazamokuhle, amalgamated to form the Transitional Local Councils. In 2001, the Transitional Local Councils of Middelburg and Hendrina, as well as some smaller towns, were amalgamated. A new municipality was formed, namely Steve Tshwete Local Municipality (www.localgovernment.co.za).

The Nkangala District Municipality includes the following municipalities (Figure 11):

- eMalahleni Local Municipality
- Steve Tshwete Local Municipality
- Victor Khanye Local Municipality
- Emakhazeni Local Municipality
- Thembisile Hani Local Municipality
- Dr JS Moroka Local Municipality

Steve Tshwete Local Municipality covers a geographical area of approximately 3 976 km^2. The towns and settlements within Steve Tshwete include Middelburg, Mhluzi, Hendrina, Kwazamokuhle, Rietkuil, Pullenshope, Komati, Presidentsrus, Naledi, Lesedi, Kranspoort, Blinkpan, Koornfontein, Kwa-Makalane and Doornkop.

The Municipality is well located in terms of the Maputo Development Corridor, the Middelburg / Steelpoort mining resource link, as well as the Middelburg / Bethal / Ermelo / Richards Bay Corridor.

Figure 12: Nkangala District Municipality

6 ENVIRONMENTAL IMPACT ASSESSMENT

6.1 ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOLLOWED

6.1.1 Approach to Environmental Impact Assessment

The term 'environment' is used in the broadest sense in an EIA. It covers the physical, biological, social, economic, cultural, historical, institutional and political environments.

An Environmental Impact Assessment is a good planning tool. It identifies the environmental consequences of a proposed project from the beginning and helps to ensure that the project, over its life cycle, will be environmentally acceptable and integrated into the surrounding environment in a sustainable way.

6.1.2 Environmental Impact Assessment Process Followed

Under Section 24 of the National Environmental Management Act (NEMA), the Minister promulgated the regulations pertaining to environmental impact assessments (EIA Regulations, 2014) under Government Notice No. 326 in Government Gazette 38282 of 4 December 2014. These EIA regulations repealed the 2010 EIA regulations and therefore any process relating to environmental authorisations must be undertaken under the EIA Regulations, 2014.

Chapter 4 of the EIA Regulations, 2014 deals with the provisions for application for environmental authorisation. In view of the above, Thungela Operations (Pty) Ltd is obliged to comply with provisions of Chapter 4 for the intended environmental authorisation application for the activities (listed activities) within the proposed project.

Part 2 of chapter 4 of the EIA Regulations, 2014 contemplate process to be undertaken for the application for environmental authorisation for the proposed project, which is the BAR process. The process to be followed is describe below.

6.1.2.1 Pre-application consultation with the Competent Authority

In terms of section 24D (1) of the National Environmental Management Act, 1998 (Act 107 of 1998), the Minister responsible for mineral resources is the competent authority for environmental matters relating to mining and associated activities. In view of the above, the application for the environmental authorisation for the proposed project was submitted to the Department of Mineral Resources and Energy (DMRE), eMalahleni Regional Office for their consideration and decision making.

6.1.2.2 Public Participation Process

Public participation is the cornerstone of the EIA process. The principles of the NEMA govern many aspects of EIA's, including public participation. These include provision of sufficient and transparent information on an ongoing basis to stakeholders to allow them to comment. Comments received from the public participation process will be included in the impact assessment and measures will be determined on how the comments will be addressed during the life of the proposed project.

The following steps will be taken during the public participation process:

- The public participation process will commence by providing an opportunity for potential interested and affected parties to register.
- Making reports compiled within the environmental impact assessment available to registered and potential interested and affected parties for their comments.
- Interested and affected parties and the public will also be invited to public meetings where the project and all major impacts from the proposed project will be discussed.
- Further to the above, interested and affected parties and the public will be informed of the decision taken by the responsible authorities on the submitted application.

The above process will ensure that the BAR and EMPr is subjected to a public participation process, which ensures that the proposed changes (Coal Product Stockpile Expansion Project) is brought to the attention of interested and affected parties, the public and relevant organs of state including the competent authority.

6.1.2.3 BAR Phase

In compliance with Regulation 19 of the EIA Regulations, 2014, the BAR and EMPr will be submitted to the competent authority within 90 days after the submission/receipt of the environmental authorisation application.

As part of the public participation, the draft BAR and EMPr is made available to the competent authority, potential and registered interested and affected parties for their comment for a period of 30 days during the EIA phase.

6.1.2.4 Information Gathering

Environmental baseline data has been obtained through various agencies, pertaining to surface water quantities and qualities, geohydrological data and modelling, topographical analyses, soil surveys, vegetation surveys, wetland surveys and geological conditions. Weather data was acquired from the Bank Colliery rainfall station as well as from the South African Weather Service. The combined data was used to determine the land capability. Historic land use was determined through available data and by visual observations made during various field studies. The data accumulated and analysed is sufficient to gain a baseline indication of the present state of the environment. The use of these baseline studies for impact assessments is thus justified and reliable conclusions could be made.

The following specialist studies are being conducted and will be referenced during the compilation of the final Scoping Report i.e., Geohydrological Study, Wetland Assessment, Paleontological Study and Agricultural Study.

6.1.2.5 Decision on the BAR application

In compliance with Regulation 20 of the EIA Regulations, 2014, the competent authority will within 107 days of receipt of the BAR and EMPr grant or refuse the environmental authorisation.

6.2 ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

The following prediction and evaluation of impacts is based on the proposed Coal Product Stockpile Expansion project and associated activities.

The evaluation distinguishes between significantly adverse and beneficial impacts and allocates significance against national regulations, standards and quality objectives governing:

- Health & Safety;
- Protection of Environmentally Sensitive Areas;
- Land use; and
- Pollution levels.

Irreversible impacts are also identified.

The significance of the impacts is determined through the consideration of the following criteria:

Probability	:	likelihood of the impact occurring
Area (Extent)	:	the extent over which the impact will be experienced.
Duration	:	the period over which the impact will be experienced.
Intensity	:	the degree to which the impact affects the health and welfare of humans and the environment (includes the consideration of unknown risks, reversibility of the impact, violation of laws, precedents for future actions and cumulative effects).

The above criteria are expressed for each impact in tabular form according to the following definitions:

Probability	Definition
Low	There is a slight possibility (0 – 30%) that the impact will occur.
Medium	There is a 30 –70% possibility that the impact will occur.
High	The impact is definitely expected to occur (70% +) or is already occurring.

Area (Extent)	Definition
Small	0 – 40 ha
Medium	40 – 200 ha
Large	200 + ha
Duration	**Definition**
Short	0 – 5 years
Medium	5 – 50 years
Long	51 – 200 years
Permanent	200 + years
Intensity	**Definition**
Low	Does not contravene any laws. Is within environmental standards or objectives. Will not constitute a precedent for future actions. Is reversible. Will have a slight impact on the health and welfare of humans or the environment.
Medium	Does not contravene any laws. Will not constitute a precedent for future actions. Is not within environmental standards or objectives. Is not irreversible. Will have a moderate impact on the health and welfare of humans or the environment.
High	Contravene laws. May constitute a precedent for future actions. Is not within environmental standards or objectives. Is irreversible. Will have a significant impact on the health and welfare of humans or the environment.

Significance and Risk Category	Definition
Negligible	The impact/risk is insubstantial and does not require management
Low	The impact/risk is of little importance, but requires management
Medium	The impact/risk is important; management is required to reduce negative impacts to acceptable levels
High	The impact/risk is of great importance, negative impacts could render options or the entire project unacceptable if they cannot be reduced or counteracted by significantly positive impacts, and management of these impacts is essential
Positive (No risk identified)	The impact, although having no significant negative impacts, may in fact contribute to environmental or economical health

6.3 RESULTS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

6.3.1.1 Assessment of the Coal Product Stockpile Expansion Project impacts/risks

6.3.1.2 Pre-Construction Phase and Construction Phases

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
Construction of the Coal Product Stockpile/Expansion and associated surface infrastructure i.e. existing topsoil/subsoil stockpiling areas, storm water management structures (clean water cut off drain, dirty water drain).							
The formation of stockpiles (usable and unusable topsoil) will result in topographical highpoints, which may alter the local topographical patterns of the immediate area.	Topography	Without mitigation					Ensure that limited space is used for the stockpiling of the removed topsoil material. Use all material removed during the ground clearance of the expansion area for the rehabilitation of the Coal Product Stockpile during decommissioning phase.
		S	M	S	L	L	
		With mitigation					
		S	M	S	L	L	
The Coal Product Stockpile expansion will be located in close proximity to natural lowlands feeding into the Spook Spruit, and eventually the Olifants River. Allowing spillages from the construction site to be released from the Coal Product Stockpile expansion will result in the contamination of soils within the above-mentioned lowlands (particularly during extreme rainfall events), which may eventually result	Soils	Without mitigation					During construction, Thungela Operations (Pty) Limited must ensure that clean recovery and safe stockpiling of all soil material that can be used in the construction of the base of the expansion, and as cover soil during the rehabilitation of the Coal Product Stockpile facility. The Coal Product Stockpile expansion will be constructed in such
		S	H	P	H	H	
		With mitigation					
		S	H	P	L	M	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
in the destruction of the sensitive landscapes within the lowlands.							a manner that any spillages to the wetland system is prevented. Thungela Operations (Pty) Limited must ensure that all applicable environmental authorisations are obtained for the proposed Coal Product Stockpile expansion.
The stripping of soil layers during the ground clearance of the area where the Coal Product Stockpile will be expanded will result in the existing productive soils (soils becoming completely unproductive. It must however be noted that due to the highly developed, built-up and transformed environment, the value of the land as a topsoil source is probably greater than its arable value. Topsoil removed from the construction site will be stockpiled. The stockpiled topsoil will be prone to possible loss of fertility, which may affect the ability of the soil to support the post mining land use of the site.	Soil	Without mitigation					Use sites of lower agricultural potential soils for the proposed development whenever possible, and if the use of areas with good quality soil is unavoidable, strip topsoil clean from underlying non-topsoil materials and stockpile as prescribed by a soil specialist. This mitigation measure will at this stage not lower the impact, but will create the opportunity to do proper rehabilitation during the decommissioning phase which will then alleviate the impact to a large extent. The size and height of the topsoil stockpile must be kept as small and as low as possible and the stockpiled soils must be removed as soon as possible during the decommissioning phase of the Coal Product Stockpile facility.
		S	H	P	L	M	
		With mitigation					
		S	H	M	L	L	
The stripping of topsoil will result in ceasing of the current land capability of the development area. Note that the land capability of the Coal Product Stockpile expansion area has already been reduced by the infrastructure and	Land capability	Without mitigation					Use sites of lower agricultural potential soils for the proposed development whenever possible, and if the use of areas with good soils are unavoidable, strip topsoil clean from underlying non-topsoil materials and stockpile as prescribed by a soil specialist.
		S	M	P	M	M	
		With mitigation					

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
facilities established adjacent to the site, which include a Bank 2 Village, an electrical substation, road, workshop facility and current coal product facility.		S	M	M	L	L	This mitigation measure will at this stage not lower the impact but will create the opportunity to do proper rehabilitation during the decommissioning phase which will then alleviate the impact to a large extent. The size and height of the topsoil stockpile must be kept as small and as low as possible and the stockpiled soils must be removed as soon as possible during the decommissioning phase of the facility.
Current land use over the proposed development area will cease completely due to the commencement of the Coal Product Stockpile expansion. No physical structure occurs within the proposed Coal Product Stockpile expansion area. The area is not used for any other purpose due to the presence of mining activities in the vicinity of the project area.	Land Use	Without mitigation					
		S	L	M	L	L	
		With mitigation					
		S	L	M	L	L	
The establishment of the Coal Product Stockpile expansion will result in the removal of vegetation cover from the stripping of topsoil, which will lead to the loss of habitat. It must, however, be noted that the area to be used for development of the above facilities is an impacted natural grassland. Limited habitat is thus available resulting in the area not having a high biodiversity value.	Natural vegetation	Without mitigation					Use sites with most disturbed vegetation cover for the development and if development on natural vegetation is unavoidable, strip topsoil clean from underlying non-topsoil materials, stockpile and re-vegetate the stockpile as prescribed by the soil and flora specialist. Ensure that construction activities are limited within the approved development footprint.
		S	H	P	M	M	
		With mitigation					
		S	L	M	L	L	
Animal burrows and habitats remaining within the proposed development site will be destroyed during construction. This may result in the migration of remaining animal life away from the affected areas. It must be noted however	Animal Life	Without mitigation					Use stockpiled topsoil for rehabilitation of the Coal Product Stockpile during decommissioning phase of the Coal Product Stockpile facility. The above-mentioned areas must be seeded with a seed mix
		S	L	S	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
that the faunal survey undertaken at the proposed Coal Product Stockpile expansion site indicated that the area is not having any remaining natural habitat, due to the existing mining related disturbances, hence no extensive animal life was encountered at the proposed development area. This has therefore resulted in the significance of the impacts on faunal life being deemed low to very low.							recommended by a suitably qualified person. This will ensure that the re-establishment of suitable vegetation is achieved during the decommissioning and closure phases of the proposed project. The area of disturbance must be monitored for the identification of declared alien invasive plant species, which must be eradicated whenever identified.
Reduction in runoff to the adjacent watercourses due to containment of high sediment runoff emanating from the construction site, with no release to the catchment.	Surface Water	Without mitigation					The aerial extent of the disturbed and potentially contaminated areas will be kept as small as possible. Areas where dirty construction activities are carried out (e.g. vehicle servicing areas and workshops, fuel storage areas, waste storage areas) will be minimised and surrounded by bunds. Upslope clean water runoff will be diverted around construction activities.
		S	H	S	M	M	
		With mitigation					
		S	L	S	L	L	
Exposure of soils during construction by the stripping of vegetation and soils may cause erosion, which may lead to increased silt loads in surface water runoff. This may result in the contamination of the clean water environment. If allowed the above impacts may result in the Spook Spruit and its wetland system being negatively impacted. Further to the above, the topsoil stockpile will be prone to	Surface Water	Without mitigation					Areas that are stripped should be optimised to limit unnecessary stripping. Storm water upslope of the stripped areas should be diverted around these areas to limit the amount of storm water flowing over these areas. This must be conducted as per the approved civil designs.
		M	M	S	H	M	
		With mitigation					
		S	M	S	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
erosion prior to it being vegetated. Natural re-vegetation will likely take more than 1 season to completely cover the topsoil stockpile. The resultant erosion could lead to increased suspended solids being deposited into the Spook Spruit.							Storm water from the topsoil stockpiles must be collected and silt settled before allowing clear water from running off to the nearby veldt. The timing of the topsoil stripping should be optimised to limit the time between stripping and construction. Hydro seeding of the topsoil stockpile is recommended to speed up vegetation cover. An appropriate seed mix should be recommended by a vegetation specialist. Water quality monitoring should be undertaken downstream and upstream of the Bankfontein Dam in the region of the construction areas.
Diesel, oil and chemical spills, if allowed to occur, will result in the pollution of the surface water runoff and the groundwater regime through runoff contamination and seepage.	Groundwater	Without mitigation					Ensure that all mine machinery and vehicles are maintained on protected ground. It must be ensured that a credible company removes used oil after vehicle servicing. A sufficient supply of absorbent fibre should be kept at the site to contain accidental spills. Store all potential pollution sources in secure facilities with appropriate storm water management, ensuring contaminants are not released into the environment.
		S	M	L	M	M	
		With mitigation					
		S	L	S	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
The material to be disposed of at the expansion area has been classified will material that will result in the contamination of water that will potentially impact the groundwater should it be allowed to seep. The presence of the elements that result in the waste being contaminating has a potential of creating poor quality water which may contaminate the groundwater if allowed to seep into the groundwater regime.	Groundwater	Without Mitigation					The Coal Product Stockpile will be designed and constructed such that runoff and seepage from the Coal Product Stockpile is collected and contained in the existing return water dam. A dirty runoff collection system, which comprise permanent concrete lined collection trenches conveying dirty water runoff to the existing return water dam will be designed and constructed as planned.
		S	H	P	H	H	
		With mitigation					
		S	L	P	L	L	
The coal product stockpile expansion project area will occur in close proximity to a wetland system. Should the clearance of the expansion area not be conducted properly, the construction activities will affect the wetland through wetland water quality deterioration, loss and disturbance of wetland habitat, erosion within wetlands, sediment transport into wetlands and spread of alien plant species.	Sensitive Landscapes	Without mitigation					The expansion should be designed such that as little as possible contaminated seepage and dirty runoff water from the Coal Product Stockpile reports to the remaining wetlands. The associated infrastructure should be designed and constructed to have measures that will prevent the seepage or overflow of mine affected water into the wetland area. Spillages of hazardous waste must be cleaned as soon as possible. Ensure that no equipment is maintained anywhere near the wetlands. During construction, chemical toilets must be provided and used
		S	H	M	M	M	
		With mitigation					
		S	M	M	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
							and they must be serviced on a regular basis. Safe disposal certificates must be obtained for the disposal of the sewage at the sewage treatment works. In order to reduce the potential impacts associated with the introduction of contaminants dissolved or suspended in the runoff from construction sites, where practically possible, no runoff will be introduced into wetlands directly. Introduction into dry land areas will be preferred as the vegetation will provide an opportunity to limit the movement of contaminants. Energy dissipaters will be constructed at the end of each clean storm water trench. The extent of disturbance should be limited by limiting all construction activities as far as practically possible to the Coal Product Stockpile expansion footprint. Existing routes will be used to provide access during construction as this will reduce the extent of the newly disturbed area along the route. Implement alien vegetation control program within wetland areas. Denuded areas outside the Coal Product Stockpile footprint, due to construction must be vegetated after construction with grass species. All vehicles should remain on designated roads with no

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
							indiscriminate driving through wetland or riparian areas. Monitor all systems for erosion and incision. Erosion prevention measures must be installed prior to the onset of construction activities. Locate all stockpiles, laydown areas and temporary construction infrastructure at least 100m from the edge of delineated wetlands. All areas around newly constructed infrastructure is to be rehabilitated to pre-development conditions in order to prevent the on-going loss of catchment yield and thereby return stream flow conditions to pre-development levels as far as possible.
Construction activities during the establishment of the Coal Product Stockpile Expansion and associated infrastructure will include land clearing, topsoil removal, material loading and hauling, stockpiling, grading, bulldozing, and compaction during construction. These activities will result in the mobilisation of dust that will migrate away from the site to the nearby residences and office areas. This will be a nuisance to the communities and will result in aesthetic impacts associated with fugitive dust emissions. On-site dust fall may have health and nuisance implications to employees at the existing offices.	Air Quality	Without mitigation					Mitigation measures must be focussed on watering of haul roads and marshalling areas. Standard industry techniques should be supplemented with administrative control measures.
		M	L	S	L	L	
		With mitigation					
		M	L	S	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
Due to the current state of the land in terms of infrastructure, noise level generated from the construction activities will comply with the Gauteng Province (GN 5479 of 20 August 1999) Noise Control Regulations, SANS 10103:2008 guideline and International Finance Corporation.	Noise	Without mitigation					Ensure that proper management measures as well as technical changes are undertaken to reduce the impacts on surrounding employees. This include ensuring that less noisy equipment is used, that equipment is kept in good working order and that the equipment must be fitted with correct and appropriate noise abatement measures and where possible use white-noise generators instead of tonal reverse alarms on heavy vehicles operating on roads.
		S	M	S	M	L	
The activities undertaken during the construction phase of the Coal Product Stockpile expansion and associated infrastructure will occur on a local scale due to the localized extent of the development. The Coal Product Stockpile and associated infrastructure will exert a high visual impact within the 1km zone. Critical viewpoints such as the main roads, nearby human settlements (Bank Village), nearby farmsteads and businesses may be affected by the proposed construction activities.	Visual Aspects	Without mitigation					Ensure that any earthworks and landscaping are conducted to reduce the visual impacts Ensure that colour/texture and scale are also used in reducing the visual impacts Ensure that lighting is conducted in a manner that will reduce the impacts on visual aspects at night times.
		M	M	S	L	L	
The commencement of the proposed project may result in an influx of 'outsiders' seeking jobs. This may likely	Socio economic aspects	Without mitigation					Thungela Operations (Pty) Limited will ensure that no unrealistic expectations are created.
		S	M	S	S	L	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
contribute to the following negative impacts i.e. increase in local unemployment levels, potential conflict between locals and "outsiders" that compete for employment opportunities and other resources, increase in the number and size of informal settlements, potential increase in crime and additional pressure on local government to provide housing, services, employment and so forth. Current high crime rates could be exacerbated by an uncontrolled influx of jobseekers and informal settlements that manifest during the construction phase. The limited number of employment opportunities makes the influx of jobseekers highly unlikely.		With mitigation					Detail of the construction period will be communicated to local communities and the community will be informed regarding the number of new positions that will be created. Local Councillors will be involved in the process to ensure that they convey the information to the local communities through their established means of communication (community meetings, etc.).
		S	M	S	S	L	
During the construction phase, the R 35 and minor roads leading to the site will be utilised. Low bed trucks will access the site daily and large dump trucks will also have to access the site on a daily basis. Hard parking will be allowed for equipment on site. This, together with other activities, will result in disruptions in daily living and movement patterns for surrounding communities, landowners and road users in the form of traffic and intrusion impacts resulting in short-term disruptions and	Socio economic aspects	Without mitigation					Announce disruptions, road closures and other disruptions; Erect signboards (if required) indicating access to the construction site; Impose penalties for reckless drivers as a way to enforce compliance to traffic rules; Inspect trucks and other heavy vehicles on a regular basis to avoid oil spillages and un-roadworthy vehicles that could lead to accidents;
		S	M	S	M	L	
		With mitigation					
		S	M	S	M	L	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
safety hazards. Factors that could further impact negatively include damage to road surfaces resulting in an increase in accidents, frustrated motorists and financial implications for local and provincial government, temporary road closures, construction vehicles that offload material on site (dust, noise, etc.), and increase in traffic on the access roads (gravel roads) resulting in impacts for locals, farm houses and crops. Sensitive receptors that could be potentially impacted include Bank 2 Village, small commercial centre east of the site (and its patrons), formal and informal residents located adjacent to the tarred road south of the site and road users.							Limit all activities to the development footprint of the proposed construction site; Fence off the development footprint of the proposed construction site prior to the commencement of site-clearing and construction activities; and Keep communication with neighbouring landowners, land occupiers and the public (interested and affected parties) open during the construction phase of the project.
Inadequate management of the construction process and general construction related activities could result in health and safety risks for workers and nearby communities, which could include construction related and road accidents, unauthorised access/trespassing, fire hazards at the site and nearby surrounding lands, respiratory diseases due to dust generation and air pollution, health issues due to high ambient noise levels caused by machinery and	Socio economic aspects	Without Mitigation					Ensure that safety measures are implemented to control access to the site. Ensure measures are implemented to ensure project related safety within the construction site and nearby communities. Conduct waste management at the site in accordance to the mine's waste management procedures. Ensure proper communication with all relevant stakeholders.
		M	M	S	H	H	
		With Mitigation					
		M	L	S	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
construction equipment, pollution problems, unsafe and insufficient drinking water, increase in HIV/AIDS and other STDs and dehydration and sunburn due to high temperatures in the summer months.							
Intrusion impacts (air pollution, noise impacts, visual impacts and impacts on identified heritage sites) may result from construction activities of the proposed project.	Socio economic aspects	Without Mitigation					See mitigation under the relevant section of the environmental aspects
		M	M	S	M	M	
		With Mitigation					
		M	L	S	L	L	
Positive Impacts							
As a result of contracts with SMMEs, local service providers and local procurement of goods and services, a positive impact on the local economy is expected. It is expected that these services and goods will be available in the local and wider municipal area. It is also likely that the small commercial/retail centre east of the site will experience positive economic impacts over the short-term due to its close proximity to the construction site. Informal traders (catering, food stalls, etc.) for the duration of the construction period are also a regular	Socio economic aspects	Without Mitigation					Implement requirements of the Contractor Services Management Plan (CSMP) for the duration of the construction period. As part of the tender documents the Contractor has to provide subcontracting values per package and the plan on how he will meet BEE procurement and SMMEs targets assigned. Monitor the social performance of contractors and determine how contractors fair on each KPI. Implement relevant measures should the Contractors not comply with the social management plan they submitted (impose
		S	H	S	S	M	
		With Mitigation					
		S	H	S	S	M	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
occurrence near construction sites and contribute positively towards the local economy.							penalties, termination where necessary, review of future prospective work and so forth). Cost of remedial work associated with the social incident is borne by the Contractor.
The construction phase of the proposed project will result in the following positive impact on the local economy i.e. Employment of locals and an increase in salary earners; Contracts with SMME's and local service providers where possible; Local procurement of material and goods, where possible; Positive impacts for the retail market for local merchants, shops and informal traders; and Accommodation for temporary skilled employees in local establishments and its associated spin-offs.	Socio economic aspects	Without Mitigation					Thungela Operations (Pty) Limited will adhere to its procurement strategy, which aims to increase local content of the project to its maximum. Majority of construction material requirements will be sourced from industries in eMalahleni and Middelburg. The mine will comply with the requirements as guided by the Mining Charter III with regards to SMME development and the mine's procurement policy.
		M	H	S	P	M	
		With Mitigation					
		M	H	S	P	M	
		S	L	S	L	L	

6.3.2 Operational Phase

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
OPERATIONAL PHASE							
Operation and maintenance of the Coal Product Stockpile Expansion and its associated infrastructure that include the topsoil/subsoil stockpiling areas.							
The placement of the coal product from the coal washing plant to the Coal Product Stockpile expansion will result in the formation of a topographical highpoint. This will result in the change of the topographical patterns of the immediate area. Note also that the area will be an extension of the existing Coal Product Stockpile facility, hence the area has already been subjected to a topographical change.	Topography	Without mitigation					The height and capacity of the Coal Product Stockpile facility will be constructed to be in compliance with the relevant mine and legal safety requirements.
		With mitigation					
The expanded Coal Product Stockpile facility will be situated in close proximity to natural lowlands (wetlands) feeding into the Spook Spruit, and eventually the Olifants River. Due to the above, the operation and maintenance of the Coal Product Stockpile facility and its associated infrastructure may cause soil contamination over the identified lowlands (particularly during extreme rainfall events) by contaminants deriving from acid rock drainage (ARD), seepage and runoff during	Soils	M	M	P	M	M	Safeguard the water resources in close proximity to the Coal Product Stockpile facility. The quality of the water and the wetlands within the Bankfontein dam and the Spook Spruit must as far as practically possible be protected. The size of the topsoil stockpile will be contained to be as small as possible and the Coal Product Stockpile facility will be rehabilitated using the stockpiled topsoil.
		With mitigation					
		S	L	P	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
OPERATIONAL PHASE							
extraordinary high rainfall events.							
The presence of the Coal Product Stockpile facility and associated infrastructure will result in the current land capability and current land uses at the footprint of the Coal Product Stockpile ceasing permanently. As mentioned before, the area is currently not used for any other purpose due to the presence of mining activities in the vicinity of the project area, hence this loss will not be significant.	Land Use and Capability	Without mitigation					The footprint of the Coal Product Stockpile facility and its associated infrastructure will be kept as small as possible. The Coal Product Stockpile facility will be rehabilitated such that a suitable land use can be established after rehabilitation of the Coal Product Stockpile facility.
		S	M	M	M	M	
		With mitigation					
		S	L	M	L	L	
During the operational phase of the Coal Product Stockpile facility, the storm water generated from the Coal Product Stockpile facility and surrounding areas will be considered as dirty and must hence be collected in the dirty water system. This water would have contributed to the flow in the Spook Spruit catchment. The collection and containment of this water will result in a reduction in the yield of the catchment. This may also result in the desiccation within the surrounding wetlands, which will result in the loss of the wetland habitat.	Surface Water	Without mitigation					As is best practice, dirty areas should be minimised. This will have the dual benefit of smaller dirty water management systems and reduction in catchment yield loss. All clean water from upslope of the Coal Product Stockpile Expansion should be diverted around the complex.
		S	L	L	L	L	
The use of trucks and heavy machinery along	Surface Water	Without mitigation					Truck, machinery and equipment will be regularly serviced

