mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

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

NAME OF APPLICANT: Rietvlei Mining Company (Pty) Ltd

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FAX NO: +27 86 206 6045

POSTAL ADDRESS: Private Bag X 1, Marshalltown, 2107

PHYSICAL ADDRESS: 151 Katherine Street, Vunani House, Sandton

FILE REFERENCE NUMBER SAMRAD: MP30/5/1/2/2/10105MR

1. IMPORTANT NOTICE

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

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

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

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

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

2. OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

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

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

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

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

(d) determine the—-

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

  (ii) degree to which these impacts—

    (aa) can be reversed;

    (bb) may cause irreplaceable loss of resources, and

    (cc) can be avoided, managed or mitigated;

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

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

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

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

PART A

SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

3. Contact Person and Correspondence Address

a) Details of

i) Details of the EAP

Name of the Practitioner: WSP Environmental (Pty) Ltd

Contact Person: Anri Scheepers

Tel No.: +27 11 300 6089

Fax No. : +27 11 361 1381

E-mail address: Anri.Scheepers@wspgroup.co.za

WSP Global Inc. and Parsons Brinckerhoff have combined and are now one of the world's leading engineering professional services consulting firms. We bring together our 31,500 staff, based in more than 500 offices, across 39 countries to provide engineering and multidisciplinary services in a vast array of industry sectors, with a focus on technical excellence and client service.

In Africa, WSP, Environment & Energy, is a leading environmental consultancy with a broad range of expertise and over 20 years' experience in the regional market. As part of a global business, we provide the marketplace with a dynamic blend of local knowledge and global expertise. While we form part of WSP Global Inc, we are also committed to transformation in our operational region, with 26% Broad Based Black Economic Empowerment (BBBEE) ownership and having achieved Level 3 BBBEE certification in South Africa.

We offer independent, insightful and professional advice to our clients to achieve a balance between environmental protection, social desirability and economic development.

At WSP Environment & Energy, we have a reputation for delivery and excellence and provide a diverse range of integrated and innovative solutions to both public and private sector clients across the industrial, mining, infrastructure and financial sectors

ii) Expertise of the EAP.

(1) The qualifications of the EAP

(with evidence as attached in **Appendix 1**).

Name	Role	Qualifications
Ashlea Strong	Project Manager	■ Masters in Environmental Management, University of the Free State, 2006. ■ B Tech Nature Conservation, Technikon SA, 2001. ■ National Diploma in Nature Conservation, Technikon SA, 1999. ■ SAQA US ID: 115753 – Conduct outcomes-based assessment (NQF Level 5), 2009. ■ Registered as Certified Environmental Assessment Practitioner of South Africa with the Interim Certification Board.
Anri Scheepers	Senior Environmental Consultant	■ Current - MSc in Environmental Management from the North West University, Potchefstroom.

Name	Role	Qualifications
		■ 2014 – Environmental Management Systems ISO 14001 Audit: Lead Auditor. ■ 2011 - ISO 14001 Environmental Management Systems (EMS) Implementation and Auditing. ■ 2009 - IEMA Approved Foundation Course in Environmental Auditing (South Africa). ■ 2007 - B.A Geography Honours, University of Johannesburg. ■ 2003 - 2006 - B.A Geography, University of Johannesburg

Proof of the above-mentioned qualifications are included in **Appendix 1**.

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

(In carrying out the Environmental Impact Assessment Procedure)

Name	Role	Experience
Ashlea Strong	Project Manager	■ 2013, Establishment of the Proposed Rietvlei Opencast Coal Mine, Rietvlei Coal Company, Mpumalanga Province ■ 2013, Decommissioning of Redundant Infrastructure at the Vaal River Operations, AngloGold Ashanti, North West and Free State Provinces ■ 2013, Decommissioning of Redundant Infrastructure at the West Wits Operations, AngloGold Ashanti, Gauteng Provinces ■ 2013, Proposed Kraft Paper Mill in Frankfort, Industrial Development Corporation of South Africa ■ 2011, Inyanda Mine Pegasus South Expansion, Mpumalanga, Exxaro Coal (Pty) Ltd. ■ 2010, Sishen Infrastructure Program, Northern Cape Province, Sishen Iron Ore (Pty) Ltd. ■ 2008, Proposed Mulilo Coal Fired Power Station and associated infrastructure as well as associated power lines and substations in the Musina area of the Limpopo Province, Parsons Brinkerhoff Africa and Mulilo Power. ■ 2008, Pebble Bed Modular Reactor Demonstration Plant and Associated Infrastructure, Western Cape Province, Eskom Generation. ■ 2008, Proposed Bantamsklip – Kappa 765 kV Transmission Lines and associated infrastructure, Western and Northern Cape Provinces, Eskom Transmission. ■ 2008, Proposed Bantamsklip – Bacchus, Bacchus - Kappa and Bacchus – Muldersvlei 400 kV Transmission Lines and associated infrastructure, Western and Northern Cape Provinces, Eskom Transmission. ■ 2006, Proposed Concentrated Solar Thermal Plant in the Northern Cape, Eskom Holdings.

Name	Role	Experience
		▪ 2006, Proposed Underground Coal Gasification plant, Eskom, Mpumalanga, Eskom Holdings. ▪ 2005, Proposed new Coal-fired Power Station in the Lephalale Area for Eskom, Limpopo Province, Eskom Generation.
Anri Scheepers	Senior Environmental Consultant	▪ 2014, Anglo Gold Ashanti Vaal River and West Wits Operations EMPR Updates ▪ 2014, Environmental Management Programme Report Consolidation and Alignment of Union Rustenburg Platinum Mines – Union Mine, Anglo American Platinum Limited ▪ 2014, Environmental Authorisation for Blue Sphere Investments and Trading 103 (Pty) Ltd ▪ 2014, Environmental Authorisation for the Proposed Construction and Operation of Two Furnaces and Associated Infrastructure at Transalloys (Pty) Ltd ▪ 2012, Samancor Manganese (Pty) Ltd Metalloys M14 Furnace Environmental Authorisation ▪ 2011, Compilation of Environmental Management Plans for West Plant at Samancor Manganese (Pty) Ltd Metalloys ▪ 2010, Hotazel Manganese - Mamatwan Mine: Proposed new Sinter Plant

Curriculum Vitae for the above-mentioned team members are included in **Appendix 2**.

b) Description of the property.

Farm Name:	Farm Rietvlei 397 Remaining Extent Farm Rietvlei 397 Portion 1
Application area (Ha)	2 225.30 ha
Magisterial district:	Steve Tshwete Magisterial District
Distance and direction from nearest town	23km northeast of Middelburg
21 digit Surveyor General Code for each farm portion	T0JS00000000039700000 T0JS00000000039700001

c) Locality map

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

The mine is proposed to be situated to the south east of the R555 road, and located within the vicinity of Middelburg, within the Steve Tshwete Council (**Figure 1**). The mine area will extend over 2 225.30ha, with the pit covering approximately 800ha.

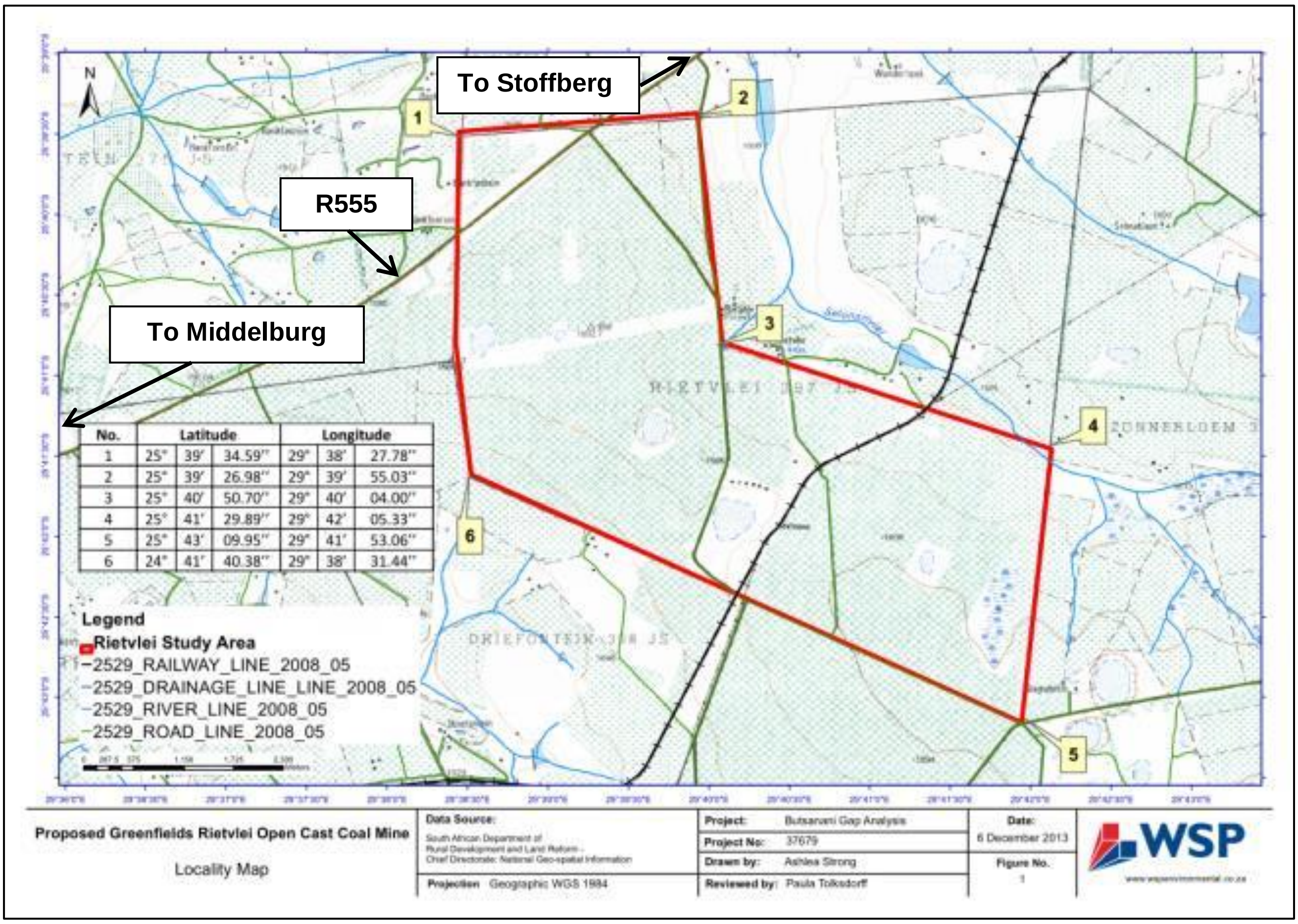


Figure 1: Locality Map (WSP, 2013)

d) Description of the scope of the proposed overall activity.

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

Figure 2 shows the proposed location of the plant area and opencast pit for the proposed Rietvlei Coal Mine.

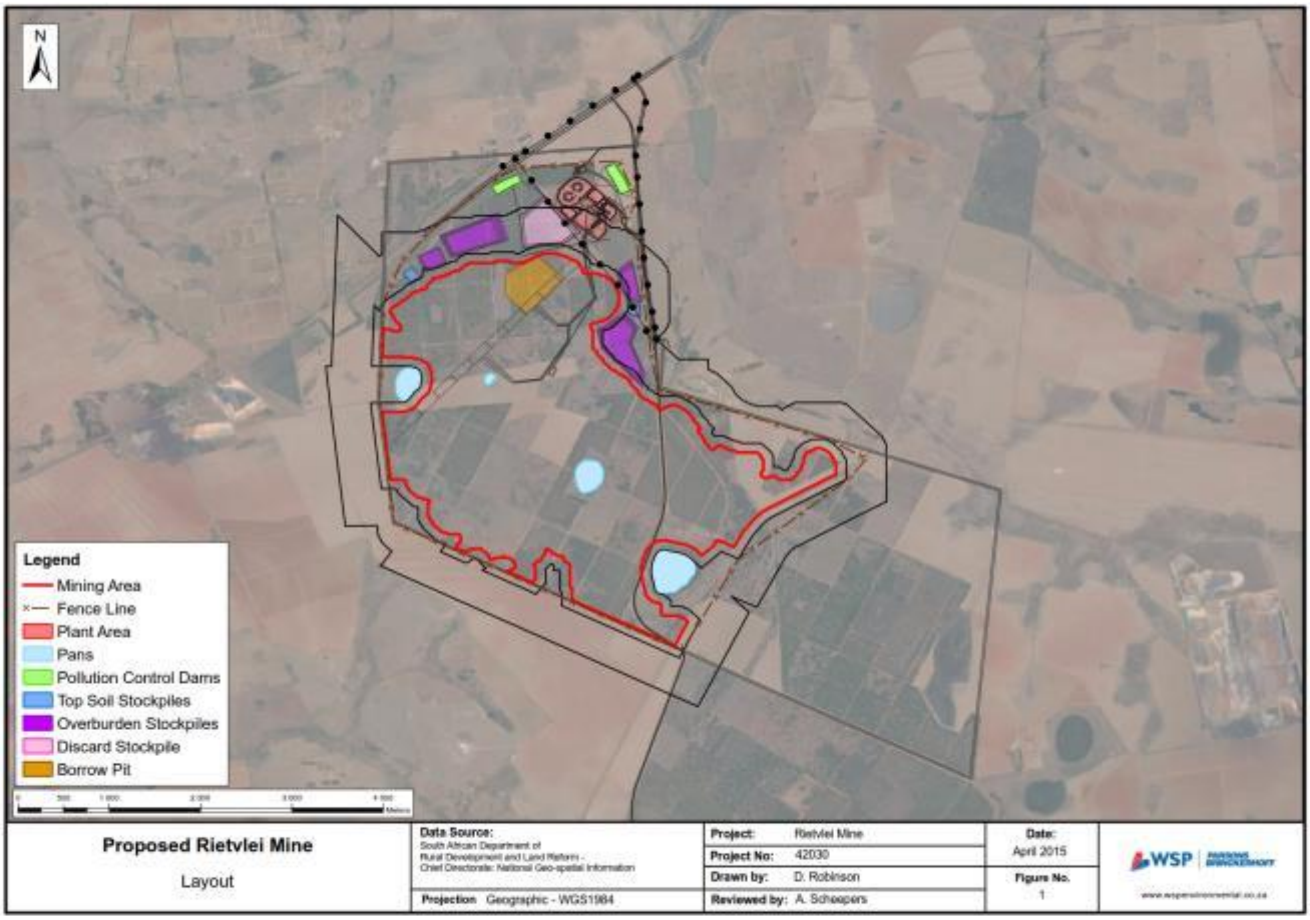


Figure 2: Schematic Illustration of the Infrastructure Associated with the Rietvlei Mine (Mindset, 2013)

(i) Listed and specified activities

NAME OF ACTIVITY **(All activities including activities not listed)** **(E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.)**	**Aerial extent of the Activity Ha or m²**	**LISTED ACTIVITY** **Mark with an X where applicable or affected.**	**APPLICABLE LISTING NOTICE** **(GNR 544, GNR 545 or GNR 546)/NOT LISTED** **NOTE: The new government notice regulations have been utilised in this table i.e. GNR 983, GNR 984 and GNR 985**
Coal processing plant and associated infrastructure:	Plant area = 302.6ha	X	**GNR 983** • *Activity 28 (ii)* **GNR 984** • *Activity 15* • *Activity 19* • *Activity 20*

NAME OF ACTIVITY	Aerial extent of the Activity Ha or m²	LISTED ACTIVITY	APPLICABLE LISTING NOTICE
			• *Activity 21*
▪ Power supply		-	-
▪ Water Supply		X	**GNR 983** • *Activity 9 (i & ii)* • *Activity 10 (i & ii)*
▪ Pollution Control Dams		X	**GNR 983** • *Activity 13* • *Activity 12 (iv)* **GNR 984** • *Activity 6* • *Activity 16*
▪ Buildings, Offices and Change Houses		X	**GNR 983** • *Activity 12 (x & xii)*
▪ Fuel Storage and Dispensing Area			**GNR 983** • *Activity 14* **GNR 984** • *Activity 4*
▪ Overburden Stockpiles		-	-
▪ Coal Discard Stockpile		X	**GNR 921** *Category B* • *Activity 7* • *Activity 10*
▪ Sewage Plant		X	**GNR 983** • *Activity 25*
▪ Water Treatment Facility		X	**GNR 984** • *Activity 25*
Provincial Road D1433 Upgrade and Diversion	Approximately 14km	X	**GNR 983** • *Activity 12 (xii)* • *Activity 24 (ii)*
Plant Roads and Haul Roads	Various distances within the plant and pit areas = 1102.6ha	X	**GNR 983** • *Activity 12 (xii)* • *Activity 24 (ii)* • *Activity 56 (ii)*
Open Cast Pit	Pit area = 800ha	X	**GNR 983** • *Activity 19 (i)* • *Activity 28 (ii)* **GNR 984** • *Activity 15* • *Activity 17*

NAME OF ACTIVITY	Aerial extent of the Activity Ha or m²	LISTED ACTIVITY	APPLICABLE LISTING NOTICE
			• *Activity 19* • *Activity 20* • *Activity 21*

(ii) Description of the activities to be undertaken

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

The Proposed Project is located approximately 50km northeast of the town of eMalahleni and 22km northeast of the town of Middelburg in the Mpumalanga Province. It is linked to Middelburg by the R555. The proposed mining area lies within a farming area within the larger Witbank Coalfield and is bordered by private properties on all sides. The mine boundary covers an area of 2 225.30ha; of this approximately 800ha will be mined. **Figure 3** illustrates the proposed mine layout as at November 2015.

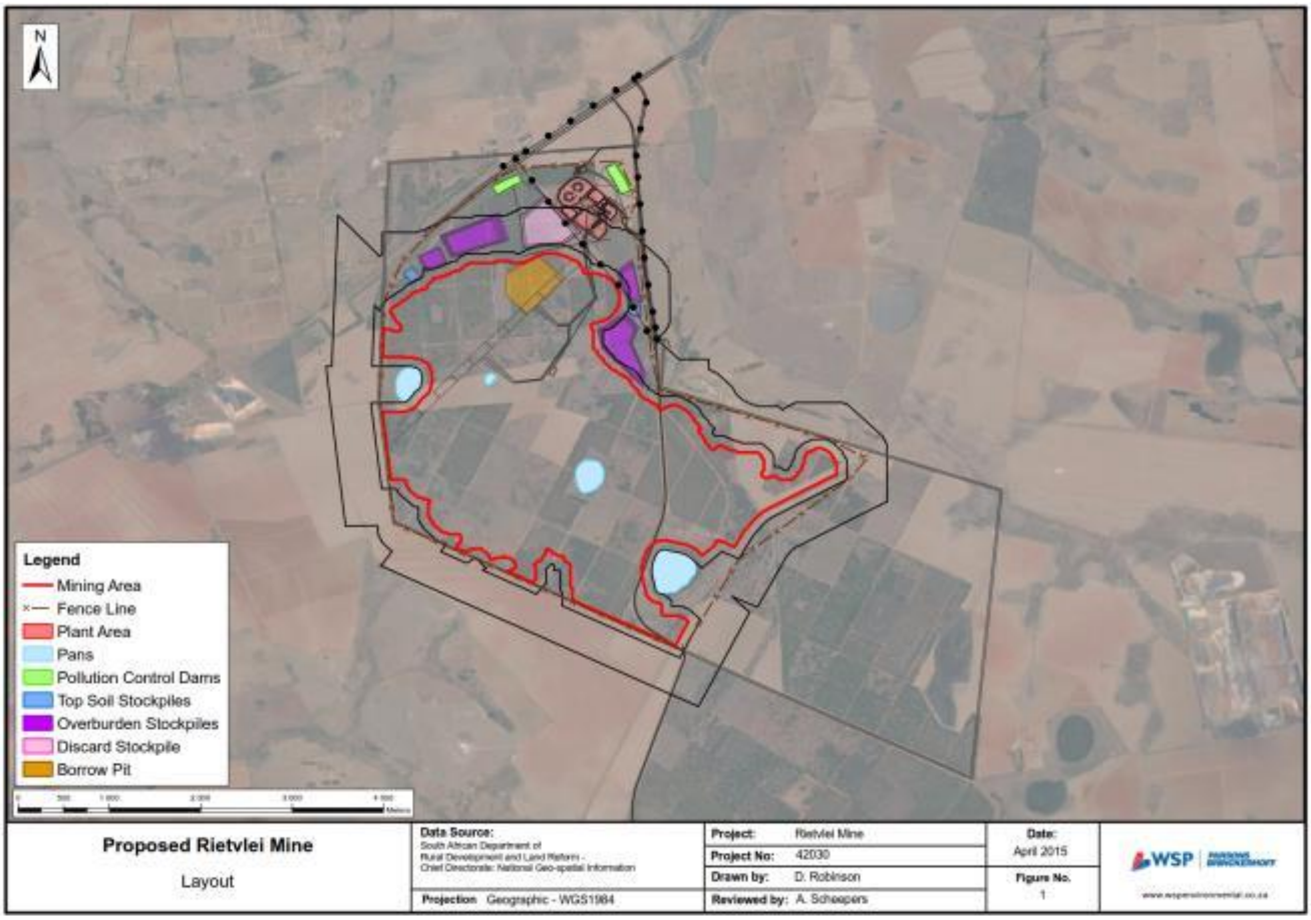


Figure 3: Proposed Rietvlei Mine Layout

Mining Method

An opencast operation utilising conventional truck and shovel mining methods is the proposed mining method for the Rietvlei Mine. The Rietvlei opencast operation will consist of one pit. The pit will be divided into northern and southern sections by a single box cut (**Figure 4** to **Figure 6**) situated toward the centre of the opencast pit. The mining operation will initially progress in a northerly direction. The initial box cut has been designed to be 80m wide, which is double the width of a standard mining strip. This will ensure sufficient volume for the adjacent second and subsequent strip of hard material volumes to fit into the void created.

The construction phase should be completed within 18 months, whilst operational life of mine will be 20 years producing an average of 2.5 million tonnes per annum (Mtpa) and a total of 47 169 kt of run of mine (RoM) coal. Opencast strip mining will occur with concurrent rehabilitation. The decommissioning and closure phase is estimated to take an additional two years to complete. Rehabilitation will form an integral part of the mining process and final rehabilitated land will not be further than four mining strips behind the mining face, thus approximately 160m.

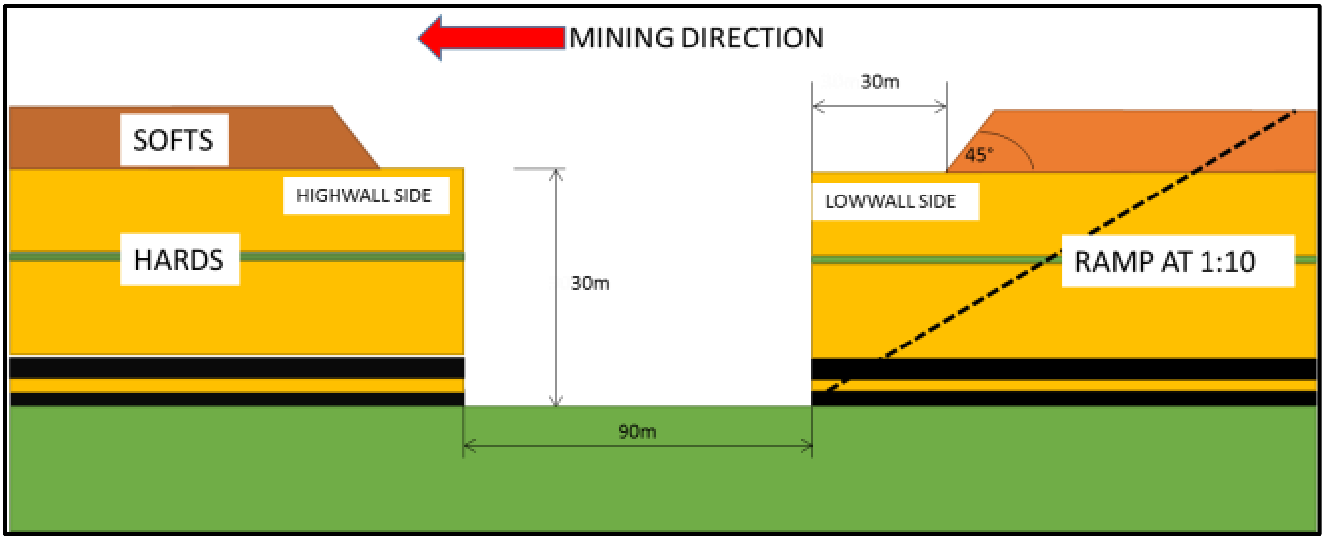


Figure 4: Schematic Section through Box cut looking North

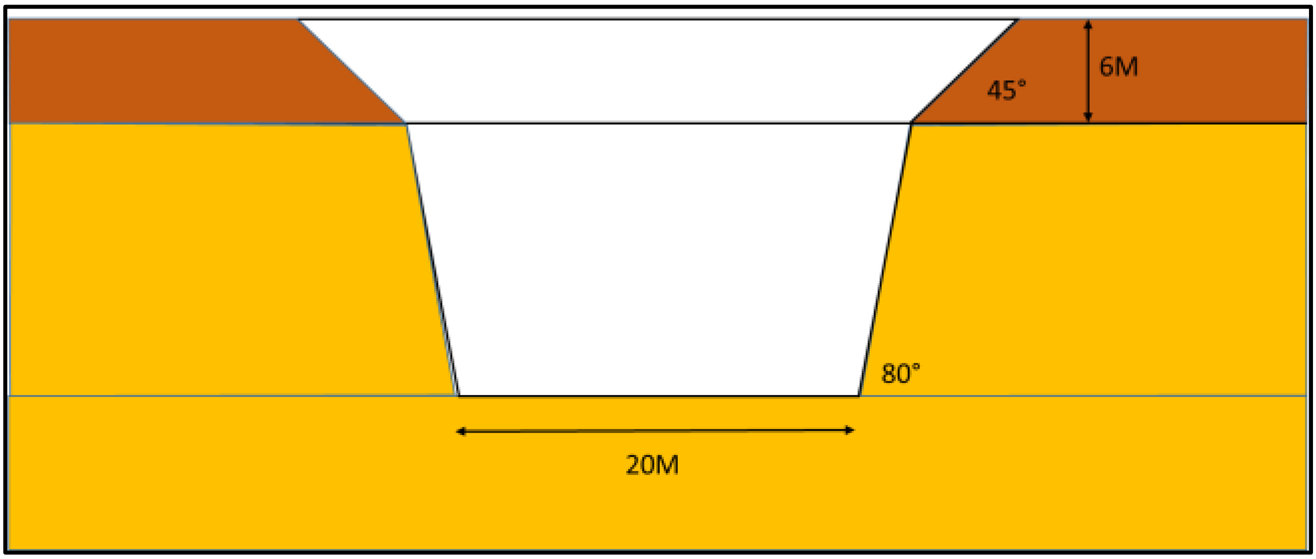


Figure 5: Schematic Section through Ramp Parallel to Box cut

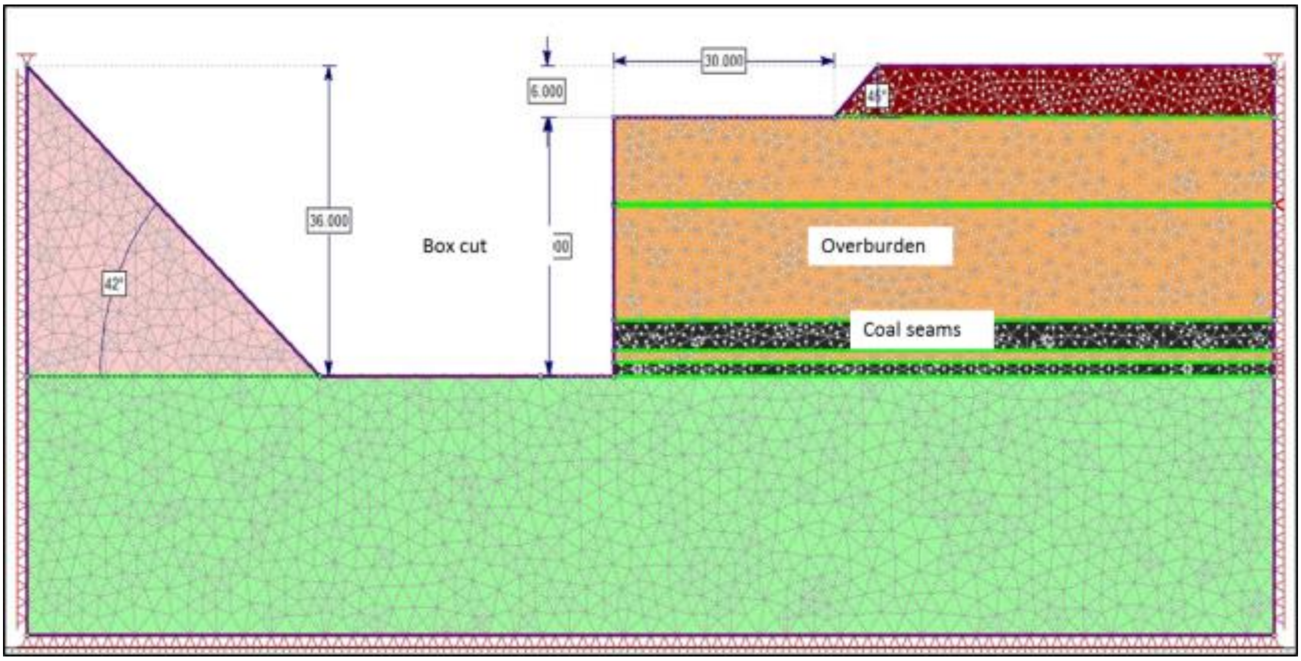


Figure 6: Diagrammatic Representation of the Box Cut

As a result of the shallow depth and thickness of the coal seams, the strip ratios for surface mining will vary. The coal that will be extracted can be divided into two grades namely, export grade thermal coal and domestic grade thermal coal which can be supplied to Eskom for use within specifically selected South African power stations.

The saleable products will be transported from the plant direcly to the customer either by road or rail.. The road from the plant, where it will link via a road diversion to the Afgri Pan Siding (the closest rail siding), will be upgraded to accommodate the transport of sales product.

The mining method will be a standard truck and shovel application where the topsoil is removed and stored. Thereafter; softs will be removed and stored at the designated material stockpiles. Drilling and blasting of the hard material will then take place. Following the blasting process of the hard material, this material will be dozed into the void after the coaling operation is concluded.

The remainder of the hard material will be loaded, trucked out of the pit and dumped over the high wall into the void created by the mining operation. Coaling will then commence and the process is repeated on a strip-by-strip basis. Material (apart from the topsoil) will then be rolled-over into the void created by the removal of the coal in the previous bench with hard and parting material forming the base, followed by softs, levelled and finally topsoil will be placed and seeded.

Figure 7 outlines the process flow for the proposed mining method at Rietvlei Mine.

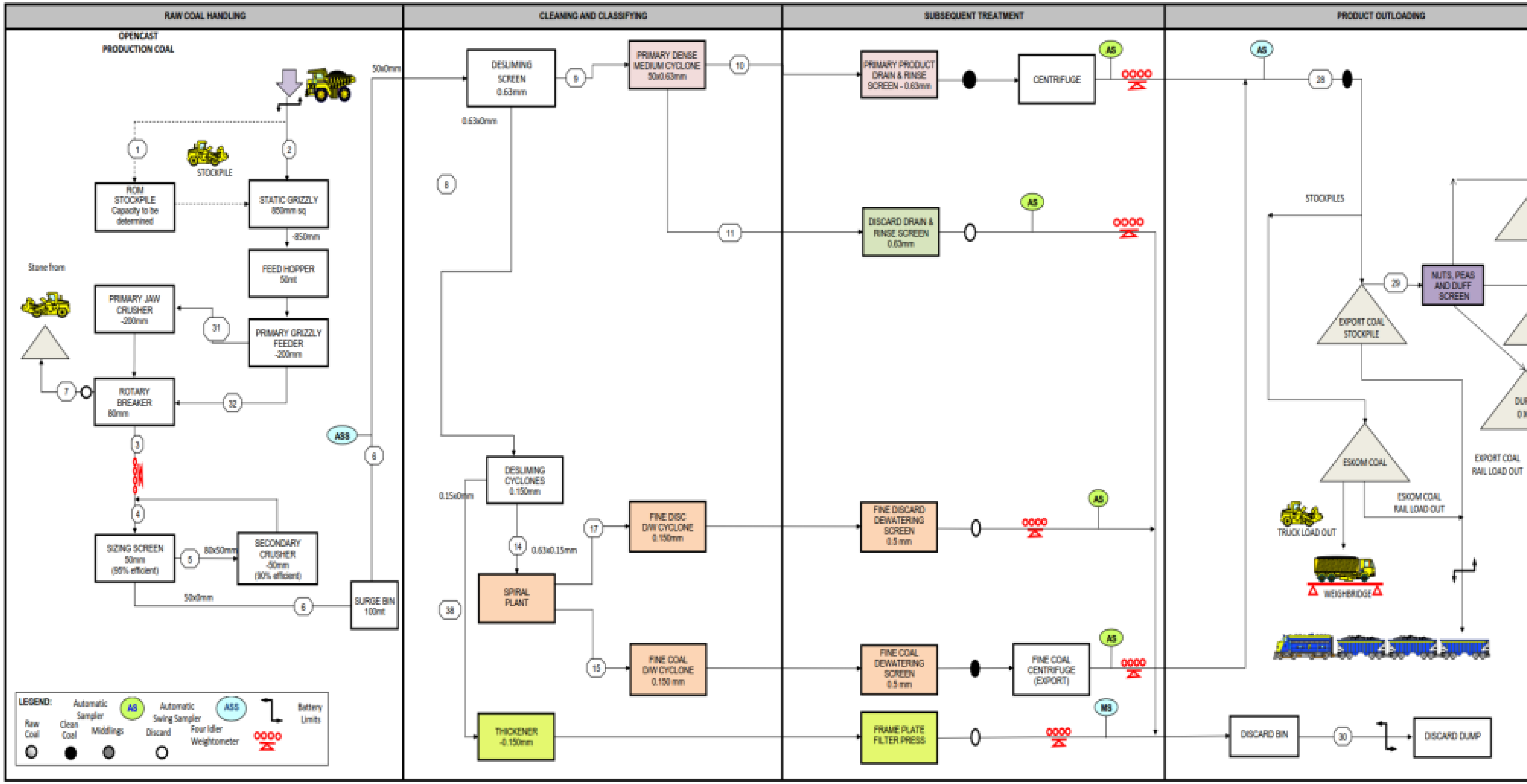


Figure 7: Proposed Mining Process Flow for Rietvlei Mine

Mine Infrastructure

Coal Processing Plant

The Coal Processing Plant (CPP) and its associated infrastructure will be located to the north of the box cut within the mining right area.

The CPP will be using Dense Medium Separation (DMS) cyclone technology. The design of the DMS Section will be based on modular concepts for simplicity and ease of operation. The Sections are designed to provide sufficient capacity for 2.5Mtpa of ROM coal.

The CPP will include retreatment, washing, screening, filtration, product handling and discard deposition. Three seams will be mined, 2 Lower (S2L), 1 (S1) and 1 Lower (S1L) seams. The initial view is that the S2L, S1L and S1 will be washed together to produce a domestic 23.5MJ/kg (air dried) product suitable for Eskom. However, should the export market reach more profitable levels, the S1 can be batch washed for a 5,500kcal/kg export product with the S2l and S1L continuing to be batch washed together for a 23.5MJ/kg (air dried) domestic (Eskom) product.. The S2A and S2U will be mined as part of waste and will be a have the potential for a raw sale blend**. Figure 8** provides an indication of the layout of the CPP.