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
OPERATIONAL PHASE							
access and haul roads and the placement of coal product at the Coal Product Stockpile facility has the potential to have the following impacts on surface water quality: • Potential hydrocarbon contamination. • Wind-blown dust settling in adjacent watercourses or surface areas, with resultant deterioration in water quality and impacts on wetlands. • Contaminated storm water discharging from the site, with resultant increase in suspended solids, siltation of carbonaceous material, increase in salinity, particularly sulphate and suspended solids in the watercourses. • Leakage of contaminated water from poorly maintained storm water channels. • Infiltration of contaminated seepage from the Coal Product Stockpile expansion area into the groundwater, with consequent groundwater contamination and potential seepage into the nearby		M	H	P	H	H	to reduce risk of leaks. Any leakages should be reported and treated immediately in a reputable manner. For large spills a suitably qualified contractor will be called in. Placement of coal product will be conducted in compliance relevant laws and mine standards. Storm water management will be conducted at the Coal Product Stockpile expansion facility. Dirty water from the Coal Product Stockpile facility and all dirty water management structures will be constructed and operated in accordance with relevant laws and regulations. All roads will be inspected regularly for signs of spills. Dust suppression on the haul roads by means of spraying with water will be implemented to minimise wind-blown dust. Waste generated from the Coal Product Stockpile expansion area will be managed in accordance to the mines' waste management procedure. A surface water quality monitoring programme will be implemented to detect deviation from the background water quality.
		With mitigation					
		S	L	S	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
OPERATIONAL PHASE							
Spook Spruit (Bankfontein Dam).							
Oil, diesel and chemical spills/leaks from machinery and storage facilities from the Coal Product Stockpile site may have an impact on the surrounding groundwater.	Groundwater	Without mitigation					The mine must ensure that a credible company removes used oil after vehicle servicing. A sufficient supply of absorbent fibre should be kept at the site to contain accidental spills. Store all potential sources in secure facilities with appropriate storm water management, ensuring contaminants are not released into the environment.
		S	L	M	L	L	
The material to be disposed of at the expansion area is considered as contamination material. The presence of the elements that classifies coal as contaminating material has a potential of creating poor quality water which may contaminate the groundwater if allowed to seep into the groundwater regime. This will eventually cause the deterioration of groundwater quality down-stream of the Coal Product Stockpile expansion project area.	Groundwater	Without mitigation					Trucks, machinery and equipment will be regularly serviced to reduce risk of leaks. The Coal Product Stockpile expansion operated according to the design specifications developed by a professional engineer and approved by DWS. Clean and dirty water systems should be separated. All dirty seepage water from the facility will be collected via drains into the new pollution control dam and the existing return water dam for containment and re-use. Groundwater quality will be monitored as on a quarterly basis. The numerical groundwater model must be updated by
		L	H	P	H	H	
		With mitigation					
		S	L	P	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
OPERATIONAL PHASE							
							calibrating the model with monitoring data if deterioration in groundwater quality is observed.
The transportation of coal product from the coal washing plant to the Coal Product Stockpile can result in the deterioration of water quality within the remaining affected temporary wetlands due to excessive coal spillages along the roads that will result in the discharge of dirty storm water into the nearby wetlands. Coal debris and dust blown off the trucks will be deposited along the wetlands and may also result in the contamination of the above-mentioned wetland systems.	Sensitive Landscapes	Without mitigation					Loading of coal trucks must be supervised to prevent overloading. The roads must be designed and operated to minimise the likelihood of spillages. All vehicles should only use designated roads with no indiscriminate driving through wetland areas. Measures such as storm water diversion trenches or berms and silt traps must be used for the diversion and collection of water from the roads that may generate dirty water. Should large spillages occur, clean-up of the spillages should be undertaken as soon as possible following the event. In this regard regular inspection of the entire route should be undertaken regularly. Dust suppression should be undertaken at the roads to prevent generation of excessive dust along the roads. Bio and aquatic monitoring of adjacent wetlands and streams are required prior to the Coal Product Stockpile expansion commencing and in regular intervals thereafter. The Present Ecological State of the wetland features must
		S	M	M	M	M	
		With mitigation					
		S	L	M	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
OPERATIONAL PHASE							
							be maintained and may not decrease due to any mining activities within or surrounding these wetland features.
Runoff, seepage and potential discharge from the Coal Product Stockpile expansion area may result in the detrimental impacts on the remaining and surrounding wetland areas. This may eventually result in the damage and destruction of the wetlands.	Sensitive Landscapes	Without mitigation					Effective clean and dirty water separation and storage capacity to comply with regulatory requirements must be implemented. Operate the dirty water trenches and water pipelines as per design specification, which was undertaken to ensure protection of the affected wetlands. All dirty water runoff and seepage from the Coal Product Stockpile expansion will be diverted and drained into the existing pollution control dam for re-use. Monitor the stretch of the dirty water trenches and water pipelines for spillages/leaks and where such spillages/leaks occur, the area should be remedied as soon as possible. Ensure that remaining wetland areas are demarcated as no go zones and all mine vehicles should be restricted to the service roads. The dirty water management structures must be operated in accordance with the approved civil design report, water use licence conditions and the mine code of practice, which will ensure that all measures are taken to prevent spillages,
		M	H	M	H	H	
		With mitigation					
		S	L	M	L	L	
		S	H	M	M	M	
		With Mitigation					
		S	L	M	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
OPERATIONAL PHASE							
							leakages and release of mine affected water into the nearby streams and their wetland systems. The integrity of these facilities will be tested on a regular basis to ensure that the structures especially their lining and capacity are properly operated.
During the operation of the Coal Product Stockpile expansion, activities such as transportation of coal via the conveyor belts and trucks, placement of the coal product and the use of the roads for accessing the facility will be sources for the generation of ambient noise. It is predicted that that the noise level to be generated from the construction activities will comply with the Gauteng Province (GN 5479 of 20 August 1999) Noise Control Regulations, SANS 10103:2008 guideline and International Finance Corporation.	Noise	Without mitigation					Where possible, construct berms or barriers shielding the affected receptors from the noise sources. Ensure that proper management measures as well as technical changes are undertaken to reduce the impacts on surrounding employees and communities. Monitor ambient noise levels on potentially affected receptors.
		S	L	M	L	L	
During the operation of the Coal Product Stockpile facility and its associated infrastructure, material handling (coal product conveyance and conveyor/truck tipping points) and placement of	Air Quality	Without mitigation					Ensure that source and receptor-based performance indicators for routine operations at Coal Product Stockpile Expansion project area are set and assessment done against such indicators.
		M	H	M	M	M	
		With mitigation					

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
OPERATIONAL PHASE							
coal product will be conducted. In addition to the above, wind blowing over open spaces where coal product has been placed and movement of vehicles along the created unpaved roads will result in significant air pollutant emissions.		M	H	M	L	L	Enforce record-keeping, environmental reporting and community liaison on matters relating to the impacts on air quality.
Critical viewpoints such as the main roads, nearby human settlements (Bank Village), businesses, settlements (formal or informal) and nearby farmsteads may be affected by the proposed construction activities.	Visual Aspects	Without mitigation					Ensure that any earthworks and landscaping are conducted to reduce the visual impacts. Ensure that colour/texture and scale are also used in reducing the visual impacts. Ensure that lighting is conducted in a manner that will reduce the impacts on visual aspects at night times.
		M	M	S	M	M	
		With mitigation					
		M	M	M	L	L	
Possible influx of job seekers may flock into the operational site. This may result in the following impacts i.e. conflict between locals and 'outsiders' if an outside labour force receives preference; conflict due to cultural differences and impacts on social networks; provision of accommodation for workers could become an economic and social burden for the mine and the Municipalities; unwanted pregnancies and an increase in HIV/AIDS and other sexually transmitted diseases may result, thereby placing more pressure on	Socio-economic Aspects	Without mitigation					Take care not to create unrealistic expectations and communicate detail of the workforce requirement to local communities and inform them that few new positions will be created. Involve the Local Councillors in the process to ensure that they convey the information to the local communities through their established means of communication (community meetings, etc.).
		M	M	M	M	M	
		With mitigation					
		M	M	M	M	M	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
OPERATIONAL PHASE							
health care facilities; an increase of single-headed households without a main income provider and pressure on health care, social grants and infrastructure and safety and security issues for the surrounding communities due to an influx of 'jobless' people.							
Mismanagement of the Coal Product Stockpile area could result in community health and safety issues for surrounding land owners, residents and road users. Possible impacts during the operational phase are similar to those that could be experienced during construction.	Socio-economic aspects	Without Mitigation					Ensure that safety measures are implemented to control access to the site. Ensure measures are implemented to ensure project related safety within the construction site and nearby communities. Conduct waste management at the site in accordance to the mine's waste management procedures. Ensure proper communication with all relevant stakeholders.
		M	M	M	M	M	
		With Mitigation					
		M	S	M	L	L	
The site of cultural and heritage importance that would have been affected by the project would have been relocated and hence no further impacts on the heritage site will result from the Coal Product Stockpile Expansion project.	Sites of Archaeological and Cultural Importance	No impacts predicted					No further mitigation measures required.

6.3.3 Decommissioning and Closure Phase

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
DECOMMISSIONING AND CLOSURE PHASES							
Covering with topsoil, contouring and seeding the decommissioned Coal Product Stockpile facility, Rehabilitation of disturbed areas. Maintenance and monitoring of rehabilitated areas and surrounding environments.							
As the Coal Product Stockpile facility is being rehabilitated, there is a potential for the creation of dangerous excavations and steep embankments which will need to be backfilled and landscaped.	Topography	Without mitigation					The Coal Product Stockpile will be rehabilitated to blend into the surrounding environment. Monitor the rehabilitated Coal Product Stockpile for signs of erosion and damage of contours.
		S	M	S	H	M	
		With mitigation					
		S	L	S	L	L	
The rehabilitation of the Coal Product Stockpile Facility and associated infrastructure will result in the soil productivity and land capability being restored. This will also result in the resumption of the use of the land since the infrastructure would have been removed.	Soils, Land Capability and Land Use	Positive impact					Topsoil will be used to cover the Coal Product Stockpile facility after it has been rehabilitated.
During the decommissioning and closure of the Coal Product Stockpile facility, potential	Soil	Without mitigation					Activity should be limited to the area of disturbance. Where required, the compacted soils should be disked to an adequate
		S	L	S	M	M	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
DECOMMISSIONING AND CLOSURE PHASES							
exist for compaction and contamination of the soils from the use of heavy vehicles. Hydrocarbon spillages and dirty water discharges from mine machinery and dirty water dams will also result in the pollution of the soil, which may not be usable post closure. There is also a potential for soil contamination by coal dust generated from the Coal Product Stockpile facility and roads within the facility. Waste from the rehabilitation site may also result in the contamination of the soil within the rehabilitated Coal Product Stockpile facility.		With mitigation					depth and re-vegetated with a recommended seed mixture. Trucks, machinery and equipment will be regularly serviced to reduce the risk of leaks. Any leakages should be reported and treated immediately in a reputable manner with spill kits which should be provided on site. For large spills a hazardous material specialist must be called in. Ensure that water management facilities are operating adequately in accordance with GN704. Clean out silt build up over the dry season. Test for integrity of lining and management structures. Ensure that dust suppression is conducted at the MRD facility. Manage waste generated in accordance with the mine's waste management procedure.
		S	L	S	L	L	
Initial potential for erosion, loss of soil characteristics & soil degradation through soil mobilisation may result in the post mining land capability not being attained	Soil/Land Capability	Without mitigation					Ensure that removed topsoil is used during the rehabilitation of the disturbed areas. Re-vegetate any bare soil immediately. Consider use of erosion control measures such as gabion baskets. Ensure soil is replaced to an adequate depth and ensure soil
		S	M	M	M	M	
		With mitigation					
		S	L	S	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
DECOMMISSIONING AND CLOSURE PHASES							
							quality is adequate.
Positive impacts will result due to the reduction in areas of disturbance and the return of land use and capability of the disturbed areas and making available an area that was covered by the coal product for suitable post mining use.	Land Use	Positive impact					Ensure that rehabilitation is conducted in accordance with a rehabilitation method statement approved by mine management. Ensure that contamination of the rehabilitate area by carbonaceous material and hydrocarbon liquids are prevented.
During the decommissioning phase, most impacts will be associated with the rehabilitation of the Coal Product Stockpile facility. Access and haul roads will be removed, as will topsoil stockpiles, berms and diversion trenches. During this process, short-term impacts will be moderate, as heavy earth-moving machinery will disturb large areas. Previously vegetated areas may be disturbed which may increase erosion potential. These short-term impacts will give way to long-term benefits. Further to the above, dirty water from the site may be released to the surrounding environment resulting in the	Natural Vegetation	Without mitigation					The topsoil will be replaced at the Coal Product Stockpile facility footprint as per rehabilitation plan stipulated by the soil and vegetation specialists. These areas must be re-seeded with the relevant seed mix recommended by a suitably qualified person. Develop and implement a declared weed and invader eradication programme. Ensure berms/trenches are erected between active area and clean environment to contain all dirty water runoff and divert to the existing return water dam. Clean out silt build up over the dry season. Ensure adequate capacity in the existing return water dam.
		S	M	M	M	M	
		With mitigation					
		S	L	S	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
DECOMMISSIONING AND CLOSURE PHASES							
contamination of the natural vegetation areas.							
During the decommissioning and closure phases disused infrastructure will be demolished/rubble removed, stockpiles will be removed for use during rehabilitation, the coal stockpiling facility will be rehabilitated (levelled, topsoiled and seeded). Heavy machinery will be used during the rehabilitation. During the process of rehabilitation, surface water environment (Bankfontein Dam and the Spook Spruit) may be contaminated by silted runoff water, hydrocarbon liquids and seepage water from the area affected by acid mine drainage.	Surface Water	Without mitigation					Trucks, machinery and equipment will be regularly serviced to reduce the risk of leaks. Any leakages should be reported and treated immediately in a reputable manner with spill kits which should be provided on site. For large spills a hazardous material specialist must be called in. Monitor areas for erosion and ponding and rehabilitate if necessary. Ensure soil management measures are followed to reduce erosion. Maintain the storm water management structures until it can be proven that the area is self-sustaining. Ensure water management facilities are operating adequately as per GN704 requirements and that capacity is not compromised through silt build-up. Clean out silt build up during the dry season. Continue with surface water monitoring.
		M	M	S	M	M	
		With mitigation					
		S	L	S	L	L	
Once the facility is fully operational, polluted water (water with high salinity and metal concentrations) can migrate away from the facility towards the Bankfontein Dam and	Groundwater	Without Mitigation					Rehabilitate the coal product stockpile area such that the infiltration of water through the floor is minimised. Ensure that monitoring systems for detection of surface and groundwater pollution are put in place. This will include the
		L	H	P	H	H	
		With mitigation					

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
DECOMMISSIONING AND CLOSURE PHASES							
Spook Spruit.		M	L	P	L	L	positions of both surface water sampling points and monitoring boreholes. All the monitoring data needs to be collated and analysed on at least an annual basis after closure and included in the mine's management reports. This information will also be required by government departments (Department of Water and Sanitation, Department of Environmental Affairs) for compliance and monitoring.
As this phase will involve additional traffic, significant dust may be generated on the areas being rehabilitated and on unpaved roads. This dust and fine particulates generated, will migrate away from the site towards the identified receptors. Should the dust and fine particulate reach the receptors, such receptors may be affected by the dust	Air Quality	Without mitigation					Ensure that source and receptor-based performance indicators for routine operations at the mine area are set and assessments done against such indicators. Enforce record-keeping, environmental reporting and community liaison on matters relating to the impacts on air quality Ensure that source specific management measures Coal
		S	L	S	L	L	
		With mitigation					
		S	L	S	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
DECOMMISSIONING AND CLOSURE PHASES							
and fine particulates.							Product Stockpile Expansion project are complied with.
Noise will be generated during the rehabilitation of the facility and the associated surface infrastructure, removal of material from site by trucks and rehabilitation of the disturbed areas by mine machinery.	Noise	Without mitigation					Provide employees with ear plugs and employees must be instructed to use the ear plugs. Continue implementing the methods decided on from the investigation of the use of white-noise generators instead of tonal reverse alarms on heavy vehicles operating at stockpile areas. Ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures.
		S	L	S	L	L	
		With mitigation					
		S	L	S	L	L	
The site of cultural and heritage importance that would have been affected by the project would have been relocated and hence no further impacts on the heritage site will result from the Coal Product Stockpile Expansion project.	Sites of Archaeological and Cultural Importance	No significant impacts predicted.					No further mitigation required.
During the decommissioning phase of the project, negative impacts associated with retrenchments, which include flooding of job markets if affected employees are unable to secure new employment; decline in the economic active population if people leave	Socio-economic Aspects	Without mitigation					Where retrenchments or closure of the operation is imminent, the mine implements a process to ameliorate the social and economic impact on individuals, regions and economies. Assessment and counselling services for affected employees must be provided. Comprehensive self-employment training programmes must be provided.
		L	M	P	M	M	
		With mitigation					
		L	M	M	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL COMPONENT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
DECOMMISSIONING AND CLOSURE PHASES							
the region resulting in a further decline of the economy of the region; abandonment of infrastructure such as houses; increase in poverty levels; increase in single-headed households without a main income provider and pressure on health care, social grants and infrastructure and safety and security issues for the surrounding communities due to a growth in the number of 'jobless' people, will occur.							Comprehensive training (non-mining skills) and re-employment programmes must be provided. Creation of jobs for local economies encouraged. Regeneration of local economies must be encouraged. Assessment of the Social Plan Fund must be conducted. Use the Future Forum, which is in place to identify challenges affecting the mine and to come up with appropriate solutions; and to implement solutions agreed upon by both employer and employee representatives.

6.4 SUMMARY OF SPECIALIST REPORTS

6.4.1 Agricultural Agro-Ecosystems Assessment

Main impacts of the proposed development on the agricultural resources. See the Agricultural Study attached as **Appendix C**.

Soil acidification and salinization

Current acidification levels were not determined. Saline surface crusts are present in the northern (downslope) subarea. This implies that these processes, which go together, are already ongoing. Best industry practices must be implemented and monitored with respect to the proposed new extensions.

Soil compaction of the footprint

Surface compaction would be part of leachate collection measures. Soil compaction can be alleviated mechanically, however, after decommissioning, removal of all product and closure of the facility.

Dustiness

Dustiness have more of an impact on plants and nearby facilities than on the soil resources. However, combatting dustiness is to constitute an important part of implementing best industry practices.

Long-term benefits

The large investments in coal-fired power stations require that installations will complete their intended life cycles to be profitable. The intended project will contribute to effectively supply coal to power stations for helping to enable them to complete their life cycles without resulting in undue permanent losses of agricultural resources. A serviceable ROM facility is also essential for beneficiation for product export.

Alternative sites

The terrain involved is one of sensitive arable land changing within metres to sensitive wetlands with only narrow, or no, transitional zones of lower sensitivity in between. This results in a situation where switching around in the landscape offers little scope for siting installations on less sensitive land.

Surrounding agricultural activities

The development will have little or no negative effect on the commercial agriculture in the wider area surrounding it. There will be little or no disturbance of current agricultural activities.

Acceptability of the development

Considering (a) that a serviceable facility is a necessary component of coal mining, (b) that extending the existing facility appears to be a practical solution, (c) that the period of impact is limited and (d) that the impacts would not necessarily be permanent, the proposed development should be supported.

6.4.2 Paleontological Impact Assessment

Summary of findings. See the Paleontological Study attached as **Appendix D**.

Field Observation:

The area is not large, but partially fenced with an existing stockpile. One section is covered by lush vegetation, trees and building rubble. All areas could be viewed, but very few rocks or outcrops are present, mostly isolated sandstone rocks. The topography is flat. Fossils were not located.

The Project includes one locality Option present on the Vryheid Formation:

Option 1: Two rectangular areas blocked in yellow west of the R 35 Road situated on Bank Road with the existing stockpile to the east. The approximate size of the site is 2.6 hectares.

Recommendation:

The potential impact of the development on fossil heritage is VERY HIGH and therefore a field survey was necessary for this development (according to SAHRA protocol). A Phase 1 Palaeontological Impact Assessment: Field Study was done. A Phase 2: Mitigation will be recommended if the Phase 1: Field Study finds fossils (not found) or if fossils are found during the development.

- Mitigation will be needed if fossils are found during the development.
- No consultation with parties was necessary. The Environmental Control Officer must familiarise him- or herself with the formations present and its fossils and follow protocol.
- The development may go ahead with caution due to the presence of the Vryheid Formation shale.
- The ECO together with the mine geologist must survey for fossils before and or after clearing, blasting, drilling or excavating.
- The EMPr already covers the conservation of heritage and palaeontological material that may be exposed during construction activities. For a chance fossil find, the protocol is to immediately cease all construction activities, construct a 30 m no-go barrier, and contact SAHRA for further investigation.

Concerns/threats to be added to EMPr:

- Threats are earth moving equipment/machinery (for example haul trucks, front end loaders, excavators, graders, dozers) during construction, the sealing-in, disturbance, damage or destruction of the fossils by development, vehicle traffic, prospecting, mining, and human disturbance.
- Special care must be taken during the excavation of foundations, trenches, channels and footings and removal of overburden not to intrude fossiliferous layers.

6.5 ENVIRONMENTAL IMPACT STATEMENT

Bank Colliery is an operational mine that extracts coal from the No. 2 and No. 4 coal seams within its mining right area. The coal mining is undertaken by conventional bord and pillar mining methods. Coal is processed on site using a DMS plant (Bank 2 Coal Washing Plant), with washed coal being stockpiled at the coal product stockpiling facility before being railed from the mine RLT to Richards Bay Coal Terminal. Arising mineral residue from the coal washing process during the life of mine have resulted in a number of mineral residue deposit facilities on the property of which only one facility is still active i.e. Bank 2 MRD facility.

The volumetric airspace limit at the operational coal product stockpiling facility is due to be reached shortly. This has led to the need for the identification of remedial projects to alleviate this apparent

bottleneck. Thungela Operations (Pty) Limited has decided to extend the current coal product stockpiling facility. This will prevent the coal stockpiling facility from reaching its airspace capacity, hence allowing the mine to continue using the facility.

Failure to undertake the above-mentioned identified remedial project may result in the mine closing pre-maturely, which will have significant negative impacts on its employees and the local economy. In view of the above, the Goedehoop North Coal Product Stockpile Expansion project was selected as the project to prevent the pre-mature closure of the mine.

6.5.1 Description of affected environment

The proposed Goedehoop North Coal Product Stockpile Expansion project is situated in area characterised by a gentle undulating plateau with fairly broad to narrowly incised valleys such as the Olifants River valley, which are associated with surface water features such as rivers, streams and pans. These includes the Spook Spruit and its tributaries.

A variety of soil types were identified within the project area, which include Hutton, Bainsvlei and Westleigh soil types. Regarding the use of the land over the proposed project area, most of the surveyed area is fallow and transformed land. These include the infrastructure such roads and its servitude. Non-transformed land (wilderness or fallow lands) is largely restricted to the southern edges of the project area.

Surface and groundwater environments have shown some changes due to the current land uses, with the surface water environment being the most impacted. The study area is comprised of wetland systems. The wetland systems identified within the proposed project area have been significantly impacted upon by previous and current mining activities. As such the ecological services rendered by the wetland areas are minimal.

The proposed project is situated within the Steve Tshwete Local Municipality. The major economic activities in the region are those associated with coal mining, metallurgical industries, commerce and light engineering, power generation, agriculture and administration. Mining is the major industrial activities in the vicinity of the proposed project area. An increase in the environmental and economic impacts and various criminal activities and land invasions has been noted over the last number of years.

6.5.2 Summary of key findings of the environmental impact assessment

During the construction phase impacts on the soils, natural vegetation, surface water, groundwater, sensitive landscapes, air quality, noise, visual aspects, sites of archaeological and cultural importance and socio-economic status of the surrounding communities will be medium to high without mitigation. These impacts are as a consequence of the expansion footprint being positioned within wetland systems and within the catchment of the Spook Spruit and the Bankfontein Dam. These ecosystems have severely impacted temporary wetlands and streams, which feed into the Bankfontein Dam. Alternatives considered for the location and designing/layout of the expansion project has shown that the selected location and designs would be the most favourable. Thungela Operations (Pty) Limited will undertake measures to ensure that the identified impacts are minimised. With the exception of the impacts on the identified wetlands, which cannot be mitigated, assessment of the rest of the impacts with the proposed mitigation measures has shown the significance of the impacts on all affected environmental aspects to be reduced from medium and high significance to low significance.

No significant impacts on land use was predicted. Several uses, which are mine related within and around the proposed project area may be affected, however measures will be put in place to minimise the impacts. Measures such as safety along the roads and dust suppression will be undertaken to ensure that the impacts on the current mine related uses are not detrimentally affected.

With differential stockpiling and careful handling of the soils removed from the proposed project infrastructure area, the impacts on soils will be low after mitigation.

Assessment of the vegetation within the footprint of the development area has shown limited presence of natural vegetation. Despite the area being altered, proper rehabilitation and seeding with a seed mix recommended by a suitably qualified person, will ensure that the impact on the natural vegetation after implementation of the mitigation measures is low. In fact, since areas with exotic plant species will be rehabilitated to have just local plant species, an improvement in the state of the vegetation within some parts of the project area will result.

Dirty storm water runoff from the dirty water areas of the Expansion and associated surface infrastructure will have a detrimental impact on the surrounding water environment should this water be released to the environment. In order to prevent the occurrence of the above-mentioned impacts, a storm water management system, which will ensure the diversion and collection of dirty storm water from the expansion area must be developed and will be implemented at the proposed project area. This system will further ensure that clean storm water from the project is diverted to the clean water environment, thereby preventing the contamination of clean storm water with the coal material from the proposed project area. The dirty storm water and seepage water from the expansion area will be stored in a new pollution control dam or the existing return water dam. A system, which include diversion trenches will be used for the collection and reuse of water from the new pollution control dam or the existing return water dam.

Sediments will be created from the site during the construction, operational and decommissioning phase, which may impact negatively on the surrounding water environment. Silt traps which will act as settling ponds will be used to manage the silts from this runoff water. Once the silt has been settled, the clean water will be released to the natural environment. Silt traps will be constructed around the construction site for the management of runoff water with high silt loads.

The presence of the coal stockpiling facility will pose a risk to the groundwater environment in the form of contaminated leachate which will have an elevated sulphate concentration which is likely to impact negatively on the aquifer and could potentially also affect the Spook Spruit and the Bankfontein Dam. Water management measures have been provided that will ensure that the predicted impacts are managed and reduced. Should the measures be undertaken, the significance rating predicted impacts would reduce to low rating.

Wetlands were identified within and around the proposed Expansion project. Assessment of the wetlands has shown that some of the wetlands are highly modified due to current and previous land use activities. The proposed expansion area is situated within one of the wetland areas, hence will result in their permanent destruction. However, the proposed project will be sited to be away from the other wetland systems, which is situated within the Spook Spruit and feds into the Olifants River. Measures will be undertaken to ensure protection of all remaining wetlands. These include storm water management within the expansion area, increasing awareness of the presence of the wetland to the mine employees and contractors, visible demarcation of the identified wetlands and ensuring that where the wetlands are directly affected, as small a space as possible is affected.

No heritage site is situated within the proposed expansion area.

Dust and noise will have low impacts on the surrounding communities. Despite the low impact significance rating, measures will be put in place and implemented in order to maintain the impact significance rating as low.

Commencement of the proposed Expansion Project will ensure that employment opportunities, although on a temporary basis during the construction phase, are created. This will, to a limited extent, have a positive impact on the socio-economies of the surrounding towns.

Thungela Operations (Pty) Limited will work with the local communities to promote security on an ongoing basis.

6.6 Aspects for Inclusion as conditions of the Environmental Authorisation

In authorising the proposed Coal Product Stockpile Expansion Project, the following conditions should form part of the environmental authorisation:

- Thungela Operations (Pty) Limited may not alter the location of any of the project activities included in this environmental impact assessment without obtaining the required environmental authorisation to do so under NEMA.
- Thungela Operations (Pty) Limited will not undertake any new activity that was not part of this environmental impact assessment and that will trigger a need for an environmental authorisation without proper authorisation.
- Thungela Operations (Pty) Limited must, where possible, update the specialists reports, management procedures and method statement included in the BAR and EMPr. Frequency of updates must be informed by suitably qualified persons.
- The EMPr must be implemented fully at all stages of the proposed Coal Product Stockpile Expansion Project
- Thungela Operations (Pty) Limited must take all reasonable measures to integrate the environmental management at the proposed Expansion Project to the Bank Colliery environmental management system.

6.7 Description of Assumptions, Uncertainties and Gaps in Knowledge

The EIA Regulations, 2014 outline specific requirements that a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures must be provided in the BAR.

The assessments undertaken are based on conservative methodologies and these methods attempts to determine potential negative impacts that could occur on the affected environmental aspects. These impacts may however be of smaller magnitude than predicted, while benefits could be of a larger extent than predicted.

This section outlines various limitations to the specialist studies that have been undertaken and indicates, where appropriate, the adequacy of predictive methods used for the assessment. This has

been done to provide the authorities and interested and affected parties with an understanding of how much confidence can be placed in this impact assessment.

The impact assessment has investigated the potential impact on key environmental media relating to the specific environmental setting for the site. A number of desktop assessment were undertaken and result thereof and are presented in this report.

The information provided in this BAR and EMPr is therefore considered sufficient for decision-making purposes.

6.8 Reasoned Opinion as to Whether the Proposed Project should or should not Continue

6.8.1 Reason why the activity should be authorised or not

According to the impact assessment undertaken for the proposed project, this facility is used for the placement of coal product currently being generated from the existing Bank 2 coal processing plant. Assessment of the facility has shown that the available volumetric airspace within the facility is not enough to see the mine to end of life. In view of the above, Thungela Operations (Pty) Limited had to consider options for ensuring that space is made available for the future placement of coal product generated from the processing coal at the mine's coal washing plant.

An option identification analysis was initiated to identify possible replacement projects to extend to life of mine ("LOM") of the coal product stockpiling facility. The proposed Coal Product Stockpile Expansion project was identified as the most suitable project to extend the life of the facility.

According to the impact assessment undertaken for the proposed expansion project, the key impacts of the project are on sensitive landscapes through groundwater plume migration, destruction of the nearby wetlands, contamination of surface water environment through discharge of mine affected water. These impacts may be experienced throughout the life of the mine.

Other impacts from the proposed project include the socio-economic impact on the surrounding communities through unrealised expectations and disruption of normal daily routes. The surrounding community may also be impacted via air pollution, higher than normal noise levels and change in the aesthetics of the area which will have impacts on the sense of place. It must however be noted that the area is currently used for mining purposes, hence the communities surrounding the proposed project area are used to mine related operations.

The project will also have positive impacts due to the employment to be created although for a short term during the construction phase. The sustenance of current employment due to the ability of the mine to continue mining and processing their run of coal will also have a positive impact. A number of community-based projects will be implemented by the mine, which will have positive impacts on the surrounding community.

All comments received during Public Participation Process and detailed specialist reports will be included in this final BAR and EMPr. The management of the impacts identified in the BAR for all phases of the proposed project will be undertaken through a range of programmes and plans contained in the EMPr. In consideration of the programmes and plans contained within the EMPr as well as designs, layouts and method statements compiled for the project, which is assumed will be effectively implemented, there will be significant reduction in the significance of potential impacts.

Based on the above, it is therefore the opinion of the EAP that the activity should be authorised.

6.8.2 Conditions that must be included in the authorisation

See section 6.6 above.

6.9 Period for which the Environmental Authorisation

Bank Colliery already has a mining right with an approved EMPR that is valid until 2032, which will be enough to cover the life of the proposed project..

6.10 Undertaking

The signed undertaking is presented at the front of this document.

6.11 Financial Provision

According to the EIA Regulations, 2014, where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts must be provided in the BAR and EMPr.

In order to avoid duplication, the financial provision for the proposed project has only been provided under the relevant section of the EMPr.