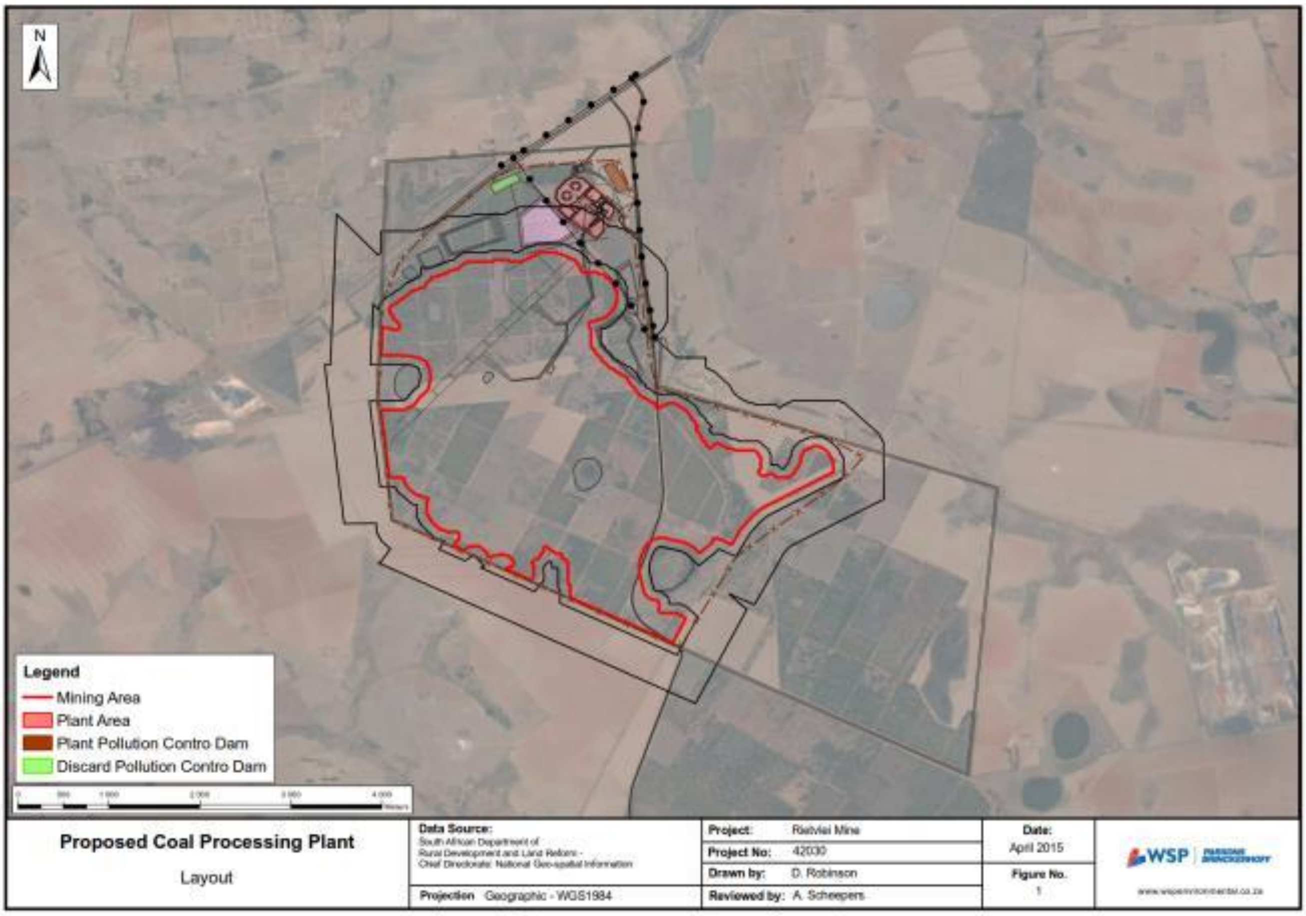


Figure 8: Proposed Coal Processing Plant Layout

Power Supply

Eskom has been approached to provide power to the proposed mine site. It is expected that a 3MVa, connection will be provided from the Retreatment Plant to the Nittens substation.

Water Supply

- *Potable water*

The source of the potable water supply has yet to be confirmed, however the supply requirement is based on the following:

- Consumption per person of 185l/day; and
- Total number of persons 155.

- *Fire water*

Fire protection systems will be based on the minimum requirements of SANS 10400: The application of the National Building Regulations Part T: Fire protection. The following will be provided on site:

- Fire water storage tanks;
- Fire water pumping system;
- Fire water main reticulation system;
- Strategically placed fire hydrants; and
- Take-off points on the main reticulation system for the plant and mining contractor.
- *Mine water requirement*

It is anticipated that a total of 975m^3 per day (355 875m^3 per annum) will be required for the operation of the mine. The majority of this water will be obtained from the collection of stomr water run-off and pit dewatering. Due to the fact that on-site collection of water will not provide the full water requirement, the remaining water will be obtained from an external source such as the Selons River. The top-up water requirement is estimated to be approximately 120 000 m^3 per annum.

- *Clean and Dirty Water System*

All water collected from the mining area (including stomr water and pit water) will be stored in two high density polyethylene-lined pollution control dams (PCD) (i.e. the Discard PCD and the Plant PCD) and re-used in the beneficiation plant as well as for dust-control purposes on the haul roads. The locations of the PCDs are highlighted on **Figure 8**.

Stomr water cut-off drains with dimensions of 2m deep by 1.5m wide will be provided around the entire periphery of the mining site. The cut-off drains and berms will be constructed to ensure that no clean run-off water enters the mining area but that it is rather diverted around the mining area and allowed to flow into surrounding water courses. These drains will be constructed so as to collect and deliver all dirty water from the mining site to the PCDs. All water will be routed through a silt trap before entering the PCDs. The PCDs have been designed with a volume of 66 000m^3 (excluding the freeboard) and will cater for a 1:50 year storm event. **Figure 9** shows the proposed surface water management infrastructure for the plant area.

The Groundwater Study estimates that the cone of depression will extend 2km beyond the pit boundary and that the expected inflow of water is 300m^3 per day. It is recommended that dewatering is conducted ahead of the mining faces, which should provide sufficient quantities of water for the operations. Water from the pit will be pumped into the Discard PCD.

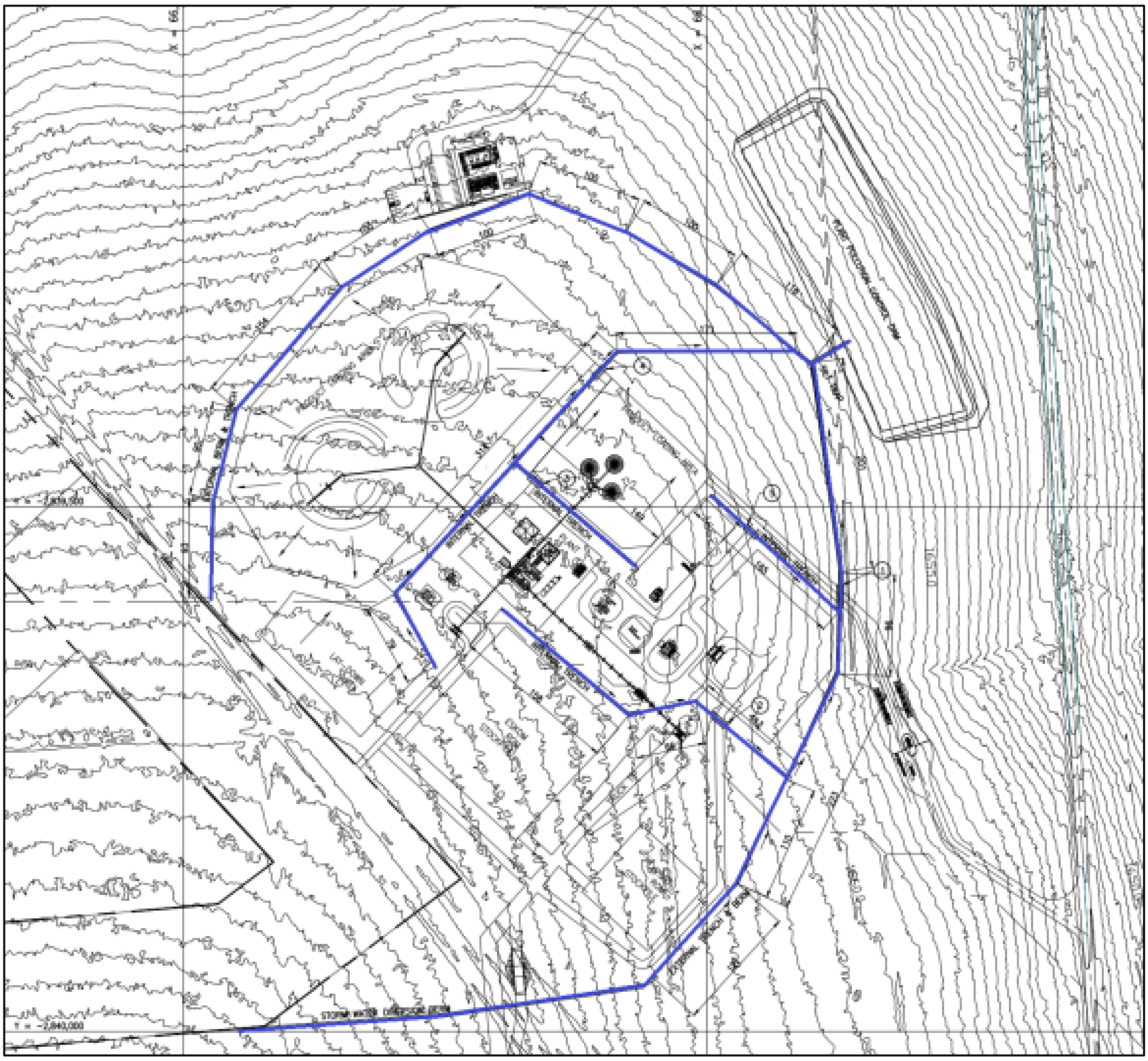


Figure 9: Proposed Surface Water Management Infrastructure for the Plant Area (Indicated as blue lines)

<u>Road Infrastructure</u>

- *D1433 upgrade*

  The existing Provincial Road D1433 (Pan Siding Road), which is currently in a state of disrepair, will not be able to carry the burden of heavily loaded coal trucks over the life of the mine. This road is therefore earmarked to be repaired and upgraded to enable it to meet the increased traffic volume between the R555 and to the Pan Siding. The proposed upgrading will be undertaken in two sections (**Figure 10**):

  - Section 1: From the proposed mine, northbound to the intersection with the Provincial paved road P51/2 (also known as the R555). This section of road will be utilised as an access road to the proposed Rietvlei Mine; and
  - Section 2: From the proposed mine, southbound to the paved section of road D1433, at the rail line crossing at Pan Station. This section of road will be utilised by the Rietvlei Mine for the haulage of their coal stock.
  - The proposed upgrading will include:
    - The improvement of the road geometry (horizontal and vertical alignments) to accommodate the coal haulage trucks;
    - Improvement of the road pavement structure to withstand laden haulage trucks;
    - An improved gravel wearing course;
    - Installation of stomr water drainage cross culverts;

- Improving the stomr water drainage along the road by means of side drain where necessary; and
- Relocation of intersections to improve sight distances; or, alternatively installation of traffic calming measures where the intersection cannot be relocated.

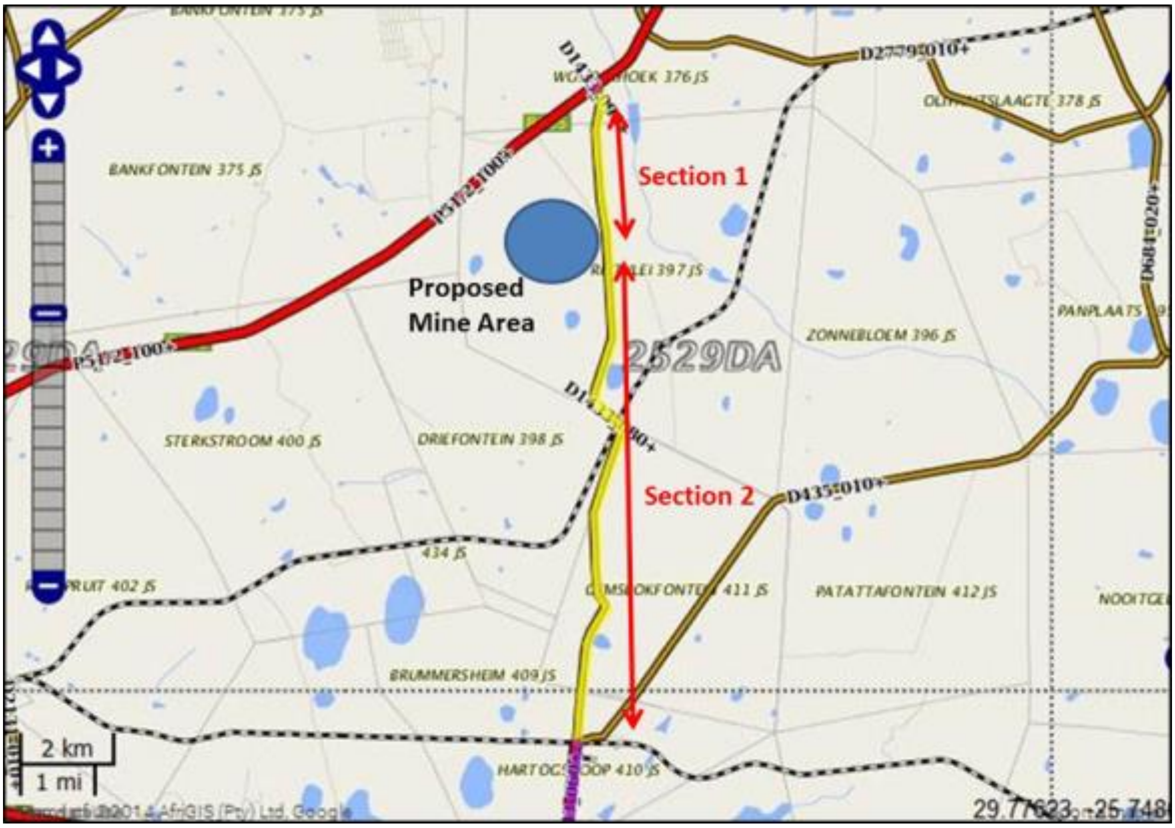


Figure 10: Key Plan of Road Upgrading

- *Pan Siding Road (D1433) Diversion*

  A portion of the district road (D1433) between the R555 and the Afgri Pan Siding will be impacted by the proposed mining activities towards the end of the life of mine and will therefore be required to be diverted at a later stage. The road is currently used by local farmers and inhabitants of the area. The local community will continue to have access to the road and the mine will need to ensure that all signage and road safety warnings are adequate to warn road users regarding the danger of heavy vehicles on the road. **Figure 11** indicates the proposed road diversion from Rietvlei to the siding.

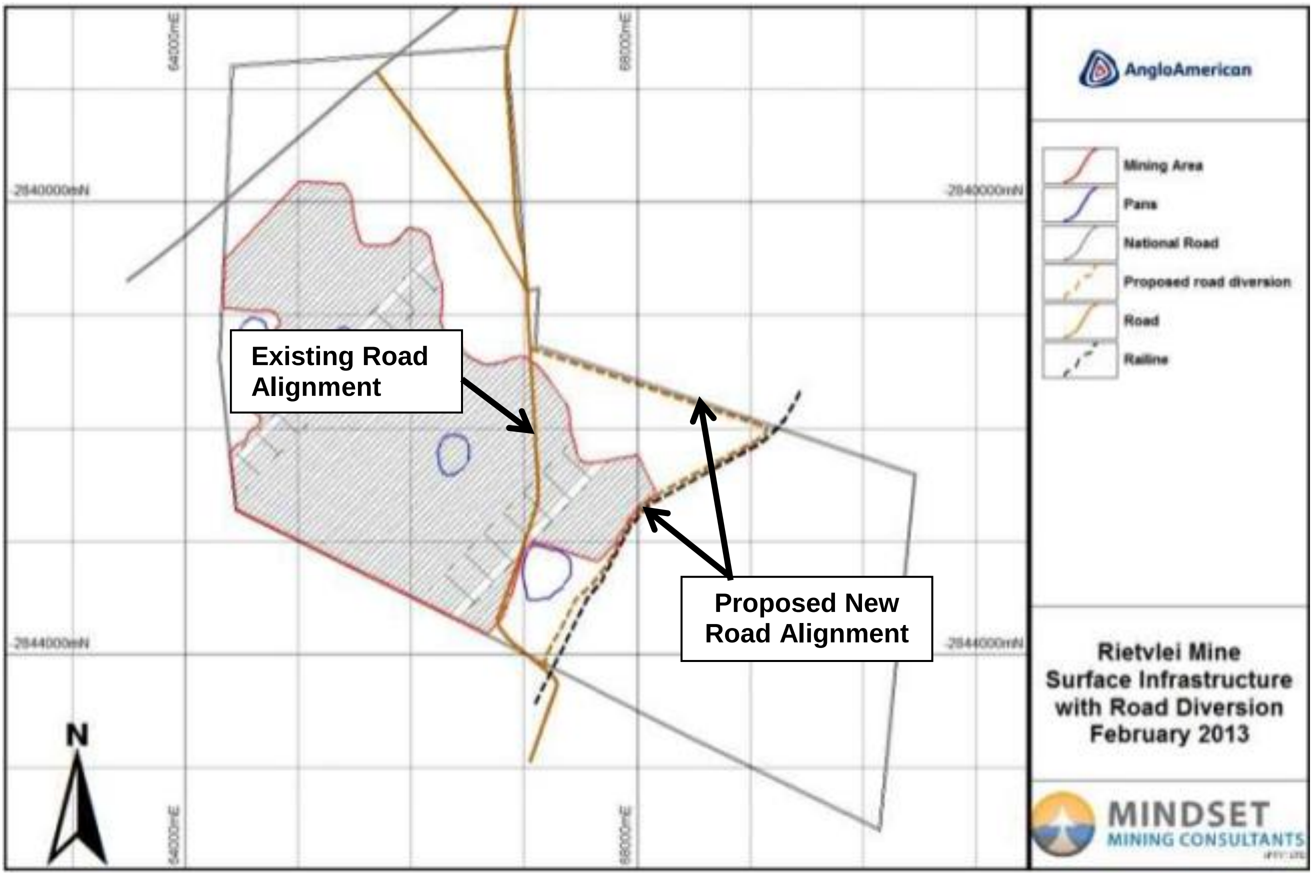


Figure 11: The proposed road diversion from Rietvlei to the Pan siding

- *Plant roads*

  Figure 12 outlines the layout of the roads associated with the plant area.

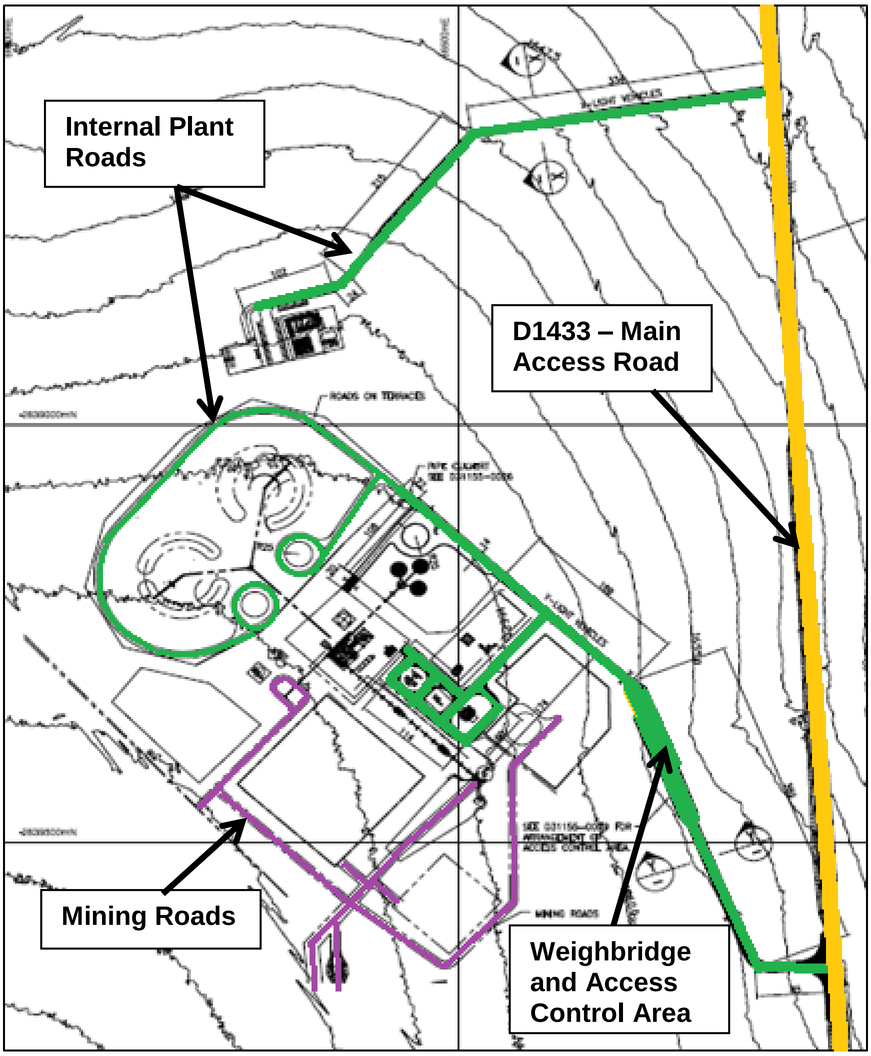


Figure 12: Arrangement of Internal Plant Roads

Buildings and Facilities

- *Buildings, Offices and Change Houses*

  The following buildings will be constructed on the site:

  - An office complex to accommodate the full-time mine personnel, with a floor space of 365m2;
  - A plant office at the plant site; and
  - A separate guard room at the mine entrance.

  All other buildings will be container based, modular in design, and supplied as complete units based on the occupancy requirements. The total staff compliment for the day-, night, - third- and fourth shifts is estimated at a total of 155 people. A shared change house facility will be provided for the client and plant operator with shared water heating and sewer facilities.

- *Fuel storage and Dispensing area*

  Fuel will be stored in a steel tank supplied and maintained by the fuel suppliers. Oil will be stored in drums (provided by fuel suppliers.). A mobile pneumatic pump will be used for filling and will also be supplied by the fuels suppliers. All fuel and oil will be stored in a bunded area to be built and maintained in accordance with SANS 10131.

- *Parking:*

  The following parking has been included for visitors and staff (**Figure 13**):

- Visitor’s parking area will cater for 12 car ports;
- A total of 40 car ports are provided for with fencing around the parking area; and
- A total of 6 parking bays for busses have been provided, with fencing around the parking area.

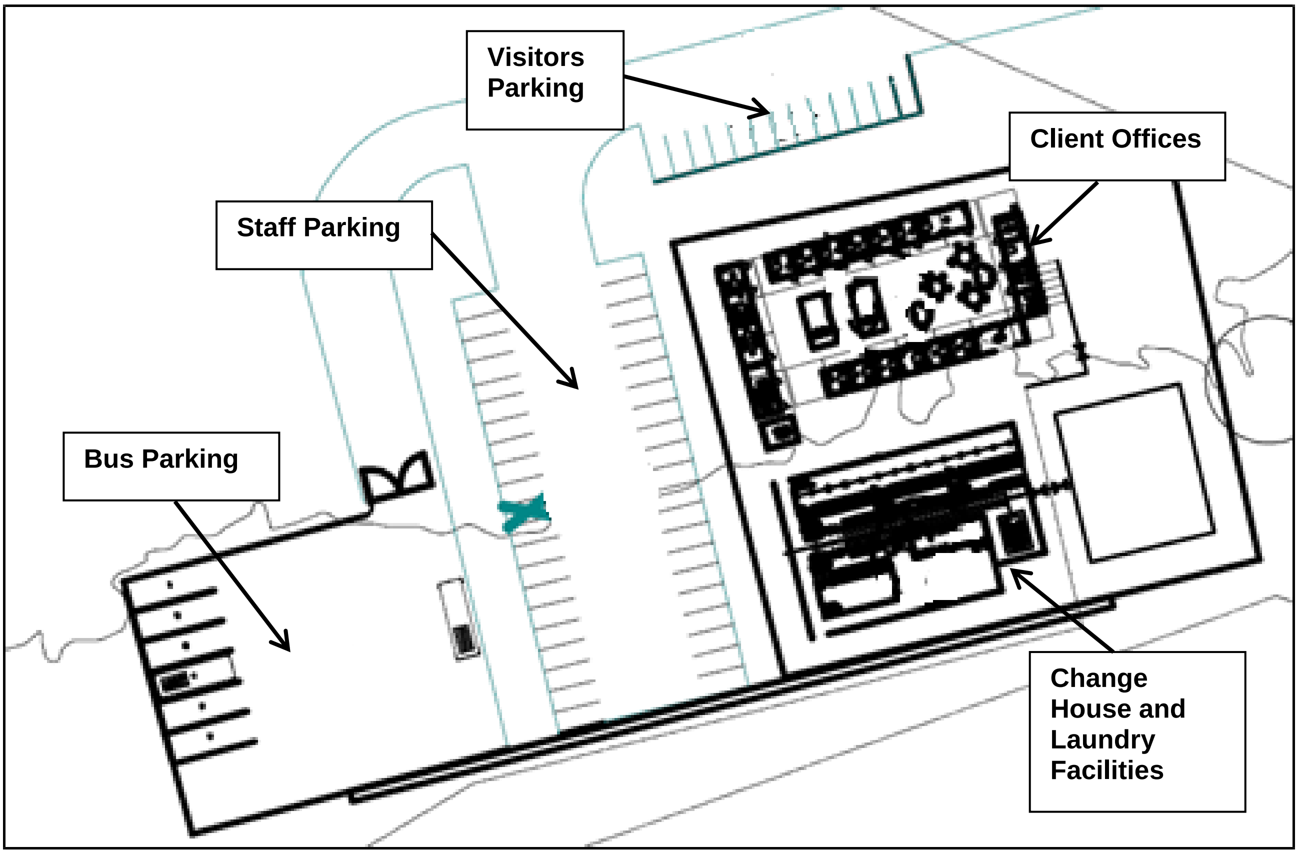


Figure 13: Parking Areas

- *Perimeter Fencing*

  A fence of 16 260m in length will be erected around the mine perimeter (**Figure 14**). The fence will be constructed of Galvanised Diamond Mesh 1.8m high, with 500mm Flat Wrap razor wire coils fitted to the top of the fence. Warning signs “DANGER KEEP OUT” will be fixed to fence at 500m intervals.

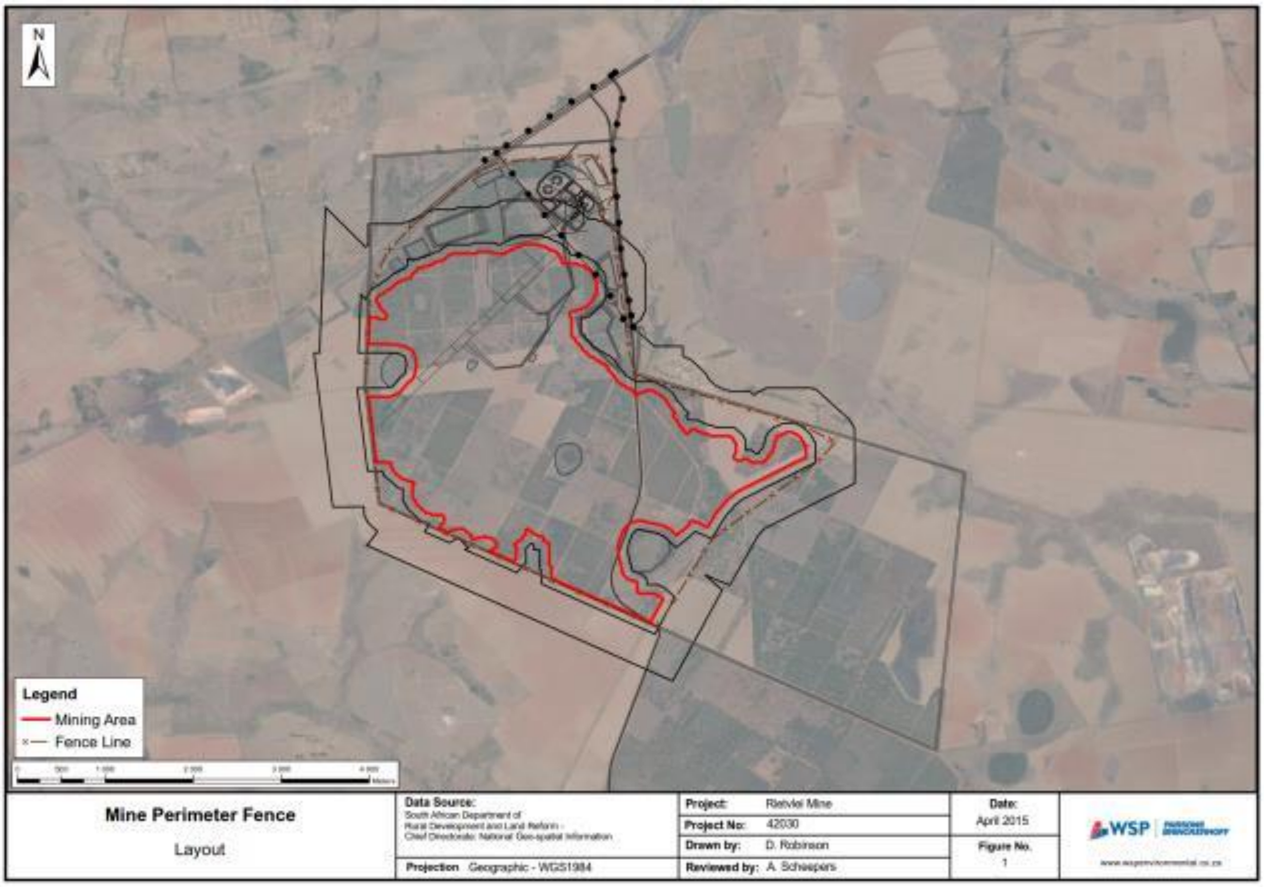


Figure 14: Mine Perimeter Fence (indicated in yellow)

- *Overburden Stockpiles*

  Figure 15 shows the proposed areas for the storage of overburden material. Separate stockpiles have been proposed for hard material (indicated in brown), soft material (Indicated in orange) and topsoil (indicated in green).

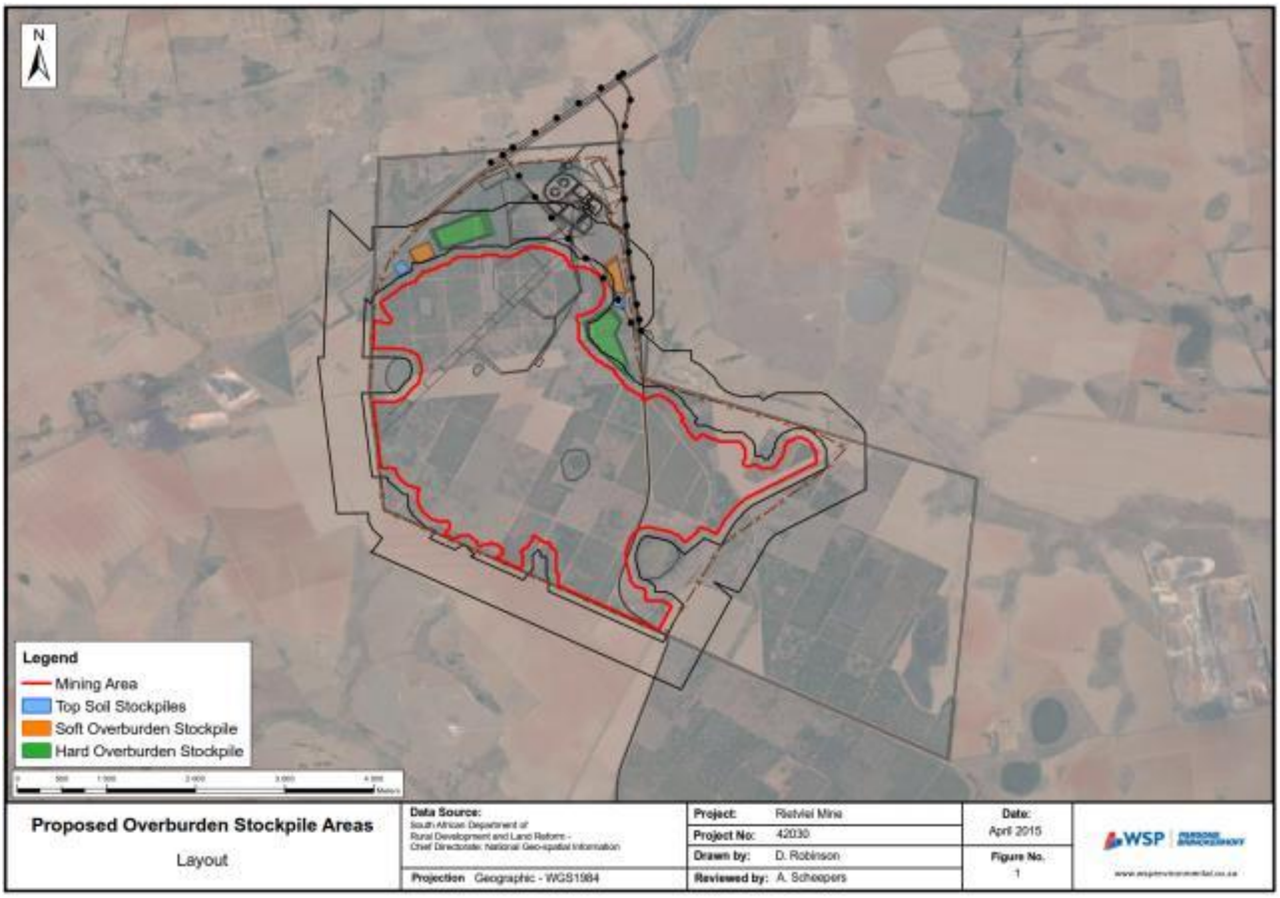


Figure 15: Proposed Overburden Stockpile Areas

- *Coal Discard Stockpile*

  Coal discard and fines from the filter plant will be discarded onto a coal discard facility to be located to the southwest of the plant area (**Figure 16**). The discard facility included on **Figure 16** is a phase 1 discard facility designed to accommodate 2.1 million m^3 of compacted discard for the first 5 years of the life of mine. The resultant height of the facility will be 30m at a 1:3 slope. This facility has been designed with the potential to be expanded over the life of mine as and when required in order to reduce the upfront costs.

  As part of the Bankable Feasibility Study (BFS) test work was carried out on coal samples with regards to washability and quality. No discard was generated during this process and therefore no material was available for waste profiling. However, the proponent requested that the preliminary design of the lining for this facility would be based on a Class C liner as outlined in GNR 636 (**Figure 17**). **Figure 18** shows the proposed preliminary liner design for the discard facility.

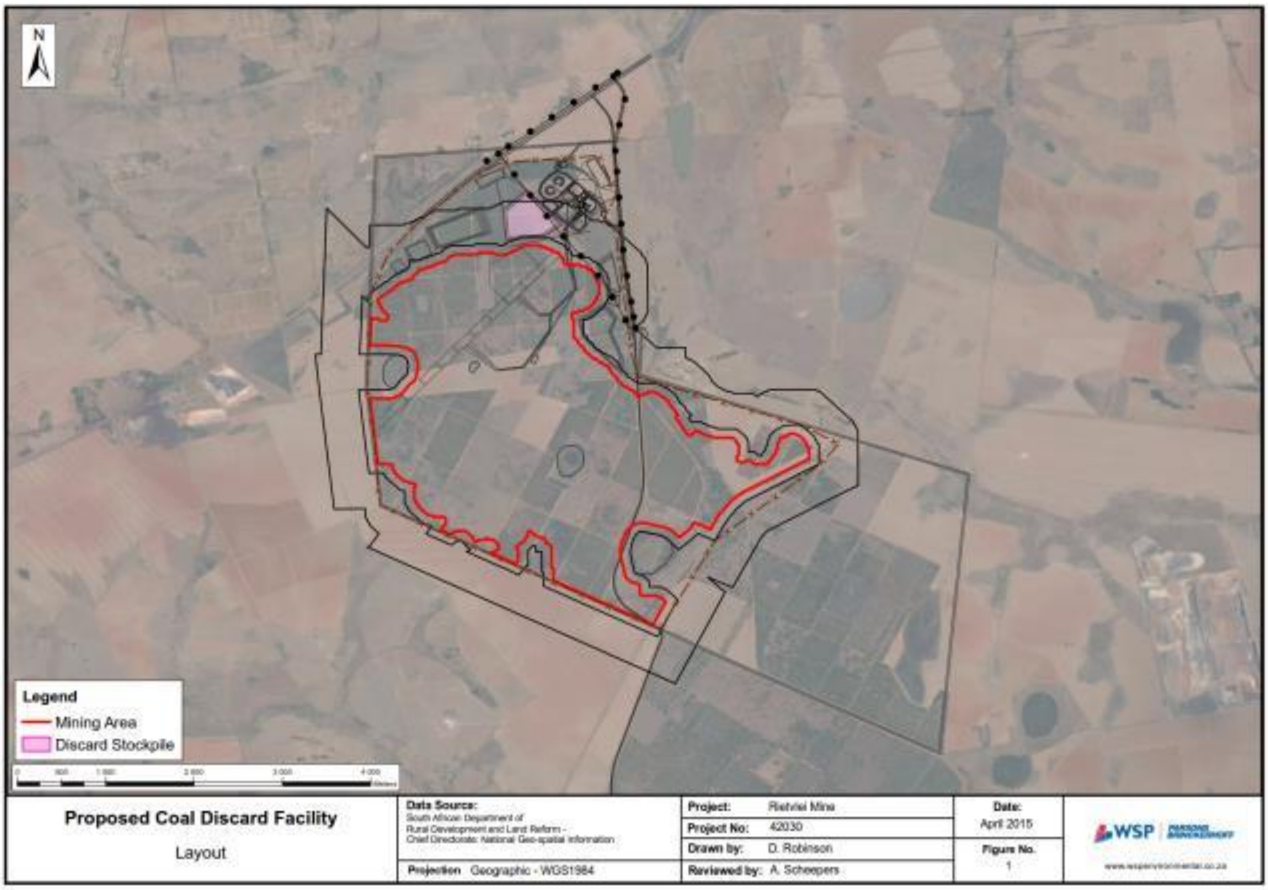


Figure 16: Proposed Coal Discard Facility (indicated in orange)

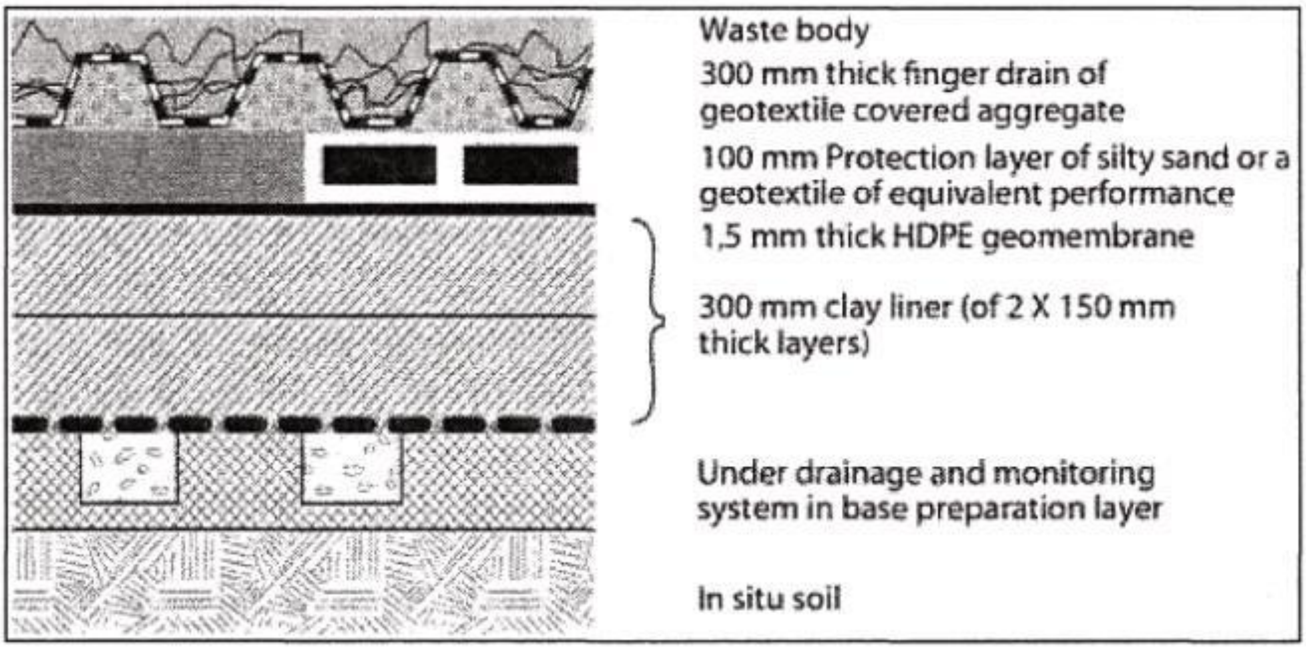


Figure 17: Class C liner required as outlined in GNR 636

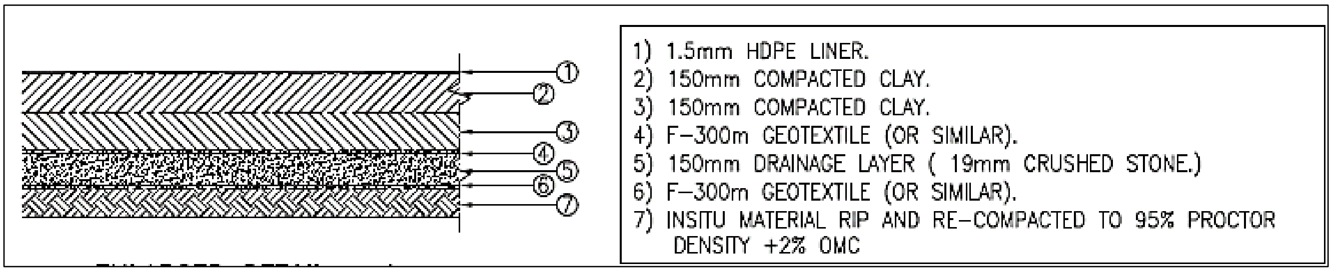


Figure 18: Proposed Preliminary Liner Design for the Rietvlei Coal Discard Facility

- *Sewage Plant*

  A sewage plant (in the form of a package plant) with the design capacity to process 96.8m^3 of fluid per day, with a total volume flow of 15Kl and a capacity of 80 persons, will be situated in the vicinity of the plant and main office complex. The plant requires a total surface area of 44m^2 (8.6m x 5.2m). Grey and black water will feed into a septic tank and then be pumped to the package plant. Water will be treated to general water quality limits and pumped into the Plant PCD for use in the beneficiation plant. Sludge will be removed by an external contractor.

e) Policy and Legislative Context

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT
(A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process);	**(i.e. Where in this document has it been explained how the development complies with and responds to the legislation and policy context)**	**(E.g In terms of the National Water Act:- Water Use Licence has/has not been applied for).**
Minerals and Petroleum Resources Development Act (No. 28 of 2002)		In terms of Section 5 of the MPRDA no person may mine any area without: ▪ A mining right; ▪ An approved environmental management programme (EMPR); and ▪ Notifying and consulting with the landowner. Therefore, to ensure that mining within the study area is lawful the applicant must: ▪ Lodge a mining right application with the DMR in terms of Section 22 of the MPRDA; ▪ Conduct an ESIA process and compile an environmental management programme (EMPR) in terms of Section 39 of the MPRDA and submit such to the DMR; and

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT
		Notify and consult with the landowner in terms of Section 27 of the MPRDA.
National Environmental Management Act (No. 107 of 1998)	Part A 2 d (i)	In terms of Section 24(2) of the NEMA the Minister of the DEA may identify activities which may not commence without prior authorisation from the Minister or member of the Executive Committee (MEC) and may also identify geographical areas in which specified activities may not commence without prior authorisation from the Minister or MEC. The Minister of the DEA thus published GNR 544 (Listing Notice 1), 545 (Listing Notice 2) and 546 (Listing Notice 3) (18 June 2010) listing activities that may not commence prior to authorisation from the Minister or MEC. The regulations outlining the procedures required for authorisation are published in GNR 543 (EIA Regulations) (18 June 2010). Listing Notice 1 identifies activities that require a Basic Assessment (BA) process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity. Listing Notice 2 identifies activities that require an S&EIR process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity. Listing Notice 3 identifies activities within specific areas that require a BA process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity. WSP undertook a detailed analysis of the listed activities contained in Listing Notice 1, 2 and 3 in order to ascertain which of the activities are relevant to the Proposed Project. The activities, potentially applicable to the Proposed Project are as follows: ▪ GNR 983: Activities 9, 10, 12xii, 13, 14, 19, 24, 25, 28 and 56 ▪ GNR 984: Activities 4, 6, 12x, 12xii, 12iv, 15, 16, 17, 19, 20, 21, 25 and 28. The result of the analysis indicated that an S&EIR process is required. Due to the results presented in the Biodiversity Study, the activities previous identified in GNR 54, namely activities 2, 4, 12 and 16, are no longer applicable.
National Environmental Management Waste Act (No. 59 of 2008)	Part A 2 d (i)	Section 20 of the NEM:WA states that no person may commence, undertake or conduct a waste management activity except in accordance with a WML. A list of waste management activities that require a WML was published in GNR 921 (29 November 2013). GNR 921 states that a person who wishes to commence with a waste management activity must undertake the required basic assessment or Scoping and EIA process in accordance with GNR 543 stipulated under NEMA. WSP undertook a detailed analysis of the listed activities contained in GNR 921 in order to ascertain which of the activities are relevant to the Proposed Project. The activities potentially applicable to the Proposed Project are as follows: ▪ GNR 921 – Category B – Activity 7 and 11. The result of the analysis indicated that an S&EIR process is required.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT
		GNR 926 of 2013 under the NEM:WA provides a set of national norms and standards for the storage of waste, which apply, to any person who stores general or hazardous waste in a waste storage facility. The purpose of these norms and standards is to: ▪ Provide a uniform national approach relating to the management of waste storage facilities; ▪ Ensure best practice in the management of waste storage facilities; and Provide minimum standards for the design and operation of new and existing waste storage facilities.
National Environmental Management: Waste Amendment Act (No. 26 of 2014)	Part A 2 d (i)	The National Environmental Management: Waste Amendment Act (No. 26 of 2014) (NEM:WAA) was promulgated on 2 June 2014 with an effective date of 2 September 2014. In terms of the proposed project the most notable amendments were the change in the definition of waste and the inclusion of Schedule 3. Waste is now defined as follows: *"any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to this Act"* Schedule 3 provides a list of defined wastes categorised as either hazardous (Category A) wastes or general (Category B) wastes. An important inclusion in Category A is the inclusion of residue deposits and reside stockpiles as waste. Prior to the promulgation of NEM:WAA, residue deposits and stockpiles were dealt with under the MPRDA and not considered waste. Residue deposits and stockpiles include wastes resulting from exploration, mining, quarrying and physical and chemical treatment of minerals. The fact that residue deposits and stockpiles are now considered wastes, compliance to the following is now required: ▪ Waste Classification and Management Regulations (GNR 634); ▪ National Norms and Standards for the Assessment of Waste for Landfill Disposal (GNR 635); and ▪ National Norms and Standards for Disposal of Waste to Landfill (GNR 636). As part of the Proposed Project a coal discard stockpile is proposed. In terms of NEM:WAA the coal discard is now considered to be a waste. The following are important to note: ▪ **Waste Classification:** Residue deposits and stockpiles are defined under Schedule 3 of the NEM:WAA. Based on our current understanding, the coal discard (mining residue) is recognised as hazardous under Schedule 3. Wastes

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT
		either defined or listed do not require classification in terms of South African National Standard (SANS) 10234:2008 'Globally Harmonised System of Classification and Labelling of Chemicals (GHS)' (SANS 10234). ▪ **Disposal Requirements:** Coal discard is categorised as hazardous waste, due to the fact that this is a greenfield site, there was no coal discard available for profiling to determine the disposal/containment requirements (with specific reference to the landfill design) in terms of GNR 635 and GNR 636. Therefore, the Proponent made the decision to complete the lining design to fulfil the Class C lining requirements.
National Environmental Management Air Quality Act (No. 39 of 2004)	Appendix 18	The NEM:AQA requires the Minister of the DEA to publish a list of activities which results in atmospheric emissions which may have a detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage. Section 22 of NEM:AQA requires that an Atmospheric Emissions Licence (AEL) be obtained for such listed activities. In terms of GNR 893 (22 November 2013), category 5 (mineral processing, storage and handling), subcategory 5.1 (storage and handling of ore and coal) requires an AEL only in the event that these facilities are "not situated on the premises of a mine or works as defined in the Mines Health and Safety Act 29/1996". This is therefore not applicable for the Proposed Project.
National Water Act (No. 36 of 1998)	Appendix 19 Appendix 20 Appendix 24 Appendix 26 Appendix 33	Section 22(1) of the NWA states that a person may only use water if the water use is authorised by a licence under NWA or if the responsible authority has dispensed with a licence requirement if it is satisfied that the purpose the NWA will be met by the granting of a licence, permit or other authorisation under any other law. A person may only use water without a licence if the water use is permissible: ▪ Under Schedule I of NWA; ▪ As a continuation of an existing lawful use; and ▪ In terms of a general authorisation issued under Section 39 of NWA. A water use licence (WUL) is required in terms of Section 41 of the NWA for activities listed in Section 21 of the said Act. The water uses potentially applicable to the Proposed Project include: ▪ Section 21(a): Taking of water from a water resource; ▪ Section 21(c): Impeding or diverting the flow of water in a water course; ▪ Section 21(g): Disposing of water in a manner which may detrimentally impact on a water resource; ▪ Section 21(i): Altering the bed, bank, course or characteristics of a watercourse; and

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT
		▪ Section 21(j): Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people. GNR 704 (4 June 1999) under the NWA provides regulations on the use of water for mining and related activities aimed at the protection of water resources (requirements for clean and dirty water separation). GNR 704 requires *inter alia* the following: ▪ Separation of clean (unpolluted) water from dirty water; ▪ Collection and confinement of the water arising within any dirty area into a dirty water system; ▪ Design, construction, maintenance and operation of the clean water and dirty water management systems so that it is not likely for either system to spill into the other more than 1:50 years; ▪ Design, construction, maintenance and operation of any dam that forms part of a dirty water system to have a minimum freeboard of 0.8m above full supply level, unless otherwise specified in terms of Chapter 12 of the NWA; and ▪ Design, construction, and maintenance of all water systems in such a manner as to guarantee the serviceability of such conveyances for flows up to and including those arising as a result of the maximum flood with an average period of recurrence of 1:50 years. GNR 704 also stipulates that no person in control of a mine or activity may- ▪ Locate or place any residue deposit, dam, reservoir, together with any associated structure or any other facility within the 1:100 year flood line or within a horizontal distance of 100m from any watercourse or estuary, borehole or well, excluding boreholes or wells drilled specifically to monitor the pollution of groundwater, or on water-logged ground, or on ground likely to become water-logged, undermined, unstable or cracked; ▪ Place or dispose of any residue or substance which causes or is likely to cause pollution of a water resource, in the workings of any underground or opencast mine excavation, prospecting diggings, pit or any other excavation; and Use any area or locate any sanitary convenience, fuel depots, reservoir or depots for any substance which causes or is likely to cause pollution of a water resource within the 1:50 year flood line of any watercourse or estuary.
National Environmental Management Biodiversity Act (No. 10 of 2004)	Appendix 22 Appendix 23 Appendix 24 Appendix 26	Sections 52(1)(a) and 56(1) of the National Environmental Management Biodiversity Act (No. 10 of 2004) (NEM:BA) state that the Minister may publish national lists of species and ecosystems, respectively, that are threatened or are in need of protection. A list of species that are threatened or are in need of protection was published in GNR 151 (23 February 2007), with GNR 152 (23 February 2007) detailing the regulations relating to such species. These regulations are

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT
		imposed where restricted activities involve specimens of listed threatened or protected species. GNR 152 defines the requirements of permitting and the process related thereto. An assessment considering the presence of any floral and faunal species of concern, as well as suitable habitat to support any such species, was undertaken during the biodiversity assessment. No red data list (RDL) floral species are listed within the relevant grid reference (2529DA) for the Proposed Project. In addition, no RDL floral species were recorded during the site assessment. No RDL or protected reptilian, avifauna and mammal species were encountered in the study area. The amphibian habitat is abundant and in a relatively good condition in most parts of the wetland and pan systems. A RDL amphibian species namely the Giant African Bullfrog (*Pyxicephalus adspersus*) was encountered, which is listed as vulnerable on the IUCN RDL. In terms of invertebrates, the Marsh Sylph (*Metisella meninx*) which is listed as vulnerable on the IUCN RDL has a high probability of occurring in the study area based on distribution patterns for the species. No *Leersia hexandra* grass was observed during the survey and the probability of occurrence of *M meninx* is considered to be low. No other RDL invertebrate species are likely to occur within this study area.
National Environmental Management Protected Areas Act (No. 57 of 2003)	Appendix 22	Sections 48 to 53 of the NEM:PAA lists restrictions of activities that may not be conducted in a protected area. Section 48 states that no person my conduct commercial prospecting or mining activities in a: ▪ Special nature reserve or nature reserve; ▪ Protected environment without the written permission of the Minister and the Cabinet member responsible for minerals and energy affairs; and ▪ Protected area referred to in Section 9: • (b) World heritage sites; or • (d) Specially protected forest areas, forest nature reserves and forest wilderness areas declared in terms of the National Forests Act (No. 84 of 1998). No protected areas were identified within the vicinity of the site.
National Heritage Resources Act (No. 25 of 1999)	Appendix 28	Section 34 and 38 of the NHRA detail specific activities that require an approved heritage impact assessment by the SAHRA. The heritage activities identified as potentially applicable for the Proposed Project are as follows ▪ 1(a) - The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length; ▪ 1(c) - Any development or other activity which will change the character of a site:

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT
		• Exceeding 5 000m^2 in extent; or • Involving three or more existing erven or subdivisions. ▪ 1(d) - The re-zoning of a site exceeding 10 000m^2 in extent; ▪ 2 - Any development of the site where "development" means any physical intervention, excavation, or actions, other than those caused by natural forces, which results in a change to the nature, appearance or physical nature of a place, or influences its stability and future well-being, including: • Construction, alteration, demolition, removal or change of use of a place or a structure at a place; or • Carrying out any works on or over or under a place; or • Any change to the natural or existing condition or topography of land; or • Any removal or destruction of trees, or removal of vegetation or topsoil. Section 48(2) requires a permit from the SAHRA to perform such actions at such time and subject to such terms, conditions and restrictions or directions as may be specified in the permit.
Conservation of Agricultural Resources Act (No. 43 of 1983)	Appendix 21 Appendix 22	In terms of the amendments to the regulations under the CARA, landowners are legally responsible for the control of alien species on their properties. Various Acts administered by the DEA and DWA, as well as other laws (including local by-laws), spell out the fines, terms of imprisonment and other penalties for contravening the law. Although no fines have yet been placed against landowners who do not remove invasive species, the authorities may clear their land of invasive alien plants and other alien species entirely at the landowners cost and risk. Specific management measures for the conservation of agricultural resources have been included in the project and the areas disturbed from mining activities will be rehabilitated to a predefined land use.
National Forest Act (No. 84 of 1998)	Appendix 22	The specialist consultant, Scientific Aquatic Services (SAS), was responsible for assessing the study area and identifying any protected tree species. No protected trees were identified within the boundaries of the Proposed Project site.
Fencing Act (No. 31 of 1963)	Part A 2 g (iii) Part B 1 d (ix)	Section 17 requires that any person erecting a boundary fence may clean any bush along the line of the fence up to 1.5 metres on each side thereof and remove any tree standing in the immediate line of the fence. However, this provision must be read in conjunction with the environmental legal provisions relevant to the protection of flora.
Hazardous Substances Act (No. 15 of 1979)	Part B 1 d (ix)	Dangerous substances contained on-site during the construction phase of the Proposed Project will need to be managed in accordance with the Act and material safety data sheets (MSDS) will need to accompany all dangerous goods (hydrocarbon fuels, cleaning chemicals, paints, etc.).

f) Need and desirability of the proposed activities.

(Motivate the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location).

The Broad Based Socio Economic Empowerment Charter for the South African Mining Industry, hereafter referred to as “the Mining Charter”, is a government instrument designed to effect sustainable growth and meaningful transformation of the mining industry. The Mining Charter seeks to achieve the following objectives:

- To promote equitable access to the nations mineral resources to all the people of South Africa;
- To substantially and meaningfully expand opportunities for Historically Disadvantaged South Africans (HDSA) to enter the mining and metals industry and to benefit from the exploitation of the nation’s mineral resources;
- To utilise and expand the existing skills base for the empowerment of HDSA and to serve the community;
- To promote employment and advance the social and economic welfare of mine communities and major labour sending areas;
- To promote beneficiation of South Africa’s mineral commodities; and
- Promote sustainable development and growth of the mining industry.

To this end, the Proposed Project was earmarked by Anglo American Operations (Pty) Limited as a project to be developed, operated, and owned by a Black Economic Empowerment (BEE) company. RMC has been identified as the BEE company and forms part of Anglo American Operations (Pty) Limited’s strategy to assist emerging Black-owned companies to develop mining projects. RMC is a 60% BEE Company with 40% of RMC being held by Emalangenis and a further 20% held by Vunani Resouces through its one third share in Butsanani, a 60% shareholder in RMC.

Although some coal will likely be sold to the export market, once the market recovers, the majority of the coal from the Rietvlei Opencast Coal Mine will be sold domestically to Eskom, and thus contribute to the reliable provision of electricity which is critical to energy security, industrial development and poverty alleviation initiatives in the country.

The mining activity will also realise several advantages for the local community. The mining activity will provide an income generation for the area, as well as a cash injection into the country’s economy. The employment of local labour will decrease the unemployment rate in the area, as well as allow for the uplifting of these workers (through the implementation of the Social and Labour Plan (SLP) as attached in **Appendix 3**).

The implementation of the SLP will contribute to the empowerment of both the workforce (through the SLP’s Human Resources Development Programme) and local community (through the SLP’s Local Economic Development Programme). It is estimated that for every one job created by direct employment, five are created by indirect employment.

g) Motivation for the preferred development footprint within the approved site including a full description of the process followed to reach the proposed development footprint within the approved site.

NB!! – This section is about the determination of the specific site layout and the location of infrastructure and activities on site, having taken into consideration the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout.

Due to the fact that no location alternatives are available for the Rietvlei Opencast Coal Mine, two alternative layouts have been produced. **Figure 21** and **Figure 22** show Layout 1 and 2 respectively.

The main change between layout alternative 1 and 2 was the movement of the plant area to the northeastern corner of the site. The reason behind this move was necessitated by the need for more space due to the decision to include a coal washing plant and a coal discard facility. Layout alternative 2 is therefore the preferred option.

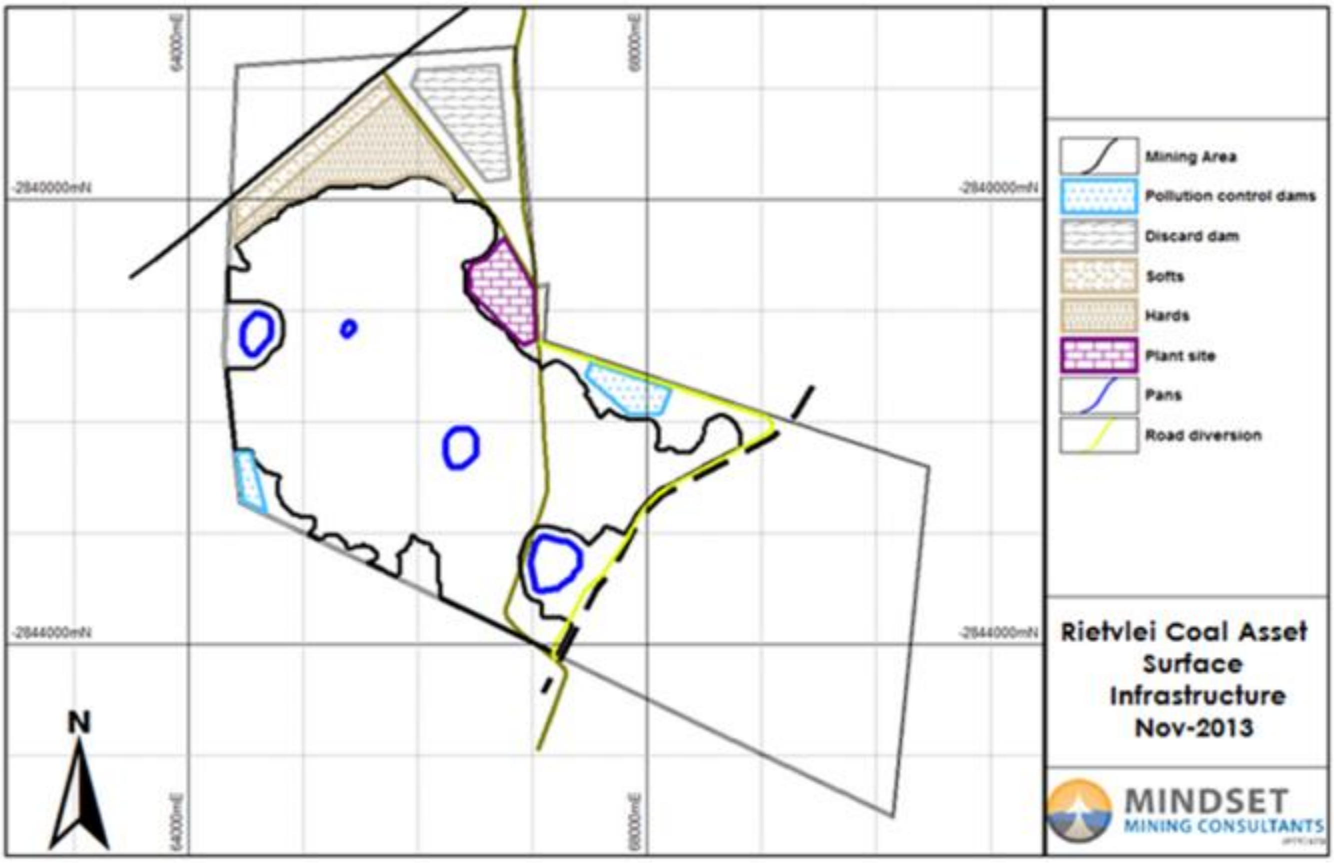


Figure 19: Layout Alternative 1

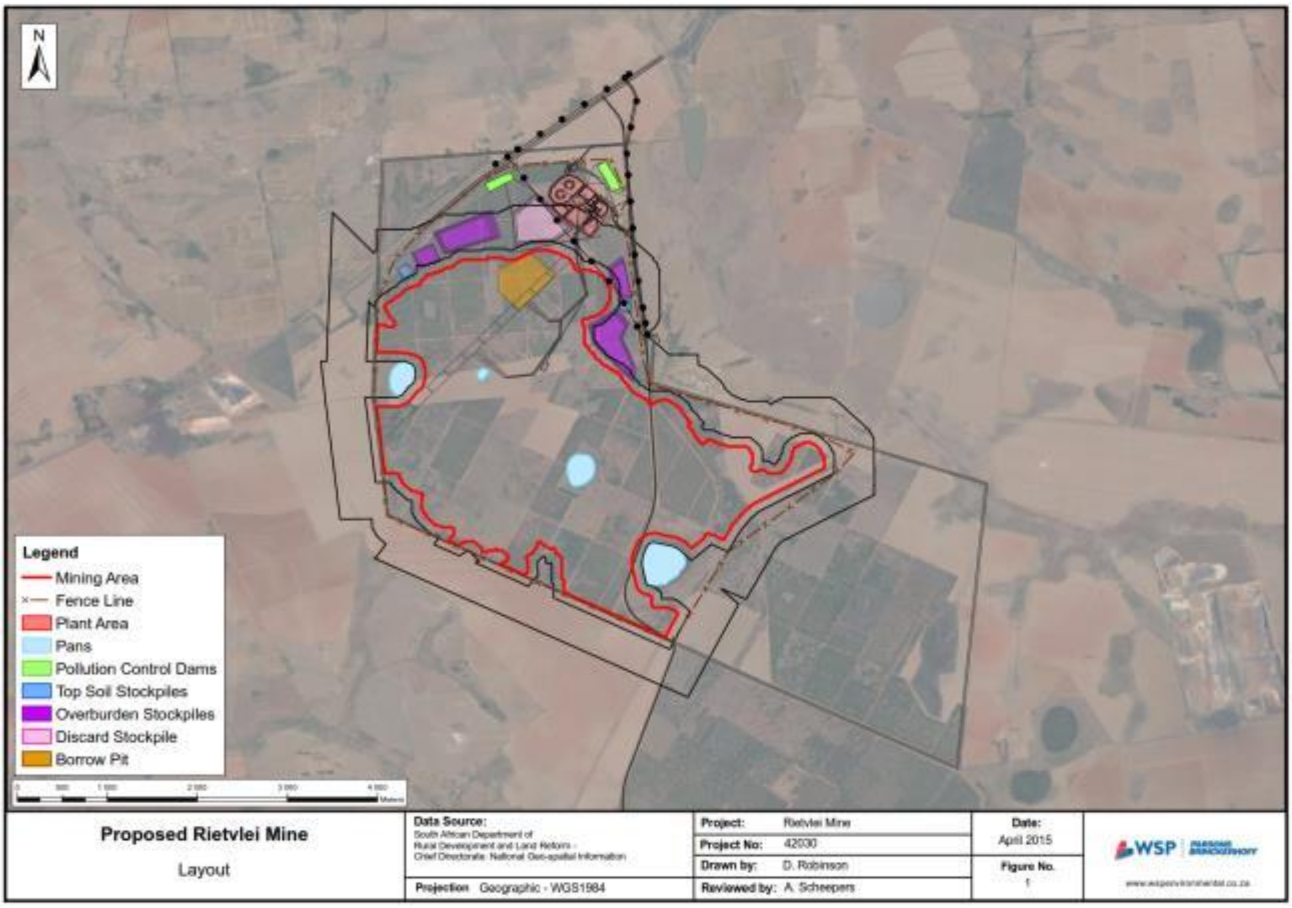


Figure 20: Layout Alternative 2

i) Details of the development footprint alternatives considered.

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

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

(b) the type of activity to be undertaken;

(c) the design or layout of the activity;

(d) the technology to be used in the activity;

(e) the operational aspects of the activity; and

(f) the option of not implementing the activity.

Location Alternatives

The location of a mining operation is based on the availability of a viable coal resource. Anglo American Thermal Coal obtained a prospecting right (MP30/5/1/1/2/57) on 18 November 2006. Subsequently a Competent Person's Report and a Feasibility Study were compiled in order to ascertain the viability of the coal resource. These studies established that a viable coal resource is available on the Remaining Portion of Rietvlei 397 JS and Portion 1 of Rietvlei 397 JS. RMC has recently acquired the prospecting right and seek to obtain the mining rights for these properties. Due to the above there are no location alternatives.

Layout Alternatives

Due to the fact that no location alternatives are available for the Rietvlei Opencast Coal Mine, two alternative layouts have been produced. **Figure 21** and **Figure 22** show Layout 1 and 2 respectively.

The main change between layout alternative 1 and 2 was the movement of the plant area to the northeastern corner of the site. The reason behind this move was necessitated by the need for more space due to the decision to include a coal washing plant and a coal discard facility. Layout alternative 2 is therefore the preferred option.

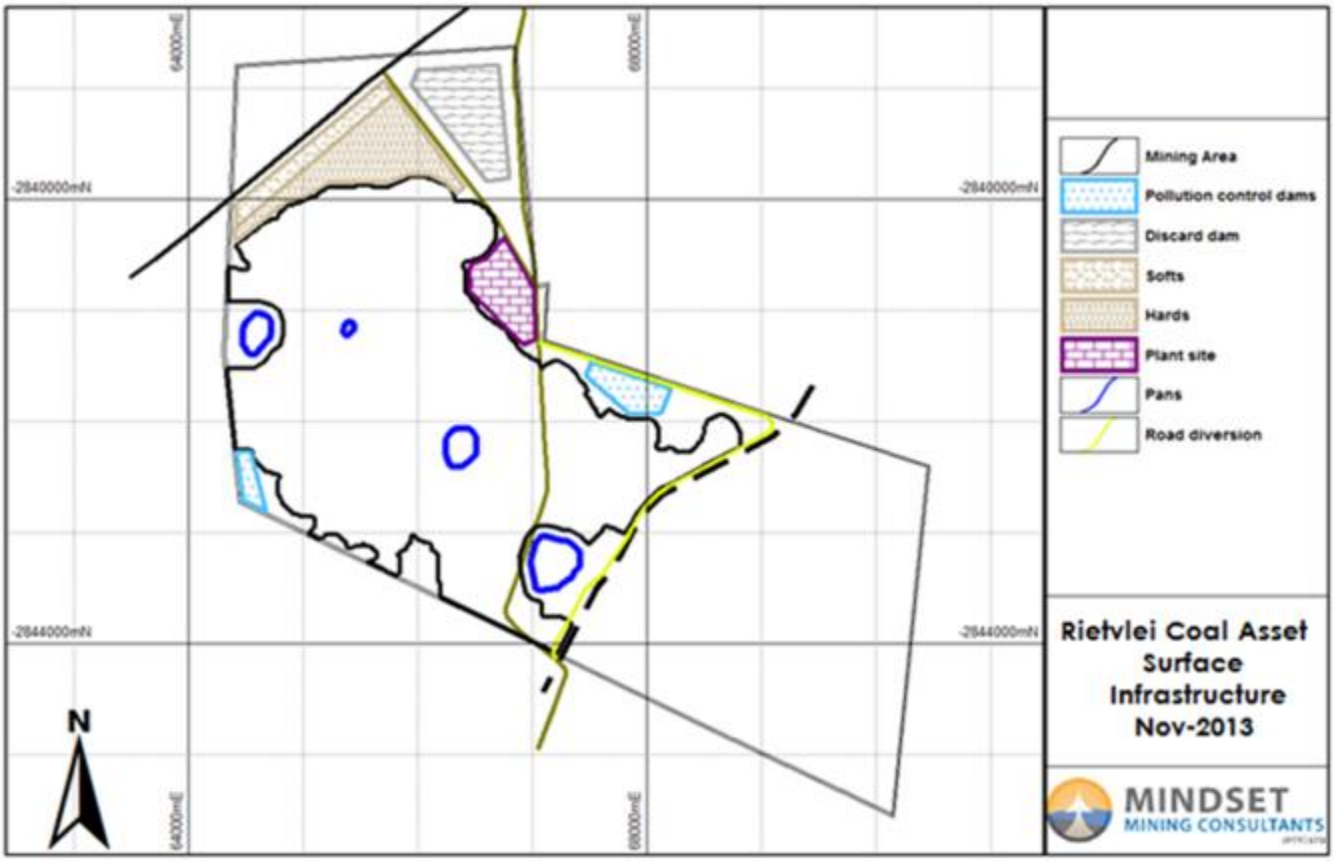


Figure 21: Layout Alternative 1

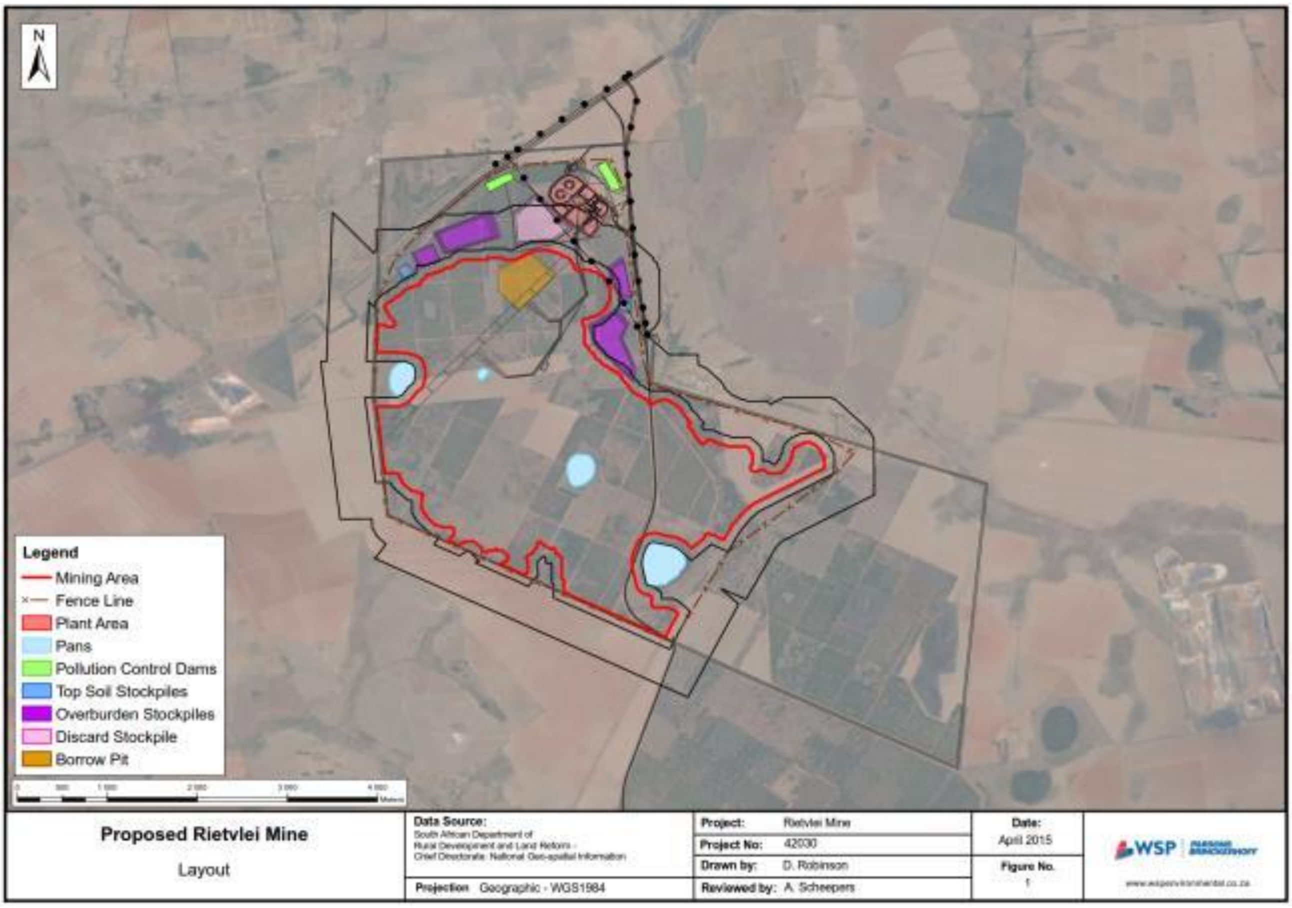


Figure 22: Layout Alternative 2

Linear Alternatives

The district road, D1433, currently joints the R555 (tar road from Middelburg to Stoffberg) to the Pan Siding and to the R104 (tar road from Middelburg to Wonderfontein). This road is currently used by local farmers and inhabitants of the area. The local community will still have access to the road and the mine will need to ensure that all signage and road safety warnings are adequate to warn road users regarding the danger of heavy vehicles on the road.