6.12 Other Information Required by the Competent Authority

Aside from the BAR and EMPr no other information has been requested by the competent authority

6.13 Other Matters Required in Terms of Section 24 (4) (a) and (b) of the Act

Any matter required in terms of the above section of the Act will be complied together with Thungela Operations (Pty) Ltd.

PART B

Environmental Management Programme

1 DETAILS OF THE EAP

The details of the EAP are provided in section 1.1 of Part A of this document

2 DESCRIPTION OF THE ASPECTS OF THE ACTIVITY

The requirements to describe the aspects of the activity are covered by the environmental management programme and are included in PART A of the document under section 1. The reader is therefore referred to section 1 of PART A of this document.

3 COMPOSITE MAP

The map superimposing the proposed project, its associated structures and infrastructure on the environmental sensitivities of the preferred site will be provided on approval of the EMPr. Note that all areas that must be avoided due to their environmental sensitivity will be indicated in the Layout Plan.

4 DESCRIPTION OF THE MANAGEMENT OBJECTIVES INCLUDING MANAGEMENT STATEMENTS

4.1 GENERAL CLOSURE PRINCIPLES AND OBJECTIVES

The following are the closure objectives, general principles and objectives guiding closure of mining areas for Bank Colliery closure planning:

- Rehabilitation of areas disturbed as a consequence of mining to a land capability that will support and sustain a predetermined mix of post-closure land uses;
- Removal of all infrastructure that cannot be beneficially re-used, as per agreements established, and returning the associated disturbed land to the planned final land use;
- Removal of existing contaminated material from mine-affected areas;
- Reinstatement of self-sustaining ecosystems over the rehabilitated infrastructure and mining affected areas, requiring minimum on-going maintenance to facilitate a walk away situation;
- Establishment of final landforms that are stable and safe in the long run;
- Establishment and implementation of measures that meet specific closure related performance objectives;
- Management of mine-affected water to prevent long-term risk of contamination of surface and underground water sources;
- Treatment of mine-affected water to ensure compliance with all relevant standards and supply for beneficial use where feasible;
- Prevention of acid mine drainage;

- Minimisation of decant from all open water bodies;
- Addressing surface subsidence and all other related surface disturbance, to ensure that these are free draining to local watercourses without compromising ecological and hydrological functionality;
- Rehabilitation of the pans, wetlands and watercourses affected by mining;
- Limitation of recharge of rainfall to the underground mine workings to reduce the amount of water to be abstracted; and treatment to prevent surface and/or near surface contaminated excess mine water decant; and
- Monitoring and maintenance of rehabilitated areas and water treatment processes forming part of mine closure to ensure the long-term effectiveness and sustainability of measures implemented.

4.2 MANAGEMENT OF ENVIRONMENTAL DAMAGE, ENVIRONMENTAL POLLUTION AND ECOLOGICAL DEGRADATION CAUSED BY THE COAL PRODUCT STOCKPILE EXPANSION ACTIVITIES

The following actions will be undertaken by Bank Colliery to ensure that the closure objectives are attained.

4.2.1 Infrastructure Areas

- All infrastructure will be demolished and the area rehabilitated.
- All concrete structures will be removed so that the land can be returned to as near as practically possible to its original state. Concrete work that extends below ground level will be removed to a metre below the surface. Steel will be sold as scrap metal.
- All rehabilitated areas will be shaped to be free draining without concentrating flow such that erosion occurs, fertilised and a mixture of indigenous and pasture grasses will be planted. Following this rehabilitation the infrastructure areas will have a capability similar to the pre-mining environment.
- All rehabilitated areas will be maintained for a period of 3 years, where after the frequency will be reassessed. Vegetation cover will be maintained by annual application of fertiliser combined with biennial cutting or burning for the first three years. After this period, fertilizer will be applied as and when required. This will be determined by monitoring the basal cover and fertilizer levels against Thungela Operations (Pty) Limited standards.
- Maintenance with respect to erosion will be conducted on a minimum three-monthly basis if and where required. This frequency will be reassessed after a 3-year period. The final rehabilitated surface will be stable, self-sustaining and erosion-free.
- All roads not required for after mining purposes will be removed and the ground restored as above.

4.2.2 Roads

The MPRDA and Regulations under the MPRDA require all infrastructure associated with the mining operation to be removed and the surface on which it was situated to be returned, as close as is practically possible, to the original land use.

- Access roads will be rehabilitated. All gravel roads will be graded to remove carbonaceous material (which will be removed to the Mineral Residue Deposit facility for disposal). The roads will be cross-ripped to 300 mm at right angles to the natural slope, fertiliser added as per soil requirements and vegetated with a seed mix of indigenous and pasture grasses. Maintenance will be conducted on the rehabilitated areas as indicated in the Policy statement.
- Note that if the ownership of the areas is not transferred to a third party, the buildings, roads and access roads will be removed, the areas rehabilitated and maintained as per point 1 above.

4.3 POTENTIAL RISK OF ACID MINE DRAINAGE

The generation, release, mobility, and attenuation of acid rock drainage (ARD) is a complex process governed by a combination of physical, chemical, and biological factors. Neutral mine drainage (NMD) and saline drainage (SD) are governed by similar factors but may or may not involve the oxidation of sulphides. Whether ARD, NMD, or SD enters the environment depends largely on the characteristics of the sources and pathways. Characterization of these features is therefore key to the prediction, prevention, and management of drainage impacted by the products of sulphide oxidation.

The geochemical sampling was therefore conducted within the scope of work to collect sufficient data to answer the following questions:

- Is ARD likely to occur and what are the potential sources?
- What type of chemistry is expected?
- When is likely to start and how much will be generated?

What are the significant pathways that transport contaminants to the receiving environment and can those contaminants be attenuated along those pathways?

- What are the anticipated environmental impacts?
- What can be done to prevent or mitigate/manage ARD?

The geochemical sampling was guided by the Global Acid Rock Drainage Guide as developed by the International Network for Acid Prevention, National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) Amendments to The List Of Waste Management Activities That Have, Or Are Likely To Have, A Detrimental Effect On The Environment, as well as the Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste, 2nd ed. DWAF, 1998.

From the results of the geochemical analysis and the water quality form the seepage water from the MRD, it is evident that:

- The mineral residue currently produced from the washing facility are currently neutral but have extremely high acid potentials to generate the following i.e. Ca, Mg, Cl, SO4 and Metals.

4.4 STEPS TAKEN TO INVESTIGATE, ASSESS AND EVALUATE THE IMPACTS OF THE ACID MINE DRAINAGE

During the assessing of the impacts of the proposed project on groundwater, a numerical groundwater model, which took into consideration the results from the geochemical analysis, was used to investigate, assess and evaluate the impacts of acid mine drainage.

Numerical groundwater modelling is considered to be the most reliable method of anticipating and quantifying the likely impacts on the groundwater regime.

Modelling for the proposed project was done as representation of a groundwater flow system that attempts to mimic the natural processes. It is therefore a simplified version of the natural system, compiled with geological, hydrogeological, hydrological and meteorological data; which utilises governing equations to incorporate all this data and simulates the hydraulic properties or geochemical properties of the system.

4.4.1 Flow modelling

The finite difference numerical model was created using the US Department of Defence Groundwater Modelling System (GMS10.0) as Graphical User Interface (GUI) for the well-established Modflow and MT3DMS numerical codes.

MODFLOW is a 3D, cell-centred, finite difference, saturated flow model developed by the United States Geological Survey. MODFLOW can perform both steady state and transient analyses and has a wide variety of boundary conditions and input options. It was developed by McDonald and Harbaugh of the US Geological Survey in 1984 and underwent eight overall updates since. The latest update (Modflow NWT) incorporates several improvements extending its capabilities considerably, the most important being the introduction of the new Newton formulation and solver, vastly improving the handling of dry cells that has been a problem in Modflow previously.

4.4.2 Transport modelling

Transport modelling was done using MT3DMS. MT3DMS is a 3-D model for the simulation of advection, dispersion, and chemical reactions of dissolved constituents in groundwater systems. MT3DMS uses a modular structure similar to the structure utilized by MODFLOW, and is used in conjunction with MODFLOW in a two-step flow and transport simulation. Heads are computed by MODFLOW during the flow simulation and utilized by MT3DMS as the flow field for the transport portion of the simulation.

4.4.3 Risk Assessment

The groundwater risk assessment will be assessed by defining the three components, which are the source, the pathway and the receptor. The risk assessment approach is therefore aimed at describing and defining the relationship between cause (source) through the groundwater pathway and the effect to the receptor. In the absence of any one of the three components, it is possible to conclude that groundwater risk does not exist.

4.5 ENGINEERING AND DESIGNS SOLUTIONS TO BE IMPLEMENTED TO AVOID OR REMEDY ACID MINE DRAINAGE

The reactions of acid mine drainage from sulphide minerals are discussed according to the three stage stoichiometric example of pyrite oxidation after James, (1997) and (Ferguson & Erickson, 1988) in which one mole of pyrite oxidized forms two moles of sulphate:

Reaction (2.1) represents the oxidation of pyrite to form dissolved ferrous iron, sulphate and hydrogen. This reaction can occur abiotically or can be bacterially catalysed by Thiobacillus ferrooxidans.

FeS2 +7/2 O2 + H2O Fe2+ + 2SO42- + 2H+ (2.1)

The ferrous iron, (Fe2+) may be oxidised to ferric iron, (Fe3+) if the conditions are sufficiently oxidising, as illustrated by reaction (2.2). Hydrolysis and precipitation of Fe3+ may also occur, shown by reaction (2.3). Reactions (2.1), (2.2) and (2.3) predominate at pH > 4.5.

e2+ + 1/4O2 + H+ Fe3+ + 1/2H2O (2.2)

Fe3+ + 3H2O Fe(OH)3 (s) +3H+ (2.3)

Reactions (2.1) to (2.3) are relatively slow and represent the initial stage in the three-stage AMD formation process. Stage 1 will persist as long as the pH surrounding the waste particles is only moderately acidic (pH > 4.5). A transitional stage 2 occurs as the pH decreases and the rate of Fe hydrolyses (reaction 2.3) slows, providing ferric iron oxidant. Stage 3 consists of rapid acid production by the ferric iron oxidant pathway and becomes dominant at low pH, where the Fe2+ (ferric iron) are more soluble (reaction 4):

FeS2 + 14 Fe3+ + 8H2O 15Fe2+ + 2SO42- + 16H+ (2.4)

Without the catalytic influence of the bacteria, the rate of ferrous iron oxidation in an acid medium would be too slow to provide significant AMD generation. As such the final stage in the AMD generation process occurs when the catalytic bacteria Thiobacillus ferrooxidans have become established. Reactions (2.2) and (2.4) then combine to form the cyclic, rapid oxidation pathway mainly responsible for the high contamination loads observed in mining environments. This contaminated water, which is mostly found in the mined out workings or mineral residue deposits will migrate from the source towards the receptors through the groundwater flow paths.

The following measures are recommended to try and avoid or remedy the generation of acid mine drainage within the MRD facility. Note that it will be impossible to totally eliminate the generation of acid mine drainage, however the measures given below will reduce the extent of the acid mine drainage. These have been divided in terms of the phases of the proposed project:

Pollution prevention starts in the planning phase of an operation through evaluation of plans and, aimed at understanding the potential impacts of alternative working methodologies and a conscious effort to select, design and implement the alternatives that maximise the ability to prevent pollution. Typical pollution prevention measures that were implemented include those shown below:

- A layout plan that has considered closure and rehabilitation issues (effects of plume migration) was prepared by the mine and is submitted for approval by the competent authority. The numerical model will be updated regularly (every 3 to 5 years) during operation with available monitoring data. All operational planning and activities will be undertaken with eventual closure in mind, such that operations can end in a manner that minimizes the final risks and liabilities in the post-closure phase.
- As seepage to the Spool Spruit is the prime groundwater risk, measures to reduce this impact will be implemented. This will be accomplished by construction of stormwater trenches at the parameter of the Coal Product Stockpile Expansion facility. This will collect the seepage from

the Coal Product Stockpile Expansion facility, which will flow to the Return Water Dam for reuse in the coal processing plant.

- Current monitoring boreholes for Bank Colliery and any other new ones will be sampled to obtain information on the groundwater regime as well as for future monitoring purposes.

4.6 Measures to Remedy Residual or Cumulative Impacts from Acid Mine Drainage

Remove as much coal from the opencasts as possible, as pyritic material that is the main cause of acid mine drainage, is associated with the coal.

Place remaining acid producing material as low as possible in the pit to ensure fast flooding of the material. All mined areas should be flooded as soon as possible to bar oxygen from reacting with remaining pyrite.

4.7 Volumes and Rates of Water Use Required for the Proposed Project

The volumes and rates of water use required for the mining operation will be assessed during the mining activities.

4.8 Water Use Licence Application

Department of Water and Sanitation will be consulted for the determination of the requirements in terms of the NWA.

5 ENVIRONMENTAL MANAGEMENT PROGRAMME

Impact Activity Reference	Environmental Attribute	Impact Management Objectives	Targets (Impact Management Outcomes)	Management Actions and Interventions	Responsibility For Actions/Intervention	Monitoring Action	Responsibility and Frequency For Monitoring	Time period for Management Action
PRE-CONSTRUCTION AND CONSTRUCTION PHASE								
Expansion of the GHN Coal Product Stockpiling Facility and associated surface infrastructure i.e., existing/new topsoil/subsoil stockpiling areas, storm water management structures (clean water cut off drain and dirty water drain), access/haul roads.								
Loss of wetland soils and loss of productivity of the soils.	Soils.	To ensure that the establishment of the Coal Product Stockpile Expansion site and construction of associated infrastructure do not have detrimental impacts on the identified wetland soils and on the soil productivity, post closure land use and land capability.	Ensure that the stripping and stockpiling of the soils are undertaken in accordance with the Thungela Operations (Pty) Limited's rehabilitation guidelines. This will ensure that the soils are available for rehabilitation of the Coal Product Expansion Facility during decommissioning phase.	The topsoil from the Coal Product Stockpile Expansion area will be stripped to depths as recommended by the soil specialist. These will be stockpiled in the topsoil stockpile.	Appointed contractor and the mine site manager.	Visually monitor the quality of the stockpiled topsoil on establishment.	Environmental Control Officer (ECO)	During the stripping and stockpiling of topsoil.
				The stockpiling of the topsoil may be used to create a perimeter berm that will act as a visual shield and noise barrier for the surrounding community.	Appointed contractor and the mine site manager.	The stockpiling of topsoil will be inspected.	ECO weekly and Site manager daily when activity is taking place.	During stockpiling of topsoil
				The stockpiling of the stripped topsoil will not result in the topsoil stockpile exceeding a height of five meters, which will assist in minimizing compaction of the soils.	Appointed contractor and the mine site manager.	The stockpiling of topsoil will be inspected and the stockpile will be surveyed.	ECO weekly and Site manager daily. Stockpile surveyed on completion.	During stockpiling of topsoil
				The stockpiled topsoil will be seeded with a recommended seed mix to ensure that a good vegetation cover is achieved, which will prevent erosion of the stockpile.	Appointed contractor and ECO.	The seeding will be monitored by inspection.	ECO will inspect the seeding monthly.	During rainy season after stockpiling of topsoil.
				No mixing of the topsoil with subsoil will be allowed.	Appointed contractor and ECO.	Undertake regular inspections to confirm correct placement of the removed soils.	ECO will undertake the inspection weekly and Site manager daily.	During the stripping and stockpiling of topsoil.
				As far as possible, areas with disturbed vegetation cover were selected for sitting the proposed topsoil.	Appointed contractor and ECO.	Undertake regular inspections to confirm correct placement of Coal Product Stockpile Expansion and infrastructure.	ECO will inspect the establishment of the Coal Product Stockpile Expansion site monthly.	During the stripping and stockpiling of topsoil.

Impact Activity Reference	Environmental Attribute	Impact Management Objectives	Targets (Impact Management Outcomes)	Management Actions and Interventions	Responsibility For Actions/Intervention	Monitoring Action	Responsibility and Frequency For Monitoring	Time period for Management Action
Inability to achieve the mine's post closure land use and capability	Land Use and Capability	To ensure that the establishment of the Coal Product Expansion Facility allows for the area to be used for the preferred post closure land use.	The Coal Product Stockpile Expansion site will be established such that it allows for the preferred post closure land use to be achieved.	Soils will be stripped and stockpiled as describe in the management actions under soils. This will result in the restoration of as much seed bank as possible.	Appointed contractor and site manager.	Same as under soils.	Same as under soils.	See time period under soil management actions.
Loss of natural vegetation and seed bank in the affected areas.	Flora.	To ensure that the establishment of the Coal Product Expansion Facility and construction of the associated infrastructure do not result in the permanent loss of vegetation and its seed bank.	The management of the impact will comply with the mine's biodiversity management plan and closure plan for the Coal Product Expansion Facility.	Soils will be stripped and stockpiled as describe in the management actions under soils. This will result in the restoration of as much seed bank as possible. As much as possible areas with disturbed ecosystems were used for the siting of the Coal Product Stockpile Expansion and its associated infrastructure. The establishment of the Coal Product Stockpile Expansion and the construction associated infrastructure will be limited to the approved development site. Where possible markers will be used to demarcate the approved development site. Where possible, areas that will not be used during the operational phase should be rehabilitated and seeded with a recommended seed mix. This must also ensure that alien species do not encroach into the disturbed and rehabilitated areas. The unused areas must be maintained such that they do not deteriorate from their pre-mining state. The disturbed and rehabilitated areas will be monitored for identification of alien and invader plant species.	Appointed contractor and site manager. ECO. ECO and contractor. ECO. ECO.	Same as under soils. The area will be inspected to ensure that placement of Coal Product Stockpile Expansion and infrastructure is as the approved layout plan. The area will be inspected to ensure that placement of Coal Product Stockpile Expansion and infrastructure is as per approved layout plan. The area being rehabilitated will be inspected. The area being rehabilitated will be inspected. Where necessary a botanist will be consulted for confirmation of alien and invader plant species.	Same as under soils ECO weekly and Site manager daily. ECO weekly and Site manager daily. ECO weekly and Site manager daily. ECO monthly.	See time period under soil management actions. During the planning and pre-construction phase. Whenever possible during construction phase. Whenever possible during construction phase. During summer season of the construction phase.
Loss of catchment yield.	Surface Water.	Ensure that the establishment of the Coal	Management of the storm water runoff	The Coal Product Stockpile Expansion and associated infrastructure will be designed to	Appointed contractor supervised by the	Inspect the construction of the facility and infrastructure to	ECO will undertake the	During pre-construction and

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		Product Stockpile Expansion facility and associated infrastructure do not have detrimental impacts on the catchment yield.	upstream of the Coal Product Stockpile Expansion will comply with the requirements of the regulations under the GN704 and as far as possible with the requirements of the relevant DWS Best Practice Guidelines.	occupy as small an area as possible.	mine engineer.	ensure that the Coal Product Stockpile Expansion is constructed in accordance with the approved layout plan.	inspections weekly during the construction of the project area.	construction phase.
				The storm water diversion structures for the Coal Product Stockpile Expansion and associated surface infrastructure will be constructed in accordance with the Coal Product Stockpile Expansion project civil designs approved by the DWS, which shows the storm water management systems' silt control and erosion protection.	Appointed civil engineer.	Inspect and signoff the construction of the storm water diversion structures on completion of its construction.	ECO will undertake inspections weekly and Site manager daily in the duration of the activity.	During construction of the structures.
				The construction site will be optimised to limit over stripping. This will ensure that the generation of unnecessary volumes of silted water is controlled on site.	ECO.	The constructed storm water diversion structures will be inspected.	ECO and Site manager will undertake the inspections after every heavy rainfall event otherwise monthly.	Throughout construction phase.
				The constructed storm water diversion structures will be maintained in good order, which will including cleaning out the structures where necessary.	ECO.	Inspection of the constructed storm water diversion structures.	ECO and Site manager will undertake the inspections after every heavy rainfall event otherwise monthly.	Throughout construction phase.
				Any damage within the constructed storm water diversion structures will be repaired as soon as possible.	ECO.	Inspection of the constructed storm water diversion structures.	Mine engineer and ECO will undertake the inspections after every heavy rainfall event otherwise monthly.	Throughout construction phase.
Deterioration of water	Surface Water.	Ensure that the	The quality of storm	Storm water diversion structures (berms and	Appointed engineer	Inspect and approve the	Mine engineer as	Throughout

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quality in the Spook Spruit and Bankfontein Dam.		establishment of the Coal Product Stockpile Expansion facility and associated infrastructure do not have detrimental impact on nearby stream water quality.	water from the Coal Product Stockpile Expansion and associated infrastructure will comply with the target water quality objectives as stipulated in the Goedehoop North Colliery water use licence.	trenches) will be constructed to divert clean water runoff to the nearby Spook Spruit (Bankfontein Dam). If a situation exist where the storm water diverted is contaminated and cannot be diverted to the clean water system, this water will be collected into a sump and then pumped via the new dirty water pipeline to the existing return water dam.	and the project team.	construction of clean storm water diversion structures on completion of the construction. Construction undertaken in accordance to the designs approved by relevant authorities.	and when required, ECO will undertake the inspections weekly and Site manager daily during the construction of the storm water management structures.	construction phase.
			Goedehoop North Colliery will undertake the construction of the Coal Product Stockpile Expansion and its associated surface infrastructure in compliance with the regulations under the GN704.	Areas that are to be stripped of topsoil should be optimised to limit unnecessary stripping.	Appointed contractor supervised by the ECO or mine engineer.	Inspect the site's storm water diversion during stripping of the site.	Mine engineer and ECO will undertake the inspections monthly.	Throughout the construction phase.
				Storm water from upslope of the stripped areas should be diverted around these areas to limit the amount of storm water flowing over these areas.	Appointed contractor and ECO.	Monitoring of water quality at the Spook Spruit up and down stream of the Coal Product Stockpile Expansion.	ECO will undertake the monitoring monthly.	During the stripping of the topsoil.
				Excessive sedimentation of storm water run-off from the site will be prevented.	Project implementation team.	Inspection of the site during soil stripping for excessive sedimentation run-off.	ECO will undertake the inspections weekly and Site manager daily.	Throughout the construction phase.
				Mine vehicles and machinery used during the construction phase must be well maintained	Appointed contractors and the ECO.	The site, vehicles and machinery will be inspected for signs of hydrocarbon leakages.	ECO and site EMS rep will undertake the inspections on a weekly basis.	Throughout the construction phase.
				Storm water diversion will be constructed for the diversion water from the dirty water areas of the expansion project (as stipulated in the design report and drawings approved by DWS).	Appointed contractor, Registered Professional Civil Engineer and ECO.	Inspect and sign off the construction of the dirty storm water diversion structures and pollution control dam facility.	ECO and engineer will undertake the inspections weekly during the	Throughout the construction phase.

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						Inspections will be conducted to ensure that the construction is conducted in accordance with the designs specifications approved by relevant authorities.	construction of the structures.	Throughout the construction phase.
Groundwater contamination by carbonaceous material from construction excavation.	Groundwater.	Ensure that the establishment and construction of the Coal Product Expansion and storm water structures do not result in groundwater contamination during their use.	The establishment of the Coal Product Stockpile Expansion and storm water diversion structures will be constructed in compliance with the regulations under the GN704 and approved civil design report and design drawings.	The Coal Product Stockpile Expansion has will be designed and constructed and signed off by a professional engineer tol ensure that seepage water from the Coal Product Stockpile Expansion is collected and stored at the new pollution control dam or existing return water dam.	Appointed internal civil engineers, appointed professional and independent civil engineer, appointed contractor, ECO and mine environmental coordinator.	Inspect the construction of the expanded Coal Product Expansion Facility to ensure that the construction is in line with the approved civil designs. The construction will be signed off by a professional engineer.	The contractor will be present throughout the construction, the mine engineer, professional engineer and ECO will inspect the site every week. The mine environmental co-ordinator will inspect the site whenever necessary.	Throughout the construction of the water management structures and facilities at the proposed project.
Groundwater contamination with hydrocarbon spills.	Groundwater.	Ensure that the groundwater regime is not detrimentally affected by the waste spillages.	Hydrocarbons generated will be managed in terms of the norms and standards for waste	Mine machinery will be repaired in the existing workshops. No maintenance outside the dedicated workshop will be allowed unless it is emergency repairs which must be	Appointed contractor, Mine engineer and ECO.	The project area will be inspected for signs of waste/oil spillages.	ECO will inspect the area on a monthly basis.	During the construction phase of the project.

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			storage and in accordance with the mine's waste management procedures.	on protected ground. All hydrocarbon liquids will be stored in leak and corrosion resistant containers. These containers will be placed on concrete floors. The containers used for the storage of hydrocarbon liquids will be maintained in good condition. Training, which will be in compliance with the requirements of the norms and standards for the waste storage facilities will be conducted for employees working with waste (hydrocarbon liquid), including contractors' employees. All spillages must be contained and the affected areas remedied. An emergency preparedness plan, which will be in line with the mine's environmental emergency plan and the norms and standards for the waste storage facilities will be used. Where necessary, sufficient supply of absorbent fibre will be kept at site to contain accidental spills. Credible waste collectors will be used for the removal of waste from the site to a registered waste disposal facility.	Appointed contractor, Mine engineer, geologist and ECO. Appointed contractor, Mine engineer, geologist and ECO. Appointed contractor, Mine engineer, geologist and ECO. Appointed contractor, Mine engineer and ECO.	The containers will be inspected for detection of leaks, identification of spillages and any other damages. Records of training will be kept. Areas with spillages will be monitored after remediation to confirm that the areas are properly cleaned up. Volumes of waste collected will be recorded in accordance with existing mine systems.	ECO will inspect the containers on a monthly basis. ECO will inspect the records quarterly. ECO will monitor the affected areas on a monthly basis. Appointed contractor and ECO will record volumes during collection.	Whenever waste is generated from the site throughout the construction phase. Training will be conducted at intervals approved by the mine The management action will be undertaken when spillages occur throughout the construction phase. Waste will be collected whenever enough waste material has been collected.
Wetland destruction and loss of habitat.	Sensitive Landscapes.	Ensure that the establishment of the Coal Product Stockpile Expansion and associated infrastructure do not have detrimental impacts on the wetlands identified within the project study area.	Maintain or improve the current PES and EIS of the remaining wetlands within the project study area in accordance with the water use licence conditions. The areas to be rehabilitated will be in	The Coal Product Stockpile Expansion will be designed and established such no seepage and dirty runoff water from the Coal Product Stockpile reports to the remaining wetland. The development footprint of the Coal Product Stockpile Expansion facility and associated infrastructure will be demarcated	ECO, appointed engineers and contractors. ECO and appointed contractors.	Establishment of the Coal Product Expansion Facility will be inspected. The affected wetlands will be assessed annually.	ECO will inspect the site on a weekly basis and the engineers on a monthly basis. ECO will ensure that suitably qualified persons	Throughout the establishment of the Coal Product Stockpile Expansion. The demarcation will be undertaken before the

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			compliance with Thungela Operations (Pty) Limited's rehabilitation guidelines.	with visible markers before its establishment.			assess affected the wetlands.	establishment of the Coal Product Expansion Facility expansion.
				The Coal Product Stockpile Expansion site will be outside one hundred meters from the Spook Spruit wetland and the Bankfontein Dam.	Appointed contractor and ECO.	Inspections will be conducted during the establishment of the Coal Product Stockpile Expansion to determine compliance with the management action.	ECO will undertake inspections weekly and site manager daily.	The management action will be undertaken during the establishment of the Coal Product Expansion Facility expansion.
				No construction activities will be allowed outside the Coal Product Expansion Facility expansion development footprint. As far as possible, disturbed areas will be used for sitting the Coal Product Stockpile Expansion footprint and existing routes will be used to provide access during construction as this will reduce the extent of the newly disturbed area along the route.	ECO and appointed contractors.	Inspections will be conducted during the construction of the Coal Product Expansion Facility expansion to determine compliance with the management action.	ECO will undertake inspections weekly and site manager daily.	The management action will be undertaken during the establishment of the Coal Product Expansion Facility expansion.
				A storm water management system that will ensure that clean storm runoff water from the Coal Product Stockpile Expansion area is diverted to the nearby stream will be constructed. Storm water from the construction area will be managed in such a manner to prevent any release of sedimentation runoff into the nearby stream/wetlands. Where necessary, silt and erosion barrier structures will be installed where silt build up and high velocity run can be expected.	ECO, appointed contractor and appointed engineers.	Construction of the storm water diversion trenches and silt control structures will be conducted. Surface water will be monitored.	ECO and mine engineer will conduct the inspections weekly and the ECO will undertake surface water monitoring monthly.	The management action will be undertaken during construction and maintenance will be conducted throughout the construction phase.
				Alien vegetation control program will be implemented within wetland areas.	ECO and wetland specialist.	The stripping and stockpiling of the soils and vegetation will be inspected.	The ECO and wetland specialist will undertake the inspection weekly and bi-monthly,	The management action will be conducted during the construction phase.