A portion of the district road (D1433) between the R555 and the Pan Siding will be impacted by the proposed mining activities and will therefore be required to be diverted. The diversion of the district road will only occur in the next 15 years giving the mine enough time to divert the road in such a way that the impact on the surrounding environment, the local farmers and surrounding community will be minimised. **Figure 23** indicates the proposed road diversion from the Rietvlei Opencast Coal Mine to the siding.

The D1433 is also earmarked to be upgraded to enable it to carry the burden of heavily loaded coal trucks to the R555 and to the Pan Siding. The proposed upgrading will be undertaken in two sections:

- Section 1: From the proposed mine, northbound to the intersection with the Provincial paved road P51/2 (also known as the R555). This section of road will be utilised as an access road to the proposed Rietvlei Mine; and
- Section 2: From the proposed mine, southbound to the paved section of road D1433, at the rail line crossing at Pan Station. This section of road will be utilised by the Rietvlei Mine for the haulage of their coal stock.

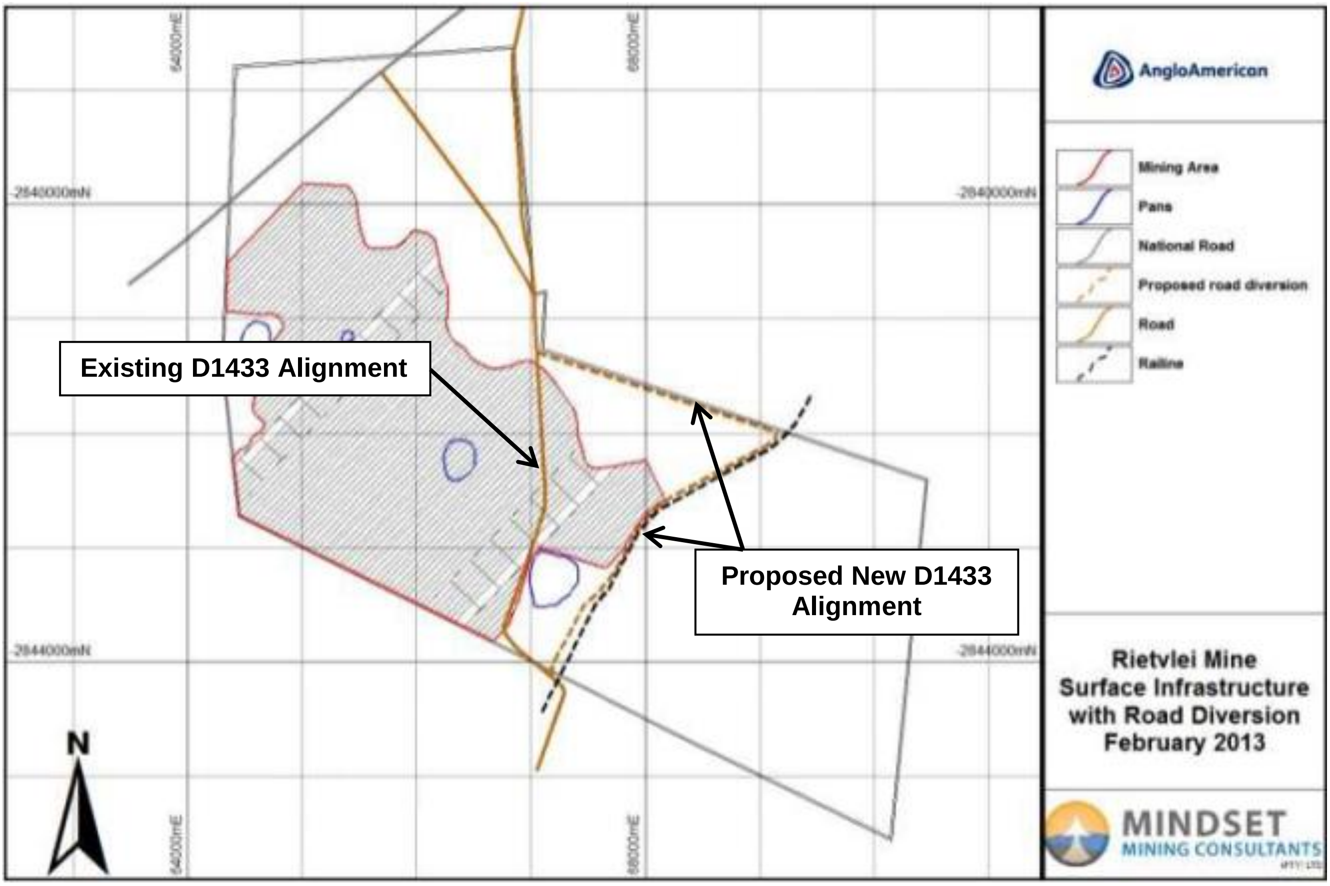


Figure 23: The proposed road diversion from Rietvlei to the Pan siding

Design Alternatives

Mining Method

In general coal is mined via either underground or opencast methods. Underground operations are more capital intensive than opencast operations. In the case of the Rietvlei Mine, underground mining is not considered a viable alternative, as the target seam is too shallow (average depth of 25m). In addition, the remaining two seams would not be able to be safely mined by underground methods due to the thickness of the partings between these seams as well as the thickness of the seams themselves. Opencast mining is considered the preferred mining method.

Discard Disposal

The construction of a discard facility will increase the mine's footprint, and pose a potential dust source. The original proposal for the Rietvlei Mine was to investigate the washing of the coal by a third party which would obviously negate the necessity of a coal discard facility on-site. However, due to the location of the reciprocal third party, the transport costs will add a significant cost to the project. It has subsequently been decided to include a washing plant at the mine which has therefore necessitated the design and inclusion of a coal discard facility on-site.

Siding

There are two potential sidings available for use by the mine. The Arnot Siding is located further east of the Afgri Siding and therefore the use of the Arnot Siding would add a significant cost to the project. The Afgri Siding is considered to be the preferred option.

Alternative Land Uses

The evaluation of alternative land uses and development assesses the potential activities that can be undertaken on the project site in the event that the Proposed Project does not go ahead. When identifying and evaluating alternative land uses, consideration needs to be taken on current land use in the surrounding area as well as the proposed development plans for the regional area. The following alternatives have been identified:

- Agriculture and forestry; and
- Mining.

Due to the fact that agriculture and forestry are the existing land uses on Portion 1 and the Remaining Portion of Rietvlei 397 JS. Therefore, in the event that the Proposed Project does not go ahead the status quo will remain albeit the exisiting forestry is predominantly alien in nature.

No-go Alternative

The 'no-go' option will be a scenario in which there will be no mining. The reserves will not be mined, and no income generation will be realised. The area will remain a predominantly agricultural area.

South Africa has a recent history of power outages, and as such requires coal for the generation of power. The Rietvlei project has been earmarked for such a supply and the 'no-go' scenario will result in such supply not being realised.

The establishment of the mining operation will result in a cash injection into secondary industries such as contractors, manufacturers and suppliers. These secondary industries will not benefit if there is no mining. In addition to this, the SLP will not be implemented. This will result in no investment within the local community, and as a result there will be a loss in the potential for community upliftment.

ii) Details of the Public Participation Process Followed

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

Public participation is understood to be a series of inclusive and culturally appropriate interactions aimed at providing stakeholders with opportunities to express their views, so that these can be considered and incorporated into the S&EIR decision-making process. Effective public participation requires the prior disclosure of relevant and adequate project information to enable stakeholders to understand the risks, impacts, and opportunities associated with the Proposed Project.

The objectives of the public participation process can be summarised as follows:

- Identify relevant individuals, organisations and communities who may be interested in or affected by the Proposed Project;
- Clearly outline the scope of the Proposed Project, including the scale and nature of the existing and proposed activities;
- Identify viable Proposed Project alternatives that will assist the relevant authorities in making an informed decision;
- Identify shortcomings and gaps in existing information;
- Identify key concerns, raised by stakeholders that should be addressed in the subsequent specialist studies;
- Highlight the potential for environmental impacts, whether positive or negative; and
- To inform and provide the public with information and an understanding of the Proposed Project, issues and solutions.

The Roles and Responsibilities of the Stakeholder

Registered stakeholders have the right to bring to the attention of the competent authority any issues that they believe may be of significance to the consideration of the application. The rights of stakeholders are qualified by certain obligations, namely:

- Stakeholders must ensure that their comments are submitted within the timeframes that have been approved by the DEA, or within any extension of a timeframe agreed by the Proponent, EAP or competent authorities;
- Serve a copy of the comments submitted directly to the competent authorities, the Proponent or the EAP; and
- Disclose to the EAP any direct business, financial, personal or other interest that they might have in the approval or refusal of the application.

Role of Stakeholders

The roles of stakeholders in a public participation process usually include one or more of the following:

- Assisting in the identification and prioritisation of issues that need to be investigated;
- Making suggestions on alternatives and means of preventing, minimising and managing negative impacts and enhancing Proposed Project benefits;
- Assisting in, or commenting on, the development of mutually acceptable criteria for the evaluation of decision options;
- Contributing information on public needs, values and expectations;
- Contributing local and traditional knowledge; and
- Verifying that their issues have been considered.

Responsibility of Stakeholders

In order to participate effectively, stakeholders should:

- Become involved in the process as early as possible;
- Register as a stakeholder;
- Advise the EAP of other stakeholders who should be consulted;
- Contribute towards the design of the public participation process (including timeframes) to ensure that it is acceptable to all stakeholders;
- Follow the process once it has been accepted;
- Read the material provided and actively seek to understand the issues involved;
- Give timeous responses to correspondence;
- Be respectful and courteous towards other stakeholders;
- Refrain from making subjective, unfounded or ill-informed statements; and
- Recognise that the process is confined to issues that are directly relevant to the application.

Approach to Public Participation

Our approach to stakeholder engagement is based on the following principles:

- Undertake meaningful and timely participation with stakeholders;
- Focus on important issues during the S&EIR process;
- Undertake due consideration of alternatives;
- Take accountability for information used;
- Encourage co-regulation, shared responsibility and a sense of ownership over the Proposed Project lifecycle;
- Apply "due process" particularly with regard to public participation as provided for in the EIA Regulations; and
- Consider the needs, interests and values of stakeholders.

Scoping Methodology

The following activities are undertaken as part of the scoping phase and subsequent stakeholder engagement:

- Stakeholder identification;
- Authority notification;
- Stakeholder notification;
- Stakeholder meetings;
- Compilation of a Comment and Response Report (CRR);
- Public review of the DSR; and
- Public review of the FSR.

Stakeholder Identification

During the scoping phase a number of stakeholder were identified and informed of the Proposed Project. Presently all stakeholders identified to date have been registered on the project stakeholder database. The EAP endeavoured to ensure that individuals/organisations from referrals and networking were notified of the Proposed Project. Refer to **Appendix 5** for a list of stakeholders captured in the project database.

Authority Notification

WSP consulted with the Department of Mineral Resources on 4 May 2015 and 18 August 2015. The minutes of this workshop are included in **Appendix 6**.

WSP notified a number of other national, provisional and local authorities of the Proposed Project via a notification letter at the start of the scoping public participation process. No comments have been received from these authorities to date however communication lines will remain in place for the duration of the Proposed Project should the authorities wish to comment on the Proposed Project and the EA processes undertaken.

Stakeholder Notification

- *Newspaper Advertisements*

  In accordance with the requirements of GNR 982, the Proposed Project was advertised in local newspapers during the scoping phase. The purpose of the advertisement was to notify the public of the Proposed Project and to invite them to register as stakeholders (see **Appendix 7**). The relevant advertisement dates are listed in **Table 1**.

Table 1: Date on which the Adverts were published during the scoping phase

Newspaper	Publication Date	Language
Witbank News	7 February 2014	English
Middelburg Observer	7 February 2014	Afrikaans

- *Site Notices*

  The official site notices were erected during the scoping phase as per GNR 982 on the proposed site. **Table 2** provides the detail concerning these locations of the official site notices. Copies of the site notices are included in **Appendix 8**. In addition, general project notices, announcing the Proposed Project and inviting stakeholders to register, were placed at the following locations in and around the project area during the scoping phase (**Table 3**).

Table 2: Site Notice Locations for the scoping phase

Location	Co-ordinate	Photographs
	S 25° 39' 00.3" E 29° 39' 55.6"	

Location	Co-ordinate	Photographs
	S 25° 39' 13.9" E 29° 39' 57.1"	
	S 25° 41' 43.1" E 29° 40' 02.1"	
	S 25° 42' 03.4" E 29° 39' 54.7"	

Table 3: General Project Notice Locations

Location	Co-ordinate	Photographs
Gerard Sekoto Library (Middelburg)	S 25° 46' 24.63" E 29° 27' 21.41"	
Middelburg Chamber of Commerce	S 25° 46' 39.63" E 29° 26' 53.93"	

Location	Co-ordinate	Photographs
eMalahleni Library	S 25° 52' 20.19" E 29° 13' 00.59"	

- *Background Information Document*

  The purpose of a background information document (BID) is to provide stakeholders with introductory information on the applications, the S&EIR process and the public participation process. The BID also provides stakeholders who are interested in the Proposed Project with the opportunity to register by way of completing the registration sheet distributed with the BID. Information on the registration sheet has been used to register stakeholders on a database so that they will receive all future project-related information and invitations to meetings. The registration sheet includes a section for comments and issues, which allows stakeholders the opportunity to provide the EAP with written comments and feedback. A copy of the BID is contained in **Appendix 9**.

  BIDs were distributed to surrounding areas and are seen as a suitable notification mechanism for most stakeholder groupings however, in order to ensure an encompassing notification, email, and fax notifications were sent to all registered stakeholders (**Appendix 10**) and copies of the BID were placed at the following locations:

  - Gerard Sekoto Library (Middelburg);
  - Middelburg Chamber of Commerce; and
  - eMalahleni Library.

Figure 24: Background Information Documentation left at the above-mentioned locations

<u>*One-on-one stakeholder meetings*</u>

One-on-one stakeholder meetings were held, as required, in order to present the Proposed Project to key stakeholders and to ask the stakeholders to raise concerns or queries (**Table 4**). The one-on-one stakeholder meetings were facilitated at appropriate venues. WSP facilitated the meetings and was accompanied by the proponent where applicable. The minutes to these meetings are included in **Appendix 11**.

Table 4: One-on-one Meetings held

Stakeholder	Date	Venue
Mr Gideon Anderson	27 March 2014	Zonnebloem Farm
Mr Jan Roux	24 April 2014	Driefontein Farm

Comment and Response Report

All concerns, comments, viewpoints and questions (collectively referred to as 'issues') have been documented and responded to adequately in a CRR (**Appendix 12**). The CRR records the following:

- List of all issues raised;
- Record of who raised the issues;
- Record of where the issues were raised;
- Record of the date on which the issue was raised; and
- Response to the issues.

Public Review of the Draft Scoping Report

The DSR was placed on public review for a period of 30 days from **8 September 2015** to **9 October 2015**, at the following venues:

- Gerard Sekoto Library (Middelburg)
- Middelburg Chamber of Commerce
- Emalahleni Library
- WSP Website (http://www.wspgroup.com/en/Welcome-to-WSP-Africa/WSP-Africa/About-WSP-Africa/public-documents/)

All registered stakeholders and authorising/commenting state departments were notified of the public review period as well as the locations of the DSRs via fax, email and post, refer to **Appendix 13**. The abovementioned plan, for notification and provision of reports, will also be utilised for the review of the EIR once the EIR phase has commenced.

Public Meetings

Table 5 outlines the meetings that were held. The meetings outlined the details of the Proposed Project and provided opportunities for stakeholders to raise issues, concerns and queries. The meetings also established lines of communication between stakeholders and the project team. The meetings were facilitated by WSP's EIA team and were attended by RMC representatives. Invitations to the meetings were sent out in the form of faxes, telephone calls, emails and site notices. The minutes to the meetings are included in **Appendix 14**.

Table 5: Public Meetings

Date	Time	Venue	Attendance
Thursday, 27 March 2014	10:00 – 12:00 (Authorities Meeting)	Middelburg Chamber of Commerce	Attended by a number of local and district authorities.
	13:00 – 15:00 (Community Meeting)	On site	Postponed on request of the Landowner.
	17:30 to 19:00 (Public Open Day)	Middelburg Chamber of Commerce	No attendance.
	19:00 to 20:30 (Public Meeting)		No attendance.
Thursday, 24 April 2014	10:00 to 11:30 (Community Meeting)	On site	Postponed on request of the community representatives. Meeting to be re-scheduled after consultation with the Landowner and community representatives.
Wednesday 28 May 2014	10:00 to 12:30 (Community Meeting)	On site	Attended by 19 members of the local community as well as WSP and RMC representatives.

Final Scoping Report Submission

All issues raised during the scoping phase of the Proposed Project were incorporated into the FSR. The FSR was submitted to DMR on the **17 October 2015**. The FSR and PoS for EIA were acceptance by DMR on **9 December 2015**. A copy of acceptance letter has been included in **Appendix 15.**

EIR Methodology

The following activities are undertaken as part of the EIR phase and subsequent stakeholder engagement:

- Stakeholder identification;
- Authority notification;
- Stakeholder notification;
- Stakeholder meetings;
- Compilation of an CRR;
- Public review of the Draft EIR; and
- Public review of the Final EIR.

Stakeholder Identification

The identification and registration of stakeholders is an ongoing activity during the course of the S&EIR Process. It should be noted however that only a registered stakeholder is entitled to comment, in writing, on all written submissions made to the competent authority by the applicant or the EAP managing an application, and to bring to the attention of the competent authority any issues which that party believes may be of significance to the consideration of the application, provided that comments are submitted within the timeframes that have been approved or set by the competent authority or any extension of a timeframe agreed to by the applicant or EAP.

Stakeholders have and will continue to be identified and notified of the Proposed Project. This gives each stakeholder a chance to comment and provide relevant information that will be taken into account during the EIA process so that an informed decision regarding the Proposed Project can be made. Refer to **Appendix 5** for a list of stakeholders captured in the project database.

Comment and Response Report

All concerns, comments, viewpoints and questions (collectively referred to as 'issues') received during the EIR phase have been documented and responded to adequately in the Comment and Response Report **Appendix 12**.

Public Review of the Draft EIR

The Draft EIR was placed on public review for a period of 30 days from **Monday 25 January 2016** to **Friday 26 February 2016**, at the following venues:

- Gerard Sekoto Library (Middelburg);
- Middelburg Chamber of Commerce;
- eMalahleni Library; and
- WSP Website (http://www.wspgroup.com/en/WSP-Africa/What-we-do/Services/All-Services-A-Z/Technical-Reports/).

All registered stakeholders and authorising/commenting state departments were notified of the public review period as well as the locations of the Draft EIR via email, post and hand-outs at the stakeholder meetings (**Appendix 16**).

- *Newspaper Advertisements*

  The public review period and public meeting dates were advertised in local newspapers (**Appendix 17**). The advert was placed in the Middelburg Observer and Witbank Nuus on 29 January 2016.

- *Site Notices*

  In addition, general project notices, announcing the EIR review period and public meeting dates, were placed at the following locations in and around the project area:

  - Gerard Sekoto Library (Middelburg);
  - Middelburg Chamber of Commerce; and
  - eMalahleni Library.

Figure 25: Site Notices for the Availability of the Draft EIAR and Public Meetings

- *Public Meetings*

  Table 6 outlines the meetings that were held during the Draft EIR review period. The meetings outlineed the details of the Proposed Project and provided and opportunity for stakeholders to raise issues, concerns and queries. The meetings also established lines of communication between stakeholders and the project team. The meetings were facilitated by WSP's EIA team and were attended by RMC representatives. Invitations to the meetings were sent out in the form of faxes, telephone calls, emails and site notices. There were no attendees at the Public or Authority meetings refer to **Appendix 14** for the attendance register.

Table 6: Meetings held during the Draft EIR Review Period

Date	Time	Venue
10th February 2016	14:00 to 16:00 (Authorities Meeting)	Middelburg Chamber of Commerce
10th February 2016	18:00 to 20:00 (Public Meeting)	Middelburg Chamber of Commerce

A community meeting was not held, refer to **Appendix 14** for correspondence with the landowner.

Final EIR Submission

All issues raised during the EIR phase of the Proposed Project have been incorporated into this the Final EIR and have been addressed. The Final EIR will be submitted to the Competent Authority for review and decision-making. The Final EIR will simultaneously be made available for public review for a period of 30 days. Once a decision has been reached, the stakeholders will be informed of the final decision and have 10 days to inform the authorities of their intent to appeal.

Ongoing Consultation and Engagement

In addition to the public documents distributed to stakeholders, there will be ongoing communication between the Proponent, WSP and stakeholders throughout the S&EIR process. These interactions include the following:

- In addition to the project announcement letters, a letter will be sent out to all registered stakeholders providing them with an update of the Proposed Project once the Draft EIR has been approved;
- Interactions with stakeholders will take place in English and Afrikaans as required;
- Feedback to stakeholders, individually and collectively;
- Written responses (email, faxes or letters) will be provided to stakeholders acknowledging issues and providing information requested (dependent on availability); and
- As per the GNR 543, particular attention will be paid to landowners, and neighbouring communities, specifically where literacy levels and language barriers may be an issue.

The consultation with all stakeholders will continue into the Final EIR phase. Consultation will continue and will include:

- Distribution of all project information and findings to stakeholders;
- Public review of the Final EIR for a period of 30 days;
- EIA feedback once a decision has been made by the authorities; and
- Information in the media and press.

Analysis of Stakeholders

Breakdown of the Stakeholders

Issues that were raised to date by stakeholders have been analysed within this section. **Table 7** and **Figure 26** provide a breakdown of stakeholders currently registered on the database.

Table 7 Breakdown of Stakeholders Currently Registered on the Database

Representative sector	Further explanation	No. of stakeholders
Government departments	All tiers of government, namely, national, provincial, and local government. Also inclusive of parastatal organisations such as Transnet, Eskom, SANRAL and Telkom	92
Business and consultants	■ Local and neighbouring businesses in the area. ■ Representatives of consulting organisations that provide services in the area	35
Non-governmental organisations (NGOs) and community based organisations	Agricultural unions, churches, and environmental NGOs	4
General public	Local communities, farmers, and other such individuals who may have an interest in the project	32

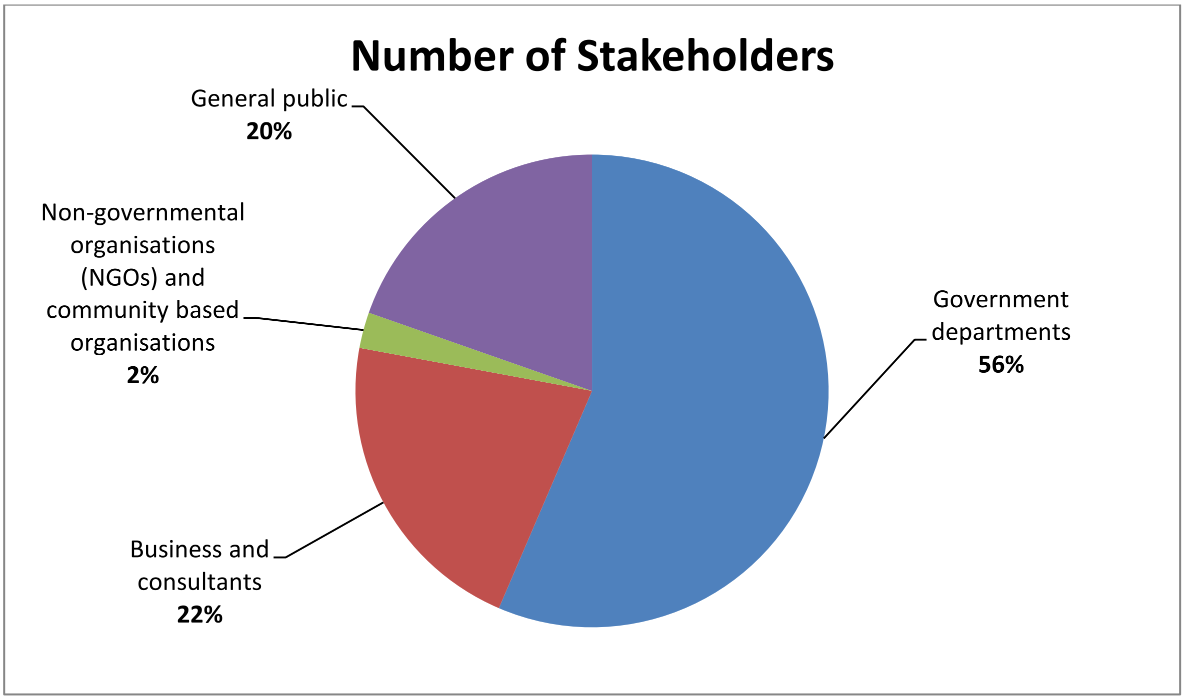


Figure 26: Pie chart showing the Breakdown of the Stakeholders currently Registered on the Database

Key Issues and Concerns

The following key issues and concerns raised by stakeholders have been recorded in the CRR (**Appendix 12**):

- Job creation;
- The impact on water quality;
- The cumulative impact of mining;
- The impact on existing infrastructure;
- The impact on agriculture;
- The impact on safety and security;
- The impact on air quality; and
- The impact on noise.

iii) Summary of issues raised by I&Aps

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

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
AFFECTED PARTIES					
Landowner/s					
Lawful occupier/s of the land					
Name: Wilson Ngwenya **Organisation:** landowner	**X**	**Date**: 08 August 2014 **Form of Correspondence:** E-mail	Contact details for Muzi of Emalangeni and Sipho Mpumlwane of RMC	I am just waiting for confirmation from the client on who the correct person will be in terms of a contact person for yourself – at this stage in the process I think it may be best to send any queries through to myself so that I can facilitate the distribution of information to the correct people ***Ashlea Strong (WSP Environmental)***	Not Applicable
Name: Wilson Ngwenya **Organisation:** landowner	**X**	**Date**: 08 August 2014 **Form of Correspondence:** E-mail	How long do you think the whole process will take place before mining begins because we have small agreements with mentor's and other stakeholders could it be a year or two?	It is difficult to say exactly when mining would begin as the EIA process is still in the process of being undertaken. At this stage it looks like a decision may only be reached towards the middle of next year – but this is still an estimate at this stage. More information will be available once the EIA report is released for public review ***Ashlea Strong (WSP Environmental)*** The construction phase should be completed within 18 months, whilst operational life of mine will be 20 years producing an average of 2.5 million tonnes per annum (Mtpa) and a total of 47 169 kt of run of mine (RoM) coal.	Part A 3 d (ii) Mining Method

Interested and Affected Parties **List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.**		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
Name: Wilson Ngwenya **Organisation:** landowner	**X**	**Date**: 08 August 2014 **Form of Correspondence:** E-mail	When is a possibility of follow-up meeting for beneficiaries?	It is likely that a follow up meeting will only happen towards the beginning of next year (2015) – but the exact dates are as yet unknown. ***Ashlea Strong (WSP Environmental)*** The follow-up meeting for beneficiaries will be held on 10th February 2016.	Part A 3 g (ii)
Name: Wilson Ngwenya **Organisation:** landowner	**X**	**Date**: 08 August 2014 **Form of Correspondence:** E-mail	Did you get someone who could help with the dust collection?	We didn't get someone in the end – but dust collection was done in other ways to include in the report ***Ashlea Strong (WSP Environmental)***	Appendix 18
Landowners or lawful occupiers on adjacent properties					
Name: Jan Roux **Organisation:** Landowner – Driefontein Farm	**X**	**Date**: 24 April 2014 **Form of Correspondence:** One-on-one Meeting	Will they take our drivers?	The mine will require a certain level of skill and identification. No illegal immigrants will be allowed to work on the mine. ***Ashlea Strong (WSP Environmental)***	Appendix 3
Name: Jan Roux **Organisation:** Landowner - Drifontein Farm	**X**	**Date**: 5 May 2014 **Form of Correspondence:** Fax	■ My plaas is afhanklik van skoon drink water vir my, my wekkers asook my beeste. Hoe gaan julle dit waarborg dat dit so sal bly. ■ Wat gaan gebeur met afloop reenwater want my lande is reg langsaan die myn? ■ Wat gaan gedoen word met suur myn water dat dit nie by my beland en in die vleilande afloop nie?	■ Specialist studies are being conducted to address these concerns with regards to surface and groundwater. These studies will be included in the EIA report ***Ashlea Strong (WSP Environmental)*** ■ Specialist studies such as a Hydrogeological Impact Assessment and Surface Water Impact Assessment will be undertaken to determine the effects runoff from the mine will	Appendix 19 Appendix 20 Appendix 33

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
				have on the surroundings which will be included in the EIA report ***Ashlea Strong (WSP Environmental)*** ■ Specialist studies such as a Hydrogeological Impact Assessment and Surface Water Impact Assessment will be undertaken to determine the effects that acid mine drainage may have on the land and wetlands which will be included in the EIA report ***Ashlea Strong (WSP Environmental)***	
Name: Gideon Anderson **Organisation:** Zonnebloem Boerdery - Landowner	X	**Date:** 27 March 2014 **Form of Correspondence:** One-on-one Meeting	The potential impacts on groundwater to the Zonneblom farm was mentioned as there are existing groundwater impacts due to other mining activities in the area, namely the limited availability of groundwater	Specialist studies such as a Hydrogeological Impact Assessment and Surface Water Impact Assessment will be undertaken to determine the impacts on groundwater which will be included in the EIA report ***Ashlea Strong (WSP Environmental)***	Appendix 19 Appendix 20 Appendix 33
Name: Gideon Anderson **Organisation:** Zonnebloem Boerdery - Landowner	X	**Date:** 27 March 2014 **Form of Correspondence:** One-on-one Meeting	No issues regarding acid mine drainage are experienced currently, however decanting might be experienced in the future.	Your comment has been acknowledged ***Ashlea Strong (WSP Environmental)***	Appendix 30 Part B 1 d (iii)
Name: Jan Roux **Organisation:** Landowner - Drifontein Farm	X	**Date**: 24 April 2014 **Form of Correspondence:** One-on-one Meeting	Will the mine affect the quality of the water I am obtaining from three natural springs. I have concerns regarding potential flooding that will affect the quality of the water.	There are a number of specialist studies that will be undertaken to investigate ground water, surface water and possible acid mine drainage. A clean and dirty water system will be recommended in the Environmental Management Programme. A stomr water plan will also be implemented to make sure that	Appendix 19 Appendix 20 Appendix 33

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
				no dirty water is released into your water sources. ***Ashlea Strong (WSP Environmental)***	
Name: Jan Roux **Organisation:** Landowner - Drifontein Farm	**X**	**Date**: 24 April 2014 **Form of Correspondence:** One-on-one Meeting	What does WSP do once authorisation is given?	We usually take a step back; the mine will continue to implement the EMPR. They usually have their own environmental department to help implement the EMPR through internal and external auditing. This is not guaranteed to be done by WSP and could be done by another company. It is usually requested that audits are done annually to make sure the mine is implementing the EMPR. If they want to become IOS 14001 compliant they will also need to be audited. Audits are also required by the Department of Water Affairs with regards to Water Use Licenses. ***Ashlea Strong (WSP Environmental)***	Not Applicable
Name: Gideon Anderson **Organisation:** Zonnebloem Boerdery - Landowner	**X**	**Date**: 27 March 2014 **Form of Correspondence:** One-on-one Meeting	The cumulative impacts of mining in the area must be considered. Other mines in the area include: Mafube, Glencor, OpsiCoal, Hakhano Coal, Canyon Coal, Silver Unicorn (prospecting on Olifantslaagte) and Fountain Capital	The cumulative impacts will be further investigated in the EIR and EMPR. Specialist studies will be undertaken to address these impacts and determine their severity and extent. The cumulative impacts of mining on the area will be investigated and will include impacts of the mines you have listed. ***Ashlea Strong (WSP Environmental)***	Part A 3 g (v) Appendix 18 to Appendix 32
Name: Gideon Anderson **Organisation:** Zonnebloem Boerdery - Landowner	**X**	**Date**: 27 March 2014 **Form of Correspondence:** One-on-one Meeting	Practical implementation measures are to be listed in the EMP. Details required are: dates, responsible persons and contact details. This will result in a more detailed Mine Management Plan.	All implementation measures will be listed in the EMPR compiled in the EIA phase with all required and relevant information captured. ***Ashlea Strong (WSP Environmental)***	Part B 1 d (ix)

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
Name: Jan Roux **Organisation:** Landowner - Drifontein Farm	**X**	**Date**: 24 April 2014 **Form of Correspondence:** One-on-one Meeting	When will the project start?	We are currently finalising the scoping report. The next step will be to start the environmental impact assessment (EIA) process. The final EIA report is scheduled to be submitted at the end of the year with the hope that a decision will be made early next year. Following this the tender process will begin in order to identify a suitable contactor. The construction phase should commence during 2015 if no delays are encountered. There are a number of licenses and authorisations that are needed before the project can begin including the water use licenses and the mining right. The Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET) must make a decision before these other licenses and authorisations are approved. ***Ashlea Strong (WSP Environmental)*** The construction phase should be completed within 18 months, whilst operational life of mine will be 20 years producing an average of 2.5 million tonnes per annum (Mtpa) and a total of 47 169 kt of run of mine (RoM) coal.	Part A 3 d (ii) Mining Method
Name: Jan Roux **Organisation:** Landowner - Drifontein Farm	**X**	**Date**: 24 April 2014 **Form of Correspondence:** One-on-one Meeting	Is there coal under my farm?	There are large quantities of coal found in this area of the province, however for the exact details one would need to contact the Council of Geoscience. ***Ashlea Strong (WSP Environmental)***	Not Applicable
Name: Jan Roux **Organisation:** Landowner -	**X**	**Date**: 24 April 2014	Will the Box Cut method be used correctly?	There is a risk of the mine not implementing the strategy correctly however, the DMR is becoming strict	Part A 3 d (ii) Mining Method

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
Drifontein Farm		**Form of Correspondence:** One-on-one Meeting		with regards to the enforcement of mitigation measures in an attempt to ensure that mines implement the recommendations made. One of the ways that compliance is assessed in through undertaking annual internal and external audits. ***Ashlea Strong (WSP Environmental)***	
Name: Jan Roux **Organisation:** Landowner - Drifontein Farm	**X**	**Date**: 24 April 2014 **Form of Correspondence:** One-on-one Meeting	Will a fence be set up around the mine?	A fence would be constructed around the mine property as safety and security is a priority. No housing will be available on site and all labour will be obtained from Middleburg and the surrounding the communities. ***Ashlea Strong (WSP Environmental)***	Part B 1 d (ix) Appendix 3
Name: Jan Roux **Organisation:** Landowner - Drifontein Farm	**X**	**Date**: 24 April 2014 **Form of Correspondence:** One-on-one Meeting	Do you have anything to do with the leasing of the land?	We are only required by legislation to liaison with the landowner which is the Department of Land Affairs (DLA). However it is best practise to inform the famers that are leasing directly from the DLA or indirectly from these farmers. ***Ashlea Strong (WSP Environmental)***	Appendix 12
Name: Jan Roux **Organisation:** Landowner - Drifontein Farm	**X**	**Date**: 24 April 2014 **Form of Correspondence:** One-on-one Meeting	How will the coal be exported from the mine? If they use the roads; traffic is going to be a problem especially on the R555.	The coal will be either exported by road or railway. A traffic study will be conducted to assess the impact that the mine may have on the roads. ***Ashlea Strong (WSP Environmental)***	Part A 3 d (ii) Mining Method Appendix 32
Name: G.P. Anderson **Organisation:** Zonnebloem Boerdery - Landowner	**X**	**Date**: 10 Maart 2014 **Form of Correspondence:** Email	U advertensie in die Middleburg Observer van 28 Februarie 2014 het betrekking. Ek versoek u hiermee om my as direk geaffekteerde party in RMC se aansoek om mynreg op die plaas Rietvlei te register. My betrokkenheid	Thank you for your comment. A hard copy of the report was delivered to Mr Anderson at the one on one meeting held on the 27 March 2014. ***Ashlea Strong (WSP Environmental)***	Appendix 12

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
			is kortliks as volg: ■ Ek is die eienaar van die plaas Zonnebloem 396 JS wat oos van Rietvlei gelee is en direk aan die Rietvlei plaas grens. ■ Ek is die regmatige gebruiker en bewerker van die gewaslande op Rietvlei wat voortvloei uit 'n "share crop agreement "met die huidige huurders van Rietvlei nl. Mfana Wilson Ngwenyaen Elizabeth Mlangeni. ■ Ek is verder ook die huurderen regmatige gebruiker van die plaas Patatafontein 412 JS wat Suid-Oos langs Rietvlei gelee is. Registeer ook die volgende plaswerkers van my as geaffekteerde partye aangesien die mense se woonplekke ongeveer 30m vanaf die grensdraad tussen Rietvlei en Zonnebloem op die plas Zonnebloem gelee is: ■ Mandla Jacob Masilela(7304036085081) ■ Themba Frans Mahlangu (8501115507088) ■ Sfiso Mahlangu (9112095695080) ■ Scoof Cedeni Mtsweni (7703156210082) ■ Jeffry Wani Klau (7206215825080) ■ Bongani Elias Jiyane (8908206232080) ■ Joseph Thulani Mthimunye (6704106232080) ■ Amos Andries Mnisi		

Interested and Affected Parties **List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.**		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
			(6505045584085) Ek will dit verder onder u aadag bring dat in terme van regulasie 49van die regulasies met alle geaffekteerde partye end ie publiek volledig geskomsulteer is. Wk wild it mar verwagdat daar volledig met ons " geconsult" moet word. Ek versoek verder 'n gedrukte kopie van die konsep besteropnameverslag en is u welkom om my by bogenoemde kontakbesonderhede te kontak.		
Name: Jan Roux **Organisation:** Landowner - Drifontein Farm	X	**Date**: 5 May 2014 **Form of Correspondence:** Fax	Ek is die eienaar van plaas driefontein no 398 met s yonder afdelings wat in die driefontein 398 trust gerigestreer is. Daar is paar punte wat ek onder u aandag wil bring wat my bekommer met die steenkool myn wat langs my gaan oopmaak.	Your comment has been acknowledged and recorded ***Ashlea Strong (WSP Environmental)***	Appendix 12
Name: Jan Roux **Organisation:** Landowner - Drifontein Farm	X	**Date**: 5 May 2014 **Form of Correspondence:** Fax	▪ Hierdie skrywe moet in die myn se notules opgeneem word ▪ Ek vertrou dat my skrywe aandag sal geniet en date k terugvoer sal ontvang en op hoogte van verwikkelinge gehou sal word.	▪ The letter has been recorded and placed in the comment and response report for your perusal. ***Ashlea Strong (WSP Environmental)*** ▪ All comments have been acknowledged and recorded. All Feedback will be provided and placed in the FSR as well as the EIA Report ***Ashlea Strong (WSP Environmental)***	Appendix 12
Name: G.P. Anderson **Organisation:** Zonnebloem Boerdery - Landowner	X	**Date**: 27 March 2014 **Form of Correspondence:** One-on-one Meeting	The details of other stakeholders were provided: Jan Roux from Driefontein Farm (082 388 3722), WP Roux (082 262 1471), Mahlangu (contact details to be obtained from Dept of Land Affairs), Koos de Klerk from Afgri Silos (083 677 8224) and Komati Land	Thank you for your interest in the project. Just to confirm we have added Jan Roux, WP Roux, Mahlangu, Koos de Klerk and Komati to our database. As per your request a BID as well as a formal registration and comment form have been sent to the contact	Appendix 5

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
			Forest (offices are in Belfast)	information provided. Please don't hesitate to contact us if you have any further queries ***Ashlea Strong (WSP Environmental)***	
Name: Jan Roux **Organisation:** Landowner - Drifontein Farm	X	**Date**: 24 April 2014 **Form of Correspondence:** One-on-one Meeting	I will send an email to WSP once I have consulted with Mr G Anderson as he has gone through this process before. It will contain all my concerns with the project.	That will be the best method in order for all your concerns to be recorded. If possible could you send it through before the 5 May which will allow the comments to be placed in the Final Scoping Report. ***Ashlea Strong (WSP Environmental)***	Appendix 12
Name: Jan Roux **Organisation:** Landowner - Drifontein Farm	X	**Date**: 5 May 2014 **Form of Correspondence:** Fax	▪ Daar is gepraat van die pad wat geskuif gaan word wie gaan my ekstra kilometres wat ek en my voertuie elke dag moet ry betaal? ▪ My ongerief met die baie vragmotors op my pad dalk kan die myn help met ander pad?	▪ A portion of the road between the Middelburg and Stoffberg road and the Afgri Pan Siding will be impacted by the proposed mining activities and will therefore be required to be diverted due to the planned location of the open cast pit however this road will not be constructed as of yet and is only proposed to be developed in the next 10 years. Your concerns regarding compensation have been forwarded to the applicant. ***Ashlea Strong (WSP Environmental)*** ▪ A Traffic Impact Assessment will be conducted to investigate whether alternative roads or access roads are required. As these roads are used by local farmers all opinions will be considered. ***Ashlea Strong (WSP Environmental)***	Part A 3 g (i) Appendix 32
Name: G.P. Anderson **Organisation:** Zonnebloem	X	**Date**: 27 March 2014	Fence to be constructed along the "new road"	Your comment has been noted and will be addressed.	Part B 1 d (ix)

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
Boerdery - Landowner		**Form of Correspondence:** One-on-one Meeting		***Ashlea Strong (WSP Environmental)***	
Name: Jan Roux **Organisation:** Landowner - Drifontein Farm	**X**	**Date**: 24 April 2014 **Form of Correspondence:** One-on-one Meeting	I have some concerns with regards to the realignment of the Pan Siding road as this road is currently my access road and taking an alternative route will increase costs. The road will also cause additional dust and the mine will create water problems.	The movement of the road is predicted to only take place in approximately 10 years when the mine starts to move south. The idea is to move the road around the boundary of the farm. Although the prospecting right includes the area on the other side of the railway line, this area will not be mined. Air Quality assessments will be done to assess the level of dust that could be generated from the mine and road. The development of the mine is predicted to start in the middle of the study area moving towards the north and then the south. ***Ashlea Strong (WSP Environmental)***	Part A 3 d (ii) Mining Method Appendix 18
Name: G.P. Anderson **Organisation:** Zonnebloem Boerdery - Landowner	**X**	**Date**: 27 March 2014 **Form of Correspondence:** One-on-one Meeting	Farm dwellers are in the area, but it has been confirmed that they will not be affected by the proposed mining activities	You comment has been noted and will be addressed. ***Ashlea Strong (WSP Environmental)***	Part A 3 g (iv) and (v) Appendix 3
Name: Jan Roux **Organisation:** Landowner - Drifontein Farm	**X**	**Date**: 5 May 2014 **Form of Correspondence:** Fax	Gaan daar ´n heining tussen ons gespan word en onderhou word?	A fence will be included as part of the EMPR which will be implemented by the applicant. ***Ashlea Strong (WSP Environmental)***	Part B 1 d (ix)
Name: G.P. Anderson **Organisation:** Zonnebloem Boerdery - Landowner	**X**	**Date**: 27 March 2014 **Form of Correspondence:** One-on-one	The life of mine (20 years), the size of mining area (800 hectares) and the fact that no residence will be allowed on site was explained.	Your comment has been acknowledged ***Ashlea Strong (WSP Environmental)*** The construction phase should be	Part A 3 d (ii) Mining Method

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
		Meeting		completed within 18 months, whilst operational life of mine will be 20 years producing an average of 2.5 million tonnes per annum (Mtpa) and a total of 47 169 kt of run of mine (RoM) coal.	
Name: Jan Roux **Organisation:** Landowner - Drifontein Farm	X	**Date**: 5 May 2014 **Form of Correspondence:** Fax	■ Die stof wat op my oeste gaan beland en my opbrengs gaan benadeel asook die grond versuur wat ekstra kalk dan sal benodig gaan julle my moet verged vuna myn het vir G P Anderson verged elke maand. ■ Waar ek op ´n plaas met skoon lug gebly het gaan ek nou in ´n vuil swart myn moet vaskyk en sy stink stof moet inasem	■ An Air Quality Impact Assessment and a Soils and Land Capability Impact Assessment will be conducted to assess these impacts to determine the severity it may have on the surrounding areas. Mitigation measures will also be implemented to reduce these impacts. ***Ashlea Strong (WSP Environmental)*** ■ An Air Quality Impact Assessment and a Visual Impact Assessment will be conducted to assess how the mine may affect the air quality and visual appearance of the area and to determine the severity it may have. Mitigation measures will also be implemented to reduce these impacts. ***Ashlea Strong (WSP Environmental)***	Appendix 18 Appendix 21 Appendix 25
Name: G.P. Anderson **Organisation:** Zonnebloem Boerdery - Landowner	X	**Date**: 27 March 2014 **Form of Correspondence:** One-on-one Meeting	■ Clearly defined dust control measures are to be stipulated ■ Use of the siding by agricultural, forestry and mining companies pose a risk in terms of safety since a bottleneck effect will be experienced at this point. There will be noise and dust issues are expected in this area as well.	■ All dust control measures will be clearly laid out within the EMPR compiled in the EIA phase ***Ashlea Strong (WSP Environmental)*** ■ Within the scoping report there are a number of potential dust and noise impacts that have been predicted for the propose project refer to section 10.4.3.2, 10.7.6.7, 10.7.6.8, 10.7 and 7.11. Specialist's studies will be	Appendix 18 Appendix 27 Part B 1 d (ix)

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
				conducted to assess the potential dust and noise impact and an EMPR compiled in the EIA phase will be designed to help mitigate these potential impacts to help reduce the effect on the surrounding areas. ***Ashlea Strong (WSP Environmental)***	
Name: Jan Roux **Organisation:** Landowner - Drifontein Farm	**X**	**Date**: 5 May 2014 **Form of Correspondence:** Fax	Indien daar geskiet word langs my moet alle klippe opgetel word wat my trekkerbande kan beskadig G P Anderson het so reeling met vuna gehad	A Blasting and Vibration Assessment will be undertaken as part of the EIA phase. Mitigation measures will be recommended in order to minimise any impacts identified. ***Ashlea Strong (WSP Environmental)***	Appendix 29
Municipal councillor					
Municipality					
Name: Sibongile Mtsweni **Organisation:** Steve Tshwete Local Municipality	**X**	**Date**: 27 March 2014 **Form of Correspondence:** Authorities Meeting	Has the process on land-use change (rezoning) begun?	Yes, the process on rezoning has begun. ***Ashlea Strong (WSP Environmental)***	Not Applicable
Name: Saffiya Shaik **Organisation:** Directorate: Electrical Engineering Services	**X**	**Date**: 28 February 2014 **Form of Correspondence:** Email	Kindly forward the e-mails to: Mr S. I. Khalaki (Assistant Director: Planning and Bulk Consumers) He can be contacted on (013) 249 7226 and his cell number is: 081 213 2301. His e-mail address is: setsoto@stevetshwetelm.gov.za Hope you find the above in order.	Thank you for your interest in the project. Just to confirm we have added Mr S. I. Khalaki to our database. As per your request a BID as well as a formal registration and comment form have been sent to the contact information provided. Please don't hesitate to contact us if you have any further queries. ***Ashlea Strong (WSP Environmental)***	Appendix 5 Appendix 12

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
Name: Linah Malatjie **Organisation:** Nkangala District Municipality	**X**	**Date**: 27 March 2014 **Form of Correspondence:** Authorities Meeting	Is this considered to be a public meeting?	No, this meeting is defined as an authorities meeting, the public meeting will be held this the evening (27/3/2014 at 19:00). ***Ashlea Strong (WSP Environmental)***	Part A 3 g (ii)
Name: Ishmael Khalani **Organisation:** Steve Tshwete Local Municipality	**X**	**Date**: 27 March 2014 **Form of Correspondence:** Authorities Meeting	Will the R555 be encroached upon?	No the R555 will not be impacted upon in terms of realignment. It is only the district road (Pan Siding road) that will need to be moved. Municipal and provincial authorities have been informed. ***Ashlea Strong (WSP Environmental)***	Part A 3 g (i) Appendix 32
Name: WD Fouche **Organisation:** Steve Tshwete Local Municipality	**X**	**Date:** 27 March 2014 **Form of Correspondence:** Letter	Your attention is drawn to the fact that there is an existing residential development known as Somaphepha Rural Village which is located on the North-Western site of the proposed mining activity. Therefore, the proposed activity on the Remaining Extent and Portion 1 of the farm Rietvlei 397 JS will have a negative impact on the existing residential environment.	Thank you for this information. The social impact of the mining operations will be investigated during the EIA Phase. It should also be noted that no mining operations will take place on the north-western side of the R555. **Ashlea Strong (WSP Environmental)**	Appendix 3 Appendix 4
Name: WD Fouche **Organisation:** Steve Tshwete Local Municipality	**X**	**Date:** 27 March 2014 **Form of Correspondence:** Letter	Please be advised that should your application be successful, you will be required to submit an application for a land use change to the municipality for consideration before commencing with mining operations.	The process on rezoning has begun. **Ashlea Strong (WSP Environmental)**	Not Applicable
Organs of state (Responsible for **infrastructure that may be** **affected Roads Department,** **Eskom, Telkom, DWA e**					

Interested and Affected Parties **List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments** **Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
Name: Michael Yorke-Hart **Organisation:** Sanral	**X**	**Date**: 26 February 2014 **Form of Correspondence:** Email	Please can you send BID for the attached project Regards Mike Yorke-Hart(SANRAL)	Thank you for your interest in the project. Just to confirm we have added Mike Yorke-Hart to our database. As per your request a BID as well as a formal registration and comment form have been sent to the contact information provided. Please don't hesitate to contact us if you have any further queries. ***Ashlea Strong (WSP Environmental)***	Appendix 5
Name: B Viljoen **Organisation:** Mpumalanga Government	**X**	**Date**: 7 February 2014 **Form of Correspondence:** Fax	Apply for all services over / within the road reserve of D22 District and provincial roads.	Thank you for your comments. This information has been provided to the applicant. ***Ashlea Strong (WSP Environmental)***	Appendix 12
Communities					
Local Community surrounding the site	**X**	**Date:** 28 May 2014 **Form of Correspondence:** Community Meeting	The community is concerned about their houses; they would like to know if the houses on the other side of the railway line will be affected and if so how will the mine assist them.	The houses on the southern side of the railway will not be affected by the mine however, the settlement on the mine footprint will be affected and will need to be relocated.	Appendix 3
Local Community surrounding the site	**X**	**Date:** 28 May 2014 **Form of Correspondence:** Community Meeting	The community is concerned about possible dust problems that may arise as a result of the mining activities.	A dust bucket has been placed in the area to monitor the amount of dust currently being produced. An Air Quality Assessment will be undertaken to assess how much dust the mine is expected to produce. If the impact is considered to be high, mitigation measures will be recommended to either prevent or reduce it.	Appendix 18
Local Community surrounding the site	**X**	**Date:** 28 May 2014 **Form of**	The community is concerned that blasting used to extract the coal will result in shattered windows and cracks	A Noise Impact Assessment as well as a Blasting and Vibrating Assessment will be done to determine the level of	Appendix 27 Appendix 29

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
		Correspondence: Community Meeting	appearing in their house. Noise concerns have also been noted	impact the mine will have on the residents in the area. Possible alternatives will be identified to determine the best strategy that will produce the least impact. Mitigation measures will also be recommended in order to reduce the significance of the impacts identified.	
Local Community surrounding the site	**X**	**Date:** 28 May 2014 **Form of Correspondence:** Community Meeting	Roads	The movement of the Pan Siding road is predicted to only take place in approximately 10 years when the mine starts to move south. A Traffic Impact Assessment will be undertaken to determine the impact of increased traffic as well as to assess the best alternative for the realignment of the road.	Appendix 32
Local Community surrounding the site	**X**	**Date:** 28 May 2014 **Form of Correspondence:** Community Meeting	The community has concerns regarding their cattle and livestock health. They want to know what will happen if the water used by the communities is contaminated by the mine as a result of chemicals and untreated waste water being released into the cattle's drinking water, this could cause TB?	Surface and groundwater impact assessments are being undertaken to identify the potential impacts in this regard. The current mine plan makes provision for a closed water system to ensure that only clean water is released from the mine. The studies will propose and recommend mitigation measures for all impacts.	Appendix 19 Appendix 20
Local Community surrounding the site	**X**	**Date:** 28 May 2014 **Form of Correspondence:** Community Meeting	Health concerns were raised by the community as they are afraid that the pollution caused by the mine may lead to the contraction of certain diseases such as TB. They feel that mines always promised them a lot of things but do not always delivered on these promises.	Noted	Appendix 12
Local Community surrounding the site	**X**	**Date:** 28 May 2014 **Form of**	Graves Lindiwe Mahlangy asked that the community be included in the	A Heritage Impact Assessment has been conducted and a number of graves have been identified on the proposed site. The applicant is in the	Appendix 28

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
		Correspondence: Community Meeting	consultation process for the graves and they will be given enough time to consult with their Elders.	process of identifying and consulting with these families. If any graves are unidentified the community will need to assist with the identification process. The graves will be moved according to the correct procedures outlined in the National Heritage Resources Act.	
Local Community surrounding the site	**X**	**Date:** 28 May 2014 **Form of Correspondence:** Community Meeting	Land Claimants	The Department of Land Reform and Rural Development stated that there are only two families that are the rightful occupants of the proposed area. The community identified five families, namely, Mahlangu, Mnguni, Mthimunye, Masombuka and Mtsweni who live in the area. Contact numbers were provided for the families.	Not Applicable
Local Community surrounding the site	**X**	**Date:** 28 May 2014 **Form of Correspondence:** Community Meeting	Will there be any job opportunities?	The community will be the first to be informed of any jobs available; however the mine will hire people with relevant qualifications/experience. The community would like to provide the following services for the mine: ▪ Cleaning services; ▪ Catering; ▪ Transport etc. AS announced that there will be another meeting later this year, which will ensure that the community remain updated throughout the whole process.	Appendix 3
Local Community surrounding the site	**X**	**Date:** 28 May 2014 **Form of Correspondence:** Community	Lindiwe Mahlangy would like to know if a fence is needed, will the mine provide it in order to prevent their livestock from moving into the mining area.	Yes, the mine will be fenced.	Part B 1 d (ix)

Interested and Affected Parties **List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.**		**Date** **Comments** **Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
		Meeting			
Dept. Land Affairs					
Traditional Leaders					
Dept. Environmental Affairs					
Other Competent Authorities **affected**					
Name: Isaac Nyatlo **Organisation:** Department of Water Affairs	**X**	**Date**: 14 February 2014 **Form of Correspondence:** Email	Please check on DWA WEBSITE, WWW.DWA.GOV.ZA, go to DWA projects, and click projects on internet, you will see Olifants Reconciliation Strategy, also all towns Recon study is there.	Thank you for your comment. ***Ashlea Strong (WSP Environmental)***	Appendix 12
Name: N.S Maliaga **Organisation:** Department of Water Affairs	**X**	**Date**: 04 April 2014 **Form of Correspondence:** Letter	▪ The Applicant must conduct a preliminary legal assessment to identify all the water use activities associated with the proposed project that will require authorization by the DWA and the applicant is hereby referred to Section 22(1) of the National Water Act (Act36 of 1998). ▪ Any other water use related activities associated with this project that are not permissible as indicated on Section 22(1) of the National Water Act , 1998 (Act 36 of 1998) will require authorization by this Department. The applicant must liaise with this Department	▪ Your comments have been acknowledged and we confirm that a water use license will be applied for. Please see Table 2.3 of Section 2.6.2 of the Report to view all listed water uses that will be triggered. ***Ashlea Strong (WSP Environmental)*** ▪ All water uses have been considered and reviewed to determine which activities have been triggered. Please see table 2.3 of Section 2.6.2 of the Report to view all listed water uses that will be triggered. A meeting occurred on the 25 November 2013 to discuss this project and	Appendix 20 Appendix 26 Appendix 33 Part B 1 d (ix)

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
			for guidance on the requirements for such authorizations. ▪ <u>Stomr water management:</u> the final report should also indicate how the stomr water will be managed during all phases of the project. ▪ <u>Water courses:</u> in the page 15 of the Report a locality map depicts the Selons River and its tributaries in close proximity to the project area. The applicant should also indicate a 1:100 year buffer zone along the Selons River and its tributaries in relation to the proposed mining area.	accept all guidance from the DWA. Further meetings will be planned to discuss this project. ***Ashlea Strong (WSP Environmental)*** ▪ Your comment will be considered and addressed with in the Stomr water section of the EMPR which will be included as part of the EIA process. ***Ashlea Strong (WSP Environmental)*** ▪ Your comments have been acknowledged and will be considered. ***Ashlea Strong (WSP Environmental)***	
Name: Jenna Lavin **Organisation:** Heritage Officer Archaeology, Palaeontology and Meteorites Unit South African Heritage Resources Agency	**X**	**Date**: 07 March 2014 **Form of Correspondence:** Email	Thank you for your indication that development is to take place in this area. Please note that SAHRA no longer accepts documents via email or through the post. In order for SAHRA to comment on this case you are required to lodge the application through our online application system, SAHRIS (www.sahra.org.za). You will first need to register and await for the confirmation email before you will be able to create the case on SAHRIS. If you require any assistance you can browse through the help tutorials on the website or alternatively give us a call at the office. 111 Harrington Street PO Box 4637, Cape Town 8000, South Africa	The project requires a Heritage Impact Assessment by SAHRA. The heritage activities identified for the Proposed Project are contained within Table 2-4 of the Report. The report will be submitted in the appropriate manner requested by SAHRA. If we require any additional information we will contact the office or ideally use the help tutorials recommended. ***Ashlea Strong (WSP Environmental)***	Appendix 28

Interested and Affected Parties **List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.**		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
			E-mail: jlavin@sahra.org.za Phone : +27 (0)21 462 4502 Fax : +27 (0)21 462 4509 Web : www.sahra.org.za		
Name: Mr M Loock **Organisation:** Chief Town Planner: Spatial Planning (Mpumalanga Provisional Government: Department of Co-operative Governance and Traditional Affairs)	**X**	**Date**: 14 March 2014 **Form of Correspondence:** Fax	Our discussion with regard to the above-mentioned project refers. We would hereby like to thank you for affording our Department the opportunity to comment on the above-mentioned project. ■ ACTIVITY DESCRIPTION: Rietvlei Mining Company (Pty) limited intends establishing and operating an opencast coal mine, referred to as the Rietvlei opencast coal mine on the Remainder and Portion 1 of the farm Rietvlei 397 JS. The mine will be situated to the south-east of the R555 road, and located within the vicinity of Middelburg, within the Steve Tshwete Local Municipality. The mine area will extend over 2 225.30ha, with the pit covering approximately 800ha. ■ LEGISLATIVE REQUIREMENTS WSP Environmental (Pty) Limited compiled, on behalf of Rietvlei Mining Company (Pty)Limited, a Draft Scoping Report in accordance with the NEMA Environmental Impact Assessment (EIA) Regulations (Government Notice Regulation (GNR) 543 of 2010) and GNR 527 of the Minerals and Petroleum Resources Development Act (No. 28 of 2002). As indicated in the Scoping Report the following are required prior to the commencement of the proposed	Thank you for your interest in this project. Your comments have been acknowledged and will be considered. A town planner has been appointed to obtain relevant town planning authorisation. All required applications will be submitted to the Steve Tshwete Local Municipality to acquire the necessary land use rights. No accommodation will be provided on site. All Labour will be housed within the nearest existing urban area as suggested. ***Ashlea Strong (WSP Environmental)***	Not Applicable

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
			Project • Environmental authorisation (EA) for activities identified in terms of GENR 544, 545 and 546 (18 June 2010) published in terms of the National Environmental Management Act (No. 107 of 1998) (NEMA) • A waste management license (WML) for activities identified in terms of GNR 921 (29 November 2013) published in terms of the National Environmental Management: Waste Act (No.59 of 2008) (NEM:WA) • A water use license (WUL) in terms of the National Water Act (No. 36 of 2004)) (NWA) Equally important to the above, though a separate process is to acquire the necessary land use rights from Steve Tshwete Local Municipality. Rietvlei Mining Company (Pty) Limited will have to obtain the relevant land use rights prior to the commencement of the intended opencast coal mine. This is based on the recent Constitutional Court case ruling in the matter between Maccsand (Pty) Limited and the City of Cape Town Case – CCT 103/11 (2012) ZACCT. ▪ POLICY ALIGNMENT Spatial Development Framework (SDF) The Steve Tshwete Local Municipality has developed a Spatial Development Framework, 2010 (SDF) to guide future growth and development within		

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
			its area of jurisdiction. The SDF is therefore a key policy document to inform the decisions taken by a municipality on land development applications. According to the SDF, Small settlements have developed in response to mining or coal power station activities in the area, mainly south of the N4 towards Hendrina. This has led to the formation of smaller centres with good infrastructure, but spatially segregated from any economic activity. To prevent the further segregation of settlements the SDF developed a key strategy which intends to establish a functional hierarchy of urban and rural nodes (service centres/agri-villages). This is to ensure equitable and equal access of all communities to social infrastructure, services and economic activities and to prevent the ad-hoc decision-making which distract from logical urban form. Hence, the workers of the proposed opencast coal mine should be accommodated within the nearest urban or rural node where social and economic infrastructure exist. ▪ CONCLUSION AND RECOMMENDATIONS Based on the above deliberation the following is recommended: • Rietvlei Mining Company (Pty) Limited should submit an application to Steve Tshwete Local Municipality to acquire the necessary land use rights which		

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
			will enable them to operate an opencast coal mine. • The proposed mine should exclude any permanent on-site accommodation. Workers should be accommodated within the nearest existing urban areas/tons where social and economic infrastructure exists.		
Name: N.S Maliaga **Organisation:** Department of Water Affairs	X	**Date**: 04 April 2014 **Form of Correspondence:** Letter	Access roads: the report must also indicate if access roads will be constructed, however the use of existing access roads is encouraged in order to minimize the effects of soil erosion that can lead to siltation of above mentioned water resources.	Existing roads will be used as far as possible however a portion of the road between the Middelburg and Stoffberg road and the Afgri Pan Siding will be impacted by the proposed mining activities and will therefore be required to be diverted due to the planned location of the open cast pit however this road will not be constructed as of yet and is only proposed to be developed in the next 10 years. ***Ashlea Strong (WSP Environmental)***	Part A 3 g (i) Appendix 32
Name: N.S Maliaga **Organisation:** Department of Water Affairs	X	**Date**: 04 April 2014 **Form of Correspondence:** Letter	▪ The EIA report must address the management of all solid waste material that will be produced from the activity with consideration of protecting the water resources from being polluted ▪ Sanitation: the final report should also specify the type of the sanitation system that will be utilised. Should the temporary toilet facilities used, its location must be indicated on a map also indicating its distance from the 1:00 buffer line from the water resources. Here the applicant must also specify where the contents from the temporary toilets will be taken for disposal.	▪ The management of all solid waste material will be considered in the EIA report. Mitigation measures will be employed to address waste related concerns and help reduce the effects the mine may have on the water sources as it is the most concerning impact as purposed by the FSR. ***Ashlea Strong (WSP Environmental)*** ▪ The Final EIA Report will specify the type of sanitation system that will be implemented. Allusion facilities will be dealt with during the compilation of the EMPR. ***Ashlea Strong (WSP***	Part B 1 d (ix) Part A 3 d (ii) Mining Method Appendix 20 Appendix 24

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
				Environmental)	
Name: N.S Maliaga **Organisation:** Department of Water Affairs	**X**	**Date**: 04 April 2014 **Form of Correspondence:** Letter	Storage chemicals and fuel: the applicant must also indicate how chemicals and fuel will be stored and handled and how the possible spillages will be contained. The location of such storage areas must be located indicated and how the access will be controlled into the storage facility.	The storage of chemicals and fuel will be considered within the EIA report. The storage, handling of chemicals, dealing with possible spills, location of the storage areas and how access to this facility will be controlled will be captured in the EMPR. Dangerous substances contained on-site during the construction phase of the Proposed Project will need to be managed in accordance with the Act and MSDS will need to accompany all dangerous goods (hydrocarbon fuels, cleaning chemicals, paints, etc.). ***Ashlea Strong (WSP Environmental)***	Part B 1 d (ix)
OTHER AFFECTED PARTIES					
Name: Muzi Twala **Organisation:** Emalangeni		**Date**: 27 March 2014 **Form of Correspondence:** Authorities Meeting	What will the community meeting entail?	The same process will be involved, however the issues addressed during the community meeting will be different from those of the public and authority meetings. ***Ashlea Strong (WSP Environmental)***	Part A 3 g (ii)
Name: Muzi Twala **Organisation:** Emalangeni		**Date**: 27 March 2014 **Form of Correspondence:** Authorities Meeting	How does the Steve Tshwete Municipality deal with electricity connections?	The study area is outside of the municipality's jurisdiction therefore Eskom will have to be contacted directly. ***Ashlea Strong (WSP Environmental)***	Not Applicable
INTERESTED PARTIES					

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.	Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
Name: Johanna Sidinile **Organisation:** Fabricated Steel Manufacturing Company (Pty) Ltd	**Date**: 14 April 2014 **Form of Correspondence:** Email	I am interested in following up on the abovementioned project from the contractor's point of view. Our company Fabricated Steel Manufacturing specialises in the manufacturing and erection of various Prefabricated buildings. We would appreciate it if you could please add our company name onto your database and also to kindly send us updates relating to this project. I have attached our company brochure with our company profile for ease of reference.	Thank you for your interest. You have been added to the database. ***Ashlea Strong (WSP Environmental)***	Appendix 5
Name: Divan van der Merwe **Organisation:** Fountain Capital	**Date**: 17 February 2014 **Form of Correspondence:** Email	We have received notice of an EIA that is currently being undertaken for the development of a new Greenfields opencast coal mine, Rietvlei Coal Mine, near Middelburg. Fountain Capital is developing a coal resource on the north-east border of the Rietvlei project and we have an existing coal mining operation towards the south of the project. Can you please register us as an IAP's and send further information in order for us to identify if there is any interface needed.	Thanks for your interest in the project. Just to confirm we have added you to our database. As per your request below please find attached the BID as well as a formal registration and comment form. Please don't hesitate to contact us if you have any further queries ***Ashlea Strong (WSP Environmental)***	Appendix 5
Name: Dawid Venter **Organisation:** Fountain Capital	**Date**: 19 March 2014 **Form of Correspondence:** Email – Comment and Registration Form	We plan on operating a coal mine on the remaining extent of Farm Zonnebloem 396 JS	Thank you for your comment. ***Ashlea Strong (WSP Environmental)***	Appnedix 12
Name: Nivara Pillay **Organisation:** Southern Mapping	**Date**: 25 April 2014 **Form of**	Thank you for getting back to me and providing all the information regarding Rietvlei (company profile and brochure	Thank you for your interest in the project. Just to confirm we have added you to our database. As per your request below please find attached the	Appendix 5 Appendix 12

Interested and Affected Parties **List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.**	**Date** **Comments** **Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
	Correspondence: Email	have been attached).	BID as well as a formal registration and comment form. Please don't hesitate to contact us if you have any further queries ***Ashlea Strong (WSP Environmental)***	

iv) The Environmental attributes associated with the development footprint alternatives. (The environmental attributed described must include socio- economic, social, heritage, cultural, geographical, physical and biological aspects)

(1) Baseline Environment

(a) Type of environment affected by the proposed activity.

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

Climate

This section was compiled utilising the information contained in the Air Quality Impact Assessment undertaken by Airshed Planning Professionals, which is included in **Appendix 18** for further information.

The proposed Rietvlei opencast mining area is located in the Mpumalanga Highveld Region approximately 1 600m above sea level. Overall, the climate of this region is described as a summer rainfall area, where summers are mild to warm, whilst winters are cool to cold and dry.

No meteorological station is in place at the proposed Rietvlei Mine and to overcome this problem it was decided to make use of measured meteorological data obtained from the South African Weather service for their Rietvallei station. The weather station is approximately 23 km east of the proposed Rietvlei Mine.

Local Wind Field

Figure 27 shows that the predominant wind direction comes from the north-west and east with strong winds of up to 10m/s. Calm conditions are experienced 11.2% of the time with a wind direction of predominately north-westerly and easterly during day-time conditions. Wind tends to increase in north-westerly direction. Night-time conditions are characterised by winds from the north-easterly, easterly and south–easterly sectors.

As depicted in **Figure 28** the summer months are dominated by easterly, south easterly winds. Wind strength can be experienced of up to 15m/s. The autumn months experience strong winds of up to 8 m/s usually blowing in the north-westerly, south easterly and easterly sectors. The winter months reflect dominancy of winds from the north-westerly sectors and during spring the wind direction is in a north-westerly and north-easterly direction, with an increase in frequencies of occurrence being evident.