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							respectively during the construction.	
				Denuded areas due to construction must be vegetated after construction with grasses endemic to the area. Erosion prevention measures must be installed prior to the onset of construction activities.	ECO and Thungela officials responsible for rehabilitation.	Rehabilitated areas will be monitored for vegetation growth and for identification of erosion and incisions.	Vegetation growth monitoring will be conducted by suitably qualified person for three growth seasons and erosion/incision will be monitored by the ECO once a month.	The management action will be conducted during the construction phase.
Air pollution through air pollutants' emissions, from the construction site.	Air quality.	Ensure that all operations during the pre-construction and construction phase of the Coal Product Stockpile Expansion do not result in detrimental air quality impacts.	The Coal Product Stockpile Expansion will be constructed such that the ambient air quality does not exceed the National Air Quality Standards and the European Community Levels, which include the Thungela Air Quality Standards (internal air quality standards).	Wet suppression using water carts will be conducted at areas with excessive dust emissions, which will include used open spaces and unpaved roads, transfer points and any other areas with potential to generate excessive dust. Chemical surfactants will be considered should water suppression not yield satisfactory results. Traffic will be restricted to demarcated areas and traffic volumes and speeds within the Coal Product Stockpile Expansion construction site will be controlled. The farmers and community meetings conducted by the mine will be used for environmental reporting and community liaison on matters relating to the impacts on air quality.	Appointed contractor and ECO. Safety Officer/VOHE. ECO.	Visual inspections of areas with possible dust emissions such as unpaved roads and transfer points will be conducted on a monthly basis. Ambient dust fall and PM monitoring (including recommended additional monitoring points) will be conducted as part of the existing monitoring programme. Meetings with farmers will be arranged.	ECO weekly and site manager daily. VOHE (Ambient monthly and PM daily) ECO will arrange and attend meetings once every year.	Throughout the construction phase. Throughout the construction phase. Whenever meetings with farmers are arranged and held during the construction phase.
Increased noise levels.	Noise aspects.	Ensure that the noise levels emanating from the Coal Product Stockpile	The noise levels from the Coal Product Stockpile Expansion	The existing Coal Product Expansion Facility will be used as a sound barrier around noisy parts of the Coal Product Stockpile	Appointed contractor and ECO.	Undertake ambient noise monitoring programme.	VOHE and ECO will undertake the monitoring	Throughout the construction phase.

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		Expansion construction site will not have detrimental effects on the mine employees and surrounding communities.	construction site will be managed and measures will be taken to ensure that noise levels are below the National Noise Control Regulations, SANS10103:2008 guidelines and the International Finance Corporation (World Bank) guidelines.	Expansion area. This will partially control noise towards the Bank Village. Limit the maximum speed on the haul roads to 60 km/h or less, subject to risk assessment. Ensure that the mine employees are issued with earplugs and that they are instructed to use them. Educate employees on the dangers of hearing loss due to mine machinery noise. Any deviation detected by the noise monitoring results must be addressed.	 Safety Officer/VOHE Safety Officer Safety Officer Safety Officer/VOHE	 Speed checking will be conducted. Use of earplugs will be checked and reported. Safety meetings where the awareness is conducted will be recorded and records must be kept. Actions or measures taken to address non-compliance will be recorded and records filed.	annually. Safety Officer/VOHE will conduct speed checking as regularly as possible. Safety Officer will; check the use of the earplugs as regularly as possible. Safety Officer/VOHE will attend the daily safety meetings Safety Officer/VOHE will keep records of as and when non compliances occurs.	 Throughout the duration of the construction phase As and required to do so in accordance to the mine policy During safety meetings. As and when deviation are identified.
Visual impacts on the surrounding communities and road users from the Coal Product Stockpile Expansion construction site.	Visual aspects.	Ensure that all operations during the pre-construction and construction phase of the Coal Product Stockpile Expansion do not result in detrimental visual impacts on surrounding properties, communities and road users.	Measures will be undertaken by the mine to ensure that the visual aspects from the site are complying with the relevant visual standards and objectives, including internal standards and objectives.	Use the perimeter berms, topsoil and existing Coal Product Expansion Facility as a visual screen from the surrounding communities. Where possible areas disturbed by construction activity, must be suitably topsoiled and vegetated as soon as is possible. Limit areas of disturbance to areas where infrastructure or facilities will be constructed or placed. Where possible, the existing vegetation will be supplemented with indigenous plant species to increase the	Mine engineer and the ECO. Appointed contractor and ECO. Appointed contractor and ECO.	The constructed perimeter berms will be inspected for compliance with the design specifications. Areas of disturbance will be inspected to determine areas that need rehabilitation. Areas of disturbance inspected against the approved design specifications of the Coal Product Stockpile Expansion.	Mine Engineer on a monthly basis. ECO on a monthly basis. Mine Engineer and ECO on a monthly basis.	Throughout the construction phase. During the construction phase of the project. During the construction phase of the project.

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				effectiveness of the visual buffer. Dust suppression will be undertaken at all areas that will be affected by construction activities and where dust will be generated. Existing large trees that fall outside the earthworks area must be retained. Note that the alien eradication program, if any, will supersede this condition. Avoid upwards lighting of structures but rather direct the light downwards to focus on the object to be illuminated. Light spill, particularly upwards, must be minimised by implementing the following: Not allowing external light fittings to shine upwards, all security and road lighting shall have “blinkers” or be specifically designed to ensure light is directed downwards to reduce light spill beyond the property boundary.	Appointed contractor and ECO. ECO. Appointed contractor. Appointed contractor.	See monitoring under air quality. Inspection of the site will be conducted. Lighting installation and effects of the lighting to community will be monitored. Night time inspection of the site will be undertaken.	See under air quality. ECO on a monthly basis. Safety officer/VOHE on a monthly basis. The site manager will monitor the lighting on site daily and report to the ECO as and when necessity arises.	Daily during the construction phase of the project. Throughout the construction phase. During the operations phase of the project. Throughout the construction phase of the project.
Impact on employment.	Socio-economic aspects.	Ensure that the positive impacts on employment are sustained.	Employment at the proposed site will be conducted in compliance with mine recruitment policies.	Local labour and contractors will be appointed. This will ensure that economic spin-offs that result due to employment, benefit the local community.	Community Liaison Officer.	Records of recruitment will be kept for audit purposes.	Human Resources Manager will keep records after recruitment.	Throughout the pre-construction an construction phase.
Impact from the influx of job seekers.	Socio-economic aspects.	Ensure that measures are taken to discourage influx of job seekers.	Measures taken to control influx of job seekers will be in line with the mine’s safety and security standards.	Goedehoop North Colliery will ensure that the creation of unrealistic expectations are prevented by communicating the period of the construction phase to the local communities and the communities will be informed that few new positions will be created. Local councillors will be involved in the above communication.	Community Liaison Officer.	Number of job seekers will be monitored and meetings held by, and with the communities, will where possible, be attended by the mine.	Community Liaison Officer and Safety officer will monitor the number of job seekers weekly and will attend meetings as and when these are held.	Throughout the pre-construction an construction phase.
Impacts on the local economy during the construction phase.	Socio-economic aspects.	Ensure that the positive impacts on local economic aspects are sustained.	Goedehoop North Colliery will ensure that the implementation of the measures are in line	Thungela Operations (Pty) Limited will adhere to its procurement strategy, which aims to increase local content of the project to its maximum.	Community Liaison Officer.	The procurements will be monitored against the mine’s procurement strategy.	Procurement Officer will monitor the procurement	Throughout the pre-construction an construction phase.

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			with the mine's targets committed to in the mine's local economic development plan or procurement strategy.	As much of the construction material and service requirements as possible will be sourced from suitably qualified supplies and contractors in eMalahleni, Middelburg and the surrounds.	Appointed contractor.	Providers for services, capital goods and consumables will be checked against the procurement targets.	regularly. Procurement Officer will check how the mine performs against the targets monthly.	When procuring services and goods during the pre-construction and construction phase
				The mine must comply with the requirements as guided by the Mining Charter with regards to SMME development and the mine's procurement policy.	Procurement Officer.	Audits against the requirements of the Mining Charter will be conducted.	Procurement Officer will undertake the audits quarterly.	Throughout the pre-construction and construction phase
Disruption in daily living and movement patterns.	Socio-economic aspects.	Ensure that the disruption in daily living and movements is not detrimental to the local communities.	The mine will ensure that all mine safety standards are met.	Announce road closures and other disruptions; Erect signboards (if required) indicating access restrictions to the construction site; Non compliances will be managed according to the mine's complaints procedure Limit all activities to the development footprint of the proposed construction site; Fence off the development footprint of the proposed construction site prior to the commencement of site-clearing and construction activities; Keep communication with neighbouring land	Safety Officer. Safety Officer. Safety Officer. Safety Officer. Appointed contractor. Environmental Officer	Keep records of the number of announcements made to this effect. Inspections conducted at the site. Records of non-compliances and redress measures taken recorded and filed for audit purposes. Inspection of the construction activities against the management action will be undertaken monthly. Inspection of the construction activities against the management action will be undertaken. Minutes of any meeting held	Safety Officer will populate records monthly. Safety Officer will conduct inspections monthly. Safety Officer will keep all information on non-compliance and measures taken to redress the situation. ECO will undertake the inspections monthly. ECO will conduct the inspections monthly. ECO will keep the	As and when necessary Throughout the pre-construction an construction phase. As and when non-compliances are identified. During the construction phase of the project. Before the commencement of the construction activities.

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				owners, land occupiers and the public (interested and affected parties) open during the construction phase of the project.	and Community Liaison Officer.	with landowners will be recorded and minutes filed for audit purposes.	minutes as and when meetings are held.	Throughout the pre-construction an construction phase.
Increase in already high criminal activities due to the construction activities.	Socio-economic aspects.	Ensure that security measures are taken by the mine for protection of mine employees.	Mine's safety and security standards will be adhered to at all times during the construction phase.	Keep local SAPS informed of the construction and its progress.	Safety Officer. Protection Officer	Communication with SAPS recorded and filed.	Community Liaison Officer will communicate with the SAPS regularly.	Throughout the pre-construction an construction phase.
				Use local labour with no criminal records.	Human Resource Officer.	Recruitment records kept for audit purposes.	Human Resource Manager will keep records after recruitment.	When recruiting employees.
				Limit access to the construction area to employees and visitors with access permits.	Safety Officer.	Register all employees reporting for duty and visitors reporting to the Coal Product Stockpile Expansion area.	Human Resource Manager will ensure that records of employees reporting for duty and visitors are kept and updated monthly.	During the pre-construction an construction phase.
				Safety and security measures will be undertaken to comply with the current mine safety standards. These will include fencing, installation of CCTV cameras, 24-hour security guards, random security checks and access control.	Safety Officer.	Measures taken will be recorded and filed.	Safety Officer will keep records.	During the construction phase.
OPERATIONAL PHASE								
Operation (stockpiling of coal product) of the Coal Product Stockpile Expanded Facility and its associated surface infrastructure [existing/new topsoil/subsoil stockpiling areas, storm water diversion structures and access/haul roads.								
Formation of a topographical highpoint.	Topography.	Ensure that the placement of the coal product on the Coal Product Stockpile Expansion does not have detrimental impacts on the topography of the study area.	The expansion of the Coal Product Expansion Facility will be conducted to comply with the safety standards set in the Mine Health and Safety Act, 1996 (Act 26 of 1996), the mine's health	The height and tonnage of coal product at the Coal Product Expansion area will be in compliance to the relevant safety requirements. Coal Product Expansion Facility are operated, in accordance with the relevant operational manual.	Plant manager, Environmental coordinator and safety officer.	The placement of coal will be inspected for compliance with relevant operational manual and code of practice.	Mine Environmental Co-ordinator /Surveyor on a monthly basis.	Throughout the life of the project.

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			and safety policies, mineral residue deposit operational manual					
Contamination of soils over lowlands adjacent to the Coal Product Expansion Facility .	Soils.	To ensure that the operation of the Coal Product Expansion Facility and its associated infrastructure do not have detrimental impacts on the soils within the lowlands situated east of the Coal Product Expansion Facility .	Ensure that the operation of the Coal Product Expansion Facility and associated infrastructure is conducted in accordance with the Thungela Operations (Pty) Limited's rehabilitation guidelines, operational manual.	Where possible, the mineral residue deposit will be rehabilitated, in such a manner as to reduce the impact on the environment. Rehabilitation will ensure that mineral residue deposits are top soiled and seeded. The soil stripped from the footprint of the expanded coal product stockpile will be used to rehabilitate the area during the decommissioning phase. Soil samples will be analysed to determine fertiliser requirements of the stockpiled soils prior to utilisation. The topsoil from the Coal Product Stockpile Expansion area will be stripped to depths as recommended by the soil specialist. These will be stockpiled in the existing or new topsoil stockpile. The stockpiling of the stripped topsoil will not result in the existing topsoil stockpile exceeding a height of five meters, which will assist in minimizing compaction of the soils. The stockpiled topsoil will be seeded with a recommended seed mix to ensure that a good vegetation cover is achieved, which will prevent erosion of the stockpile. Mixing of the topsoil and subsoil during stockpiling will not be allowed.	Mine environmental co-ordinator and appointed contractor. Mine environmental co-ordinator and appointed contractor Appointed contractor and the mine site manager. Appointed contractor and Mine environmental co-ordinator. Appointed contractor and Mine environmental co-ordinator. Appointed contractor and Mine environmental co-ordinator.	The rehabilitation of the facility will be inspected and audited as per Thungela Operations (Pty) Limited's policies/guidelines. The rehabilitation of the facility will be inspected and audited as per Thungela Operations (Pty) Limited's policies/guidelines. Visually monitor the quality of the stockpiled topsoil on establishment. The establishment of the topsoil stockpile will be inspected and the stockpile will be surveyed. The seeding will be monitored by inspection. Undertake regular inspections to confirm correct placement of the removed soils.	Mine Environmental Co-ordinator and SACE Mine Environmental Co-ordinator and SACE Mine Environmental Co-ordinator monthly and Site contractor manager daily. Mine Environmental Co-ordinator weekly and Site contractor daily. Mine environmental co-ordinator will inspect the seeding monthly. Mine environmental co-ordinator will inspect the site monthly.	During the rehabilitation of the Coal Product Expansion Facility . During the rehabilitation of the Coal Product Expansion Facility During the stripping and stockpiling of topsoil. During stockpiling of topsoil During stockpiling of topsoil. During the stripping and stockpiling of topsoil.
Inability to achieve the mine's post closure	Land Use and Capability	To ensure that the establishment of the Coal	The Coal Product Stockpile Expansion site	All areas necessary for the optimal operation of the mineral residue deposits will be kept	Plant manager.	Areas used for the facility against approved	The site manager will undertake	During the operation of the

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land use and capability		Product Expansion Facility allows for the area to be used for the preferred post closure land use.	will be established such that it allows for the preferred post closure land use.	as small as practically possible. Soils will be stripped and stockpiled as describe in the management actions under soils. This will result in the restoration of as much seed bank as possible. Salinization of soil around the Coal Product Expansion Facility must be tested and should it be found that soils have been salinized, these soils must be remediated by incorporation of lime and fertiliser into the soils (though ploughing), and vegetation established on the soil. All areas affected by the coal spillages must be rehabilitated. Contaminating material must be removed and the affected areas maintained to be free of contaminating material. On areas that are not in use by the mine, the soils must be tested, limed, fertilised and re-seeded. These areas must be maintained to be in good condition.	 Appointed contractor and site manager. Mine environmental coordinator. Mine environmental coordinator.	development area will be checked via inspections. The stripping, stockpiling and use of the topsoil for rehabilitation will be monitored through inspections. The soils around the Coal Product Expansion Facility will be tested for salinity. The areas around the Coal Product Expansion Facility will be inspected for signs of spillages.	inspections. Mine environmental co-ordinator will conduct inspections monthly. Mine environmental co-ordinator will monitor the sites monthly. Mine environmental co-ordinator will inspect the site monthly.	Coal Product Expansion Facility During establishment and rehabilitation of the Coal Product Expansion Facility. During the operation of the Coal Product Expansion Facility. During the operation of the Coal Product Expansion Facility.
Loss of natural vegetation	Flora.	To ensure that the operation of the Coal Product Expansion Facility and associated infrastructure do not result in the loss of natural vegetation.	The management of the impact will comply with the mine's biodiversity management plan and closure plan for the Coal Product Expansion Facility.	Limit all activities associated with the operation of the Coal Product Expansion within the expansion area. No activities will be allowed beyond the planned expansion area. Development of erosion gullies must be monitored, repaired and repair work maintained.	Appointed contractor and site manager. Mine environmental coordinator. Contractor and mine	The placement of coal residue material will be monitored via inspections. The area will be inspected to identify development of erosions and incisions. Ensure that placement of Coal	The mine environmental coordinator will inspect the site monthly and site manager weekly. Environmental coordinator monthly and site manager weekly. Environmental	During the operational phase of the Coal Product Expansion Facility. During the operational phase of the Coal Product Expansion Facility. During the

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				Prevent the pollution of the undisturbed areas by coal spillages, air pollutants or dirty water.	environmental coordinator.	Product Stockpile Expansion and infrastructure is as the approved layout plan.	coordinator will inspect the site monthly.	operational phase.
				Prevent all open fires, provide fire-safe zones, facilities and suitable fire control measures.	Plant manager, safety officer and mine environmental coordinator.	Inspections will be conducted to ensure that all fire prevention measures are in place.	Plant manager will inspect the site weekly in dry seasons.	During for the operational phase.
				Once the facility has fully utilized, the affected areas will be rehabilitated, topsoiled and then seeded with a seed mixture of pasture and indigenous grasses.	Rehabilitation officer, contractor and environmental coordinator.	The area being rehabilitated will be inspected. Where necessary a botanist will be consulted for confirmation of alien and invader plant species.	The environmental coordinator will inspect the site monthly.	Whenever possible during operational phase.
Loss of natural vegetation	Flora	Ensure that rehabilitated areas of the Coal Product Expansion Facility have minimum impact on natural vegetation	The management of the rehabilitated Coal Product Expansion Facility will comply with the mine's biodiversity management plan and closure plan for the Coal Product Expansion Facility.	All rehabilitated areas will be seeded utilising the Thungela's seed mix. The use of *P. clandestinum* (Kikuyu) can be necessary on mineral residue deposits and pollution control water structures to ensure stabilisation of the soil, as kikuyu tends to spread more rapidly, and provide better cover than, most suitable indigenous species. *P. clandestinumis* must be controlled by the retraction of fertilisers, thus preventing it spreading into the natural veld. If it is found that the *P. Clandestinum* is migrating into the natural veld, mechanical control will be used in conjunction with the retraction of fertilisers.	Rehabilitation officer, contractor and environmental coordinator.	Inspections will be undertaken during life of mine to determine the extent of the *P. Clandestinum* aerial coverage on the mineral residue deposits and pollution control water structures.	Rehabilitation officer will inspect the facility on a yearly basis (at the end of the wet season).	During for the operational phase.
				Vegetation cover will be maintained by annual application of fertiliser for at least 3 years after rehabilitation, combined with biennial cutting or burning for the first three years. After this period, fertilizer will be applied as and when required.	Rehabilitation officer, contractor and environmental coordinator.	Monitoring of the basal cover and fertilizer levels against Thungela Operations (Pty) Limited standards	Rehabilitation officer will inspect the facility once every year.	During for the operational phase.
				A site specific declared weed and invader species eradication programme is undertaken on the Thungela Operations (Pty)	Rehabilitation officer, contractor and environmental coordinator.	Monitor the vegetation for the identification of declared weed and invader plant species.	Rehabilitation officer will inspect the facility once every year.	During for the operational phase.

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				Limited surface area. Declared weed and invader species to be eradicated in accordance with amended Regulations of the Conservation of Agricultural Resources Act, 1983.				
Deterioration of water quality in the Spook Spruit and Bankfontein Dam.	Surface water.	Ensure that the operation of the Coal Product Stockpile Expansion project does not result in the detrimental impacts on the surface water environment.	The quality of clean storm water from the Coal Product Expansion Facility will comply with the target water quality objectives as stipulated in the Goedehoop North Colliery water use licence. Goedehoop North Colliery will operate the Coal Product Expansion Facility in compliance with the regulations under the GN704.	All water that falls within the catchment area of the Coal Product Expansion Facility must be retained within that area All water management structures constructed to isolate the facility from the clean water environment and contain dirty water collected from the Coal Product Expansion Facility will be maintained in good order. Shallow seepage and contaminated storm water runoff from the facility will be collected and routed to the new pollution control dam or existing return water dam The return water dam or new pollution control dam will be operated such that it does not spill into the natural environment. All dirty water from the return water dam or new pollution control dam will be re-used at the coal processing facility. All clean water must be diverted around the Coal Product Expansion Facility to the nearby streams i.e. Spook Spruit and Bankfontein dam. The above-mentioned water management	Mine environmental coordinator and plant manager. Mine environmental coordinator, plant manager, mine civil engineer, professional engineer and appointed contractor. Mine environmental coordinator and plant manager. Mine environmental coordinator and plant manager. Mine	The operation of the water management structures will be monitored via inspections. Inspect and sign off the construction of the slimes compartment walls. Inspections will be conducted to ensure that the construction is conducted in accordance with the designs specifications approved by relevant authorities. Inspection of the Coal Product Expansion Facility will include the pollution control dam. Inspection of the Coal Product Expansion Facility will include the storm water management facilities. Surface water monitoring must	Mine environmental coordinator and plant manager will monitor the structures monthly and weekly, respectively. Mine environmental coordinator and engineer will undertake the inspections weekly during the construction of the structures. Mine environmental coordinator will inspect the dam monthly and the plant manager weekly. Mine environmental coordinator will inspect the site monthly and the plant manager weekly.	Throughout the life of the Coal Product Stockpile Expansion. Throughout the construction phase. During the operational phase of the project. During the operational phase of the project. During the

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				facility must be maintained to be in compliance with the requirements of the GN704. If any activity is not complying with the requirements of the regulations under the GN704, exemptions will be sought from the DWS. This will ensure that the surrounding surface water environment is not affected.	coordinator and plant manager.	be conducted at the facility to determine their effects on the surface water environment.	Surface water monitoring will be undertaken once a month by the mine environmental coordinator.	operational phase of the project.
Deterioration of water quality in the Spook Spruit and Bankfontein Dam.	Surface water.	Ensure that the operation of the Coal Product Expansion's storm water management does not result in the detrimental impacts on the surface water environment.	The quality of clean storm water from the Coal Product Expansion Facility will comply with the target water quality objectives as stipulated in the Goedehoop North Colliery water use licence. The storm water management system will be conducted to comply with regulations under the GN704. The Coal Product Expansion Facility and its storm water management system will comply with the mine's water balance.	The water and salt balances will be revised as stipulated in the water use licence for the mine.	Mine environmental coordinator.	Compliance with this measure will be audited through the water use licence audits.	Audits will be done by an independent auditor and mine personnel on a yearly basis.	During the operational phase of the project.
				The mine will ensure to ensure that operational capacities of the new pollution control dam or the existing return water dam are not exceeded. Water levels within the dam will be maintained by pumping.	Mine environmental coordinator and plant manager.	Regular monitoring of the levels of the new pollution control dam will be undertaken.	The plant manager will monitor the levels on a daily basis.	During the operational phase of the project.
				Where water is pumped, a dual pump system with sufficient capacity to deal with the water make and function of the facility, will be in place to ensure that water can be removed from the dam in the event of a breakdown within one of the pumps. This is necessary to ensure that dam operational capacities are maintained by water reticulation through the dirty water system (recycling).	Plant manager.	The installation of correct pumping system will be confirmed and their conditions monitored.	The plant manager will conform the installation of correct pumping system and will check on the condition of the pumping system monthly.	During the operational phase of the project.
				Flow meters will be installed on all major water pipelines and dirty water facilities.	Plant manager.	The installation of correct pumping system will be confirmed and their conditions monitored.	Same as above.	During the operational phase of the project.
				Clean and dirty water separation systems will be constructed and these will be constructed in such a manner as to contain the runoff from a 1:50 year storm event. The system has ensured that these facilities are isolated in terms of flow of water, hence all surface	Mine environmental coordinator, appointed engineers and contractors.	Compliance with this measure will be audited through the water use licence audits.	Audits will be done by an independent auditor and mine personnel on a	During the operational phase of the project.

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				water runoff from these facilities will be diverted via dirty water runoff trenches and pipelines to the pollution control dam, for eventual re-use within the beneficiation facilities. Clean water is diverted around the dirty water areas to the nearby streams i.e. Spook Spruit. The clean and dirty water separation system around all relevant surface infrastructure areas will be maintained. All pollution control and storm water diversion structures will be operated to ensure that flood event do not damage them. All damages and erosion detected will be rectified. All clean and dirty water separation systems will be checked for blockages, leakages and breaches and repair or maintenance will be conducted timeously. All vegetation in the trenches will be cut or removed to ensure that the trench has the required operational capacity.	Mine environmental coordinator and plant manager.	All pollution control and storm water diversion structures will be inspected. Water levels will be checked to ensure that the operational capacities are maintained. Repair of damaged areas will be inspected.	yearly basis. The mine environmental coordinator will inspect the facilities after a flood event and where damage was caused after the repair of such a damage.	During the operational phase of the project.
Deterioration of water quality in the Spook Spruit and Bankfontein Dam.	Surface water.	Ensure that the rehabilitation of the Coal Product Stockpile Expansion project does not result in the detrimental impacts on the surface water environment.	The quality of clean storm water from the rehabilitated Coal Product Expansion Facility during the operational phase will comply with the target water quality objectives as stipulated in the Goedehoop North Colliery water use licence. Goedehoop North Colliery will operate the Coal Product Expansion Facility in compliance with the regulations under the GN704.	Maintenance of the facility will be conducted to ensure that the impacts are minimised. Additional pollution control measures will be undertaken at the Coal Product Expansion Facility should the current measures not yield satisfactory results.	Rehabilitation officer and appointed contractor or manager responsible for the Coal Product Expansion Facility.	The areas' surface water environment will be monitored and any deviations investigated and addressed.	Mine environmental coordinator.	During the operational phase of the Coal Product Expansion Facility.

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Deterioration of groundwater quality down gradient of the Coal Product Expansion Facility .	Groundwater	Ensure that the effects of the groundwater deterioration within the Coal Product Stockpile Expansion do not affect the surrounding groundwater system.	Comply with the groundwater water quality objectives for the affected catchment and groundwater quality indicated in the integrated water use licence	The floor of the mineral residue deposit expansion area will be constructed such the it is connected to the return water dam or the new pollution control dam. This will ensure that seepage water from the site that would have resulted in the contamination of the groundwater aquifer is collected.	Appointed contractor, mine engineer, appointed civil engineer and mine environmental coordinator.	Groundwater quality will be monitored.	Mine Environmental Co-ordinator will conduct the monitoring quarterly.	During the operational phase of the project.
				All groundwater boreholes within the zone of influence of the groundwater deterioration will be monitored for groundwater quality on a quarterly basis.	Mine Environmental Co-ordinator.	Groundwater quality will be monitored.	ine Environmental Co-ordinator will conduct the monitoring quarterly.	During the operational phase of the project.
				The monitoring results must be interpreted by a qualified hydro geologist and the monitoring network should be audited to ensure compliance with regulations. The monitoring data must be used to update the numerical groundwater model.	Mine Environmental Co-ordinator and a hydro geologist.	Suitably qualified specialists will be appointed.	Mine Environmental Co-ordinator will appoint the specialist as and when necessary but not exceeding frequency of five years.	Annually during the operational phase of the project.
				If it can be proven that the mine is indeed affecting the quantity of groundwater available to certain users, the affected parties will be compensated.	Mine Environmental Co-ordinator.	Volumes of water provided to the affected parties will be monitored against the agreed volumes.	Mine Environmental Co-ordinator will conduct the metering of the water provided as per agreement with the affected user.	As and when it can be proven that the groundwater users is affected by the mine
Deterioration of water quality within the affected wetlands and destruction of the wetlands	Sensitive Landscapes	Ensure that the operation of the Coal Product Expansion Facility and its associated surface infrastructure do not result in the destruction of the wetlands and deterioration of its water quality.	The transportation and stockpiling of coal product at the Coal Product Expansion Facility expansion area and the operation of associated infrastructure will be conducted in	Ensure that effective clean and dirty water separation are undertaken. Measures such as storm water diversion trenches or berms and silt traps must be used for the diversion and collection of dirty water. The silt trap will be operated empty. All dirty water runoff and seepage from the stockpiling facility will be diverted/drained into the existing return water	Plant manager and environmental co-ordinator	Inspections and audits conducted at the reclamation site	Environmental co-ordinator and mine engineer.	Throughout the operational phase of the project

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			compliance with the requirements of the GN704 regulations and the conditions stipulated in the water use licence	dam or the new pollution control dam for re-use. Loading of coal trucks must be supervised to prevent overloading. The road must be designed and operate to minimise the likelihood of spillages. All vehicles should only use designated roads with no indiscriminate driving through wetland or riparian areas. Should large spillages occur, clean-up of the spillages should be undertaken as soon as possible following the event Dust suppression should be undertaken at the road to prevent generation of excessive dust along the roads. The Present Ecological State of the wetland features must be maintained and not decrease due to any mining activities within or surrounding these wetland features.	Plant manager and mine engineer Remediation specialists and environmental co-ordinator Plant/Production manager Wetland specialist appointed by the mine	Inspection and auditing of the road construction and its operation Regular inspections of the entire route should be undertaken regularly Regular inspections of the entire route should be undertaken regularly Auditing of the water use licence and the approved EMPr.	Environmental co-ordinator and mine engineer during the excavation of the roads. Monthly by the environmental co-ordinator. Monthly by the environmental co-ordinator. Annually by independent parties	Throughout the operational phase of the project Throughout the operational phase of the project Throughout the operational phase of the project Throughout the operational phase of the project
Generated dust within the Coal Product Expansion Facility affect the health of the mine employees and surrounding community and natural environment.	Air quality.	Ensure that the air quality within the Coal Product Expansion Facility does not affect the health of the mine employees, communities and natural environment.	Air quality within the Coal Product Expansion Facility will comply with the national dust control regulations.	Sufficient dust suppression will be undertaken to reduce the impacts of the generated dust on the employees. Employees will be provided with dust masks and will be instructed to use the dust masks.	VOHE Officer VOHE Officer	Underground workings dust fall will be monitored. Use of dust masks by employees will be monitored.	VOHE Officer will ensure that monitoring is conducted as per the mine health and safety policy. VOHE Officer will monitor the use of dusts masks monthly.	Throughout the operational phase of the project. During the operational phase of the project.
Noise generated from the operation of the mine machinery within the facility may have health effects on the mine employees and be a nuisance to	Noise.	Ensure that the noise levels within the Coal Product Expansion Facility does affect mine employees and surrounding communities.	Noise levels within the Coal Product Expansion Facility will comply with the required noise limits.	Sufficient noise buffering will be undertaken to reduce the impacts of the generated noise on the employees.	VOHE.	Noise levels will be monitored at the proposed underground workings.	VOHE will conduct noise monitoring as per the health and safety policy of the mine.	Throughout the operational phase of the proposed operation.

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surrounding communities.				Employees will be provided with ear buts for hearing protection	VOHE.	Use of ear protection by employees will be monitored.	Safety Officer/VOHE will monitor the use of ear protection by employees monthly.	Throughout the operational phase of the proposed operation.
Visual impacts on the surrounding properties, communities and road users from the Coal Product Stockpile Expansion area.	Visual aspects.	Ensure that all operations during the operational phase of the Coal Product Stockpile Expansion do not result in detrimental visual impacts on surrounding properties, communities and road users.	Measures will be undertaken by the mine to ensure that the visual aspects from the site are complying with the relevant visual standards and objectives, including internal standards and objectives.	Use the perimeter berms, topsoil and existing Coal Product Expansion Facility as a visual screen from the surrounding communities.	Mine engineer and the Mine Environmental coordinator.	The constructed perimeter berms will be inspected for compliance with the design specifications.	Mine Engineer on a monthly basis.	Throughout the operational phase.
				Where possible areas disturbed by construction activity, must be suitably topsoiled and vegetated as soon as is possible. The progressive rehabilitation measures will allow for the maximum growth period before the completion of the project.	Appointed contractor and Mine Environmental coordinator.	Areas of disturbance will be inspected to determine areas that need rehabilitation.	Mine Environmental coordinator on a monthly basis.	During the operational phase of the project.
				Dust suppression will be undertaken at all areas that will be affected by construction activities and where dust will be generated.	Appointed contractor and Mine Environmental coordinator.	See monitoring under air quality.	See under air quality.	During the operational phase of the project.
				Existing large trees that fall outside the earthworks area must be retained. Note that the alien eradication program, if any, will supersede this commitment.	Mine Environmental coordinator.	Inspection of the site will be conducted.	Mine Environmental coordinator on a monthly basis.	Throughout the operational phase.
				Avoid upwards lighting of structures but rather direct the light downwards to focus on the object to be illuminated.	Appointed contractor.	Lighting installation and effects of the lighting to community will be monitored.	Safety officer/VOHE on a monthly basis.	During the operational phase of the project.
				Light spill, particularly upwards, must be minimised by implementing the following: Not allowing external light fittings to shine upwards, all security and road lighting shall have “blinkers” or be specifically designed to ensure light is directed downwards to reduce light spill beyond the property boundary.	Appointed contractor.	Night time inspection of the site will be undertaken.	The site manager will monitor the lighting on site daily and report to the Mine Environmental coordinator as and when necessity arises.	Throughout the operational phase of the project.
The proposed project	Socio economic	Ensure that the positive	The positive impacts	Ensure that all relevant (mining industry	Community Liaison	Compliance monitoring of the	Community	Throughout the

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will have positive impacts on the socio-economic status of the area (Steve Tshwete Local Municipality).	aspects.	impacts from the proposed mining operation are sustained.	from the proposed project will improve the livelihood of the local communities.	related) statutory requirements regulating employment and procurement of services and goods are adhered to. This will be conducted in compliance with the social and labour plan of the mine. Ensure that the mine polices dealing with employment and procurement of services and goods are adhered to. This will be conducted in compliance with the social and labour plan for the mine.	Officer. Community Liaison Officer.	approved social and labour plan for the mine conducted. Compliance monitoring of the approved social and labour plan conducted annually.	Liaison Officer will monitor the approved social and labour plan for the mine annually. Community Liaison Officer will monitor the approved social and labour plan for the mine annually.	operational phase during recruitment and procuring of goods and services. Throughout the operational phase during recruitment and procuring of goods and services.
DECOMMISSIONING AND CLOSURE PHASE								
Removal of infrastructure and rehabilitation of disturbed areas								
Compaction and contamination of soils within the rehabilitation site.	Soils.	Ensure that the soils in the vicinity of the rehabilitation site is not detrimentally impacted.	Rehabilitated areas will be maintained to comply with the mine's closure objectives.	All vehicles and machinery used at the rehabilitation site will be kept in good working order. No repairs of mine vehicles or machinery will be conducted at the rehabilitation site unless it is emergency repairs, which will be conducted on protected ground. Movement of mine vehicles and machinery will be limited to demarcated routes, which will be rehabilitated when no longer in use.	Appointed contractor. Appointed contractor. Appointed contractor.	Vehicles and machinery will be inspected regularly and any oil incidences will be reported. All incidents of emergency repairs will be inspected and occurrence recorded. Rehabilitation site will be inspected to monitor areas with compaction or hydrocarbon contamination.	Safety Officer will conduct the inspections monthly. Safety Officer. Rehabilitation Officer or mine environmental co-ordinator will undertake the inspections as and when incidents are reported. Mine Environmental Co-ordinator will conduct the inspections bi-weekly.	Throughout the decommissioning and closure phases. Throughout the decommissioning and closure phases. Throughout the decommissioning and closure phases.
Achievement of post closure soil productivity, land capability, land	Soils, Land Capability, Land Use and Topography.	Ensure that the rehabilitation of the Coal Product Expansion Facility	Rehabilitated areas will be maintained to comply with the mine's closure	All infrastructure will be demolished in accordance to the rehabilitation plan.	Appointed contractor.	Demolishing of the infrastructure will be inspected.	Mine engineer will conduct the inspections bi-	Throughout the decommissioning and closure

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use and topographical patterns.		achieve post closure soil productivity, land capability, and topographical patterns in compliance with the mine closure objectives.	objectives.				weekly.	phases.
				Before topsoil can be placed, the coal stockpiling facility must have been ripped and prepared as per the rehabilitation procedures and/or guidelines.	Appointed contractor.	The backfilled surface will be surveyed to ensure correct elevation and slope.	Mine surveyor will conduct the survey after shapingg.	During the decommissioning phase of the project.
				Soil amelioration will be done according to soil analyses as recommended by a soil specialist/suitable qualified person, in order to correct the pH and nutritional status before re-vegetation.	Appointed contractor.	The soil fertility status will be determined by soil chemical analysis.	Suitably qualified person will conduct the tests after levelling (before seeding/ re-vegetation).	After levelling and before seeding/ re-vegetation of the rehabilitated areas.
				The rehabilitated footprint of the Coal Product Expansion Facility will then be re-vegetated with a grass seed mixture as soon as possible in order to stabilize the soil and prevent soil loss during the rainy season.	Appointed contractor.	Type and method of seeding and the resultant vegetation cover will be monitored.	Suitably Qualified Person will monitor the area monthly.	After levelling and top soiling of the rehabilitated areas.
				A short-term fertiliser program will be undertaken based on the soil chemical status after the first year in order to maintain the fertility status for a maximum of 2 to 3 years after rehabilitation until the area can be declared as self-sustaining.	Appointed contractor.	The implementation of the fertiliser program will be monitored.	Suitably qualified person will monitor the programme b-weekly.	After levelling and top soiling of the rehabilitated areas.
				The post-mining land capability of the Coal Product Expansion Facility will be grazing land use by replacing high quality topsoil as recommended by the mine's post closure objectives.	Mine Environmental Co-ordinator.	Land capability assessment will be conducted.	Suitably qualified person will assess land capability after rehabilitation.	After rehabilitation of the disturbed areas within the project area.
				The post-mining land uses should remain a grass mixture until a post-mining soil and land capability assessment was done by a soil specialist.	Mine Environmental Co-ordinator.	Land use will be assessed.	Suitably qualified person will assess land use after rehabilitation.	After decommissioning the project area.
				The program to control declared weeds and invaders will be implemented at the rehabilitated site.	Mine Environmental Co-ordinator.	Declared weed and invader plant species will be	Suitably qualified person will be monitored annually.	After rehabilitation of the disturbed areas within the project area.

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						monitored.		
Pollution of surface water environment.	Surface Water.	Ensure that the rehabilitation of the Coal Product Expansion Facility does not have detrimental impacts on the surface water environment.	The surface water leaving the rehabilitation site will comply with the water quality parameters stipulated in the water use licence.	The Coal Product Expansion Facility will be rehabilitated to be free draining. Erosion protection measures such as the use of contour berms and repair of gullies will be undertaken until such time that the rehabilitated surfaces can be shown to be sustainable. Existing roads should be used where possible and new disturbed areas should be minimised.	Appointed contractor. Appointed contractor. Rehabilitation officer.	Progress of rehabilitation will be monitored. Areas where grass has not yet been established will be monitored for excessive erosion. Rehabilitation site will be inspected for misuse.	Mine Environmental Co-ordinator will conduct monitoring of the rehabilitation annually.	Throughout the decommissioning and closure phases.
Groundwater contamination.	Groundwater.	Ensure that the deterioration of groundwater quality down gradient of the Coal Product Expansion Facility due to plume movement is minimised.	The groundwater leaving the site will comply with the water quality parameters stipulated in the water use licence and recommended by the ground water specialist.	If it is found that the ground water system and/or streams are indeed negatively affected by pollution from the Coal Product Expansion Facility, measures to intercept polluted seepage water must be investigated. Implement as many closure measures during the operational phase, while conducting appropriate monitoring programmes to demonstrate actual performance of the various management actions during the life of mine. Ensure that all possible sources of dirty water have been identified and that appropriate collection and containment systems have been implemented and that these do not result in further unnecessary water quality deterioration.	Mine Manager and Mine Environmental Co-ordinator. Mine Manager and Mine Environmental Co-ordinator. Mine Manager and Mine Environmental Co-ordinator.	Regular sampling of the streams/river/boreholes must be conducted. Groundwater sampling must be conducted during the operational phase to establish a database of groundwater quality to assess plume movement trends. Audit the monitoring network annually. Groundwater sampling must be conducted	Mine Environmental Co-ordinator will monitor the streams monthly. Mine Environmental Co-ordinator will monitor groundwater quarterly. Mine Environmental Co-ordinator will monitor groundwater quarterly.	During the decommissioning and closure of the proposed project
Sediment runoff from the Coal Product Expansion Facility rehabilitation site may be deposited into the wetland area thereby result in the loss of wetland habitat.	Sensitive landscapes.	Ensure that the wetlands situated in close proximity of the Coal Product Expansion Facility are not detrimentally affected by the runoff from the Coal Product Expansion Facility rehabilitation site.	The Spook Spruit wetlands will maintain or improve its current present ecological status and ecological importance status.	Runoff from rehabilitation site will be routed such that it enters a sediment trap prior to discharge to the environment.	Mine engineer and Mine Environmental Co-ordinator.	Wetlands adjacent to the Bank 2 Coal Product Stockpile Expansion project area will be monitored.	Mine Environmental Co-ordinator will employ a wetland specialist to conduct monitoring annually.	Throughout the decommissioning and closure phases.

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				The wetlands adjacent to the Coal Product Expansion Facility will be maintained and where possible rehabilitated to ensure that their PES and EIS are either maintained or improved.	Mine Environmental Co-ordinator.	Wetlands adjacent to Bank 2 Coal Product Stockpile Expansion Project will be monitored.	Mine Environmental Co-ordinator will employ a wetland specialist to conduct wetland monitoring annually.	
Air pollution from rehabilitation site.	Air quality.	Ensure that all rehabilitation at the Coal Product Expansion Facility do not have detrimental impacts on air quality.	Decommissioning and rehabilitation of the Coal Product Expansion Facility will be operated in such a manner that the ambient air quality does not exceed the air quality standards including the internal air quality targets.	Wet suppression using water carts will be conducted at areas with excessive dust emissions, which include unpaved roads. Chemical surfactants will be considered should water suppression not yield satisfactory results. The existing and paved roads needed during decommissioning will be maintained, which will reduce the extent of areas that can generate dust. These roads will be rehabilitated after their use. The traffic volumes and speed within the rehabilitation site will be controlled. This will be in accordance to the safety rules of the mine.	Appointed contractor. Mine manager and appointed contractor. Safety Officer.	Visual inspections of areas with possible dust emissions such as unpaved roads and transfer points will be conducted Ambient air quality and dust fall monitoring (including recommended additional monitoring points) will be conducted. Observations on the speed at which vehicle are travelling will be conducted.	Mine Environmental Co-ordinator will conduct inspections quarterly. Mine Environmental Co-ordinator will conduct ambient dust fallout monitoring monthly. Safety Officer will conduct inspections on an ad hoc basis.	Throughout the decommissioning phase. Throughout the decommissioning phase. Throughout the decommissioning phase.
Generated noise from the rehabilitation site.	Noise.	Ensure that the rehabilitation of the Coal Product Expansion Facility does not have detrimental impacts on employees and surrounding communities.	Ensure that the rehabilitation activities do not exceed the SANS 10103 Rating Level.	Mine's environmental awareness training will include a noise component, allowing employees and contractors to realise the potential noise risks that activities (especially night-time activities) pose to the surrounding environment. White-noise generators instead of tonal reverse alarms will be used on heavy vehicles operating on roads. Smaller or less noisy equipment should where possible be used when rehabilitating. Equipment will be well maintained and fitted with the correct and appropriate noise abatement measures such as acoustical	Mine Environmental Co-ordinator. Mine manager.	Ambient noise levels will be monitored. Equipment will be inspected when necessary.	VOHE will ensure that ambient noise is monitored annually. Mine engineer will conduct inspections bi-weekly.	Throughout the decommissioning phase.

Impact Activity Reference	Environmental Attribute	Impact Management Objectives	Targets (Impact Management Outcomes)	Management Actions and Interventions	Responsibility For Actions/Intervention	Monitoring Action	Responsibility and Frequency For Monitoring	Time period for Management Action
				mufflers (or silencers), noise absorption braids and engine bay covers over heavy equipment.				
Visual impacts from the Coal Product Stockpile Expansion Project rehabilitation works.	Visual aspects.	Ensure that the rehabilitation of the Coal Product Expansion Facility does not have detrimental visual impacts on the surrounding properties, communities and road users.	Rehabilitation area will not increase beyond the planned extent.	All infrastructures will be removed during this phase in accordance to the rehabilitation plan. The coal stockpiling facility will be rehabilitated to be free draining. The Coal Product Expansion Facility will be vegetated with seed mix recommended by a suitably qualified specialist.	Mine Environmental Co-ordinator.	Monitoring for the visual impacts will include regular inspections on the rehabilitation works against the rehabilitation plan.	Mine Environmental Co-ordinator will conduct inspections monthly.	Throughout the decommissioning phase.
Impacts on employment.	Socio-economic aspects.	Ensure that cessation of the operation does not have detrimental impacts on the employees and surrounding communities.	Manage the loss of employment in accordance to the approved Social and labour plan of the mine.	Transfer and redeploy employees and contractors wherever possible. Implement non-mining related skills development programmes for employees and family members through the SLP throughout the life of mine to enable retrenched employees to seek alternative employment or start income-generating businesses.	Community Liaison Officer. Community Liaison Officer.	Monitor the employee transfer process. Monitor the progress of the mine's employee skills development programme.	Human Resources Manager will monitor the transfer. Community Liaison Officer.	During the decommissioning of the project. During the decommissioning of the project.
AFTER CLOSURE PHASE								
Residual impacts of the mined-out areas on groundwater.	Surface and Groundwater.	Ensure that the decommissioned Coal Product Expansion Facility do not result in detrimental surface and groundwater impacts.	The groundwater around the decommissioned Coal Product Expansion Facility will comply with the water quality standards to be provided by the DWS on closure.	In the event that seepage water from the Coal Product Expansion Facility occurs and is not of a quality suitable for downstream users or in the event that volumes of water collected from the seepage collection system exceed the reuse capacity of the mine, Goedehoop North Colliery will initiate an investigation by a competent person or institution to determine the most appropriate actions to be undertaken, and the positions for such actions to be undertaken. The actions will ensure that the water quality conforms to the downstream users' needs. Such actions and methods to be employed will be discussed with the Department of Water and Sanitation to gain their approval prior to implementation.	Mine Environmental Co-ordinator.	Groundwater quality will be monitored around the rehabilitated Coal Product Expansion Facility.	Mine Environmental Co-ordinator.	Throughout the closure phase until it can be proven that the water quality has stabilised and will not cause significant impacts on the surrounding environment and water users.

6 FINANCIAL PROVISION

Section 24 P of NEMA requires an applicant applying for an environmental authorisation related to mining to comply with the prescribed financial provision for the rehabilitation, closure and ongoing post decommissioning management of negative environmental impacts before the Minister responsible for mineral resources issues the environmental authorisation. The above-mentioned financial provision may be in the form of a bank guarantee, trust fund or cash.

6.1 DESCRIPTION OF CLOSURE OBJECTIVES AND EXTENT TO WHICH THEY HAVE BEEN ALIGNED TO THE DESCRIBED BASELINE ENVIRONMENT

The closure objectives for the proposed project as detailed under section 4.1 of the EMPr, were determined in consideration of physical (infrastructure), biophysical (environmental) and socio-economic measures as well as alignment to the closure components provided by the Department of Mineral Resources and Energy (DMRE). See section 4.1 for the closure objectives.

6.2 CONFIRMATION THAT THE ENVIRONMENTAL OBJECTIVES IN RELATION TO CLOSURE HAVE BEEN CONSULTED WITH LANDOWNERS AND INTERESTED AND AFFECTED PARTIES

The draft BAR and EMPr was made available to the interested and affected parties during the public participation process for the proposed project. Note that the consultation of interested and affected parties included the owners of the properties directly affected by the proposed project and owners of land immediately adjacent the proposed project area.

The above confirms that the land owners and interested and affected parties will be consulted regarding the environmental objectives in relation to the closure of the proposed project.

6.3 REHABILITATION PLAN FOR THE PROPOSED PROJECT

In terms of Regulation 23 of NEMA EIA Regulations, 2014, an EMPr must address the requirements as determined in the regulations, pertaining to the financial provision for the rehabilitation, closure and post closure of the proposed operations. In view of the above, a rehabilitation plan must be provided to the DMRE in support of the financial provision determined for the proposed operations. Since no disturbance has results on site due to the proposed project no annual rehabilitation plan was compiled.

6.3.1 Rehabilitation of Infrastructure Areas

Whenever possible, infrastructure will not be demolished but left for post closure use. It is intended that ownership will be transferred to a third party. Should this not be possible, all infrastructure will be demolished and the area rehabilitated.

All concrete, steel works and structures will be removed so that the land can be returned to as near as practically possible to its original state. Concrete work that extends below ground level will be

removed to a metre below the surface. Concrete will be used as backfilling material in the adit and shaft areas. Steel will be sold as scrap metal. All rehabilitated areas will be shaped to be free draining without concentrating flow such that erosion occurs, fertilised and a mixture of indigenous and pasture grasses will be planted. Following this rehabilitation, the infrastructure areas will have a capability similar to the pre-mining environment. All rehabilitated areas will be maintained for a period of 3 years, where after the frequency will be reassessed. Vegetation cover will be maintained by annual application of fertiliser combined with biennial cutting or burning for the first three years. After this period, fertilizer will be applied as and when required. This will be determined by monitoring the basal cover and fertilizer levels against Thungela Operations (Pty) Limited standards.

Maintenance with respect to erosion will be conducted on a minimum three-monthly basis if and where required. This frequency will be reassessed after a 3-year period. The final rehabilitated surface will be stable, self-sustaining and erosion-free. All roads not required for residential or farming purposes, and overland conveyors will be removed and the ground restored as above.

6.3.2 Rehabilitation of Roads

Access and haul roads at the Coal Product Expansion project will be rehabilitated. All gravel roads will be graded to remove carbonaceous material (which will be removed to the Mineral Residue Deposit facility for disposal). The roads will be cross-ripped to 300 mm at right angles to the natural slope, fertiliser added as per soil requirements and vegetated with a seed mix of indigenous and pasture grasses. Maintenance will be conducted on the rehabilitated areas as indicated in the Policy statement.

6.3.3 Rehabilitation of Expanded Coal Product Stockpile Facility

The following will be undertaken for the rehabilitation of the Expanded Coal Product Stockpile Facility i.e.:

- Removal of the remaining coal product and contaminated soils within the coal stockpiling area. All carbonaceous material and contaminated soils to a depth on one meter over the stockpiling area will be removed.
- Loading and hauling of removed coal and contaminated soils from the site. Loading and hauling will be conducted using and excavator and a articulated dump truck.
- Levelling of the soil cover over the coal stockpiling area. The levelling will be conducted such that the area is free draining.
- Seeding of the area with the recommended seed mixture. A suitably qualified person will be employed to recommend the seed mixture to be used and a suitably qualified contractor will be employed to conduct the seeding

6.3.4 General Overall Rehabilitation Procedures

The above areas will all be rehabilitated according to the following principals.

All areas will be cleared of potentially contaminating material.

All areas removed of the coal and contaminated soils will be ripped and scarified to a depth of 150mm (save for the haul / access roads which will be ripped down to 1m) prior to any top soiling. Only after the levelled areas have been inspected and approved by the Mine Environmental Co-ordinator will topsoil be placed to an appropriate depth.

Areas will be filled to attain adequate topographical levels similar to that of pre-mining. The areas will be contoured to ensure adequate drainage and prevent pooling or ponding of water. Where this occurs, the areas will be revisited and graded and filled as necessary.

Where possible, pre-stripped material or clay cover will be placed over levelled areas before soil is replaced. If this is done, this will be recorded. No area will be allowed to have ponding thereby minimising the ingress of rainfall and reducing the potential for decant.

Soils that were removed and stockpiled need to be re-assessed prior to and during rehabilitation. This is necessary to ensure nutrients are adequate.

The rehabilitated areas will be sampled and the necessary lime and fertiliser requirements applied prior to re-vegetation. Any area profiled and capped will be vegetated within the same growing season. These areas will be vegetated with the prescribed seed mix which will reflect the original biome type. The seed mixture should as a minimum, be made up according to the specifications of the specialist study. Rehabilitation should be done as soon as possible to reduce risk of soil erosion and to increase habitat availability for fauna as soon as possible.

Once areas have been rehabilitated and seeded, access to these areas should be restricted. Rehabilitated areas will be monitored for vegetation cover and alien invasive encroachment on a 6-monthly basis. Areas of failed growth will be fertilised (if necessary) and re-seeded. All exotic and invasive vegetation should be removed.

Erosion and pooling of water / impaired surface water flow will be monitored on a monthly basis during the rainy season and/or after each heavy rainfall event, any areas of concern will be addressed immediately. Where erosion gullies are noted, hale bales, gabion baskets or stick energy dissipaters are to be installed, and storm water control structures will be reviewed.

The status of biodiversity and land management will be monitored on an annual basis and specialist recommendations applied.

Groundwater and surface water monitoring will continue during the decommissioning, closure and post-closure phases. Maintenance and monitoring will continue for a period of at least 5 years following closure.

6.4 Compatibility of the Rehabilitation Plan with the Closure Objectives

The rehabilitation plan was drafted to be compatible with the closure objectives.

6.5 Determination of the Quantum of the Financial Provision Required to Manage and Rehabilitate the Environment

The financial pecuniary provision for Coal Product Stockpile Expansion area will be determined based on the requirements of Chapter 2.4.1 of the *Guideline document for the evaluation of the quantum of closure-related financial provision provided by a Mine, revision 1.6, September 2004, DMRE.*

The determination of the quantum of the financial provision will be finalised once the detailed designs for the coal product stockpile expansion is completed.

6.6 METHOD OF PROVIDING FOR THE FINANCIAL PROVISION

Since Bank Colliery (Goedehoop North), within which Coal Product Stockpile Expansion project occurs, is operated under Thungela Operations (Pty) Limited, the proposed project will be covered under the current rehabilitation fund, held by Thungela Operations (Pty) Limited for the mine. Regular annual contributions are and will continue to be made to this fund to ensure that sufficient funds are available for rehabilitation of Bank Colliery during the decommissioning phase. An audited statement of the standing of the fund is submitted annually to the Department of Mineral Resources.

The quantum of the financial provision for Coal Product Stockpile Expansion Project will be included in the next contribution made to the above-mentioned group rehabilitation fund.

7 MECHANISM FOR MONITORING COMPLIANCE WITH AND PERFOMAMCE ASSESSMENT AGAINST THE ENVIRONMENTAL MANAGEMENT PROGRAMME AND REPORTING THEREOF

7.1 FUNCTIONAL REQUIREMENTS FOR ENVIRONMENTAL MONITORING

During the impact assessment, potential impacts on the environment were identified. Mitigation measures were also specified for prevention and management of the impact so as to minimise their effect on the environment. This section will describe how the mine intends to ensure that the mitigation measures are being undertaken and that their effectiveness is proven.

A monitoring programme has been developed for the identified impacts and their mitigation measures. This monitoring programme will be undertaken and results thereof used to determine the effectiveness of the mitigation measures. The ECO will have an overall responsibility for ensuring that all monitoring is conducted according to the approved EMPr. Below is the explanation of how each environmental aspect to be affected by the mine will be monitored, which include all aspects of the environment affected by the proposed Expansion Project.

7.1.1 Soil

The soil profile will be disturbed during the construction and operational phases of the proposed project. As a mitigation measure, the stripping, stockpiling and replacement of the soil layers must be conducted such that all topsoil removed are replaced during the rehabilitation of the disturbed areas. During the construction phase, the stockpiled soils will be monitored to determine the quality of the soils. The results of the analysis will be useful in determining the amount and type of fertilizers required for the soils during the decommissioning phase. The soils will also be monitored once used during the rehabilitation of the disturbed areas. Competent and accredited laboratories will be used for the analysis of the soils. Records of soil placement and package thickness will be kept during mining the decommissioning phase.

7.1.2 Topography

The establishment of the coal product stockpile expansion will result in creation of a topographical highpoint, which will alter the topographical patterns of the local surroundings.

In view of the above, it will be necessary that all voids and topographic highs created be surveyed regularly by a mine surveyor. The surveyed data must be compared and aligned to the approved design parameters of the structures resulting in topographical impacts. The regular surveying of the topography will be in essence the monitoring of the topography.

7.1.3 Natural Vegetation, Land Use and Capability

The ability of land (soils) to enable establishment and maintenance of good vegetation cover over an area can be used to describe the land capability of an area. During the placement of coal product over the coal product stockpile expansion area, the land use and capability over the areas where the project area will be impacted upon. As a mitigation measure, the disturbed areas will be rehabilitated and made comparable to the post closure land use. For the purpose of monitoring of the effectiveness of the mitigation measure on land use and capability, the establishment and ability to maintain a good vegetation cover together with monitoring described under soils will be conducted. Distribution of plant species suitable for the after-land use will be monitored during the closure phase of the project, which will be suitable for determining the effectiveness of the mitigation measures.

7.1.4 Surface and Ground Water Monitoring

The existing water quality monitoring program will be continued, until it can be shown that water quality (surface and groundwater) is both stable and within acceptable guidelines and limits, as determined by the relevant State Departments. Frequency of monitoring will remain monthly for the surface water monitoring points and quarterly for groundwater monitoring points for until the first three years after closure. Thereafter, the frequency for surface water monitoring points will decrease to quarterly and the groundwater monitoring points to be twice a year. This will again be reviewed after a further 2 years.

7.1.5 Flora and Bio-monitoring

SASS 5 monitoring surveys will continue through to the decommissioning phase. The vegetation surveys will be expanded to include all rehabilitated areas to ensure that the vegetation composition and cover is adequate.

Note that the frequency of the bio-monitoring surveys will be decreased during the decommissioning phase to annually. The bio-monitoring and vegetation surveys will continue for a minimum of 3 years after closure.

7.1.6 Noise Monitoring

Ambient Noise Monitoring can be divided into two distinct categories, namely:

- Passive monitoring – the registering of any complaints (reasonable and valid) regarding noise; and
- Active monitoring – the measurement of noise levels at identified locations.

Active environmental noise monitoring is recommended due to the medium (after the implementation of appropriate mitigation measures) significance for a noise impact to develop. In addition, should a valid complaint be registered, the mine must investigate this complaint as per the following sections. It is recommended that the noise investigation be done by an independent acoustic consultant.

Annual noise measurements will be conducted annually at the receptors identified in the noise impact assessment report. Noise measurements should continue during the construction and operational phase (annual) for the first two years of operation when the noise monitoring plan can be reviewed (measurements increased, continued, reduced or stopped).

Noise measurements must be conducted as required by the National Noise Control Regulations (GN R154 of 1992) and SANS 10103:2008.

7.1.7 Air Quality

During mining the movement of machines and blowing winds will generate dust. Impacts resulting from the generated dust will be low. Despite this, the fact that cumulative impacts may result from other sources, Bank Colliery has developed a dust-monitoring programme. Services of an independent service provider are used to monitor the overall dust generated at Bank Colliery. Where necessary, the current monitoring network should be updated to consider the receptors of the proposed expansion project.

7.1.8 Sensitive Landscapes

The monitoring of wetlands will involve the assessment of the wetland Present Ecological State and the Ecological Services on an annual basis. The soil types in the unaffected areas will not change thus a soil investigation will not be necessary. Soil investigation will only be limited to the areas where wetlands are affected. Below is the description on how the Present Ecological State and the Ecological Services will be determined.

7.1.9 7.1.9 Interested and Affected Parties

A list of all identified interested and affected parties is given in the BAR/EMPr. Any additional or new parties that would like to be included in this list will be included in the list.

Bank Colliery has regular meetings with the interested and affected parties and will continue having these meetings. These meetings are held with interested and affected parties on a bi-annual basis. Issues raised in these meetings are recorded and addressed as far as possible.

The mine also uses an open-door approach with the surrounding inhabitants and landowners. This allows the mine to pro-actively react to any perceived complaint from its neighbours thus ensuring that the situation is resolved timeously.

7.2 MONITORING COMPLIANCE WITH AND PERFORMANCE ASSESSMENT AGAINST THE ENVIRONMENTAL MANAGEMENT PROGRAMME AND REPORTING THEREOF

As part of the general terms and conditions for an environmental authorisation and in order to ensure compliance with the EMPr and regulation 34 under the EIA Regulations, 2014 and in order to assess the continued appropriateness and adequacy of the EMPr, Thungela Operations (Pty) Limited (Bank Colliery) will, for the period during which the environmental authorisation and EMPr remain valid, ensure that the compliance with the conditions of the environmental authorisation and the EMPr, is audited and that an environmental audit report is submit to the Department of Mineral Resources as

determined in the environmental authorisation for the proposed Coal Product Stockpile Expansion project.