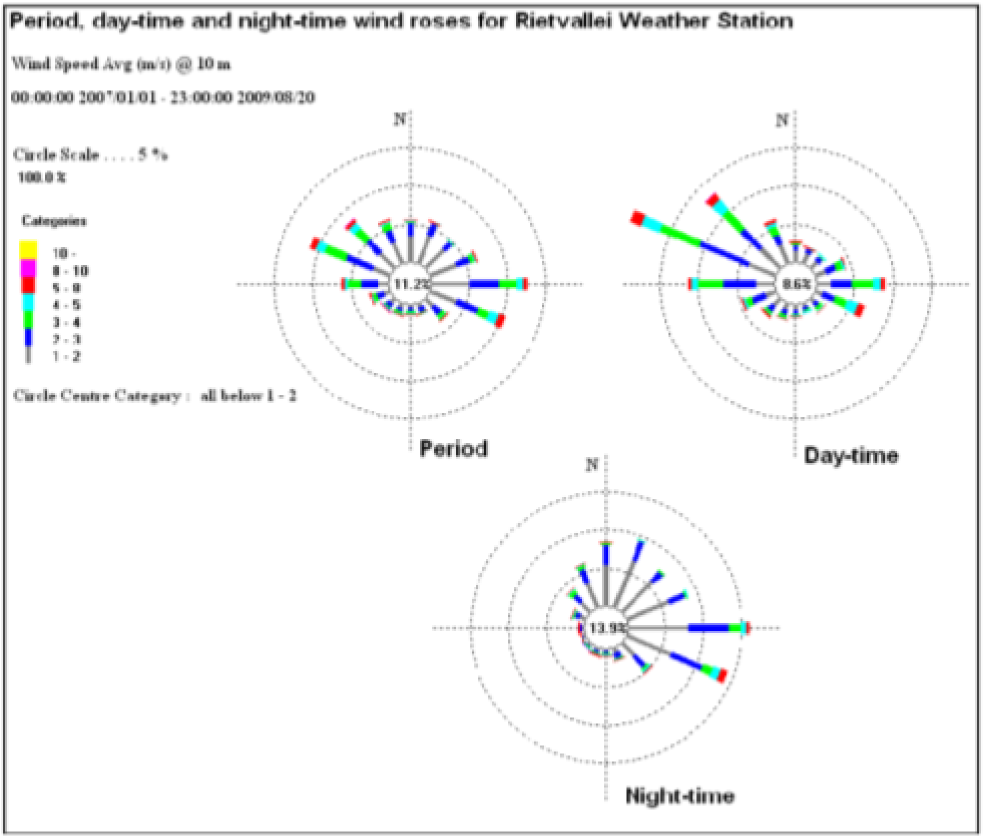


Figure 27: Wind Roses for Rietvallei for January 2007 to August 2009

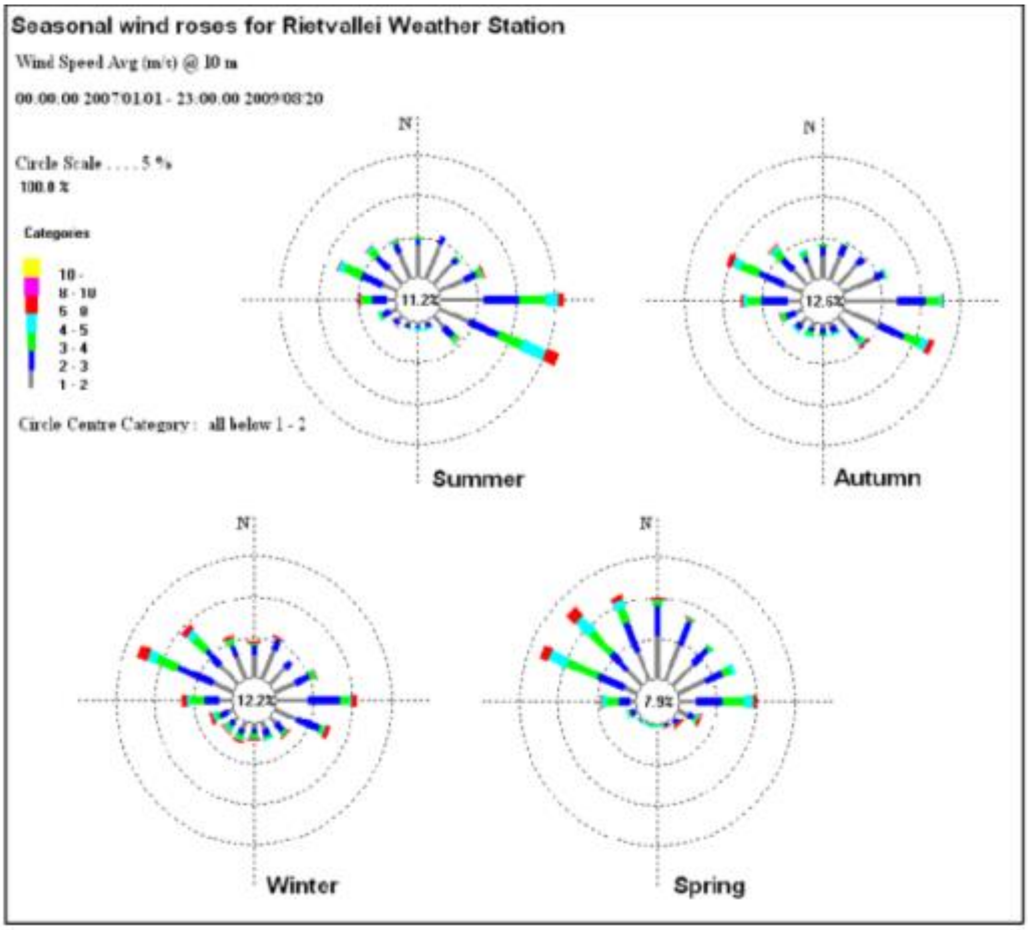


Figure 28: Seasonal wind roses for Rietvallei for January 2007 to August 2009

Air Temperature

Since no long term data are available for the proposed Rietvlei Mine area, reference was made to long term climate data for Middelburg. The long term temperature trends recorded for Middelburg from 1925-1950 are shown in **Table 8.** Minimum long-term temperatures range from -1.8°C to 13.7°C with maximum temperatures ranging between 18.4°C and 27.1°C.

Table 8:Long-term minimum, maximum and mean temperatures for Middelburg 1925-1950

Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Middelburg	Maximum	27.2	26.8	26.0	23.9	21.3	18.5	18.4	21.4	24	26	26.2	27.1
	Mean	20.5	20.1	18.7	15.7	11.7	8.3	8.3	11.1	14.7	18.0	19.0	20.1
	Minimum	13.7	13.4	11.4	7.4	2.2	-1.8	-1.7	0.8	5.3	10.1	11.8	13.2

Precipitation

The average monthly precipitation data has been recorded in **Figure 29** depicting that the total annual rainfall is 735 mm. On average the rainfall tends to occur during the summer months from October to April, with the peak rainy season in January.

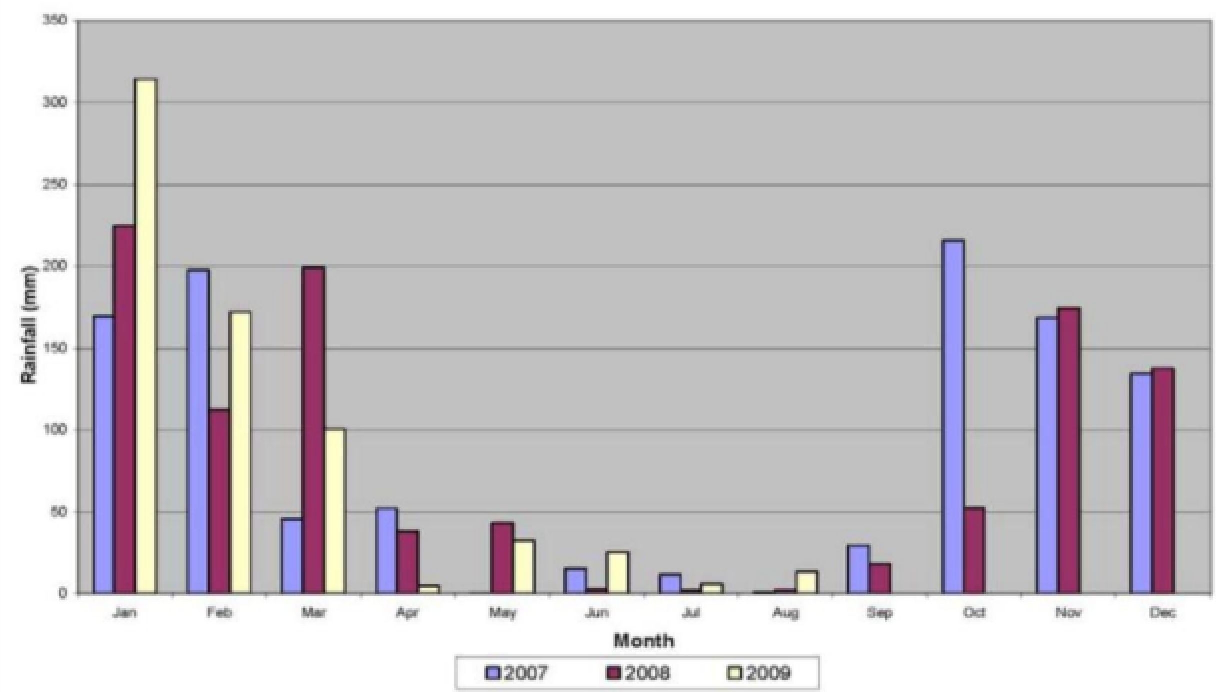


Figure 29: The average monthly rainfall for Rietvallei

Evaporation

Based on data provided by SA Explorer, the mean monthly evaporation for a Class “A” pan is shown in **Figure 30**.

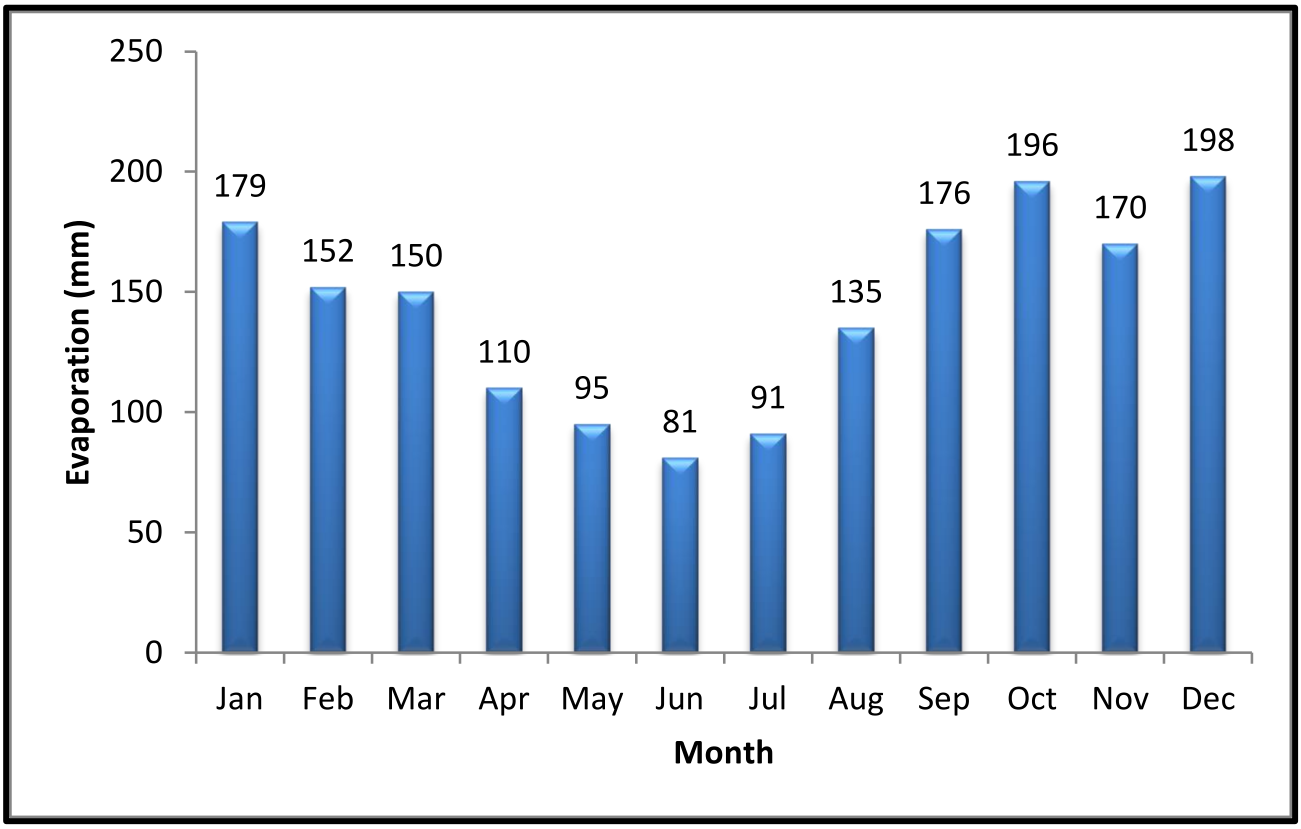


Figure 30: Average evaporation (SA Explorer)

Geology

This section was compiled utilising the information contained in the Groundwater Impact Assessment undertaken by Aqua Earth Consulting, which is included in **Appendix 19** for further information.

The mine is located in the Karoo Sequence (Vryheid Formation). The Vryheid Formation comprises mudrock, shales, rhythmite, siltstone and fine- to coarse-grained sandstone (pebbly in places). The geology of the area is shown in **Figure 31.** Five coal seams are developed in the Karoo strata, four are of economic importance. The second seam from the bottom, on average 6m thick, is the most productive (**Figure 32**).

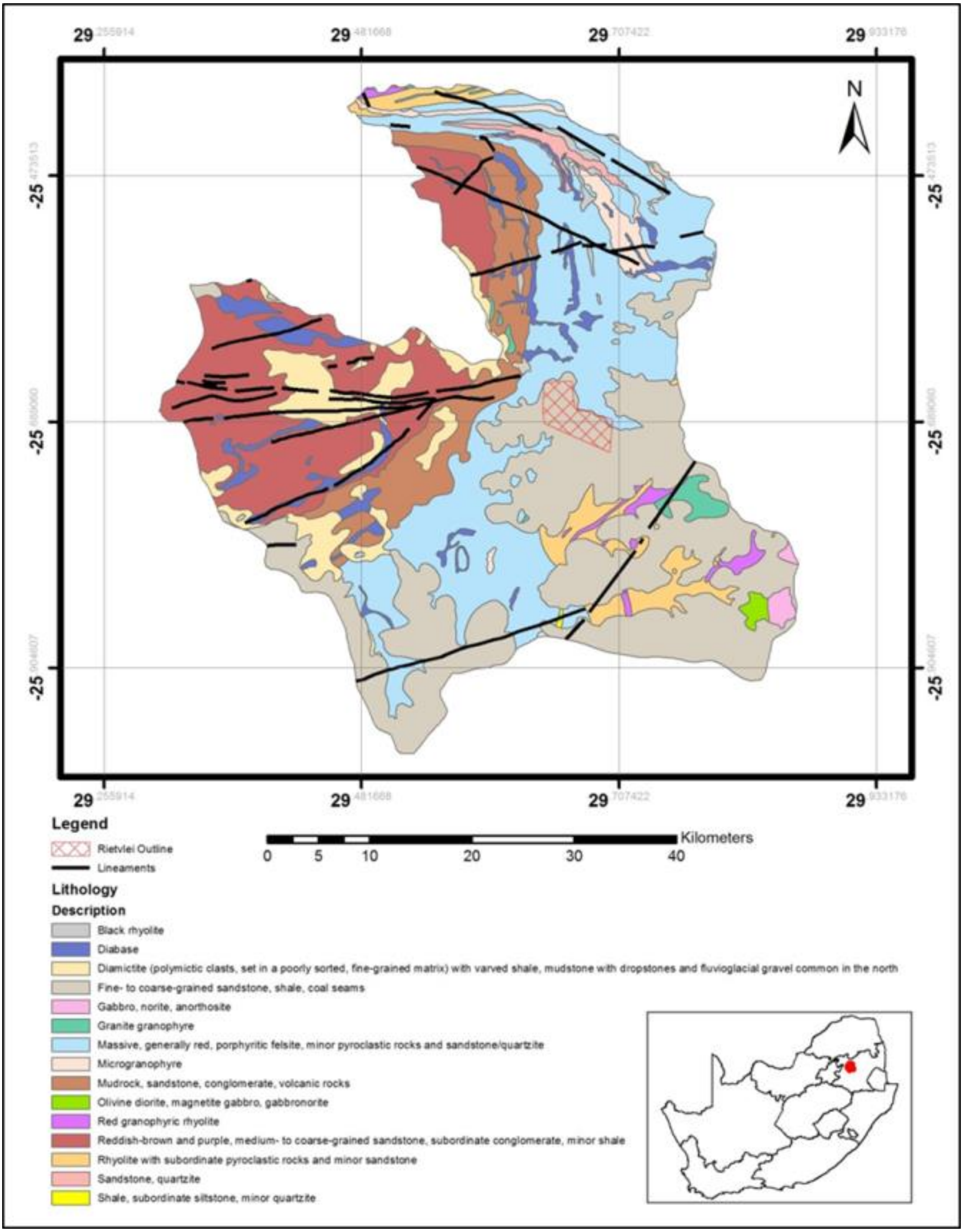


Figure 31: Regional Geology

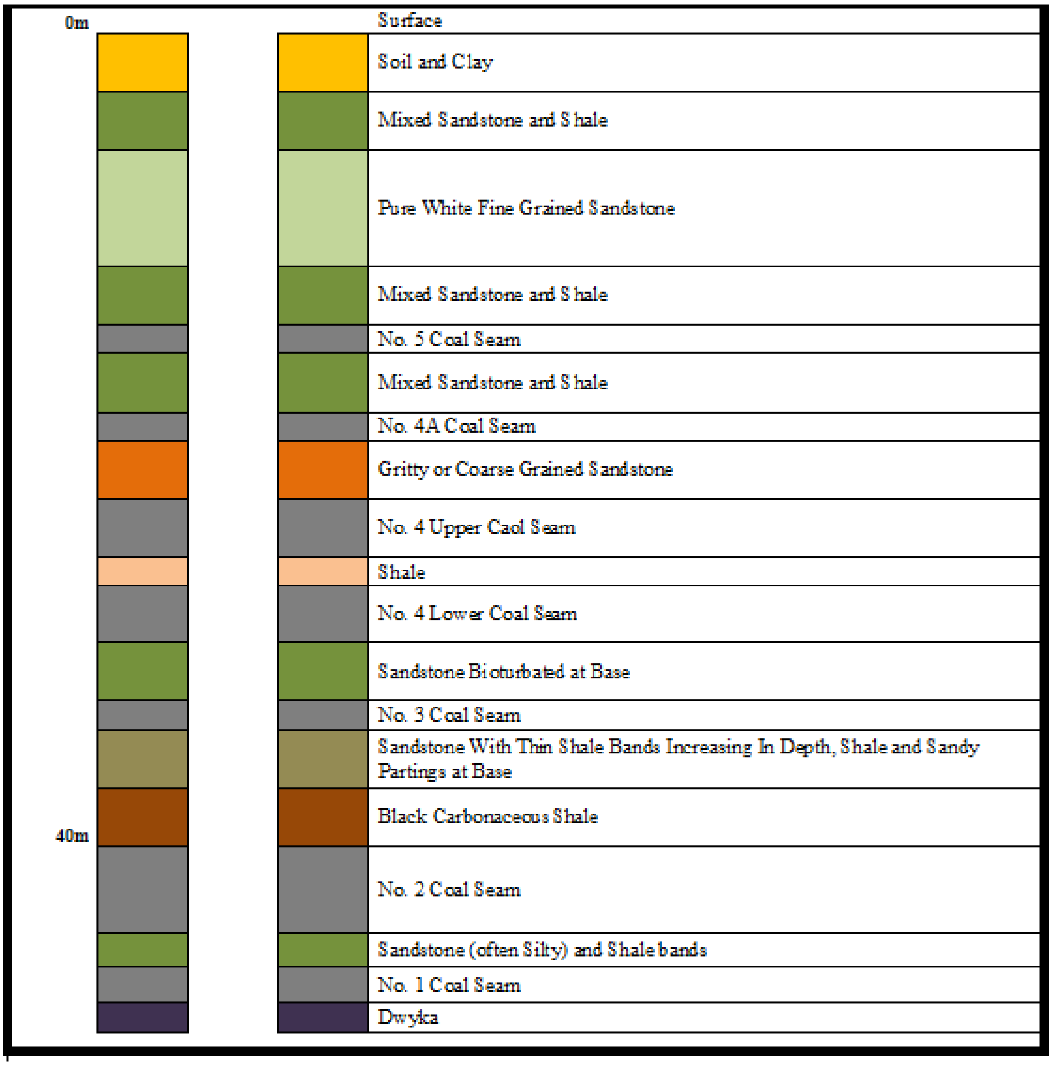


Figure 32: Generalised stratigraphy at Rietvlei

Geochemistry

Karoo shales and siltstones are generally non-acid producing and contain silicate and clay minerals such as quartz, illite, smectite, kaolinite and chlorite etc. Many of these minerals contain leachable sodium which may modify the cation concentration of water that comes into contact with these rocks. This is especially the case in the mine setting where broken rock presents a considerably greater surface area for leaching.

Karoo coal and carbonaceous shale are generally associated with the mineral pyrite (Usher et al 2001). Exposure to oxygen from mining activities oxidises the pyrite to form sulphate, iron and acidity which can enter water resources and can significantly influence the mine drainage quality under oxidizing conditions.

Secondary minerals such as calcite (CaCO3), rhodocrocite (MnCO3) and siderite (FeCO3) are known to occur in association with the Karoo rocks in the Rietvlei area. These may modify cation concentrations and offset acidity. However, Fe^{2+} from siderite dissolution will oxidise at surface to release acidity.

Topography

The Rietvlei mining area ranges in elevation from approximately 1 670 metres above sea level (masl) (in the west along the drainage lines) to about 1 900masl in the east.

The topography is classed as moderately undulating plains and pans and the landscape is characterised by relatively little topographic variation. Small drainage lines meander through the landscape resulting in shallow incisions (**Figure 33**).

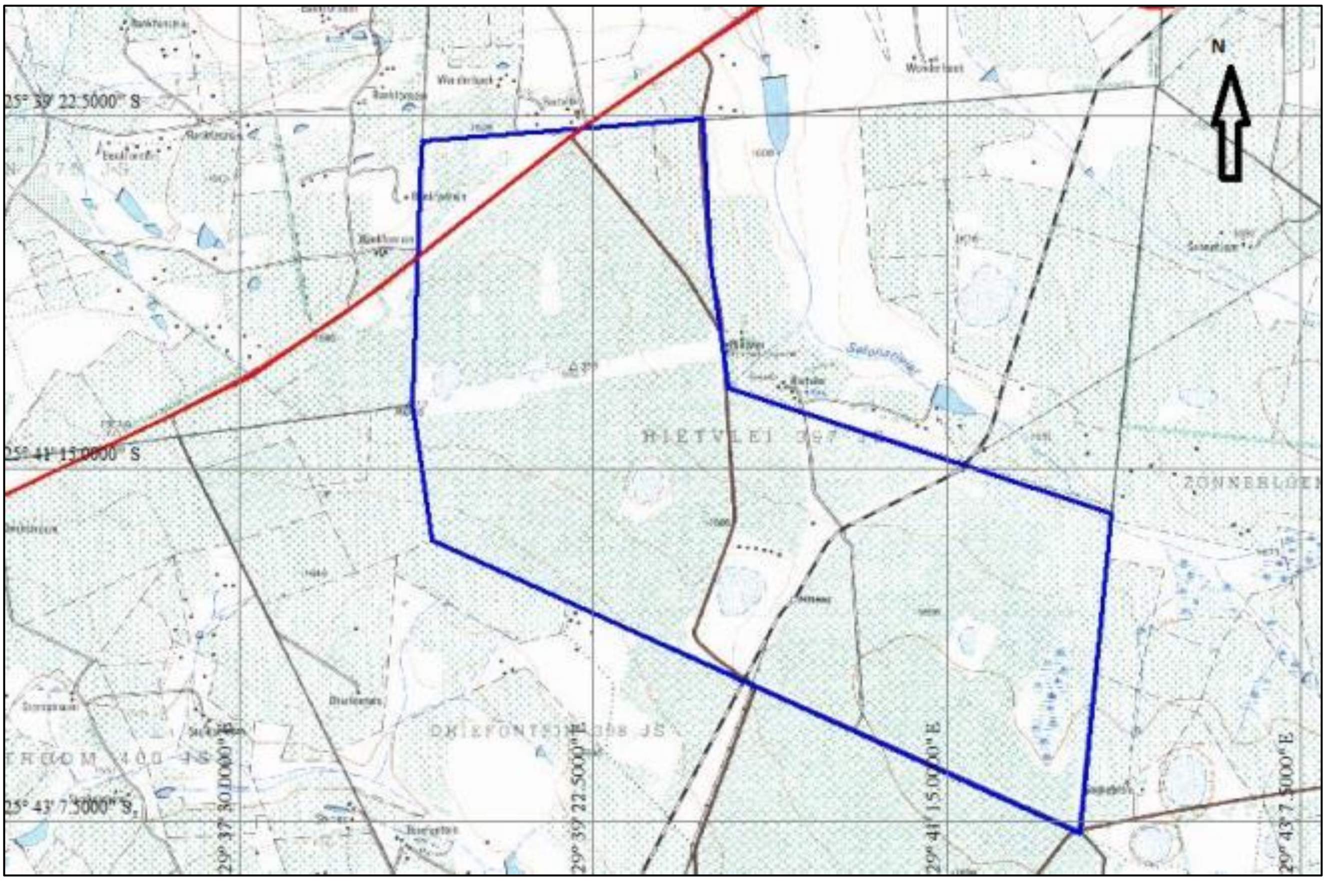


Figure 33: Topographic map of the Rietvlei Colliery

Surface Water

This section was compiled utilising information contained in the Surface Water Assessment undertaken by AquaEarth Consulting, which is included in **Appendix 20** for further information.

The proposed Rietvlei opencast mining area is situated in the B32B, B12E, and B12D quaternary catchments that form part of the Upper Olifants primary catchment area (**Table 9** and **Figure 34**). Numerous farm dams and wetlands are situated along the drainage lines. Different sized pans are irregularly spaced on the higher lying areas. During the rainy seasons, the pans hold water, but are usually dry in winter. Rietvlei forms the headwaters of:

- The Olifants River in B12D: A number of small sized dams intercept the South-West furrows that feed into Olifants River;
- The Selons River in B32B which flows North-West into Olifants River; and
- The Keerom stream which flows West-South-West into Olifants River number of small sized dams intercept the South-West furrows that feed into Keerom stream.

Table 9: Information concerning quaternary catchments

Catchment	B12D	B12E	B32B
Area (km²)	362.3	435.8	613.8
Mean annual runoff (mm/a)	38	53	51
Groundwater contribution to baseflow (mm/a)	7	18	16

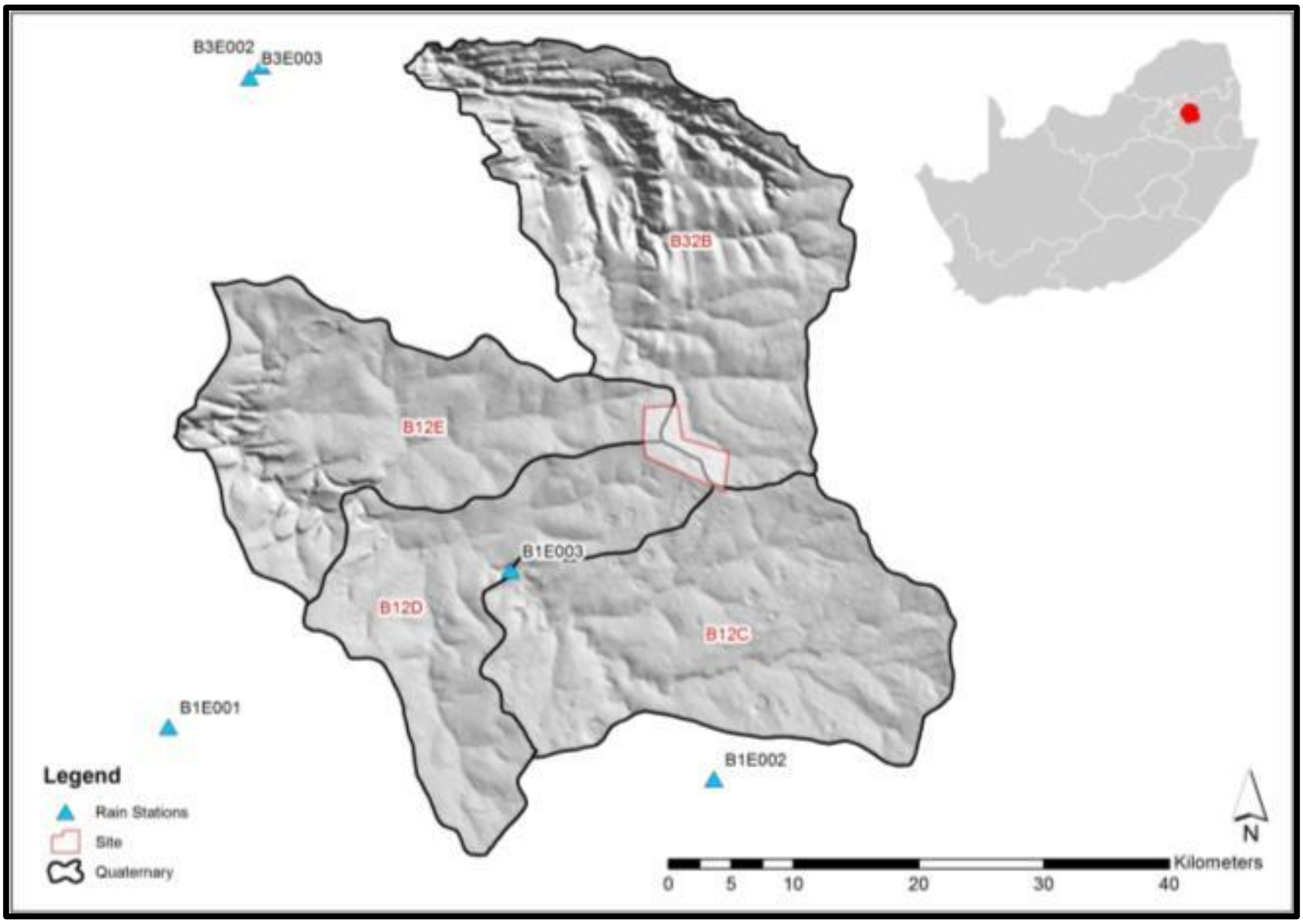


Figure 34: Quaternary Catchments applicable to the Proposed Rietvlei Mine

Rietvlei forms the headwaters of the Selons River which flows to the northwest and joins the Olifants River. The landscape slopes gently towards the river, to the northeast. A number of small sized dams are located on the streams feeding onto major rivers within the area. Local surface run-off catchments with the associated local drainage are shown together with the mining layout in **Figure 35**. The way that such local drainage is connected to the pans on the prospecting area is also illustrated. It is predicted that during the construction phase due to the location of the mine and where the catchments are found no major build-up of flow is predicted to occur.

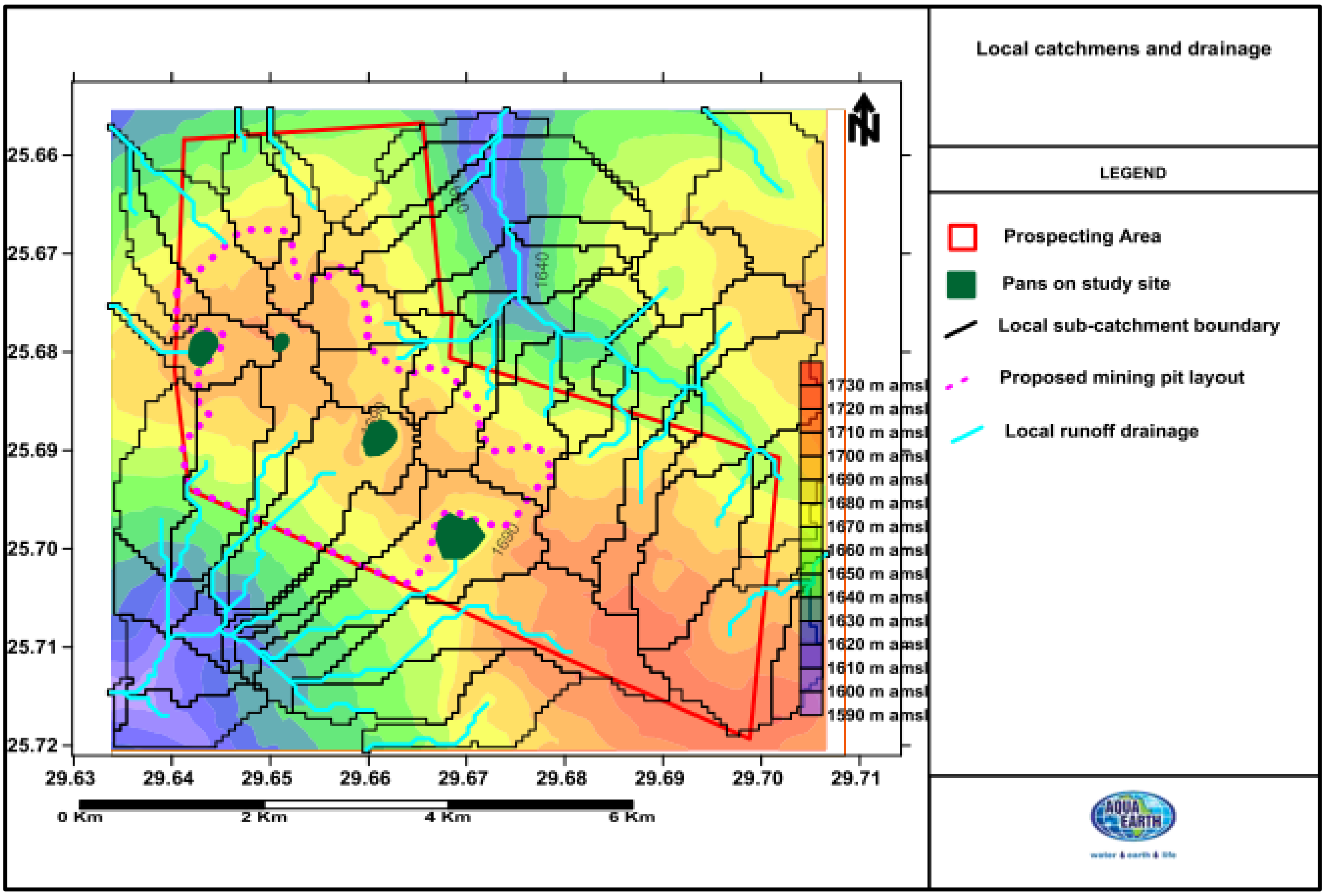


Figure 35: Local surface runoff catchments and drainage with mining layout

Rain gauge (including rainfall and evaporation) and flow gauge data is required for calibration of surface run-off modelling purposes. The closest flow and rainfall station in the vicinity that had daily records available was used in the initial site assessment. It has been determined that the only hydrological response units (HRU) that will be affected by this Project Area will be HRU10, as indicated in **Figure 36**. The assessment also indicated that no influence of any storm water activity outside of HRU10 will have an effect on any of the other catchment areas.

To setup a rainfall run-off model for B32B a rainfall and flow record over the same time period was required for calibration. The closest flow gauge to the site on the Selons River is B3H019 and is shown in **Figure 36**.

Based on the main drainage line and specific flow accumulation criteria, the delineated catchment is subdivided in the HRU or model entities. Typical model parameters such as land cover and slope is established. The B32B catchment is delineated in HRUs as shown in **Figure 37**.

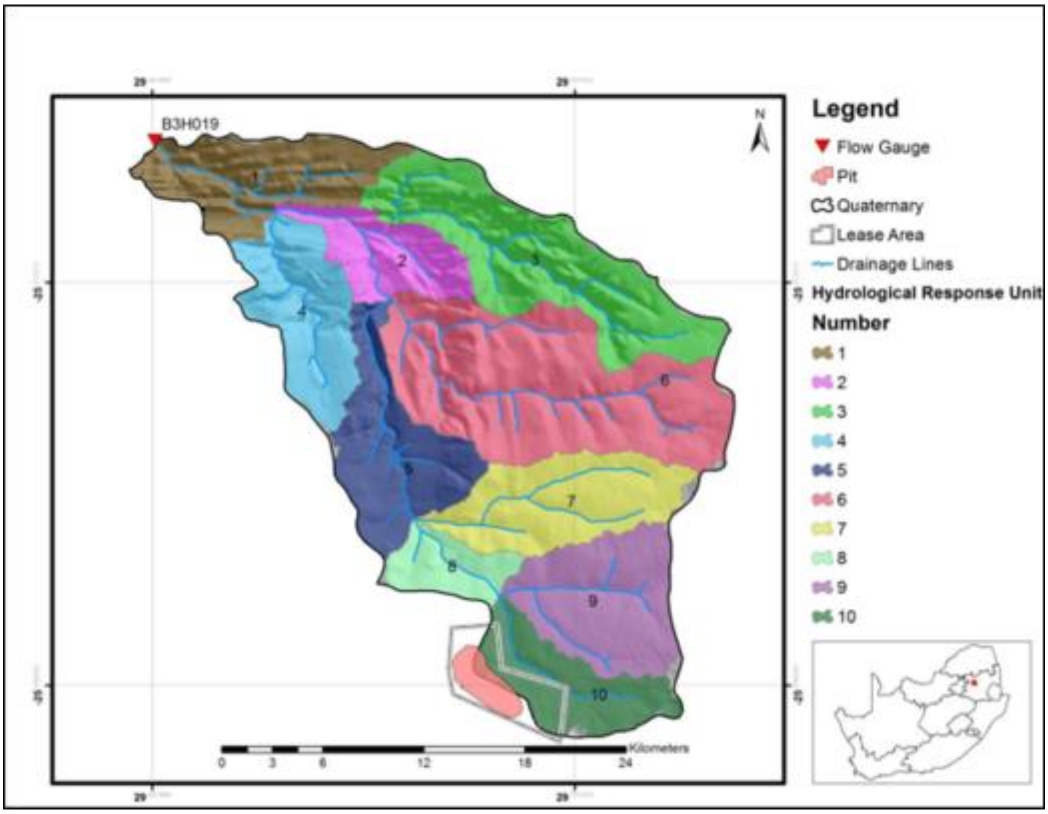


Figure 36: Location of existing surface water flow gauge

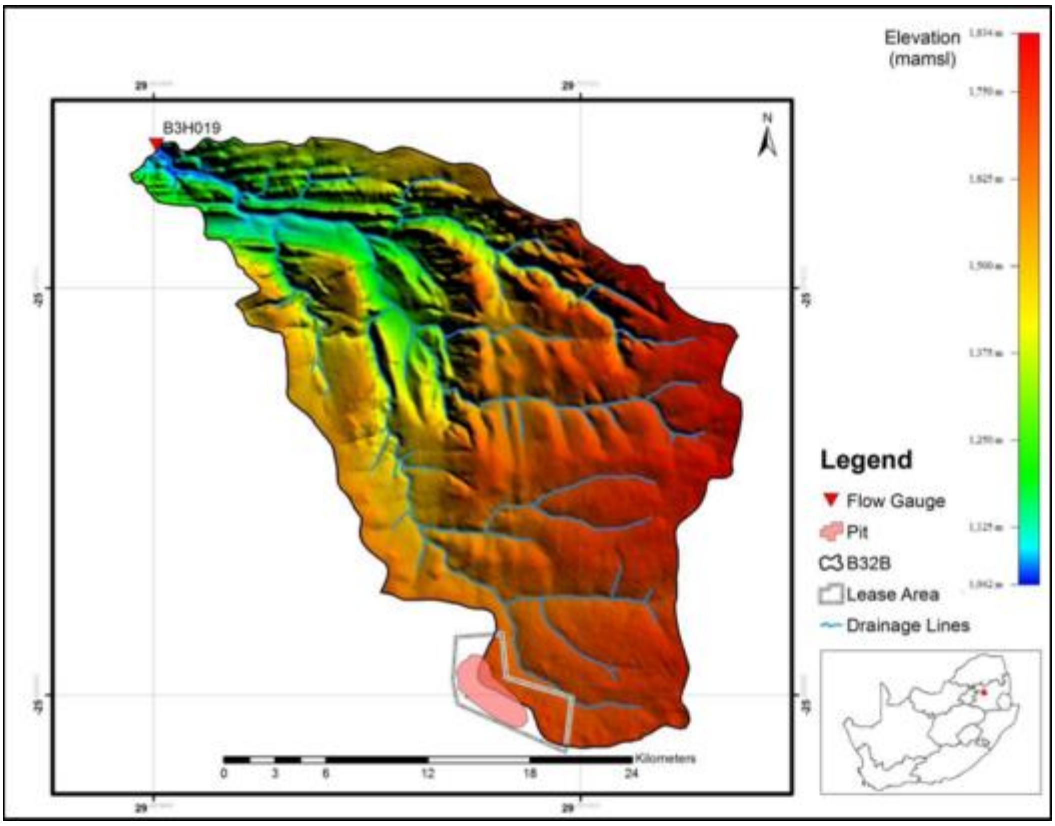


Figure 37: Delineation of hydrological response units

Flood Lines

A floodline determination was done in and around the site to ensure that the proposed open cast pit will not be affected by surface water flooding. A stream definition of 1 km^2 was applied to a digital elevation model (DEM) to delineate three floodline catchments (1, 2, and 3) around the site as shown in **Figure 38**. A summary of the calculated flood peaks per floodline catchment is presented in **Table 10**. The 1:100 year flood lines in relation to the proposed infrastructure are illustrated in **Figure 39**.

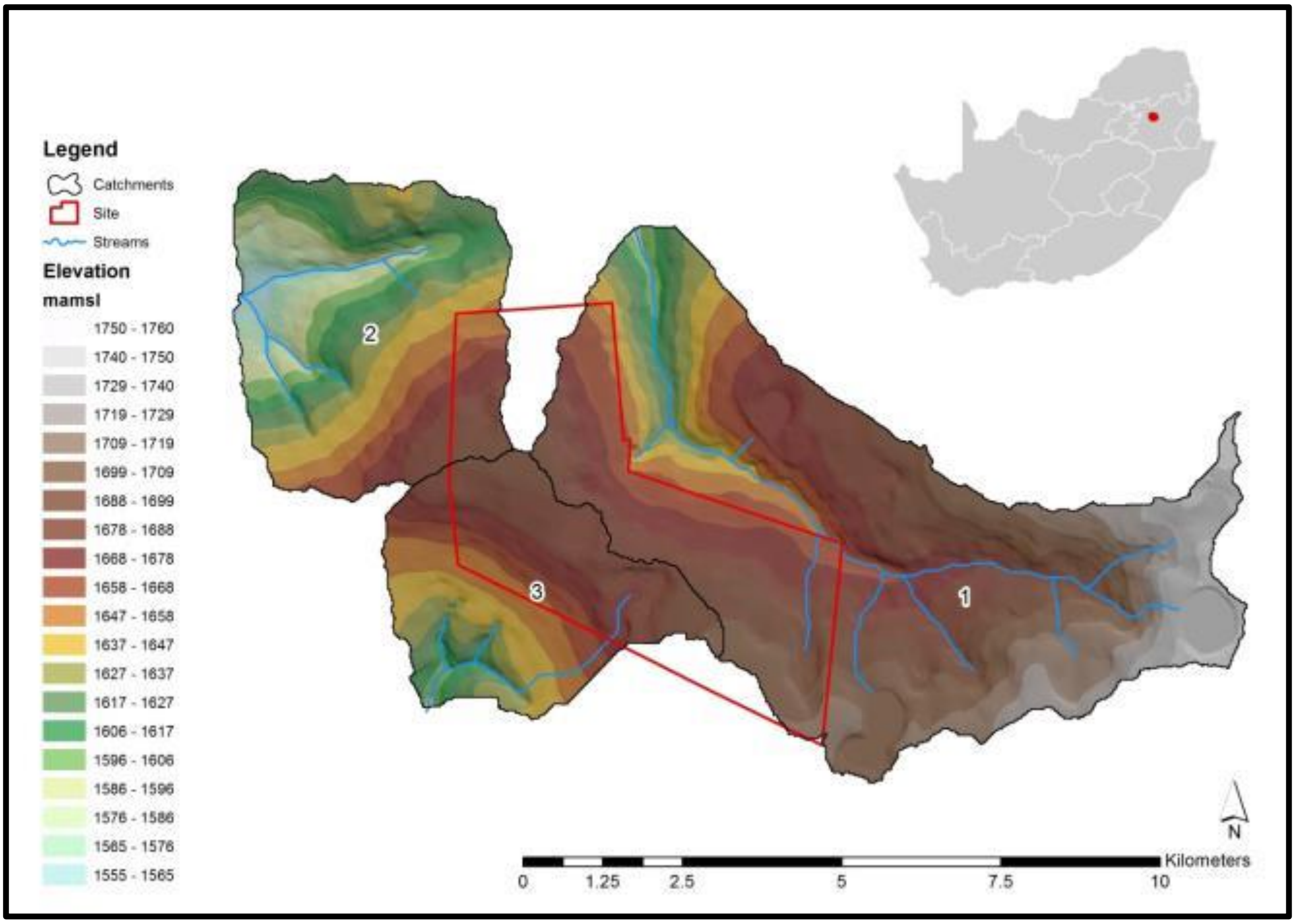


Figure 38: Flood line catchments based on 1km² stream definition

Table 10: Summary of flood peak calculations (m^3/s)

Floodline Catchment	Return Period (years)					
	1:2	1:5	1:10	1:20	1:50	1:100
1	4.43	7.52	9.96	12.60	16.39	19.52
2	7.61	12.89	17.07	21.55	28.00	33.32
3	3.35	5.78	7.73	9.84	12.89	15.43

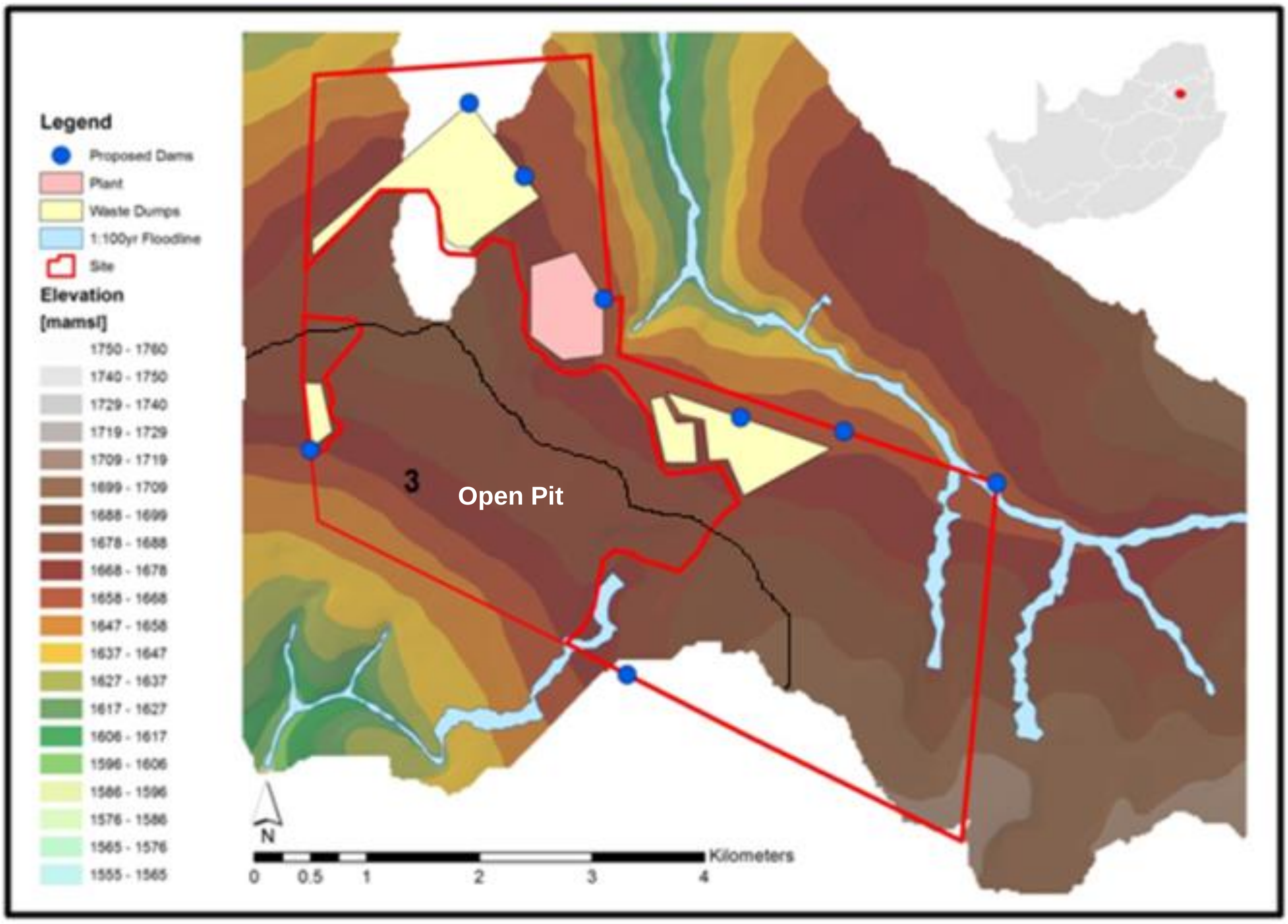


Figure 39: 1:100year flood line in relation to infrastructure

Wetlands and Pans

A number of wetlands and pans have been identified on site (**Figure 40**). Mining through pans 2 and 4 (**Figure 41**) and wetlands 3 – 7 is unavoidable; however, the mine plan was altered to ensure pans 1, 3 and 6 (**Figure 42**) are protected.

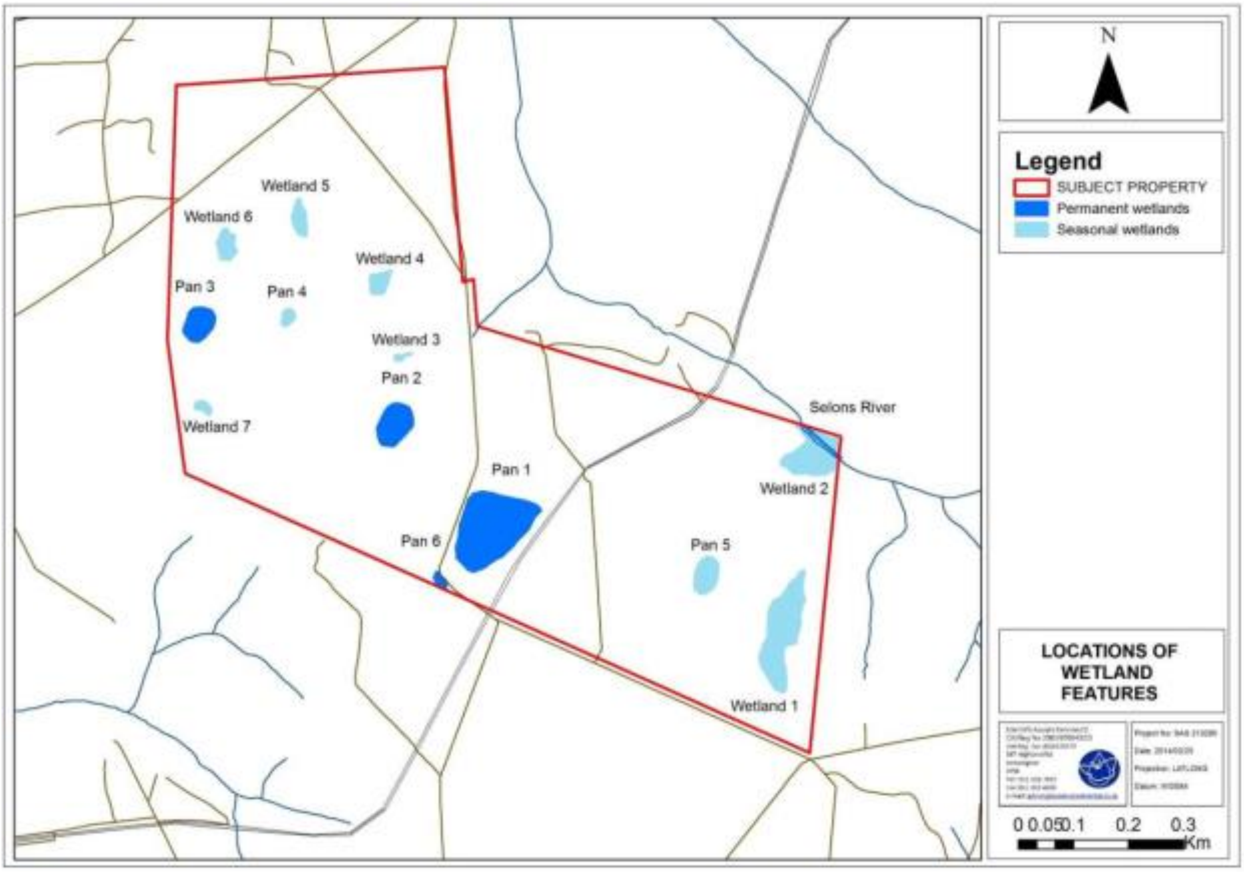


Figure 40: Location of permanent and seasonal wetlands and pans located on site (SAS, 2014)

Figure 41: Pan 2

Figure 42: Pan 1

Surface Water Quality

During a hydrocensus carried out in early 2011, two surface water points were located and visited (**Table 11**). Water samples were collected and sent to an accredited laboratory for analysis. Both samples showed a relatively neutral pH (7.12 and 7.46) and low electrical conductivity values (11mS/m and 13mS/m). The returned results indicated that all the major and minor constituents analysed fall within the recommended operational limits for drinking water (SANS 241; 2005) except for aluminium. The aluminium concentrations at both monitoring points exceeded the maximum allowable limit. It is postulated that the cause of the aluminium concentrations can be related to agricultural activities in the area and the effects of fertilizers. The detailed results are reflected in the Surface Water Study included in **Appendix 20**.

Table 11: Surface Water Points at which water samples were taken during the Hydrocensus

Farm Name	Water Body	Geographic Coordinate (WGS 84)	
		Latitude	Longitude
Rietvlei	Dam	25°40'47.11"	29°41'12.52"
Wonderhoek	Selons River	25°38'50.56"	29°40'10.28"

Groundwater

This section was compiled utilising information contained in the Groundwater Impact Assessment undertaken by Aqua Earth Consulting, which is included in **Appendix 19** for further information.

The mine is located in the Karoo Sequence (Vryheid Formation) which consists of mudstone, shale, rhythmite, siltstone and fine to coarse-grained sandstone. The permeabilities of these sandstones are usually very low. These sedimentary formations have been extensively intruded by dolerite dykes.

Aquifers at the site were characterised by a hydrocensus, followed by a programme of siting, drilling and testing of groundwater exploration/monitoring boreholes.

Hydrocensus

The field team managed to locate and visit 29 boreholes and two surface water points in 2011 (AEC 2011). At the boreholes, physical parameters such as the static water level and GPS coordinates were measured and recorded.

Communities in the area surrounding the proposed project area are dependent on groundwater sources for domestic use, livestock watering and small-scale irrigation (**Figure 43**).

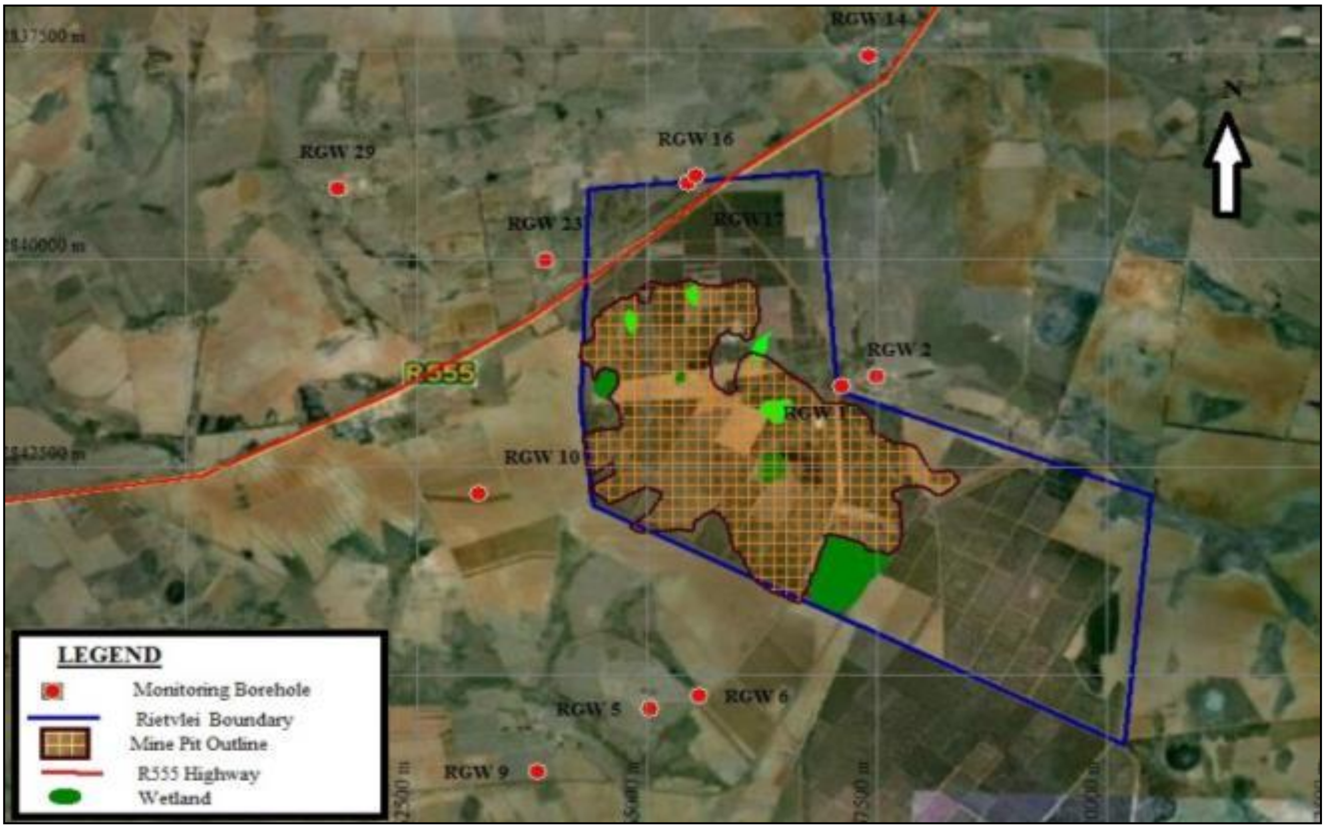


Figure 43: Groundwater abstraction points in the vicinity of the proposed mining footprint

Measured static water levels in the boreholes ranged from artesian to 21.88mbgl. Water strikes were encountered at depths ranging from 8mbgl to 50mbgl. Reported airlift yields range from 0.33l/s to 7.5l/s with the majority of boreholes having yields of less than 3l/s (AEC 2011).

Borehole siting

Siting, drilling and testing of boreholes was conducted in February 2014 (AEC 2014). Six geophysical survey traverses were conducted using magnetic method (Scintrex-G5-Magnetometer). Target sites for drilling and groundwater exploration were identified from this data. The southern and eastern parts of the mining footprint were prioritised for drilling of groundwater exploration/monitoring boreholes since this contains the main portion of the coal resource and is targeted for mining in the feasibility study (Mindset 2013).

Borehole drilling

Shallow and deep boreholes were drilled to allow separate access to the shallow and deeper aquifers for the purposes of testing and sampling (AEC 2014). A total of six deep and two shallow boreholes were drilled on the target sites (**Figure 44**). All deep boreholes were drilled to final depth of 50m, whereas all the shallow boreholes were drilled to final depth of 24m.

Boreholes were advanced using an air percussion drill rig with a 900cfm compressor with full time supervision by a geohydrologist. A 125mm steel solid and perforated PVC casing was then installed and gravel packed to the top. The boreholes where then completed with a concrete block, stand pipe, pump and lockable cap. All the boreholes were drilled with a drill bit with a diameter of 6 inch.

During drilling water strikes were recorded in six of the boreholes: four at deep boreholes and two at shallow boreholes. Borehole T5D was dry. 80 % of water strikes were between 19m and 25 mbgl. Water levels in the boreholes were measured between 1.7m and 19.2mbgl. The recorded water levels did not show any difference in hydraulic heads between shallow and deep boreholes.

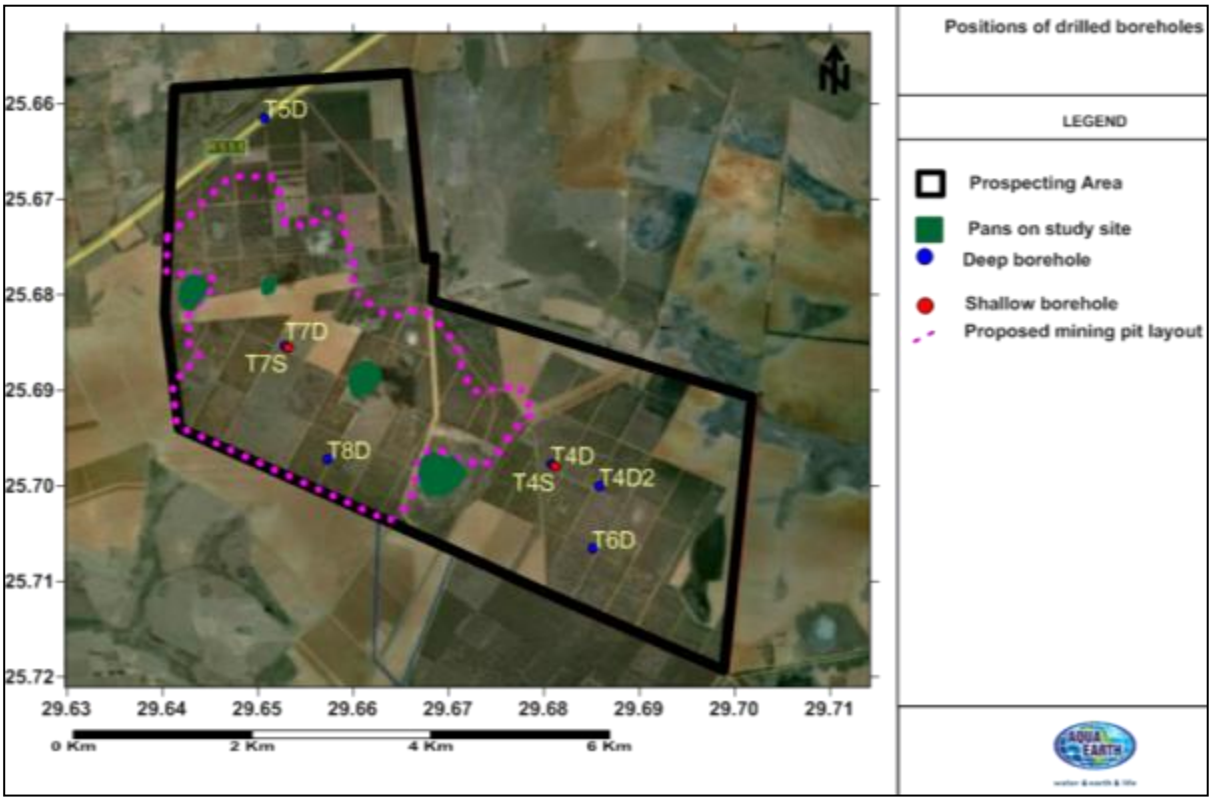


Figure 44: Boreholes drilled at Rietvlei

Borehole testing

Aquifer testing comprised slug tests, calibration tests, recovery tests, step tests and a 12-hour constant discharge test. Aquifer characteristics were determined from the test data (AEC 2014).

Aquifer matrix

Two aquifer systems have been identified at Rietvlei with little potential of yielding large volumes of water:

- **Sandstone**. The water bearing strata is mainly the sandstone above the coal seams with the major flow path being on the contact between the sandstone and coal strata. Groundwater occurrence is within pores in disintegrated/decomposed, partly decomposed rock and fractures which are principally restricted to a zone directly below the water table. The average depth to the groundwater level is at 10 to 2mbgl. The mean groundwater recharge is estimated at 35mm (Vegter, 1995).
- **Dolerite**. The Karoo dolerite consists of an interconnected network of dykes and sills. Dolerite dykes are vertical to sub-vertical discontinuities that, in general, represent thin, linear zones of a lower permeability sandwiched between fracture zones. These fracture zones can have a relatively higher permeability and can therefore act as conduits for groundwater flow. The dykes on the other hand may also act as semi- to impermeable barriers to the movement of groundwater.

Aquifer type

A laterally extensive shallow weathered zone aquifer is the main aquifer at the site.

- Unsaturated zone. The thickness of the unsaturated zone is determined by the depth to the ground water level that varies between 0.33 and 21mbgl in the vicinity, but ranges from 1.7 to 19.2mbgl within the proposed Rietvlei Mine area.
- Saturated zone. In the saturated zone, the generated groundwater elevations contour is considered as the top of the aquifer system. The base of the saturated zone is the weathered-fresh bedrock interface which is effectively the coal seam at Rietvlei.

Borehole yields

Yields in the aquifer at Rietvlei are generally low. **Table 12** summarises the yields obtained from slug testing

Table 12: Summary of slug test results and estimated yields in Rietvlei boreholes

BH Number	Recovery time	Percentage of recovery	Estimated Yield
T4S	128	55	<0.02
T6D	128	100	0.02
T8D	122	88	0.02
T7D	88	52	<0.02
T7S	37	57	<0.02
Gw Obs BH3	120	0.01	<0.02
Gw Obs BH4	98	100	0.03
Gw Obs BH2	60	48	<0.02
Gw Obs BH1	58	100	0.04

Groundwater depth

Water strikes in the shallow aquifer were intersected between 10m and 25mbgl, and concentrated at 45 mbgl in the deeper aquifer. 90% of water strikes recorded during present drilling campaign are located in the shallow aquifer with 80% between 19m and 25mbgl. Water levels in the boreholes were measured between 1.7m and 19.2mbgl. The recorded water levels did not show any difference in hydraulic heads between shallow and deep boreholes (AEC 2014).

Since a good correlation exists between the groundwater level elevations and the surface topography, it is assumed that the groundwater extends over the geometry of the surface water catchment systems (AEC 2014). Consequently, most of the groundwater recharges occurring within the study area are expected to discharge to the surface drainage systems via springs and baseflow.

The groundwater flow direction follows surface water and is moving away from the proposed Rietvlei Mine in the following directions:

- North-West, probably discharging into the furrows that feed into Olifants River;
- South West, probably discharging into Olifants River; and
- North East, discharging into Selons River which also flows North-West into Olifants River;

Aquifer permeability

The field results have shown that the saturated zone is characterized by high hydraulic conductivities at an average of 12m/d, with an estimated transmissivity values vary between 0.6 to 8 m^2/d with an average of 4.5 m^2/d (AEC 2014).

Storage coefficients were estimated ranging from 0.001 to 0.01. Mean annual groundwater recharge was estimated at 35mm (AEC 2014).

Groundwater Quality

When compared to South African National Standards for domestic use (SANS 241: 2005), the chemical results received from the laboratory, show a general baseline groundwater quality that falls within the recommended operational limits (Class 1) for all the constituents analysed (AEC 2014). Baseline groundwater quality is presented in **Table 13**.

Table 13: Baseline groundwater quality at Rietvlei

Borehole	pH	EC mS/m	TDS mg/ℓ	Ca mg/ℓ	Mg mg/ℓ	Na mg/ℓ	K mg/ℓ	Cl mg/ℓ	SO4 mg/ℓ	NO_3-N mg/ℓ	F mg/ℓ	Fe mg/ℓ	Mn mg/ℓ
T4S	6.14	5.9	38.4	13.8	3.54	8.13	5.13	1.83	6.6	<0.3	<0.1	2.1	0.07
T6D	6.11	4.6	29.9	10	2.26	2.88	3.85	0.796	2.29	<0.3	<0.1	0.99	<0.05
T8D	7.98	20.1	131	33.5	3.66	32.9	2.57	2.43	3.44	<0.3	3.5	0.07	<0.05

Borehole	pH	EC mS/m	TDS mg/ℓ	Ca mg/ℓ	Mg mg/ℓ	Na mg/ℓ	K mg/ℓ	Cl mg/ℓ	SO4 mg/ℓ	NO_3-N mg/ℓ	F mg/ℓ	Fe mg/ℓ	Mn mg/ℓ
T7S	6.46	3.7	24.1	9.11	0.66	3.57	2.58	2.26	4.22	<0.3	<0.1	<0.05	0.05
T7D	6.29	2.5	16.3	5.47	0.57	2.84	1.53	1.88	2.27	<0.3	<0.1	<0.05	<0.05
T4D2	7.59	22.9	149	72.7	11.6	9.81	9.29	2.71	6.62	<0.3	0.5	<0.05	<0.05

Recharge

Water qualities suggest that the aquifer consists of recently recharged groundwater. According to Vegter (1995) the recharge is 35mm/a, which is equal to approximately 5% of mean annual precipitation. Using the Chloride method, recharge was estimated at 4% (28mm/a) (AEC 2014).

Groundwater flow direction

The groundwater flow direction is considered to be the same for both considered aquifer systems, and groundwater is moving away from proposed Rietvlei Mine in the following direction:

- North-West, probably discharging into the furrows that feed into Olifants River;
- South West, probably discharging into Olifants River; and
- North East, discharging into Selons River which also flows North-West into Olifants River;

Aquifer Classification

Classification allows the grouping of aquifers according to their associated supply potential, water quality and local importance as a resource (**Table 14**). The aquifer underlying the Rietvlei site is classified between minor aquifer system and non-aquifer system (AEC 2014). The vulnerability classification (Parsons, 1995) is high considering the important number of users.

Table 14: Aquifer Classification System

Aquifer System	Defined by Parsons (1995)	Defined by DWAF Min Requirements (1998)
Sole Source Aquifer	An aquifer which is used to supply 50 % or more of domestic water for a given area, and for which there are no reasonably available alternative sources should the aquifer be impacted upon or depleted. Aquifer yields and natural water quality are immaterial.	An aquifer, which is used to supply 50% or more of urban domestic water for a given area for which there are no reasonably available alternative sources should this aquifer be impacted upon or depleted.
Major Aquifer	High permeable formations usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public supply and other purposes. Water quality is generally very good (<150 mS/m).	High yielding aquifer (5-20 L/s) of acceptable water quality.
Minor Aquifer	These can be fractured or potentially fractured rocks, which do not have a high primary permeability or other formations of variable permeability. Aquifer extent may be limited and water quality variable. Although these aquifers seldom produce large quantities of water, they are important both for local supplies and in supplying baseflow for rivers.	Moderately yielding aquifer (1-5 L/s) of acceptable quality or high yielding aquifer (5-20 L/s) of poor quality water.
Non-Aquifer	These are formations with negligible permeability that are generally regarded as not containing groundwater in exploitable quantities. Water quality may also be such that it renders the aquifer as unusable. However, groundwater flow through such rocks, although imperceptible, does take place, and need to be considered when assessing the risk associated with persistent pollutants.	Insignificantly yielding aquifer (< 1 L/s) of good quality water or moderately yielding aquifer (1-5 L/s) of poor quality or aquifer which will never be utilised for water supply and which will not contaminate other aquifers.

Aquifer System	Defined by Parsons (1995)	Defined by DWAF Min Requirements (1998)
Special Aquifer	An aquifer designated as such by the Minister of Water Affairs, after due process.	An aquifer designated as such by the Minister of Water Affairs, after due process.

Soil and Land Capability

This section was compiled utilising information contained in the Soil, Land Capability and Land Use Assessment that was undertaken by Rehab Green Monitoring Consultants CC, which is included in **Appendix 21** for further information.

Dominant Soil Types

The majority of the study area, 95.14% (614.69ha), consists of well-drained, red and yellow brown, loamy sand to sandy clay loam soils with arable land capability and high agricultural potential. A total of fourteen soil types, based on dominant soil form, effective soil depth, internal drainage, terrain unit and slope percentage, were identified during field observations and include:

- Hu1 - Hutton - Very deep, red, well-drained soils;
- Hu2 – Hutton - Shallow to moderately deep, red, well-drained soils with occasional gravely spots;
- Hu3 – Hutton - Shallow, mainly reddish brown, gravely soils underlain by hardpan ferricrete;
- Gf - Griffin- Very deep, yellow brown to yellowish red, well-drained soils;
- Cv1 - Clovely - Very deep, yellow brown, well-drained soils;
- Cv2 - Clovely - Deep, yellow brown, well-drained soils;
- Cv3 - Clovely - Moderately deep, yellow brown, well-drained soils;
- Cv4 – Clovely - Shallow, yellow brown, well-drained soils underlain by weathered rock;
- Gc – Glencoe - Shallow, yellow brown, well-drained soils underlain by hard plinthite;
- Ct/Lo - Contstantia - Greyish yellow to yellow brown, imperfectly drained soils;
- Lo1 - Longlands - Grey, imperfectly to poorly drained, sandy soils;
- Fw – Fernwood - Grey, poorly drained, sandy soils;
- Fw-Exc - Fernwood - Disturbed, grey, imperfectly drained, sandy soils; and
- Kd-w - Kroonstad - Grey, saturated, sandy soils underlain by gleyed clay.