7.3 ENVIRONMENTAL AWARENESS PLAN

In order to describe the core elements of the mine's Environmental Management System (EMS), which include environmental awareness, Thungela Operations (Pty) Limited has developed an environmental management manual for Bank Colliery. A copy of the manual is attached as Appendix E of this report. This manual indicates the colliery's commitment to reduce, control, bring within the law and manage the impact that its activities have on the environment and to continually improve its environmental performance.

According to the above-mentioned manual, environmental competence, training and awareness at mine is dealt with through the Training Department. The mine's training centre is used to provide induction to employees on an annual cycle, courses and environmental awareness training. The environmental training of employees and contractors, which include environmental awareness is undertaken as per the mine's Environmental Training Procedure.

7.4 UNDERTAKING TO COMPLY

I, ..., the undersigned and duly authorised thereto by **Thungela Operations (Pty) Ltd** have studied and understand the contents of this document in its entirety and hereby duly undertake to adhere to the conditions as set out therein including the amendment(s) agreed to by the Regional Manager.

Signed at .....……..... this.....day of…….....20.....

..... **.....**

Signature of applicant **Designation**

APPROVAL

Approved in terms of Section 39(4) of the Mineral and Petroleum Resources Development Act, 2002 (Act 29 of 2002)

Signed at…… this.....day of…….....20.....

.....……..

REGIONAL MANAGER

REGION……

THUNGELA OPERATIONS (PTY) LTD
BANK COLLIERY,
GOEDEHOOP NORTH,
PRODUCT STOCKPILE EXPANSION

Proposed 52 000 m^3 product stockpile area

Proposed 124 000 m^3 product stockpile area

N
W E
S

Proposed stockpile expansion areas in relation to the existing product stockpile area

DRAWN BY GEOVICON ENVIRONMENTAL (PTY) LTD
TELEPHONE NUMBER: 013 243 0542
FAX NUMBER: 086 632 4936
E-MAIL: geovicon@iafrica.com

SPECIALIST REPORT

Environmental sensitivity of the proposed project area

AGRICULTURE THEME

EIA Reference number:	
Project name:	**Product Stockpile Expansion**
Project title:	**Product Stockpile Expansion**
Date screening report generated:	26/08/2022 12:59:56, 14:13:03 and 14:28:37
Applicant:	**Thungela Resources (Pty) Ltd**
Compiler:	**Geovicon Environmental**

Contents

1. Preamble

Specialist report compiled by: J.L. Schoeman

Professional Natural Scientist (Soil Science) Reg. No. 400465/04

Relevant experience

Pedologist with 53 years of experience in detailed and reconnaissance soil surveys, soil classification, soil characterization (land and crop suitability for irrigated and rainfed land uses), pedological research (including mine soil properties and reclamation), specialist soil studies for impact assessment and pedological inputs for provincial and municipal agricultural master planning.

Statement of independence

It is hereby certified that the compiler has no vested interests in Thungela Resources, Geovicon Environmental, or any Government Department, and is committed to collecting and presenting scientific/technical facts without fear or favour.

Site inspection

The site was inspected on 25 August 2022.

Methodology

The climatic setting, topographical setting (landform) and soil properties were considered the three most important semi-permanent physical resources and determinants of land suitability for agricultural use.

To ascertain the second and third of these determinants, the area was traversed on foot and eleven georeferenced hand soil auger pits were made. At each of these, the soils were described in a standard manner. The present land use, condition of the land surface, slope class and other relevant hillslope features were noted, as these may have a bearing on the land capability and agricultural potential.

The soil types were classified and mapped in accordance with the South African Taxonomic System (Soil Classification Working Group, 1991) and correlated with the taxa of the Third Edition (2018).

The climate setting was assessed by extracting rainfall and temperature data for relevant grid cells from an unpublished climate study by the ARC-Institute for Soil, Climate and Water.

Signed:

2. The project

The purpose of the project is to extend the existing run-of-mine (ROM) product facility. As mentioned above, the intended expansion area was traversed on foot, and eleven georeferenced hand soil auger pits were made (Figure 1).

For ease of reference, the three demarcated areas will hereunder referred to as the southern, central and northern subareas.

Figure 1: Study areas with locality, number and classification of soil observation points

3. Agricultural land resources

3.1 Climate

The average long-term rainfall of the wider area is 700-750 mm per annum and falls mainly in the summer months of October to March. Summer temperatures are warm at an average long-term daily maximum temperature for January of 27°C. Winters are frosty with an average long-term daily minimum temperature for July of 0°C. Regular frost may be expected from middle May to middle September (climatic data gleaned from unpublished modelled gridded data from ARC-Institute for Soil, Climate and Water).

The climatic setting is inductive to the production of rainfed summer field crops and high yields are regularly obtained for maize and soya.

3.2 Topography and drainage

The southern and central subareas, as well as the southern part of the northern subarea of the proposed extension area is situated on a wide, level to very gently sloping topographic crest, covered by deep, well-drained terrestrial soils. Towards the north, the narrow (less than 20 m wide), elongated part of the northern subarea is situated on a somewhat steeper midslope, still covered by terrestrial soils. Further north, the midslope grades downslope into a gentle footslope. The latter is covered, by what might be termed a hillslope seep, with seasonal wetland soils

exhibiting water tables within the solum. Downslope, outside the study area, the footslope grades into an unchanelled bottomland with poorly drained soils. In this area, the water table was at the surface at the time of survey.

3.2 Soils

The soil types encountered in the proposed extension areas are shown in Figure 2 and described in Table 1.

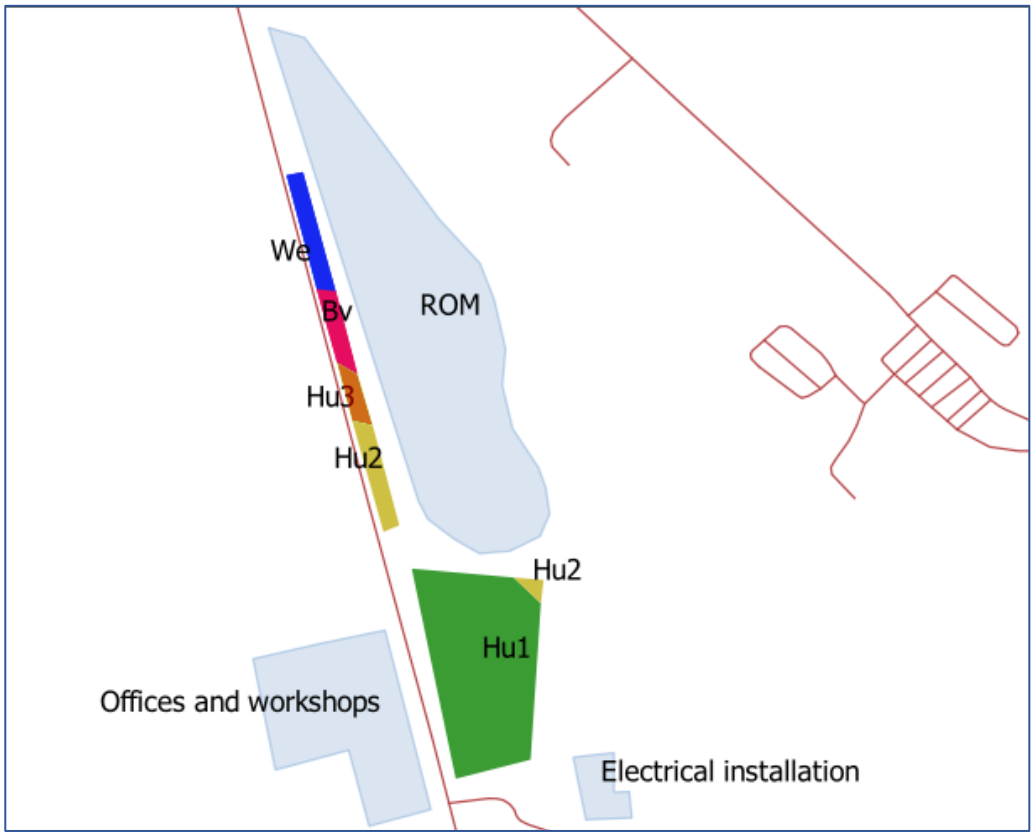

Figure 2: Soil types with surrounding infrastructure

Table 1: Description of the soil types

MAP UNIT	LANDFORM COMPONENT	SOIL COMPONENT	AREA (ha)	CORRE-LATION WITH 2018 EDITION
Hu1	Level to gently sloping crest (1-2% slope)	Deep (>120 cm) well drained, red, apedal, sandy clay loam of the Hutton form	1.84	Hutton 2110
Hu2		As for Hu1 but containing iron-manganese concretions in the lower subsoil	0.22	
Hu3	Gently sloping upper midslope (3% slope)	As for Hu1 but with an overburden of dark grey sandy loam or sandy clay loam 15-20 cm thick	0.10	
Bv	Gently sloping lower midslope and upper footslope (2-3% slope)	Deep (>120 cm) somewhat poorly drained, red, apedal, sandy clay loam, mottled in lower subsoil, of the Bainsvlei form	0.13	Bainsvlei 2210

We	Gently sloping lower footslope and bottomland (1-2% slope)	Deep, with shallow effective depth, poorly drained, grey-brown, structureless, sandy clay loam, with mottled subsoil, of the Westleigh form	0.32	Westleigh 2200
		Total	2.61	

4. Land capability

All the terrestrial soils listed above occupy terrain and climatic settings that are highly favourable for the production of rainfed summer field crops such as maize and soya. These soils all have good physical properties such as water-holding capacities and low to moderate erosion susceptibilities. Although the natural fertility is modest (natural pH values of 5.0-5.5, as displayed by modal profiles in the national soil profile database of the ARC-Institute for Soil, Climate and Water), they are responsive to fertilization and liming. The Hutton soils (Hu1, Hu2 and Hu3 in Figure 2) are also suitable for irrigated agriculture.

The “soil capability” of the terrestrial soils might be classified as very high, but climatic factors, mainly the frosty winters, but also the less than ideal rainfall, precludes a very high land capability rating. This study thus confirms the screening tool land capability assessment of “high”.

The above being stated, recognition has to be given to the fact that degradation in the form of salinization has been taking place in the vicinity of the existing ROM facility. This degradation can be reversed through leaching, however.

The northern part of the northern subarea (soil unit We) is situated in seasonal wetland terrain and is thus a sensitive area for surface water recharge, biodiversity and unjudicial agricultural land use.

5. Main impacts of the proposed development on the agricultural resources

5.1 Soil acidification and salinization

Current acidification levels were not determined. Saline surface crusts are present in the northern (downslope) subarea. This implies that these processes, which go together, are already ongoing. It might not be too late, however, to improve measures for the collection and treatment of surface runoff and leachate. Best industry practices might not have been followed in the past, but it is imperative that these have to be implemented and monitored with respect to the proposed new ROM extensions.

5.2 Soil compaction of the footprint

Surface compaction would be part of leachate collection measures. Soil compaction can be alleviated mechanically, however, after decommissioning, removal of all product and closure of the facility.

5.3 Dustiness

Dustiness have more of an impact on plants and nearby facilities than on the soil resources. However, combatting dustiness is to constitute an important part of implementing best industry practices.

6. Long-term benefits

The large investments in coal-fired power stations require that installations will complete their intended life cycles to be profitable. The intended project will contribute to effectively supply coal to power stations for helping to enable them to complete their life cycles without resulting in undue permanent losses of agricultural resources. A serviceable ROM facility is also essential for beneficiation for product export.

7. Alternative sites

The terrain involved is one of sensitive arable land changing within metres to sensitive wetlands with only narrow, or no, transitional zones of lower sensitivity in between. This results in a situation where switching around in the landscape offers little scope for siting installations on less sensitive land.

8. Surrounding agricultural activities

The development will have little or no negative effect on the commercial agriculture in the wider area surrounding it. There will be little or no disturbance of current agricultural activities.

9. Acceptability of the development

Considering (a) that a serviceable ROM facility is a necessary component of coal mining, (b) that extending the existing facility appears to be a practical solution, (c) that the period of impact is limited and (d) that the impacts would not necessarily be permanent, the proposed development should be supported.

References

Soil Classification Working Group, 1991. Soil classification. A taxonomic system for South Africa. Mem. agric. nat. Resour. S. Afr. No. 15. ARC-Institute for Soil, Climate, and Water, Pretoria.

Soil Classification Working Group, 2018. Soil Classification. A natural and Anthropogenic System for South Africa. ARC-Institute for Soil, Climate, and Water, Pretoria.

Goedehoop North Product Stockpile Expansion

Steve Tshwete Local Municipality, Nkangala District Municipality, Mpumalanga Province.

Farm: Portion 9 Bankfontein 340-JS

Fourie, H. Dr

Palaeontological Impact Assessment: Phase 1 Field Study

Facilitated by: Geovicon Environmental (Pty) Ltd

42 A.G. Visser Street,

Middelburg, Mpumalanga

Tel: 082 359 5604

2022/09/19

Ref: Pending

Plant fossil – Ecca Group

B. Executive summary

Outline of the development project: Geovicon Environmental (Pty) Ltd has facilitated the appointment of Dr H. Fourie, a palaeontologist, to undertake a Palaeontological Impact Assessment (PIA), Phase 1: Field Study of the suitability of the proposed Goedehoop North Product Stockpile Expansion, Steve Tshwete Local Municipality, Nkangala District Municipality, Mpumalanga Province on Farm: Portion 9 Bankfontein 340-JS.

The applicant, Thungela Operations (Pty) Ltd., a member of Thungela Resources Limited Group intends to expand the current stockpile area.

The Project includes one locality Option (see Figure 2):
Option 1: Two rectangular areas blocked in yellow west of the R 35 Road situated on Bank Road with the existing stockpile to the east. The approximate size of the site is 2.6 hectares.

Legal requirements:-

The **National Heritage Resources Act (Act No. 25 of 1999) (NHRA)** requires that all heritage resources, that is, all places or objects of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance are protected. The Republic of South Africa (RSA) has a remarkably rich fossil record that stretches back in time for some 3.5 billion years and must be protected for its scientific value. Fossil heritage of national and international significance is found within all provinces of the RSA. South Africa's unique and non-renewable palaeontological heritage is protected in terms of the National Heritage Resources Act. According to this act, palaeontological resources may not be excavated, damaged, destroyed or otherwise impacted by any development without prior assessment and without a permit from the relevant heritage resources authority.

The main aim of the assessment process is to document resources in the development area and identify both the negative and positive impacts that the development brings to the receiving environment. The PIA therefore identifies palaeontological resources in the area to be developed and makes recommendations for protection or mitigation of these resources.

"palaeontological" means any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or traces.

For this study, resources such as geological maps, scientific literature, institutional fossil collections, satellite images, aerial maps and topographical maps were used. It provides an assessment of the observed or inferred palaeontological heritage within the study area, with recommendations (if any) for further specialist palaeontological input where this is considered necessary.

A Palaeontological Impact Assessment is generally warranted where rock units of **LOW** to **VERY HIGH** palaeontological sensitivity are concerned, levels of bedrock exposure within the study area are adequate; large scale projects with high potential heritage impact are planned; and where the distribution and nature of fossil remains in the proposed area is unknown. The specialist will inform whether further monitoring and mitigation are necessary.

Types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (Act No.25 of 1999):
(i) objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens.
This report adheres to the guidelines of Section 38 (1) of the National Heritage Resources Act (Act No. 25 of 1999).

Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as (a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length; (b) the construction of a bridge or similar structure exceeding 50 m in length; (c) any development or other activity which will change the character of a site (see Section 38); (d) the re-zoning of a site exceeding 10 000 m² (1 ha) in extent; (e) or any other category of development provided for in regulations by SAHRA or a PHRA authority.

This report (Appendix 6, **1c)** aims to provide comment and recommendations on the potential impacts that the proposed development could have on the fossil heritage of the area and to state if any mitigation or conservation measures are necessary.

Outline of the geology and the palaeontology:
The geology was obtained from map 1:100 000, Geology of the Republic of South Africa (Visser 1984) and 2528 Pretoria (Walraven 1978), 1:250 000 geological maps.

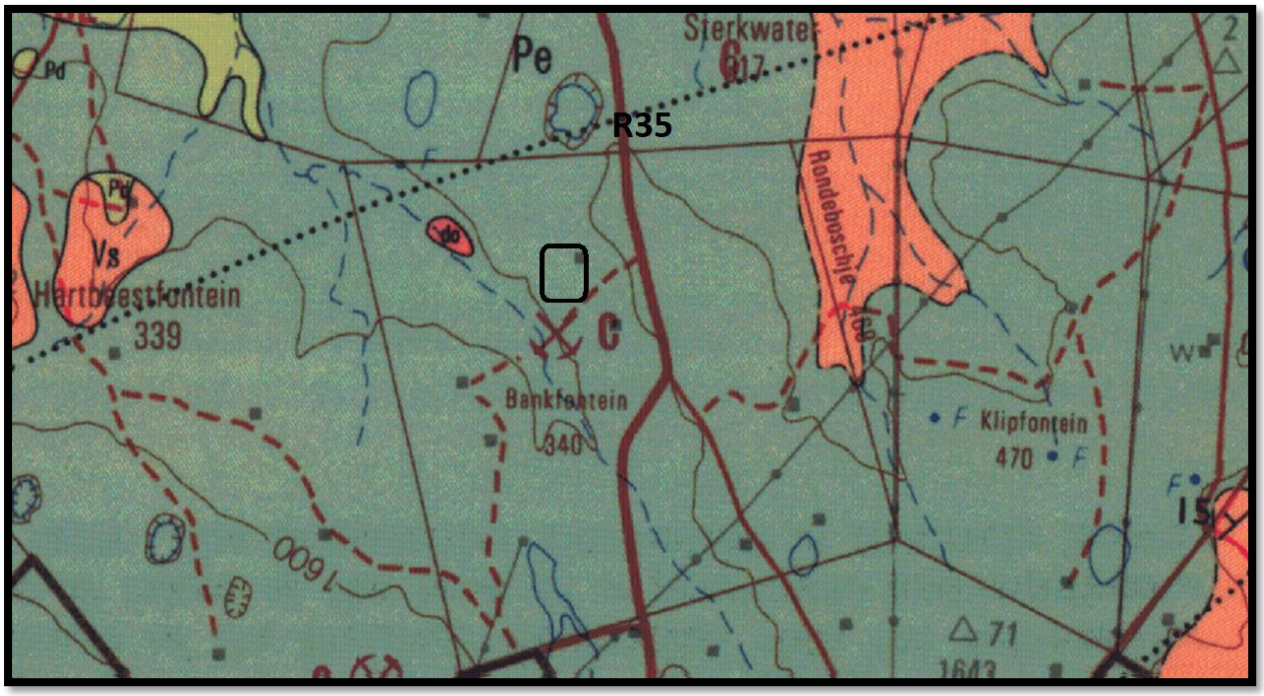

Figure: The geology of the development area.
Legend to Figure and short explanation.
do – Dolerite (pink). Jurassic.
Pe – Sandstone, shale and grit with coal and oil-shale beds (grey). Vryheid Formation, Ecca Group, Karoo Supergroup. Permian.
…… – (black) Lineament (Possible dyke).
--f— Fault.
----- - Concealed geological boundary.
⊥15˚ - Strike and dip.
□ – Approximate position of stockpile (blocked in black).

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).

Palaeontology – Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, if there is the presence of Karoo Supergroup strata the palaeontological sensitivity can generally be **LOW** to **VERY HIGH**, and here locally in the development area **VERY HIGH** for the Vryheid Formation (SG 2.2 SAHRA APMHOB, 2012).

The Ecca Group, Vryheid Formation (Pe) may contain fossils of diverse non-marine trace, *Glossopteris* flora, mesosaurid reptiles, palaeoniscid fish, marine invertebrates, insects, and crustaceans (Johnson 2009). *Glossopteris* trees rapidly colonised the large deltas along the northern margin of the Karoo Sea. Dead vegetation accumulated faster than it could decay, and thick accumulations of peat formed, which were ultimately converted to coal. It is only in the northern part of the Karoo Basin that the glossopterids and cordaitales, ferns, clubmosses and horsetails thrived (McCarthy and Rubidge 2005).

Summary of findings (**1d**): The Phase 1: Field Study was undertaken in September 2022 in spring in dry and cool conditions. The season and time have an influence on the outcome, and the following is reported:

Field Observation: The area is not large, but partially fenced with an existing stockpile. One section is covered by lush vegetation, trees and building rubble. All areas could be viewed, but very few rocks or outcrops are present, mostly isolated sandstone rocks. The topography is flat. Fossils were not located (Figures 5-11).

The Project includes one locality Option present on the Vryheid Formation:
Option 1: Two rectangular areas blocked in yellow west of the R 35 Road situated on Bank Road with the existing stockpile to the east. The approximate size of the site is 2.6 hectares.

Recommendation:
The potential impact of the development on fossil heritage is **VERY HIGH** and therefore a field survey was necessary for this development (according to SAHRA protocol). A Phase 1 Palaeontological Impact Assessment: Field Study was done. A Phase 2: Mitigation will be recommended if the Phase 1: Field Study finds fossils (not found) or if fossils are found during the development.

Concerns/threats **(1k,l,m)** to be added to EMPr:

1. Threats are earth moving equipment/machinery (for example haul trucks, front end loaders, excavators, graders, dozers) during construction, the sealing-in, disturbance, damage or destruction of the fossils by development, vehicle traffic, prospecting, mining, and human disturbance.
2. Special care must be taken during the digging, drilling, blasting and excavating of foundations, trenches, channels and footings and removal of overburden not to intrude fossiliferous layers.

The recommendations are **(1g)**:

1. Mitigation will be needed if fossils are found during the development.
2. No consultation with parties was necessary. The Environmental Control Officer must familiarise him- or herself with the formations present and its fossils and follow protocol.
3. The development may go ahead with caution due to the presence of the Vryheid Formation shale.

4. The ECO together with the mine geologist must survey for fossils before and or after clearing, blasting, drilling or excavating.
5. The EMPr already covers the conservation of heritage and palaeontological material that may be exposed during construction activities. For a chance fossil find, the protocol is to immediately cease all construction activities, construct a 30 m no-go barrier, and contact SAHRA for further investigation.

Stakeholders: Developer – Thungela Operations (Pty) Ltd.
Environmental – Geovicon Environmental (Pty) Ltd. 42 A.G. Visser Street, Middelburg, Mpumalanga. Tel: 082 359 5604.
Landowner – Anglo Operations (Pty) Ltd.

C. Table of Contents

D. Background information on the project

Report

This report is part of the environmental impact assessment process under the National Environmental Management Act, as amended (Act No. 107 of 1998) (NEMA) and includes Appendix 6 (GN R326 of 7 April 2017) of the Environmental Impact Assessment Regulations (see Appendix 2). It also is in compliance with The Minimum Standards for Palaeontological Components of Heritage Impact Assessment Reports, SAHRA, APMHOB, Guidelines 2012, Pg 1-15 **(2)**.

Outline of development

This report discusses and aims to provide the developer with information regarding the location of palaeontological material that will be impacted by the development. In the pre-construction phase it may be necessary for the developer to apply for the relevant permit from the South African Heritage Resources Agency depending on the presence of fossils (SAHRA / PHRA).

The applicant, Thungela Operations (Pty) Ltd., a member of Thungela Resources Limited Group intends to expand the current stockpile area.

No alternatives, Expansion of the product stockpile can only be conducted from the position of the current existing stockpile.

The product is transported from the processing plant at Goedehoop North by a conveyor belt to the coal silos on the eastern side of the current coal stockpile (proposed expansion). The product is stored in the silos and the current stockpile (proposed expansion), prior to being loaded into rail transport.

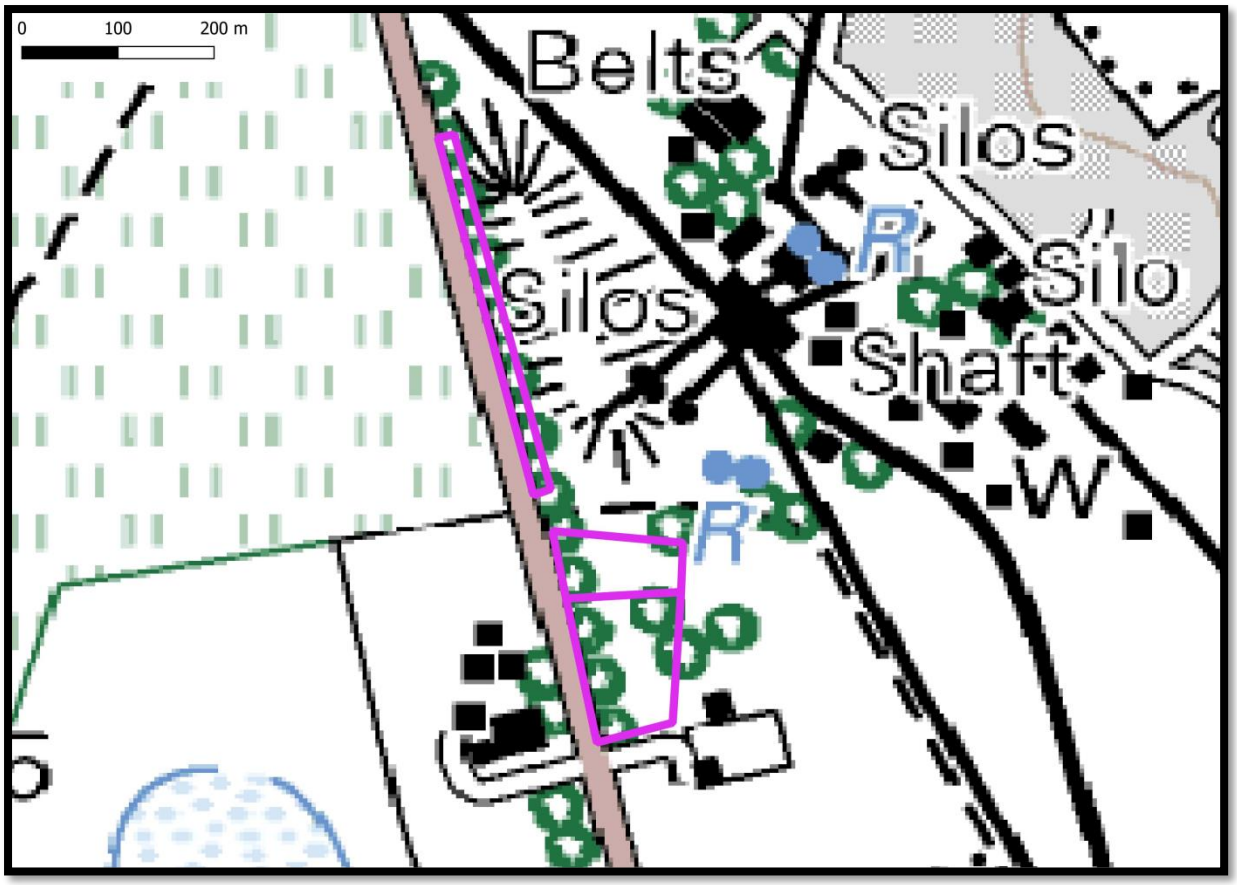

Figure 1: Topographic lay-out plan of development (Geovicon).

To have additional capacity for emergency stockpiling situations where the current stockpile will not have sufficient capacity because of the Transnet situation where train capacity is not available to transport product off site.

Related Infrastructure:

1. Access Haul Roads
2. Dirty water pipeline
3. Topsoil stockpile
4. Existing infrastructure
5. Storm water management.

The Project includes one locality Option (see Figure 2):
Option 1: Two rectangular areas blocked in yellow west of the R 35 Road situated on Bank Road with the existing stockpile to the east. The approximate size of the site is 2.6 hectares.

Rezoning/ and or subdivision of land: No.
Name of Developer and Consultant: Thungela Operations (Pty) Ltd and Geovicon Environmental (Pty) Ltd.
Terms of reference: Dr H. Fourie is a palaeontologist commissioned to do a palaeontological impact assessment: field study to ascertain if any palaeontological sensitive material is present in the development area. This study will advise on the impact on fossil heritage mitigation or conservation necessary, if any.
Short *Curriculum vitae* ***(1ai,aii)***: Dr Fourie obtained a Ph.D from the Bernard Price Institute for Palaeontological Research (now ESI), University of the Witwatersrand. Her undergraduate degree is in Geology and Zoology. She specialises in vertebrate morphology and function concentrating on the Therapsid Therocephalia. At present she is curator of a large fossil invertebrate collection, Therapsids, dinosaurs, amphibia, fish, reptiles, and plants at Ditsong: National Museum of Natural History. For the past 16 years she carried out field work in the North West, Western Cape, Northern Cape, Eastern Cape, Limpopo, Mpumalanga, Gauteng and Free State Provinces. Dr Fourie has been employed at the Ditsong: National Museum of Natural History in Pretoria (formerly Transvaal Museum) for 28 years.
Legislative requirements: South African Heritage Resources Agency (SAHRA) for issue of permits if necessary. National Heritage Resources Act (Act No. 25 of 1999). An electronic copy of this report must be supplied to SAHRA.

E. Description of property or affected environment
Location and depth:
The suitability of the proposed Goedehoop North Product Stockpile Expansion will be situated in the Steve Tshwete Local Municipality, Nkangala District Municipality, Mpumalanga Province on Farm: Portion 9 Bankfontein 340-JS.

Depth is determined by the related infrastructure to be developed and the thickness of the formation in the development area as well as depth of the foundations, footings and channels to be developed. Details of the location and distribution of all significant fossil sites or key fossiliferous rock units are often difficult to determine due to thick topsoil, subsoil, overburden and alluvium. Depth of the overburden may vary a lot. Geological maps do not provide depth or superficial cover, it only provides mappable surface outcrops. The depth can be verified with test pit results or drill cores. The depth of the Vryheid Formation is 120 m deep.

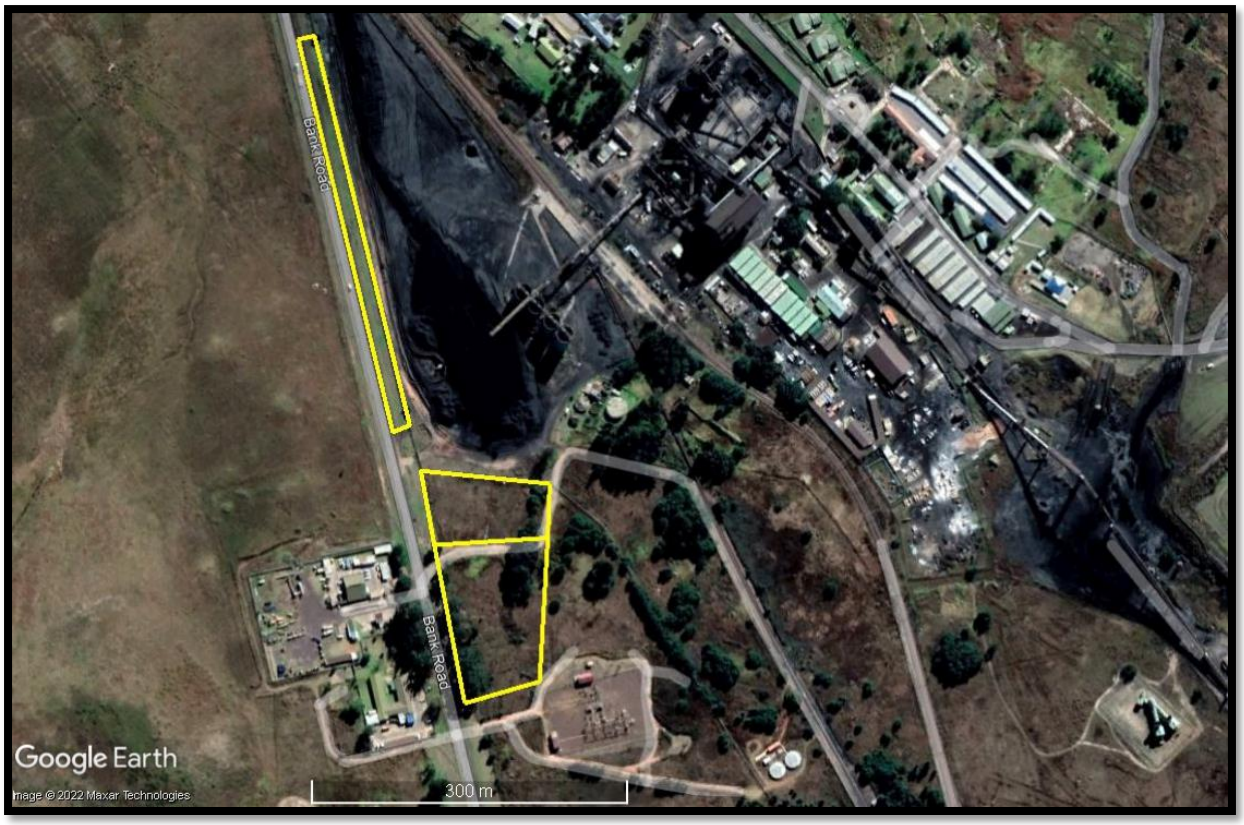

Figure 2: Google Earth image showing expansion area (Geovicon).

The site is underlain by the Karoo Supergroup Formations.

F. Description of the Geological Setting

Description of the rock units:

Large areas of the southern African continent are covered by the Karoo Supergroup (Figure 3). 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.

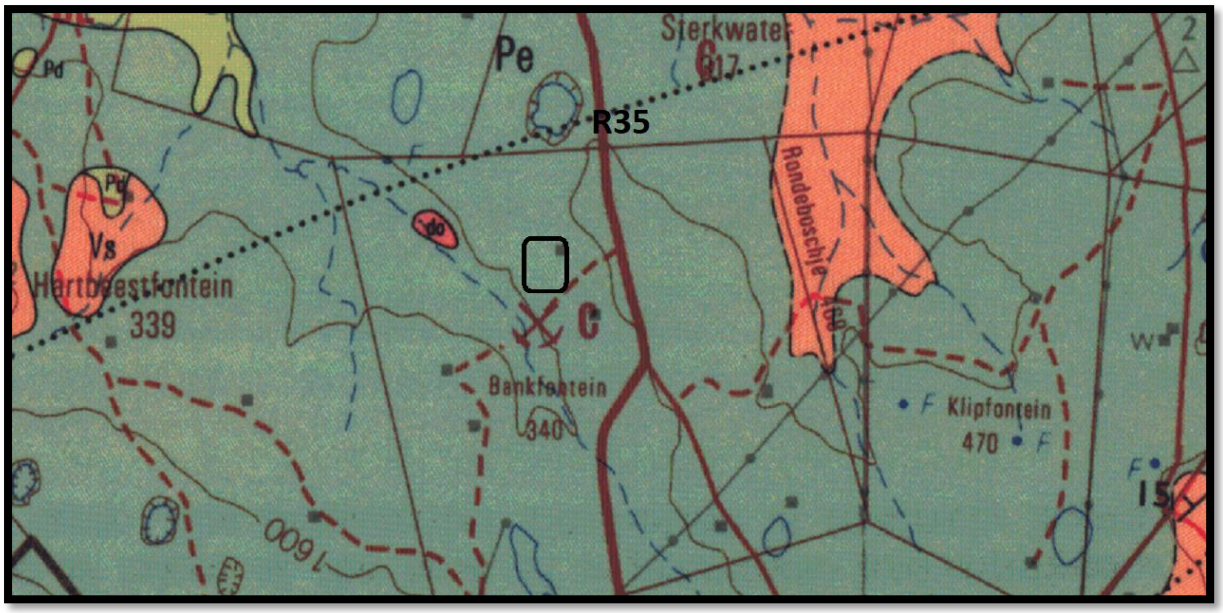

Figure 3: Geology of the development area **(1h)**.

Legend to Figure and short explanation.

do – Dolerite (pink). Jurassic.

Pe – Sandstone, shale and grit with coal and oil-shale beds (grey). Vryheid Formation, Ecca Group, Karoo Supergroup. Permian.

…… – (black) Lineament (Possible dyke).

------ - Concealed geological boundary.

--f— Fault.

⊥15˚ - Strike and dip.

□ – Approximate position of stockpile expansion (blocked in black).

Mining Activities on Figure:

C – Coal.

Mining past and present have an influence on the project.

Dolerite dykes (Jd/do) 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. Permian sediments are extensively intruded and thermally metamorphosed (baked) by sub-horizontal sills and steeply inclined dykes of the Karoo Dolerite Suite. These early Jurassic (183 Ma) basic intrusions baked the adjacent mudrocks and sandstones to form splintery hornfels and quartzites respectively. Thermal metamorphism by dolerite intrusions tends to reduce the palaeontological heritage potential of the adjacent sediments.

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 (see Appendix 1). 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).

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). 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.

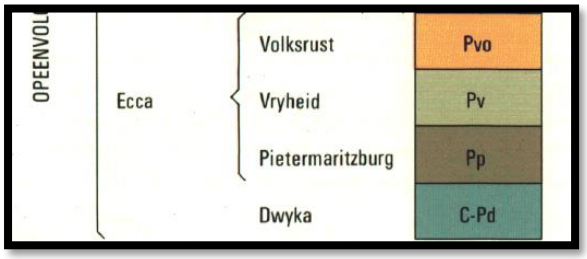

Figure 4: Lithostratigraphic column of the development area (Vryheid 2730).

Field Observation: The area is not large, but partially fenced with an existing stockpile. One section is covered by lush vegetation, trees and building rubble. All areas could be viewed, but very few rocks or outcrops are present, mostly isolated sandstone rocks. The topography is flat. Fossils were not located (Figures 5-11).

Figure 5: View of site looking south-east showing northern corner of existing stockpile.

Figure 6: Another view to the south showing where the stockpile will be expanded.

Figure 7: View towards the south-east corner of stockpile with area for expansion.

Figure 8: View across road in south where new stockpile will be located.

Figure 9: Another view of project area showing open area.

Figure 10: View of area with trees, lush grass, building rubble, but fully accessible.

Figure 11: View towards entrance road of mine.

It is recommended to wait for the response from SAHRA on the Phase 1: Field Study (this report). SAHRA protocol must be followed.

G. Background to Palaeontology of the area

Summary: When rock units of moderate to very high palaeontological sensitivity are present within the development footprint, a desk top and or field scoping (survey) study by a professional palaeontologist is usually warranted. The main purpose of a field scoping (survey) study would be to identify any areas within the development footprint where specialist palaeontological mitigation during the construction phase may be required (SG 2.2 SAHRA AMPHOB, 2012).

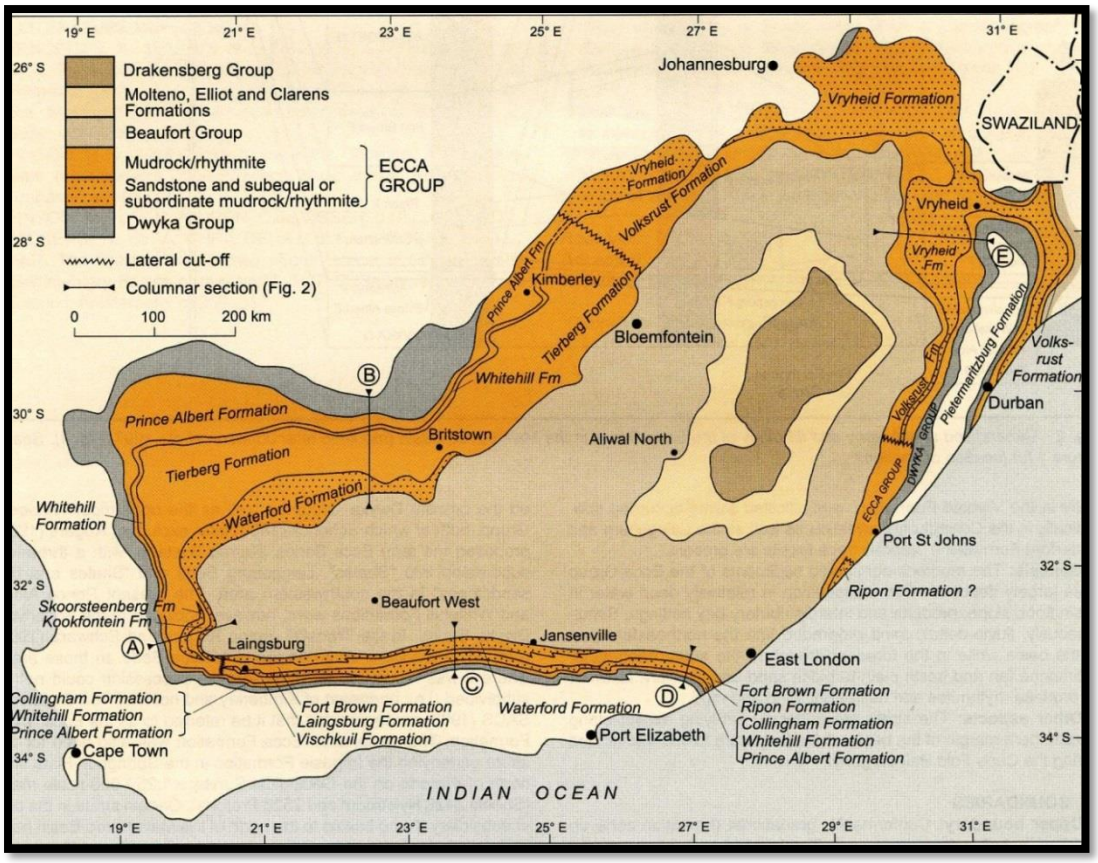

Figure 12: Extent of the Karoo Supergroup (Johnson 2009).

The Ecca Group, Vryheid Formation (Figure 12) may contain fossils of diverse non-marine trace, *Glossopteris* flora, mesosaurid reptiles, palaeoniscid fish, marine invertebrates, insects, and crustaceans (Johnson 2009). *Glossopteris* trees rapidly colonised the large deltas along the northern margin of the Karoo Sea. Dead vegetation accumulated faster than it could decay, and thick accumulations of peat formed, which were ultimately converted to coal. It is only in the northern part of the Karoo Basin that the glossopterids and cordaitales, ferns, clubmosses and horsetails thrived (McCarthy and Rubidge 2005).

The Glossopteris flora is thought to have been the major contributor to the coal beds of the Ecca. These are found in Karoo-age rocks across Africa, South America, Antarctica, Australia and India. This was one of the early clues to the theory of a former unified Gondwana landmass (Norman and Whitfield 2006).

Rocks of Permian age in South Africa are particularly rich in fossil plants (Rayner and Coventry 1985). The fossils are present in the grey shale interlayered with the coal seams. The fossils are not very rare and occur also in other parts of the Karoo stratigraphy. It is often difficult to spot the greyish fossils as they are the same colour as the grey shale in which they are present as these coalified compressions have been weathered to leave surface replicas on the enclosing shale matrix. The pollen of the Greenside Colliery near Witbank also on the Vryheid Formation was the focus of a Ph.D study. A locality close to Ermelo, also Vryheid Formation, has yielded *Scutum, Glossopteris* leaves, *Neoggerathiopsis* leaves, the lycopod *Cyclodendron leslii,* and various seeds and scale leaves (Prevec 2011).

Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, if there is the presence of Karoo Supergroup strata the palaeontological sensitivity is generally **LOW** to **VERY HIGH**.

Table 1: Taken from Palaeotechnical Report (Groenewald 2012) (**1cA)**.

Vryheid (Pv)		Light grey coarse- to fine-grained sandstone and siltstone. Dark coloured siltstone due to presence of carbon enrichment and coal beds	Abundant plant fossils of *Glossopteris* and other plants. Trace fossils. The reptile *Mesosaurus* has been found in the southern part of the Karoo Basin

Table 2: Criteria used (Fossil Heritage Layer Browser/SAHRA) **(1cB)**:

Rock Unit	Significance/vulnerability	Recommended Action
Vryheid Formation	**Very High**	Field assessment and protocol for finds is required

Databases and collections: Ditsong: National Museum of Natural History. Evolutionary Studies Institute, University of the Witwatersrand (ESI).
Impact: **VERY HIGH** for the Vryheid Formation, Karoo Supergroup. There are significant fossil resources that may be impacted by the development (mudstone, shale) and if destroyed are no longer available for scientific research or other public good (Almond, *et al.* 2009).

The Project includes one locality Option (see Figure 2) (**1f,j)** The palaeontological sensitivity is as stated above.
Option 1: Two rectangular areas blocked in yellow west of the R 35 Road situated on Bank Road with the existing stockpile to the east. The approximate size of the site is 2.6 hectares.

All the land involved in the development was assessed **(ni,nii)** and none of the property is unsuitable for development (see Recommendation B).

H. Description of the Methodology (1e)
The palaeontological impact assessment field study was undertaken in September 2022. A Phase 1: Field Survey of the affected portion includes photographs (in 7.1 mega pixels) taken of the site with a digital camera (Canon PowerShot A470). Additionally, Google Maps will be accessed on a cellular phone/tablet for navigation. A Global Positioning System (GPS) (Garmin eTrex 10) is used to record fossiliferous finds and outcrops (bedrock) when the area is not covered with topsoil, subsoil, overburden, vegetation, grassland, trees or waste. The survey did identify the Karoo Supergroup. A literature survey is included and the study relied heavily on geological maps.

SAHRA document 7/6/9/2/1 (SAHRA 2012) requires track records/logs from archaeologists not palaeontologists as palaeontologists concentrate on outcrops which may be recorded with a GPS. Isolated occurrences of rocks usually do not constitute an outcrop. Fossils can occur in dongas, as nodules, in fresh rock exposures, and in riverbeds. Finding fossils require the experience and technical knowledge of the professional palaeontologist, but that does not mean that an amateur can't find fossils. The geology of the region is used to predict what type of fossil and zone will be found in any particular region. Archaeozoologists concentrate on more recent fossils in the quaternary and tertiary deposits.

Assumptions and Limitations (**1i)**:-
The accuracy and reliability of the report **may be** limited by the following constraints:

1. Most development areas have never been surveyed by a palaeontologist or geophysicist.
2. Variable accuracy of geological maps and associated information.
3. Poor locality information on sheet explanations for geological maps.
4. Lack of published data.

5. Lack of rocky outcrops.
6. Inaccessibility of site – could be viewed.
7. Insufficient data from developer and exact lay-out plan for all structures - sufficient.

A Phase 2 Palaeontological Impact Assessment: Mitigation will include:

1. Recommendations for the future of the site.
2. Description of work done (including number of people and their responsibilities.
3. A written assessment of the work done, fossils excavated, not removed or collected and observed.
4. Conclusion reached regarding the fossil material.
5. A detailed site plan.
6. Possible declaration as a heritage site or Site Management Plan.

The National Heritage Resources Act No. 25 of 1999 further prescribes.

Act No. 25 of 1999. National Heritage Resources Act, 1999.
National Estate: 3 (2) (f) archaeological and palaeontological sites,
(i)(1) objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens,
Heritage assessment criteria and grading: (a) Grade 1: Heritage resources with qualities so exceptional that they are of special national significance;
(b) Grade 2: Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region; and (c) Grade 3: Other heritage resources worthy of conservation.
SAHRA is responsible for the identification and management of Grade 1 heritage resources.
Provincial Heritage Resources Authority (PHRA) identifies and manages Grade 2 heritage resources.
Local authorities identify and manage Grade 3 heritage resources.

No person may damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of a provincially protected place or object without a permit issued by a heritage resources authority or local authority responsible for the provincial protection.
Archaeology, palaeontology and meteorites: Section 35.
(2) Subject to the provisions of subsection (8) (a), all archaeological objects, palaeontological material and meteorites are the property of the State.
(3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.

Mitigation involves planning the protection of significant fossil sites, rock units or other palaeontological resources and/or excavation, recording and sampling of fossil heritage that might be lost during development, together with pertinent geological data. The mitigation may take place before and / or during the construction phase of development. The specialist will require a Phase 2 mitigation permit from the relevant Heritage Resources Authority before a Phase 2 may be implemented.

The Mitigation is done in order to rescue representative fossil material from the study area to allow and record the nature of each locality and establish its age before it is destroyed and to make samples accessible for future research. It also interprets the evidence recovered to allow for education of the public and promotion of palaeontological heritage.

Should further fossil material be discovered during the course of the development (*e. g.* during bedrock excavations), this must be safeguarded, where feasible *in situ,* and reported to a palaeontologist or to the Heritage Resources authority. In situations where the area is considered palaeontologically sensitive (*e. g.* Karoo Supergroup Formations, ancient marine deposits in the interior or along the coast) the palaeontologist might need to monitor all newly excavated bedrock. The developer needs to give the palaeontologist sufficient time to assess and document the finds and, if necessary, to rescue a representative sample.

When a Phase 2 palaeontological impact study is recommended, permission for the development to proceed can be given only once the heritage resources authority has received and approved a Phase 2 report and is satisfied that (a) the palaeontological resources under threat have been adequately recorded and sampled, and (b) adequate development on fossil heritage, including, where necessary, *in situ* conservation of heritage of high significance. Careful planning, including early consultation with a palaeontologist and heritage management authorities, can minimise the impact of palaeontological surveys on development projects by selecting options that cause the least amount of inconvenience and delay.

Three types of permits are available; Mitigation, Destruction and Interpretation. The specialist will apply for the permit at the beginning of the process (SAHRA 2012).

I. Description of significant fossil occurrences

All Karoo Supergroup geological formations are ranked as **LOW** to **VERY HIGH**, and here the impact is potentially **VERY HIGH** for the Vryheid Formation.

Fossils likely to be found are mostly plants (Appendix 1) 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 palaeoenvironmental reconstructions (Appendix 1).

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, prospecting, mining, and human disturbance. See Description of the Geological Setting (F) above.

J. Recommendation

a. There is no objection (see Recommendation B) to the development, it was necessary to request a Phase 1 Palaeontological Impact Assessment: Field Study to determine whether the development will affect fossiliferous outcrops as the palaeontological sensitivity of the area is **VERY HIGH**. A Phase 2 Palaeontological Mitigation is only required if the Phase 1 Palaeontological Assessment identified a fossiliferous formation (Karoo Supergroup) and fossils or if fossils are found during construction. Protocol is attached (Appendix 2).

b. This project may benefit the community, will create short- and long-term employment, the life expectancy of the community, the growth of the community, and social development in general.
c. Preferred choice: Locality Option 1 is preferred and possible.
d. The ECO must undertake periodic audits to monitor and record heritage impacts and non-compliance, preferable weekly or bi-weekly.
e. The following should be conserved: if any palaeontological material is exposed during clearing, digging, excavating, drilling or blasting SAHRA must be notified. All construction activities must be stopped, a 30 m no-go barrier constructed and a palaeontologist should be called in to determine proper mitigation measures.
f. Consultation with parties was not necessary **(1o,p,q).**
g. This report must be submitted to SAHRA/PHRA together with the Heritage Impact Assessment Report.

Sampling and collecting:
Wherefore a permit is needed from the South African Heritage Resources Agency (SAHRA / PHRA).

a. Objections: Cautious. See heritage value and recommendation.
b. Conditions of development: See Recommendation.
c. Areas that may need a permit: Yes.
d. Permits for mitigation: **Needed from SAHRA/PHRA prior to Mitigation**.

K. Conclusions

a. All the land involved in the development was assessed and none of the property is unsuitable for development (see Recommendation B).
b. All information needed for the Phase 1 Palaeontological Impact Assessment and Field Study was provided by the Consultant. All technical information was provided by Geovicon Environmental (Pty) Ltd.
c. Areas that would involve mitigation and may need a permit from the South African Heritage Resources Agency are discussed.
d. The following should be conserved: if any palaeontological material is exposed during clearing, digging, excavating, drilling or blasting, SAHRA must be notified. All development activities must be stopped, a 30 m barrier constructed, and a palaeontologist should be called in to determine proper mitigation measures.
e. Condition in which development may proceed: It is further suggested that a Section 37(2) agreement of the Occupational, Health and Safety Act 85 of 1993 is signed with the relevant contractors to protect the environment (fossils) and adjacent areas as well as for safety and security reasons.

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Declaration (1b)

I, Heidi Fourie, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development project for which I was appointed to do a palaeontological assessment. There are no circumstances that compromise the objectivity of me performing such work.

I accept no liability, and the client, by receiving this document, indemnifies me against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by the use of the information contained in this document.

It may be possible that the Phase 1: Field Study may have missed palaeontological resources in the project area as outcrops are not always present or visible while others may lie below the overburden of earth and may only be present once development commences.

This report may not be altered in any way and any parts drawn from this report must make reference to this report.

POPI Act 2013 Statement

It provides that everyone has the right to privacy and includes a right to protection against the unlawful collection, retention dissemination and use of personal information contained in this document and pertains to the phone and contact details, signature and contents.

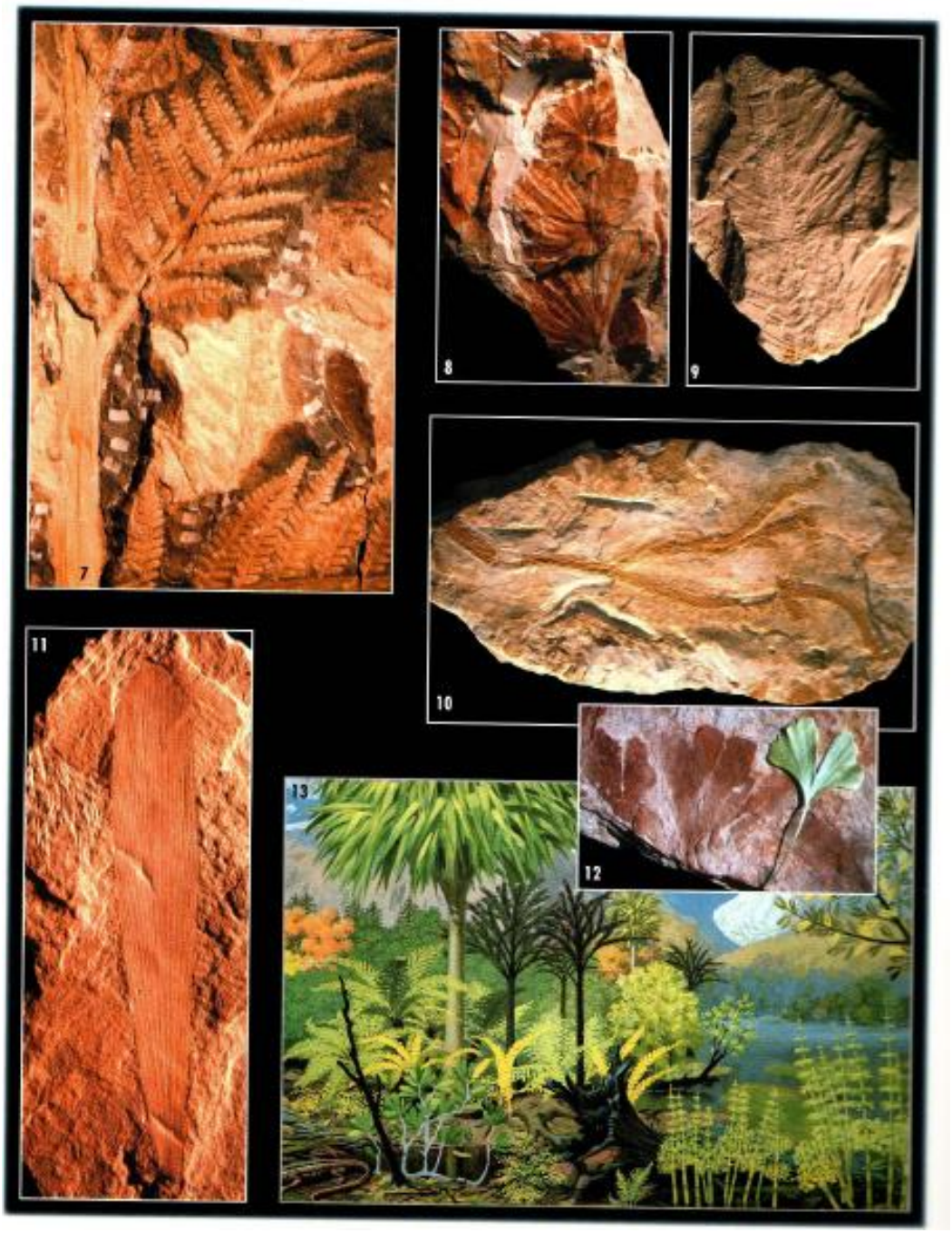
As per the Declaration Section none of the information may be shared without the permission of the author.

The report will be signed as soon as comments have been included.

_____

Heidi Fourie
2022/09/19

Appendix 1: Example of Vryheid Formation Fossils (MacRae 1999)



Appendix 2: **Protocol for Chance Finds and Management Plan (1k,l,m)**

This section covers the recommended protocol for a Phase 2 Mitigation process as well as for reports where the Palaeontological Sensitivity is **LOW**; this process guides the palaeontologist / palaeobotanist on site and should not be attempted by the layman / developer. As part of the Environmental Authorisation conditions, an Environmental Control Officer (ECO) will be appointed to oversee the construction activities in line with the legally binding Environmental Management Programme (EMPr).

- The EMPr already covers the conservation of heritage and palaeontological material that may be exposed during construction activities.

- For a chance find, the protocol is to immediately cease all construction activities, construct a 30 m no-go barrier, and contact SAHRA for further investigation. Construction workers must be informed that this is a no-go area.
- It is recommended that the EMPr be updated to include the involvement of a palaeontologist for pre-construction training of the ECO or during the digging and excavation phase of the development.
- The ECO must visit the site after clearing, drilling, excavations and blasting and keep a photographic record.
- The developer may be required to survey the areas affected by the development and indicate on plan where the construction / development / mining will take place. Trenches may have to be dug to ascertain how deep the sediments are above the bedrock (can be a few hundred metres). This will give an indication of the depth of the topsoil, subsoil, and overburden, if need be trenches should be dug deeper to expose the interburden.

Mitigation will involve recording, rescue and judicious sampling of the fossil material present in the layers sandwiched between the geological / coal layers. It must include information on number of taxa, fossil abundance, preservational style, and taphonomy. This can only be done during mining or excavations. In order for this to happen, in case of coal mining operations, the process will have to be closely scrutinised by a professional palaeontologist / palaeobotanist to ensure that only the coal layers are mined and the interlayers (siltstone and mudstone) are surveyed for fossils or representative sampling of fossils are taking place.

The palaeontological impact assessment process presents an opportunity for identification, access and possibly salvage of fossils and add to the few good plant localities. Mitigation can provide valuable onsite research that can benefit both the community and the palaeontological fraternity.

A Phase 2 study is very often the last opportunity we will ever have to record the fossil heritage within the development area. Fossils excavated will be stored at a National Repository.

A Phase 2 Palaeontological Impact Assessment: Mitigation will include (SAHRA) -

1. Recommendations for the future of the site.
2. Description and purpose of work done (including number of people and their responsibilities).
3. A written assessment of the work done, fossils excavated, not removed or collected and observed.
4. Conclusion reached regarding the fossil material.
5. A detailed site plan and map.
6. Possible declaration as a heritage site or Site Management Plan.
7. Stakeholders.
8. Detailed report including the Desktop and Phase 1 study information.
9. Annual interim or progress Phase 2 permit reports as well as the final report.
10. Methodology used.

Mitigation involves planning the protection of significant fossil sites, rock units or other palaeontological resources and/or excavation, recording and sampling of fossil heritage that might be lost during development, together with pertinent geological data. The mitigation may take place before and / or during the construction phase of development. The specialist will require a Phase 2 mitigation permit from the relevant Heritage Resources Authority before a Phase 2 may be implemented.

The Mitigation is done in order to rescue representative fossil material from the study area to allow and record the nature of each locality and establish its age before it is destroyed and to make samples accessible for future

research. It also interprets the evidence recovered to allow for education of the public and promotion of palaeontological heritage.

Should further fossil material be discovered during the course of the development (*e. g.* during bedrock excavations), this must be safeguarded, where feasible *in situ,* and reported to a palaeontologist or to the Heritage Resources authority. In situations where the area is considered palaeontologically sensitive (*e. g.* Karoo Supergroup Formations, ancient marine deposits in the interior or along the coast) the palaeontologist might need to monitor all newly excavated bedrock. The developer needs to give the palaeontologist sufficient time to assess and document the finds and, if necessary, to rescue a representative sample.

When a Phase 2 palaeontological impact study is recommended, permission for the development to proceed can be given only once the heritage resources authority has received and approved a Phase 2 report and is satisfied that (a) the palaeontological resources under threat have been adequately recorded and sampled, and (b) adequate development on fossil heritage, including, where necessary, *in situ* conservation of heritage of high significance. Careful planning, including early consultation with a palaeontologist and heritage management authorities, can minimise the impact of palaeontological surveys on development projects by selecting options that cause the least amount of inconvenience and delay.

Three types of permits are available; Mitigation, Destruction and Interpretation. The specialist will apply for the permit at the beginning of the process (SAHRA 2012).

The Palaeontological Society of South Africa (PSSA) does not have guidelines on excavating or collecting, but the following is suggested:

1. The developer needs to clearly stake or peg-out (survey) the areas affected by the mining/ construction/ development operations and dig representative trenches and if possible supply geological borehole data. When the route is better defined, it is recommended that a specialist undertake a 'walk through' of the entire road as well as construction areas, including camps and access roads, prior to the start of any construction activities, this may be done in sections.
2. When clearing vegetation, topsoil, subsoil or overburden, hard rock (outcrop) is found, the contractor needs to stop all work.
3. A Palaeobotanist / palaeontologist (contact SAHRIS for list) must then inspect the affected areas and trenches for fossiliferous outcrops / layers. The contractor / developer may be asked to move structures, and put the development on hold.
4. If the palaeontologist / palaeobotanist is satisfied that no fossils will be destroyed or have removed the fossils, development and removing of the topsoil can continue.
5. After this process the same palaeontologist / palaeobotanist will have to inspect and offer advice through the Phase 2 Mitigation Process. Bedrock excavations for footings may expose, damage or destroy previously buried fossil material and must be inspected.
6. When permission for the development is granted, the next layer can be removed, if this is part of a fossiliferous layer, then with the removal of each layer of sediment, the palaeontologist / palaeobotanist must do an investigation (a minimum of once every week).
7. At this stage the palaeontologist / palaeobotanist in consultation with the developer / mining company must ensure that a further working protocol and schedule is in place. Onsite training should take place, followed by an annual visit by the palaeontologist / palaeobotanist.

Fossil excavation if necessary, during Phase 2:

1. Photography of fossil / fossil layer and surrounding strata.
2. Once a fossil has been identified as such, the task of extraction begins.

3. It usually entails the taking of a GPS reading and recording lithostratigraphic, biostratigraphic, date, collector and locality information.
4. Using Paraloid (B-72) as an adhesive and protective glue, parts of the fossil can be kept together (not necessarily applicable to plant fossils).
5. Slowly chipping away of matrix surrounding the fossil using a geological pick, brushes and chisels.
6. Once the full extent of the fossil / fossils is visible, it can be covered with a plaster jacket (not necessarily applicable to plant fossils).
7. Chipping away sides to loosen underside.
8. Splitting of the rock containing palaeobotanical material should reveal any fossils sandwiched between the layers.

This document forms part of the Environmental Monitoring Programme. For practical reasons a palaeontologist/palaeobotanist may be required to be on site as predetermined. If any fossil material is discovered then a Phase 2 rescue operation may be necessary, and a permit will be required.

The South African Heritage Resources Agency has the following documents in place:
Guidelines to Palaeontological Permitting policy.
Minimum Standards: Palaeontological Component of Heritage Impact Assessment reports.
Guidelines for Field Reports.
Palaeotechnical Reports (Eastern Cape, North West, Northern Cape, Mpumalanga, Gauteng, Western Cape, Free State, Kwazulu Natal, and Limpopo)

Appendix 3: **Table 2:** Listing points in Appendix 6 of the Act and position in Report (bold in text).

Section in Report	**Point in Act**	**Requirement**
B	1(c)	Scope and purpose of report
B	1(d)	Duration, date and season
B	1(g)	Areas to be avoided
D	1(ai)	Specialist who prepared report
D	1(aii)	Expertise of the specialist
F Figure 3	1(h)	Map
F, B	1(ni)(iA)	Authorisation
F, B	1(nii)	Avoidance, management, mitigation and closure plan
G Table 1	1(cA)	Quality and age of base data
G Table 2	1(cB)	Existing and cumulative impacts
G, D	1(f)	Details or activities of assessment
G	1(j)	Description of findings
H	1(e)	Description of methodology
H	1(i)	Assumptions
J	1(o)	Consultation
J	1(p)	Copies of comments during consultation
J	1(q)	Information requested by authority
Declaration	1(b)	Independent declaration
Appendix 2	1(k)	Mitigation included in EMPr
Appendix 2	1(l)	Conditions included in EMPr
Appendix 2	1(m)	Monitoring included in EMPr
D	2	Protocol or minimum standard

Appendix 4: Impact Statement

The development footprint is situated on the Vryheid Formation (Pv) of the Ecca Group, Karoo Supergroup with a **VERY HIGH** palaeontological sensitivity. The nature of the impact is the destruction of Fossil Heritage. Loss of fossil heritage will have a negative impact. The extent of the impact only extends in the region of the development activity footprint and may include transport routes. The expected duration of the impact is assessed as potentially permanent. The intensity/magnitude of the impact is high as it is destructive. The probability of the impact occurring will be definite and will occur regardless of preventative measures.

In the absence of mitigation procedures (should fossil material be present within the affected area) the damage or destruction of any palaeontological materials will be irreversible. With Mitigation the impact will be moderate and the cumulative impact is low. Impacts on palaeontological heritage during the mining/construction and premining/preconstruction phase could potentially occur and is regarded as having a high possibility. The significance of the impact occurring will be as below:

S= (2+5+8)5

S = 75 High (>60).

GOEDEHOOP ENSURE COMPETENCE AND AWARENESS THROUGH TRAINING PROCEDURE

AUTHORISATIONS	NAME	POSITION	SIGNATURE	DATE
AUTHOR	Comley, Derrick	Safety Superintendent		27/03/2017
REVIEWED BY	Youell, Rowan	Engineering Manager		28/3/17
APPROVED BY	Mphokane, T-Man	General Manager		30/3/17

CONTENTS

1 AIM

To ensure staff are competent through training. Competence will only be proven through assessment by relevant line supervisors/management against specific criteria. Training is essential to ensure that the responsibilities in all systems can be fulfilled at each relevant function and level, and to meet the challenge of continual improvement. It is essential that key personnel whose work may create a significant impact be trained.

2 SCOPE

This procedure and its supporting documents will apply to all Goedehoop operations. It is also applicable to all AAplc visitors and contractors.

3 DEFINITIONS

Term	Definition
Contractor	Any person who undertakes work at an operation, in a part-time or full-time capacity, but is not permanently employed by the operation.
Training	A means of ensuring the belt run

4 ABBREVIATIONS

Term	Abbreviation
ISO	International Organization For Standardization
OHSAS	Occupational Health And Safety Assessment Series
PTO	Planned Task Observation
SME	Subject Matter Expert
VFL	Visible Felt Leadership

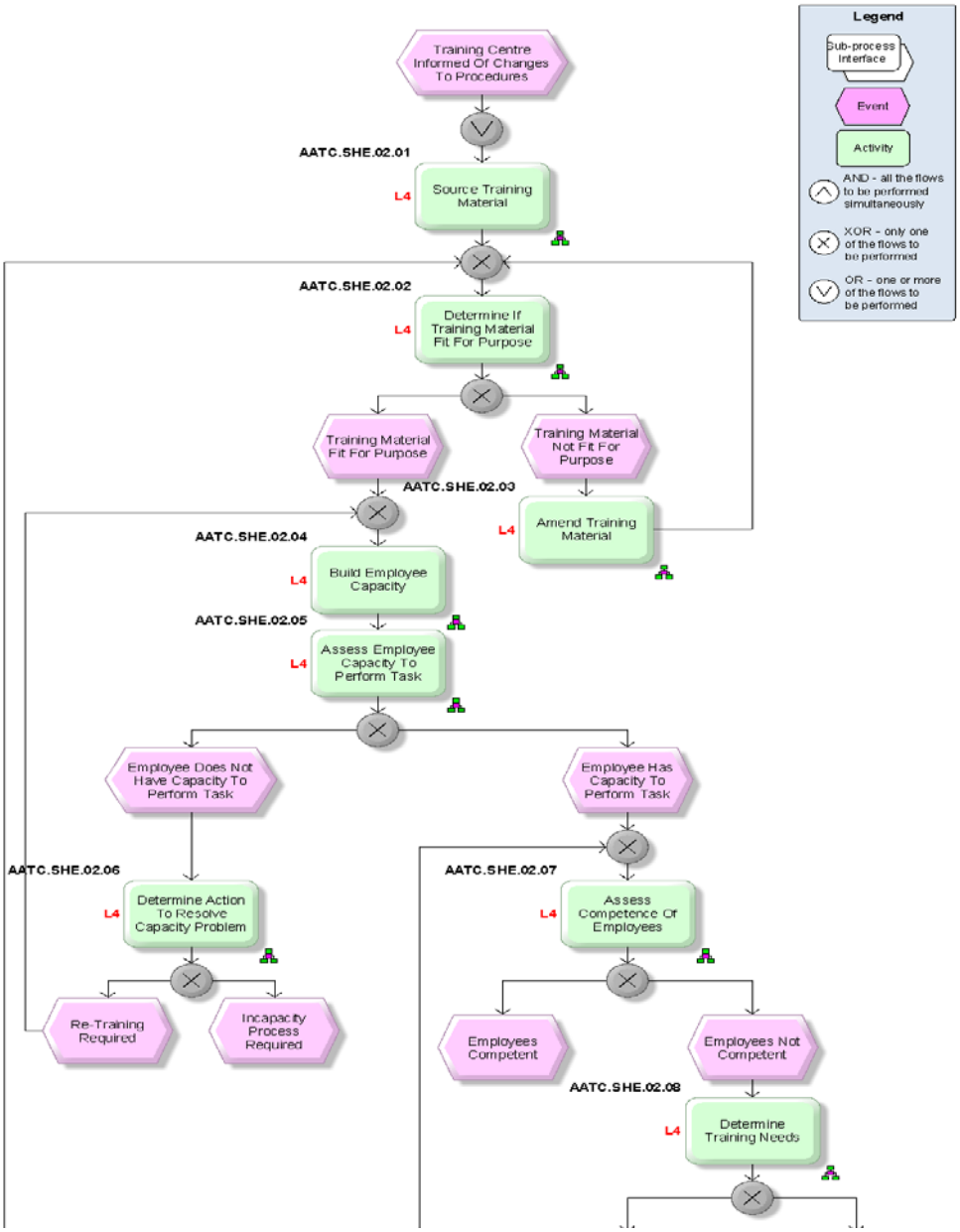
5 ADDITIONAL INFORMATION

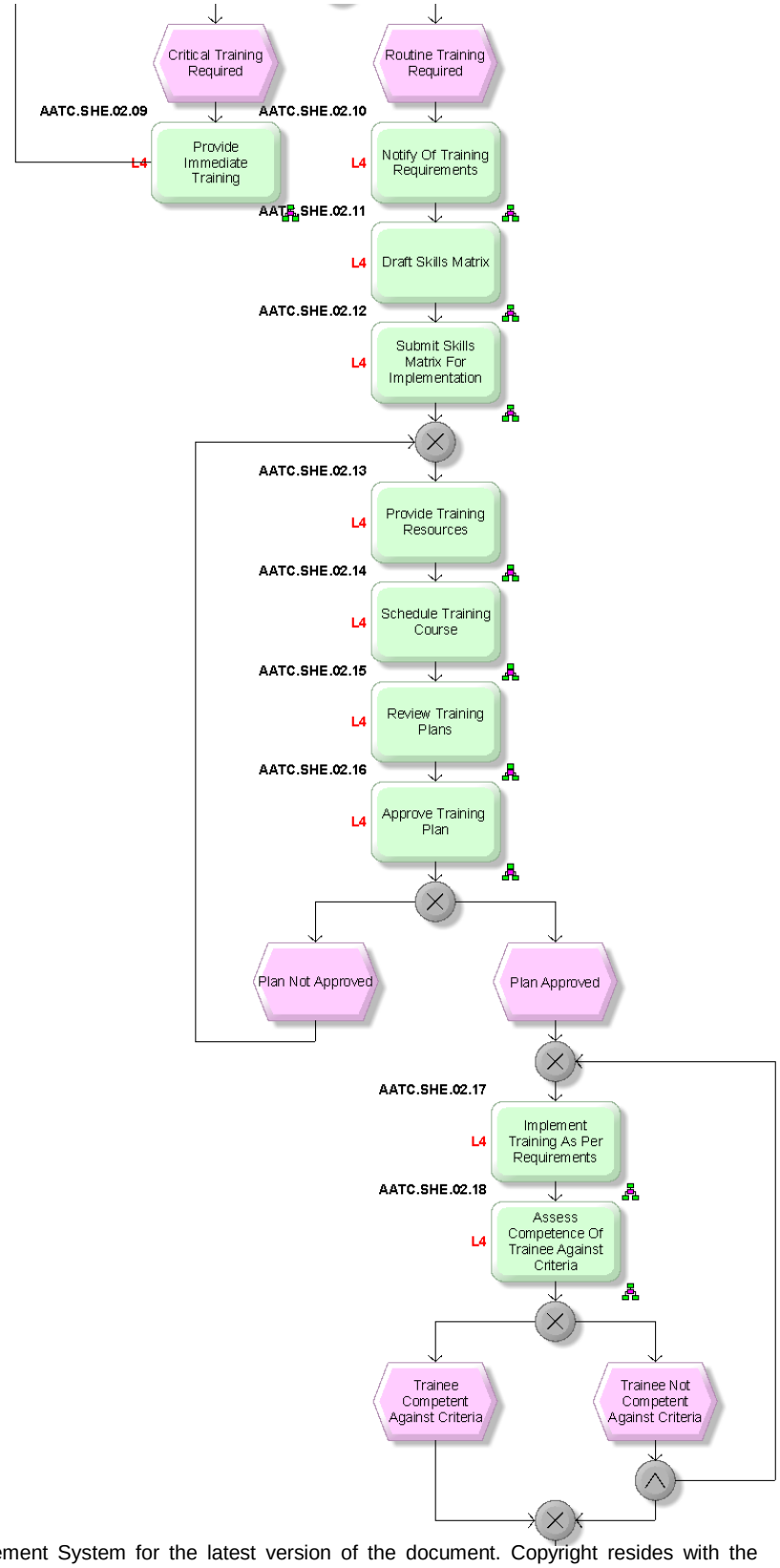
- Structured training is conducted to make key personnel aware of:
  - The importance of conformance with the Policies, Procedures, Operational Procedures and with the requirements of various systems.
  - The significant Risks of their work activities and related impacts and the corresponding benefits of improved personal performance.

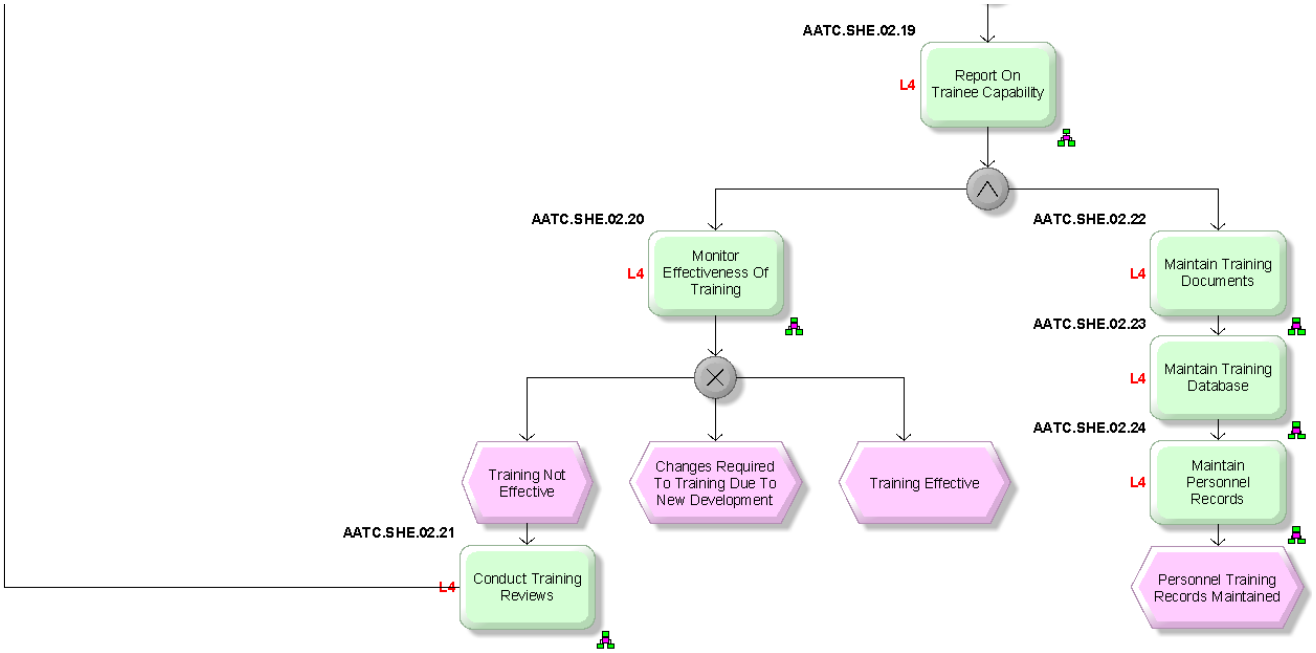
- Their roles and responsibilities in achieving the Policies and objectives and targets and conformance with the system procedures, including emergency preparedness and response.
- The potential consequences of not complying with the Procedures.
- Examples of non-conformance and the causes of non-conformance.

- Training may include external courses or seminars and internal courses and workplace training.
- The training process should also include:
  - Defined competence and skills requirements aligned with specific systems.
  - Assessment of the competence of personnel to identify gaps in their skills and knowledge with the view of identifying training needs, preparation of training plans, and then verify the effectiveness of such training.
- Resources for training should ensure adequate competent personnel are available to cover any eventuality.
- Awareness training must include the potential consequences of departure from specified operating procedures as well as significant environmental impacts, actual or potential, of their work activities.
- Training will be appropriate to the activity of individual employees.
- Visitors / Suppliers and Contractors.
- Training can be extended to include suppliers and contractors. This may be organised by the Procurement department with the assistance of Human Resources Training Department. However:
  - All contractors potentially will undergo site specific training and induction training.
  - Training will also be a requirement for long term contractors.
  - Visitors and suppliers will be inducted on site by means of the visitors onsite induction programme.

PROCESS FLOW DIAGRAM




Critical Training Required
Routine Training Required
AATC.SHE.02.09
AATC.SHE.02.10
Provide Immediate Training
L4
Notify Of Training Requirements
L4
AATC.SHE.02.11
Draft Skills Matrix
L4
AATC.SHE.02.12
Submit Skills Matrix For Implementation
L4
AATC.SHE.02.13
Provide Training Resources
L4
AATC.SHE.02.14
Schedule Training Course
L4
AATC.SHE.02.15
Review Training Plans
L4
AATC.SHE.02.16
Approve Training Plan
L4
Plan Not Approved
Plan Approved
AATC.SHE.02.17
Implement Training As Per Requirements
L4
AATC.SHE.02.18
Assess Competence Of Trainee Against Criteria
L4
Trainee Competent Against Criteria
Trainee Not Competent Against Criteria


AATC.SHE.02.19
L4
Report On Trainee Capability
AATC.SHE.02.20
L4
Monitor Effectiveness Of Training
AATC.SHE.02.22
L4
Maintain Training Documents
AATC.SHE.02.23
L4
Maintain Training Database
AATC.SHE.02.24
L4
Maintain Personnel Records
Personnel Training Records Maintained
Training Not Effective
Changes Required To Training Due To New Development
Training Effective
AATC.SHE.02.21
L4
Conduct Training Reviews

6 PROCEDURE DESCRIPTION

Activity	Description	Frequency	Relevant Document/s
R = Recommend A = Agree I = Input D = Decide E = Execute			
AATC.SHE.02.01 Source Training Material	Ensure that the required training material as identified during the risk assessment is either developed or sourced from external providers. **DE: Training Manager**	Ad Hoc	
AATC.SHE.02.02 Determine If Training Material Fit For Purpose	The Training Manager in conjunction with the Training Official and relevant Subject Matter Expert will determine if the training material is fit for purpose. **DE: Training Manager** **I: Training Official** **I: Subject Matter Expert** **I: Environmental Superintendent** **I: Safety Superintendent**	Ad Hoc	
AATC.SHE.02.03 Amend Training Material	Amend the material to ensure that it is fit for purpose **DE: Training Official**	Ad Hoc	
AATC.SHE.02.04 Build Employee Capacity	The Training Manager in conjunction with the Subject Matter Expert will build employee capacity through the required training, education, any form of communication. **DE: Training Manager** **I: Subject Matter Expert**	Ad Hoc	
AATC.SHE.02.05	Assess the employee to determine if the employee has the required capacity to perform the	Ad Hoc	

Activity	Description	Frequency	Relevant Document/s
R = Recommend A = Agree I = Input D = Decide E = Execute			
Assess Employee Capacity To Perform Task	task through the applicable evaluation. **DE: Training Official**		
AATC.SHE.02.06 Determine Action To Resolve Capacity Problem	Determine if the employee can obtain the required capacity. **DE: Training Official**	Ad Hoc	
AATC.SHE.02.07 Assess Competence Of Employees	Assess the competence of personnel against specific criteria. **DE: Line Supervisor**	Ad Hoc	
AATC.SHE.02.08 Determine Training Needs	Identify training and awareness needs as per the significant impact per job category. Training needs shall be identified through: • Performance appraisal; • PTO's • VFL Observations • Inspections • Analysis of non-conformance and incidents; • Audit findings and recommendations; • At time of recruitment (in the work place); • Training needs analysis; • Impact/ Aspect Register • Additions to scope in services provided; • The updating of procedures (quality, technical and administrative).	Ad Hoc	

Activity	Description	Frequency	Relevant Document/s
R = Recommend A = Agree I = Input D = Decide E = Execute			
	• Request by employee; • Work area review as per training procedure Persons under the control of the organisation shall be made aware of: • Consequences, actual or potential, of their work activities, their behaviour and the benefits of improved personal performance. • Roles and responsibilities and importance in achieving conformity to policies, procedures and management systems, including emergency preparedness and response requirements. • Potential consequences of departure from specified procedures. **DE: Training Manager**		
AATC.SHE.02.09 Provide Immediate Training	Provide coaching to resolve the critical training required. If the problem persists, the Line Manager will refer the matter to the Training Official or Subject Matter Expert. **D: Training Official** **E: Line Manager** **I: Subject Matter Expert**	Ad Hoc	
AATC.SHE.02.10 Notify Of Training Requirements	Once training needs have been established it is up to the Line Supervisor to notify the Training Department of the requirements. The training department will then identify pertinent and relevant courses (if not already done so by Employee/ Supervisor) and schedule training accordingly. **DE: Line Supervisor**	Ad Hoc	
AATC.SHE.02.11 Draft Skills Matrix	Draft a training matrix from training needs analysis. The Skills Matrix for every department will stipulate the training needs of the section or department. **DE: Training Official**	Ad Hoc	**Output Doc:** Training Matrix

Activity	Description	Frequency	Relevant Document/s
	R = Recommend A = Agree I = Input D = Decide E = Execute		
AATC.SHE.02.12 Submit Skills Matrix For Implementation	Submit the Skills Matrix for implementation to the General Manager for budget purposes and to determine training priority. **D: General Manager** **E: Training Manager**	Ad Hoc	**Output Doc:** Skills Matrix
AATC.SHE.02.13 Provide Training Resources	Ensure that training resources are provided. Identified and agreed training needs shall be included in budgets. Course attendance (other than at the internal induction courses) shall be scheduled on the basis of the importance of task contribution to the maintenance, effectiveness and improvement of the objectives. Training expenses, including conferences and symposia would be checked and approved by the Head of Department. The Training Department shall complete a course nomination form and ensure that the procedures are followed regarding course bookings, confirmations and payments. Planning of training for job specific training (done through training needs analysis) will be co-ordinated between the Training Manager and the relevant Section Heads. This will result with on time training schedule for job specific training on the mine. Training Resources shall take into account different levels of: • Responsibility, ability, language skills and literacy and • Risk **DE: General Manager**	Ad Hoc	
AATC.SHE.02.14 Schedule Training Course	The Training Manager or Training Official will co-ordinate all training courses both off and on-site. **DE: Training Manager** **A: Training Official**	Ad Hoc	
AATC.SHE.02.15 Review Training Plans	Review and determine if the training plans support operational requirements. **DE: General Manager**	Ad Hoc	

Activity	Description	Frequency	Relevant Document/s
	R = Recommend A = Agree I = Input D = Decide E = Execute		
AATC.SHE.02.16 Approve Training Plan	Approve the training plan. If the plans are not approved, they will be referred to the training department for further action. **DE: General Manager**	Ad Hoc	
AATC.SHE.02.17 Implement Training As Per Requirements	Training for all employees are done using various methods including: • Every 18 months for all employees - including all training needs. These needs will form part of the skills development plan and skills matrix. • At induction for new employees -specifically to provide overall awareness and understanding of the Systems. • Contractors that are employed on the colliery must, prior to any starting of working activities, complete the contractor's pack. This package requires the contractor to perform SHE Risk Assessments on the activities to be undertaken. The entire risk assessment process and the applicable EMS procedures are referenced within the contractor's package. Environmental Induction slides/ presentation shall be revised as required. • Induction is valid for a period of 18 months, hence refresher shall be done after 18 months or sooner if the person has been away from the working place in excess of 21 calendar days, or if he / she changes section. • In response to change - particularly when revised responsibilities, the introduction of new methods of working, new technology, new or modified products and changes in systems demands create the need for new skills and knowledge. • Depending on the risk profile of the contractor company Generic induction may be required.	Ad Hoc	**Input Doc:** Skills Matrix Induction Material

Activity	Description	Frequency	Relevant Document/s
	R = Recommend A = Agree I = Input D = Decide E = Execute		
	• Colliery Personnel: All employees, current and new, and contractors will undergo induction, a part of which is environmental awareness training and includes the SHE policy. Depending on a person's job category training will be performed on significant aspects pertinent to his/ her area of work. The job category is linked to the training needs analysis matrix of Goedehoop Colliery. At the end of this training, personnel will be required to complete the awareness test and the level of awareness assessed by the Training Department. Coaching and re-testing may be required if the person was found to be not yet competent. All personnel performing tasks which can cause significant or major SHE risks and impacts shall be competent on the basis of training, education and / or experience. • Visitors: All visitors to any controlled access areas of the Colliery will undertake a "visitor's induction", which highlights the main SHE risks and aspects relevant to the mine visit. • Standard Procedures: Employees and contractors shall be made aware of required Procedures related to their activities. **DE: Training Manager** **A: Contractor Employee** **A: Employee**		

Activity	Description	Frequency	Relevant Document/s
R = Recommend A = Agree I = Input D = Decide E = Execute			
AATC.SHE.02.18 Assess Competence Of Trainee Against Criteria	Carry out capacity and awareness training. Evaluation of competency training (implementation of training in the work place) will be carried out by the Line Managers through PTO's or through approved accredited training providers. Awareness and competence will also be reviewed during audits, events of an emergency, and incident. Typical competence assessments include training programme's both formal and informal, PTO's, questioning employees, experience, checklists, qualifications and ability to do the work. Gaps identified shall be referred to the training department by appropriate line Supervisor. **D: Line Manager** **E: Training Manager**	Ad Hoc	
AATC.SHE.02.19 Report On Trainee Capability	Report to the Line Supervisor whether the Trainee is capable. **D: Line Supervisor** **E: Training Official**	Ad Hoc	
AATC.SHE.02.20 Monitor Effectiveness Of Training	Monitor the effectiveness of the training. If the training is not effective as demonstrated in the workplace, or if technological advances, equipment changes, etc., changes may be recommended to the training material. **DE: Line Manager**	Ad Hoc	
AATC.SHE.02.21 Conduct Training Reviews	When the General Manager determines that training is not effective in terms of workplace requirements, changes or new technology, a review of the material will take place. **DE: General Manager**	Ad Hoc	
AATC.SHE.02.22 Maintain Training Documents	Copies of the Skills matrixes and training records will be maintained by the Training Department. **DE: Training Manager**	Ad Hoc	**Input Doc:** Skills Matrix Training Records

Activity	Description	Frequency	Relevant Document/s
R = Recommend A = Agree I = Input D = Decide E = Execute			
AATC.SHE.02.23 Maintain Training Database	A database managed by the Human Resources Department via an external service provider, is used to record all training. **DE: HRD Superintendent**	Ad Hoc	
AATC.SHE.02.24 Maintain Personnel Records	Personal Training Records and Performance Appraisals are retained in the Human Resources Department as per the Quality Management Procedure on Document Control. **DE: HRD Superintendent**	Ad Hoc	**Output Doc:** Training Records Performance Appraisals

7 REFERENCES

	Computer Based Assessments
	Environmental Procedure 004
	HR Skills Development Plan
	HR Training Records
	ISO
	ISO 14001-2004
	Mine Health and Safety Act, 1996 (Act No. 26 of 1996)
	OHSAS
	OHSAS 18001: 1999, Requirement 4.4.2: Training, Awareness And Competence
	OHSAS 18001-2007
	Personal Training Records
	PTO
	Skills Matrix
	Training Certificate
	Training Database
	Training Material
	Training Records
	VFL
	Visitors Induction Form

8 REVISION HISTORY

Version No.	Reason for Change	Date
00	New Document	03/06/2013
01	Procedure due for review	27/02/2017

9 APPENDICES