The extent of the soil types is shown in **Figure 45**.

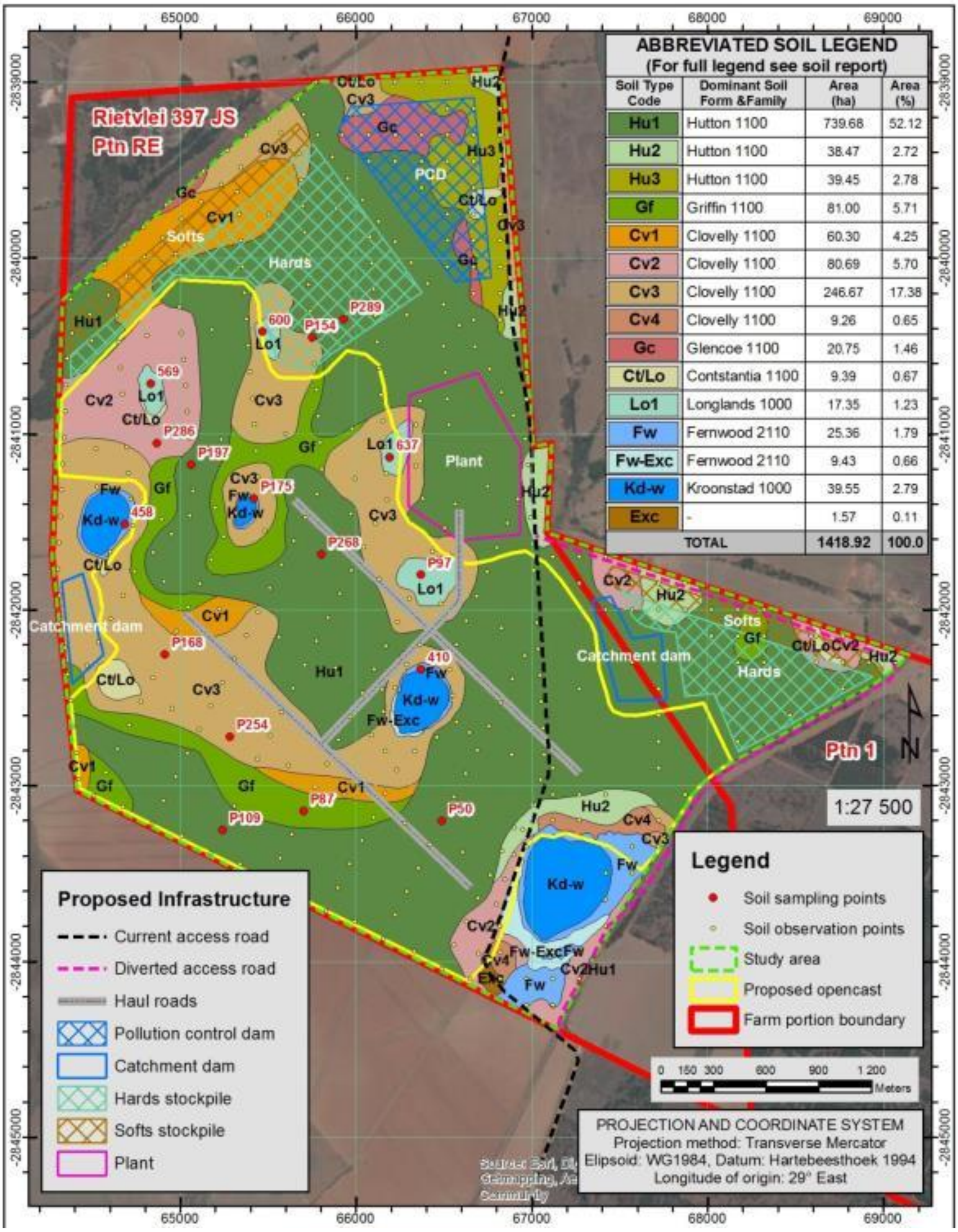
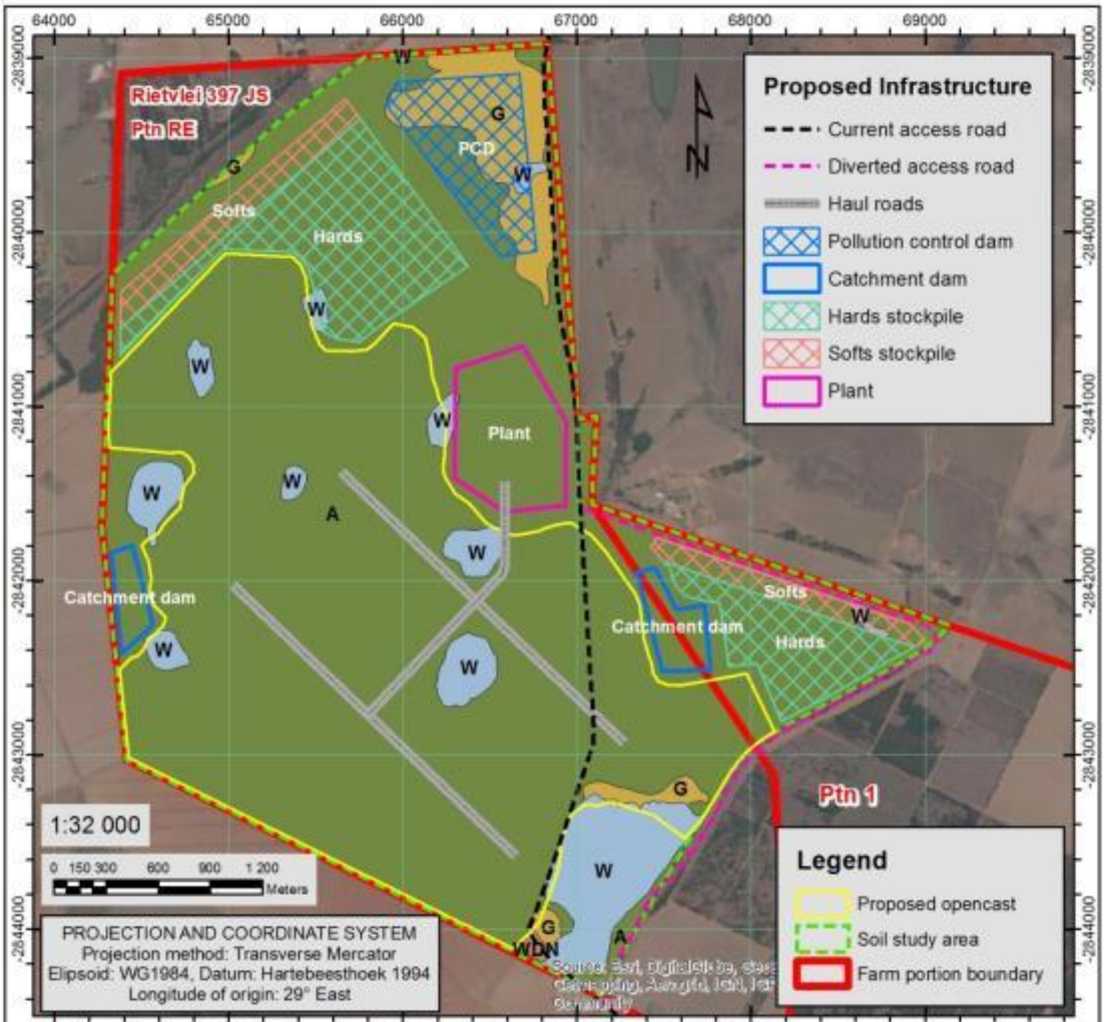


Figure 45: Detailed soil map of the proposed Rietvlei opencast mining area

Land Capability

The type of land capability was found to be predominately arable land which covered 87.88% of the study area. 4.89% of the site was found to be used for grazing while 7.14% of this land contained wetlands. This is depicted in **Figure 46**.



LEGEND: LAND CAPABILITY

Land Capability Code	Land Capability Class	*Soil Types	Broad Soil Description	Unit Count	Area (ha)	Area (%)
A	Arable	Hu1, Hu2, Gf, Cv1, Cv2, Cv3	Terrain: Flat to gently sloping crests and midslopes (0-6% slopes). Soil: Very deep (>1500 mm), red, well-drained, loamy sand to sandy clay loam soils; Moderately deep to deep (600-1500 mm), yellow brown, well-drained, loamy sand to sandy loam soils.	2	1246.81	87.88
G	Grazing	Hu3, Cv4, Gc	Terrain: Gently sloping midslopes and footslopes (0-6% slopes); Soil: Shallow, red, gravely, sandy loam soils and shallow, brownish yellow, loamy sand soils.	4	69.46	4.89
W	Wetland	Ct/Lo, Lo1, Fw, Fw-Exc, Kd-w	Terrain: Gently sloped, temporary seepage zones, weakly expressed closed depressions and prominent closed depressions on crests. Soil: Grey, imperfectly to poorly drained sandy soils underlain by weathered or hard rock, soft plinthite or gleyed clay.	12	101.08	7.14
WDN	Wilderness	Exc	Terrain: Excavated area - Quarry; Soil: No remaining soil.	1	1.57	0.11
*See soil map, Figure 3			Total	19	1418.92	100.0

Figure 46: Land Capability map of the proposed Rietvlei opencast mining area

Flora

This section was compiled utilising information contained in the Floral Assessment undertaken by Scientific Aquatic Services, which is included in **Appendix 22** for further information. Site visits were undertaken during April and October 2011 as well as January 2014.

Habitat Units

There are three habitat units identified in this region; wetlands, grasslands and transformed habitats, all of which have characteristics of historic disturbance as shown in **Figure 47**. Exotic floral species were more abundant in the seasonal zones for the wetlands due to the adjacent plantations and agricultural activities. The permanent and seasonal wetland features have seen some vegetation transformation.

Figure 47: Habitat units identified within the study area

- *Transformed Grassland Habitat*

  This habitat unit is located between the plantations on the proposed Rietvlei Mine site. Very few natural grassland areas remain on the site due to the surrounding agricultural and plantation activities that are dominant on the site. Due to the past and present human-driven disturbances, the grassland habitat unit on site is considered to be of low ecological importance. The grassland vegetation on the site is affected and transformed by alien floral encroachment, especially the *Eucalyptus* (blue gum) species.

- *Transformed Habitat*

  The areas outside the wetland and grassland habitat units have been transformed by either crop cultivation or timber plantation activities. As a result, the floral community structure has been altered to the extent that it is, in some cases, completely irreversible. This means that there is only a small likelihood of RDL species occurring here. Thus, this habitat unit is not regarded as sensitive and does not provide an ecologically important function.

- *Wetland Habitat*

  Several wetlands and pans have been identified within the proposed site. The pans have however, been classified as endoheic depression systems and the wetlands as a flat seepage according to the National Freshwater Ecosystem Priority Areas (NFEPA). The wetland features can be divided into two categories which include wetland features with permanent zones of saturation and wetland features with no permanent zones of saturation represented in **Figure 48**.

  Pan 1, 3 and 6 have been identified as having the most naturally occurring vegetation as limited alien invasion is present except in areas located in close proximity to the road or cultivated areas. The Selons River (situated to the northeast of the site) provides a number of habitats of both avifaunal and aquatic species however some areas along the river have been transformed.

Figure 48: Location of the permanent and non-permanent wetland features

Vegetation Index Score

An assessment considering the presence of any floral species of concern, as well as suitable habitat to support any such species, was undertaken. The complete PRECIS (Pretoria Computer Information Systems) floral list for the grid references (2529DA) was enquired from the South African National Biodiversity Institute (SANBI). The threatened status of all the species listed within the Quarter Degree Square (QDS) 2529DA was categorised as either least concern (LC) or not evaluated (NE). No RDL floral species were listed within the QDS. In addition no RDL floral species were recorded within the study area during the site assessment. The information gathered during the assessment of the site was used to determine the Vegetation Index Score (VIS) outlined in **Table 15**.

The largest extent of the site was impacted by stands of alien and invasive vegetation, which include the woody species *Eucalyptus camaldulensis, Pinus patula* and *Acacia mearnsii*. Invader species also encroached into the grassland habitat unit due to the edge effects from agricultural activities and plantations.

None of the medicinal species found within the study area (*Eucalyptus grandis, Helichrysum nudifolium* and *Tagetes minuta*) are listed as protected or of conservational concern. No important medicinal floral communities will be lost or impacted upon by the proposed mining activities.

Table 15: Vegetation Index for the proposed Rietvlei opencast mining area

Habitat Unit	Score	Class	Motivation
Transformed Habitat	5	**Class E – extensive loss of natural habitat**	This habitat unit is associated primarily with the plantations, alien proliferation as well as agricultural activities. The ecological functionality and habitat integrity of the transformed habitat Unit is regarded as being extremely limited.
Transformed Grassland Habitat	6	**Class D – largely modified**	This habitat unit has undergone vegetation transformation due to the surrounding alien encroachment and tree plantations

Habitat Unit	Score	Class	Motivation
Wetland Habitat	16	**Class C – moderately modified**	This habitat unit has undergone some transformation due to the surrounding tree plantations but still provides suitable habitat for numerous wetland floral species and foraging habitat for avifaunal species.

Fauna

This section was compiled utilising information contained in the Faunal Assessment undertaken by Scientific Aquatic Services, which is included in **Appendix 23** for further information.

The region is generally dominated by cultivation, mining and some wetlands. The region is disturbed and therefore the possibility of any RDL species is minimal. The highest level of fauna activity will generally be situated in close proximity to the wetland areas that are undisturbed and protected.

The area in which the site is located comprises of transformed habitat, which includes grassland plantation and agricultural lands and wetland habitats. The transformed grassland could host a number of common avifaunal and small mammal species. **Appendix 23** includes the full lists of fauna species that could potentially occur on site and those that were recorded on site during on site surveys undertaken in April and October 2011 as well as during January 2014.

Mammals

Visual and field signs of *Canis mesomelas* (Black Backed Jackal), *Cynictis penicillata* (Yellow Mongoose) and *Lepus saxatilis* (Scrub hare) were noted during the site visits. *Sylvicapra gimmia* (Common Duiker) field signs were also observed. The majority of the site has been significantly transformed, however the wetland areas, especially at the pans present on the site, still provide sufficiently intact habitat for many mammals. The wetland areas are also the habitat unit where nearly all of the mammal species were encountered. Baited Sherman traps were utilised to capture small mammals which may inhabit the site. Traps were placed in areas where suitable small mammal habitat was observed. No small mammals were successfully trapped during the exercise. However, the presence of raptor birds (Black-Shouldered Kite) indicates that a significant small mammal population is likely to be present on the site.

In terms of conservation, no RDL or threatened mammal species were encountered during the field assessments. Furthermore, the likelihood of any threatened mammal species as listed in the Faunal Assessment (included in **Appendix 23**) being encountered within the site is considered to be low due to the transformed nature of the majority of the site. Thus it is unlikely that RDL or sensitive mammal species will utilise the site for habitation or foraging purposes.

Avifauna

All bird species seen or heard during this time of the assessment were recorded. Surveys were conducted across the entire site and in the immediate surroundings. Due to the site consisting of predominantly *Eucalyptus* sp. plantations, agricultural lands and transformed grasslands, there is very little grassland habitat and there was thus a low diversity of grassland avifaunal species recorded. The likelihood of grassland bird species flying onto the site to forage is however good.

Species encountered were concentrated near the pans and Selons River. The avifaunal species found in the site are common species found within the region. These avifaunal species are all categorised as species of Least Concern by the IUCN (2014).

No global or regional RDL avifaunal species were identified during the site survey. Mention must be made that faunal species, especially avifaunal species, are mobile and are capable of moving primarily in search for new foraging resources. Thus, there is a significant probability that the *Sagittarius serpentarius* (Secretarybird), *Circus ranivorus* (African Marsh Harrier), *Falco peregrinus minor* (Peregrine Falcon), *Tyto capensis* (African Grass Owl) and the *Geronticus calvus* (Bald Ibis) may be present within the site specifically for foraging purposes specifically near the wetland habitat units. No sightings of these above mentioned RDL bird species were recorded during the site survey.

Reptiles

No suitable rocky ridge outcrops were identified within the site. Only one reptile species was identified during the assessment and this was near the Selons River namely, *Lycodonomorphus rufulus* (Common Brown Water Snake). It is anticipated that commonly occurring reptile species might inhabit the wetland areas on the site. However, reptiles are notoriously difficult to detect, are well camouflaged, may occur subterranean and have good senses to hide from predators, thus making identification of reptiles difficult. The above mentioned reptile specie is not a RDL threatened species and is classified as Least Concerned by the IUCN (2014).

No reptile RDL species were encountered and none are expected to occur due to the levels of habitat transformation and the limited suitable reptile habitat available.

Amphibians

One amphibian species was noted during the field assessment, namely the *Xenopus laevis* (Common platanna).This low diversity was potentially due to the largely nocturnal habits of amphibians and the limited habitat units available to support amphibians within the site. Amphibian species will favour the wetland habitat areas within the site.

Common species which may occur in the surrounding region include the *Ptychadena anchietae* (Plain Grass Frog), *Afrana angolensis* (Common River frog), *Cacosternum boettgeri* (Common Caco), *Kassina senegalensis* (Bubbling kassina), *Amietophrynus gutturalis* (Guttural toad), *Tomopterna natalensis* (Natal sand frog) and the *Ptychadena mossambica* (Striped grass frog) all of which are considered not threatened (MP SoER, 2003 and the IUCN, 2014).

RDL amphibian species are listed in Faunal Assessment (included in **Appendix 23**). The only amphibian species listed as being of conservational concern in relation to the site is the *Pyxicephalus adspersus* (Giant Bullfrog) (MP SoER, 2003). *P. adspersus* breed in shallow waters and can occupy temporary floodplains and rapidly drying pool areas and are also known to travel vast distances and may utilise wetlands as migratory corridors in favourable conditions. *P. adspersus* species Red Data Sensitivity Index Score (RDSIS) scores high for distribution and food potential but low for breeding habitat since the lack of extensive areas with shallow seasonal pans/wetlands will limit the ability for this species to successfully breed on the site. *P. adspersus* thus scores 63% probability of occurrence (POC) on the site.

Invertebrates

The invertebrate assessment conducted was a general assessment with the purpose of identifying common species and taxa in the site. As such, the invertebrate assessment will not be an indication of the complete invertebrate diversity potential of the proposed development site and surrounding area. No evidence was encountered of the Mygalomorphae arachnids (Trapdoor and Baboon spiders) on the site, although it should be noted that these species are notoriously difficult to detect. A representation of commonly encountered families in the Insecta class that were observed during the assessment is listed in the Faunal Assessment (included in **Appendix 23**). *Metisella meninx* or commonly known as the Marsh Sylph (Butterfly) is an invertebrate noted as vulnerable by MP SoER 2003. The site falls within the distribution range noted for *M. Meninx*. No *M. meninx* was identified during the assessment but its preferred habitat comprises of wetlands where *Leersia hexandra* (marsh grass) is dominant. No *L. hexandra* grass was observed during the survey and the presence of *M. meninx* will thus have a low possibility of occurrence within the site.

Spiders and Scorpions

Trapdoor and Baboon spiders are listed as threatened throughout South Africa (Dippenaar-Schoeman, 2002). All baboon spider species from the genus; *Ceratgyrus, Harpactira* and *Pterinochilus* are protected under NEMBA status for South Africa. All scorpion species from the genus; *Hadogenes, Opisthacanthus* and *Opistophthalmus* are also protected under NEMBA status for South Africa. There is no threatened spider or scorpion species lists of conservational interest provided by the Mpumalanga Province (MP SoER, 2003). Therefore, a record of threatened spiders and scorpions was acquired from the most resent RDL spider and scorpion data available for South Africa using the SANBI threatened species database (http://www.speciesstatus.sanbi.org). No RDL spiders or RDL scorpions were encountered within the site, although it should be noted that these species are notoriously difficult to detect. Within the site, specific attention was paid with the identification of suitable habitat for spiders and scorpions. Specific attention was paid to a rocky outcrop habitat area on the east of the site. The only spider species found was *Adriana* sp (tube web spider) which was found within the wetland/pan habitat area. This species is considered common and not threatened.

Red Data Species Assessment

Regional Mpumalanga RDL species taken into consideration for calculation of the RDSIS are indicated in the Appendix section for all taxa as indicated throughout the report. Six RDL threatened species found to have a 60% or greater probability of being associated with the site are presented in **Table 16**. These species RDSIS score high due to distribution and foraging criteria and low for favourable habitat. These species are likely to occur during foraging times. The species presented in **Table 16** were then used to calculate the RDSIS for the site, the results of which are presented in **Table 17**.

Table 16: Threatened faunal species with a 60% or greater Probability of Occurrence (POC) associated with the site

Scientific Name	Common Name	MP SOER 2003 RDL	IUCN 2014 RDL	POC
Tyto capensis	African Grass Owl	VU	LC	66
Falco peregrinus minor	Peregrine Falcon	VU	NYBA	64
Geronticus calvus	Southern Bald Ibis	VU	VU	62
Circus ranivorus	African Marsh Harrier	VU	LC	66
Sagittarius serpentarius	Secretary bird	-	VU	68
Pyxicephalus adspersus	Giant African bullfrog	VU	LC	63
VU = Vulnerable, LC = Least Concern				

Table 17: Red Data Sensitivity Index Score calculated for the site

Red Data Sensitivity Index Score	
Average Total Species Score (TSS)	66
Average Threatened Taxa Score (TT/2)	78
Average (Ave TSS + Ave TT/2)	72
% Species greater than 60% POC	9%
RDSIS of Site	**40%**

The RDSIS assessment of the site provided a moderate score of 40%, indicating a moderate importance in terms of RDL faunal species conservation on the site. In terms of the proposed development project, should the wetlands and associated buffer zones be preserved, habitat requirements for the above RDL species will be maintained to a large degree and will significantly limit the impact of the proposed mining development on the faunal assemblages. The proposed activities are thus deemed not to pose a threat to faunal conservation in the region and no RDL faunal species are likely to occur within the range of influence of the proposed activities with the exception of possible RDL bird species mentioned above.

Wetlands

This section was compiled utilising information contained in the Wetland Assessment undertaken by Scientific Aquatic Services, which is included in **Appendix 26** for further information.

Wetland System Characterisation

Several wetland and pan features were identified on site (**Figure 40**). The wetland and pan features identified during the assessment were categorised according to the method provided by Ollis et al., (2013). The results of the classification, which show that the features were classified as an Inland system falling within the Highveld Ecoregion, are presented in **Table 18**. **Table 19** identifies the two broad wetland feature types, based on the levels of inundation observed in the systems.

Table 18: Classification system for the wetland features on the site

Wetland Feature Location	Level 1: System	Level 2: Regional Setting	Level 3: Landscape Unit	Level 4: Hydrogeomorphic (HGM) Unit / HGM Type
Rietvlei Mine	**Inland:** An ecosystem that has no existing connection to the ocean but which is inundated or saturated with water, either permanently or periodically	**Highveld Ecoregion:** The subject property falls within the Highveld Ecoregion **WetVeg Group:** Mesic Highveld Grassland Group 4	**Plain:** An extensive area of low relief. These areas are characterised by relatively level, gently undulating or uniformly sloping land with a very gently gradient that is not located in a valley	**Depression:** A landform with closed elevation contours that increases in depth from the perimeter to a central area of greatest depth, and within which water typically accumulates
			Valley floor: The base of a valley, situated between two distinct valley side-slopes	**Channelled valley-bottom wetland:** A valley-bottom wetland with a river channel running through it
			Bench (hilltop/saddle/shelf): An area of mostly level or nearly level high ground (relative to the broad surroundings)	**Wetland flat:** A level or near-level wetland area that is not fed by water from a river channel, and which is typically situated on a plain or a bench

Table 19: The two broad wetland feature types identified on the site

Wetland features with permanent zones of saturation (Permanent wetland)	Wetland features with no permanent zones of saturation (Seasonal Wetland)
Pan 1	Pan 4
Pan 2	Pan 5
Pan 3	Wetland 1
Pan 6	Wetland 2
Selons River	Wetland 3
	Wetland 4
	Wetland 5
	Wetland 6
	Wetland 7

Wetland Function

The wetland function and service provision of the identified wetlands was conducted according to the guidelines as described by Kotze et al (2009).

- **Wetland features with permanent zone of saturation**

  From the results of the assessment of the permanent features (**Figure 49**), it is evident that Pan 1 and the Selons River have an intermediate level of ecological function and service provision and Pan 2, 3 and 6 have a moderately low level of ecological function and service provision. The Pan features 1-3 and 6 are the most important in terms of carbon storage. These results obtained were mainly due to the fact that these pan features have higher peat content and little soil disturbances, thus increasing the wetlands contribution to trapping carbon. The

Selons River was most important in terms of streamflow regulation and nutrient assimilation. Thus from the overall scores obtained from the wetland ecoservices calculation it was found that Pan feature 1 and the Selons River were the most important in terms of services and function, therefore obtaining a higher service value than the Pans 2, 3 and 6.

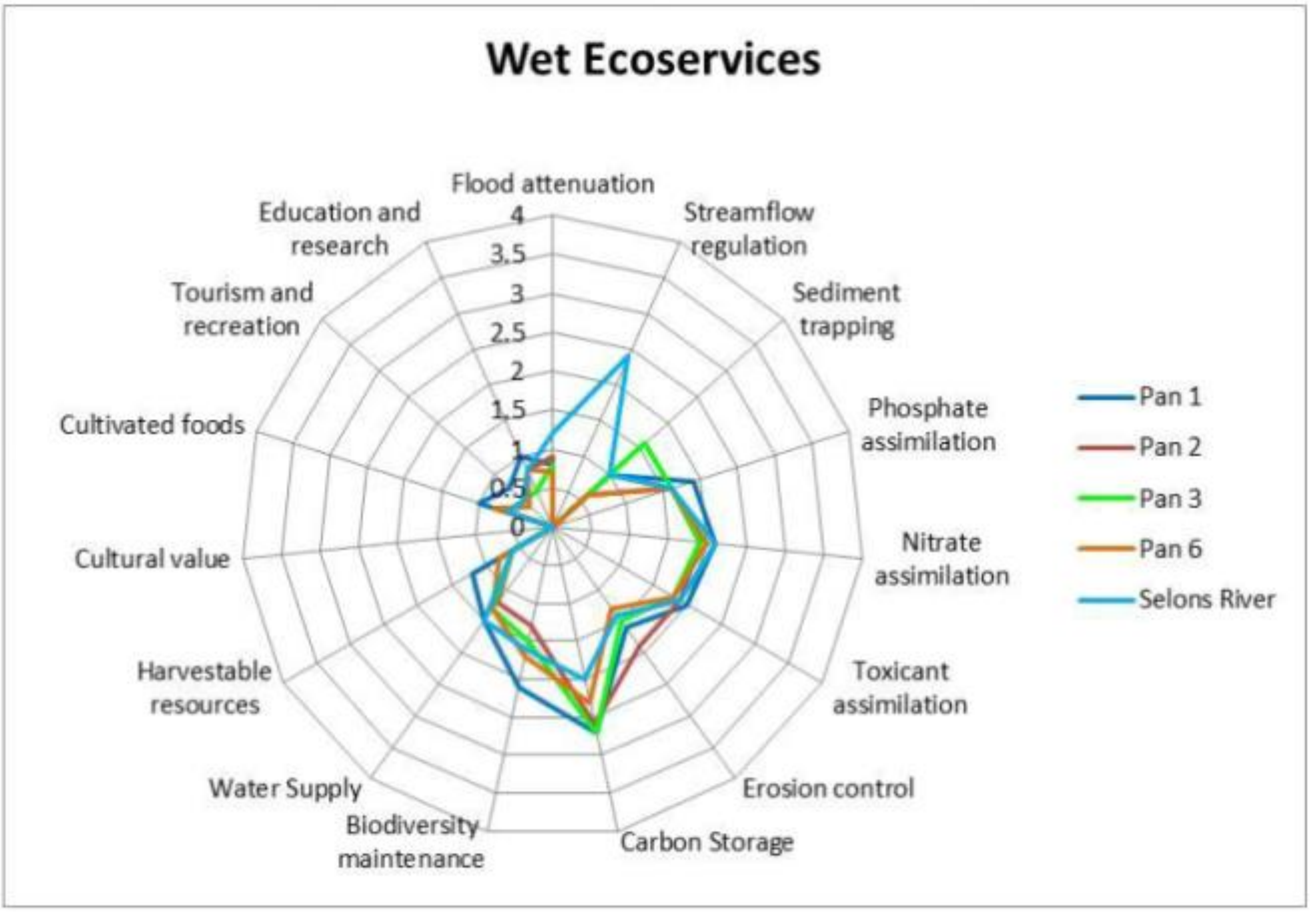


Figure 49: Radar plot of wetland services provided by the wetland features with a permanent zone

- **Wetland features with no permanent zone of saturation**

From the results of the assessment **(Figure 50**), it is evident that all of the seasonal wetland features on the site have a moderately low level of ecological function and service provision. These wetland features and pans are the most important in terms of nitrate assimilation. The results obtained were mainly due to the fact that all of the wetland features with no permanent zone of saturation display diffuse flow characteristics causing a seepage area to occur. Agricultural practises surround some parts of these wetlands, causing water and possibly some fertilisers to wash off into the wetland sections. This increases the nutrient levels within the wetlands, thus lowering the water quality.

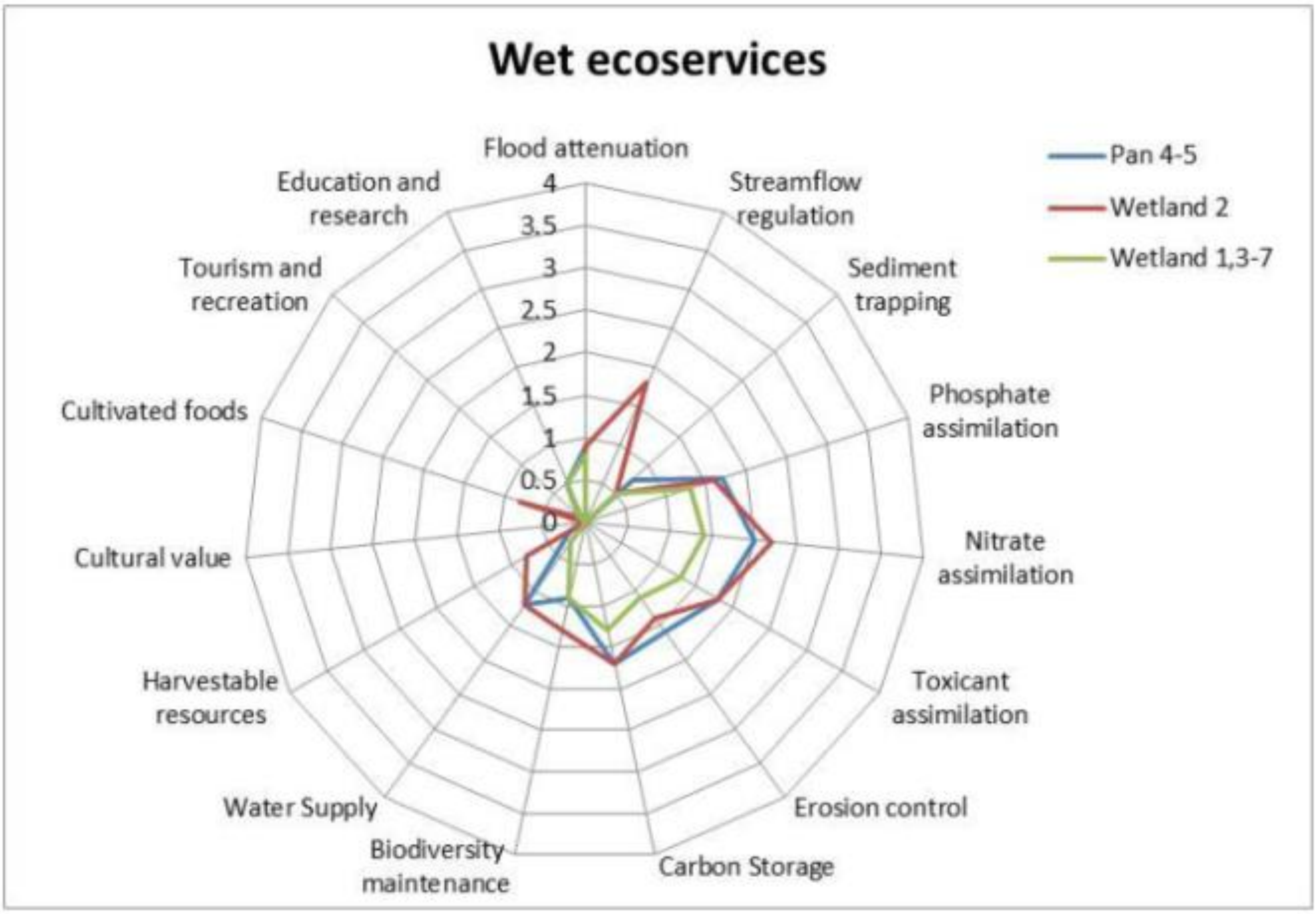


Figure 50: Radar plot of wetland services provided by the wetland features with no permanent zone

WET-Health

For the purposes of the WET-Health assessment, the state of a wetland is a measure of the extent to which human impacts have caused the wetland to differ from the natural reference condition (Macfarlane et. al. 2008). A Level 1 WET-Health assessment was applied to the features identified on the site.

The present hydrological state of the wetland features calculated a score falling between Category B (A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place) and Category D (A large change in ecosystem processes and loss of natural habitat and biota and has occurred). The present geomorphological state of the features calculated a score falling between a Category A (unmodified, natural) and a Category B (A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place). The current vegetation status within the wetland features was calculated with a score falling between Category C (A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact) and Category E (Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota).

The above results indicate that moderate to high levels of modifications of hydrology, geomorphology and vegetation have occurred. Modifying factors include historic and current agricultural activities such as vegetation clearing for crop cultivation, plantation and grazing activities contributing to increased erosion and sediment input. Considering the current rate of transformation of the landscape and proximity and expansion of plantation and agricultural activities in the vicinity, deviation from a Category B-D is expected in all of the systems, unless mitagatory measures are implemented to prevent further deterioration.

The overall score for the wetland systems that aggregates the scores for the three modules, namely hydrology, geomorphology and vegetation, was calculated using the formula5 as provided by the Wet-Health methodology. The overall score calculated for each wetland feature was determined (**Table 20**). Due to the forestry and agricultural activities, deterioration from these categories are expected. It can be concluded from the WET-Health assessment that Pan feature 1, 3; the Selons River and Wetland feature 2 have a higher function in terms of the three modules as mentioned above.

Table 20: Summarised results of the WET-Health results for the wetland features on site

Wetland Feature	Hydrology Impact Score	Geomorphology Impact Score	Vegetation Impact Score	Overall Score
Pan 1	C	A	C	C
Pan 2	D	A	D	C
Pan 3	C	A	C	B
Pan 6	C	A	D	C
Selons River and Wetland 2	B	A	C	B
Pan 4	C	B	E	C
Pan 5	D	B	E	D
Wetland 1, 3-7	D	B	E	D

- **Category A** (Unmodified, natural)
- **Category B** (Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place)
- **Category C** (Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact)
- **Category D** (Largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred)
- **Category E** (The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable)

Wetland Environmental Importance and Sensitivity (EIS)

The results of the wetland function assessment and WET-Health assessment were used to obtain the EIS assessment, for which the results are presented in **Table 21** and **Table 22**.

- **Wetland features with a permanent zone of saturation**

  The scores of 2.0 to 2.89 calculated during the assessment indicate that the permanent wetland features falls into the "high" EIS category (category 'B'). It should be noted that the high EIS score was obtained primarily as a result of habitat diversity and ecological function and status of the wetland features.

- **Wetland features with no permanent zones of saturation**

  The scores of 1.33 to 1.56 calculated during the assessment indicate that the seasonal wetland features falls into the "moderate" EIS category (category 'C'). It should be noted that the lower EIS score was obtained primarily as a result of historical agricultural practices such as crop cultivation and grazing may have contributed to the present condition of these pans through water attenuation, increased siltation and clearing of natural vegetation.

Table 21: Wetland EIS Score for the wetland features with permanent zones

Determinant	Permanent Wetland Feature									
	Pan 1		Pan 2		Pan 3		Pan 6		Selons River	
	Score	Confidence	Score	Confidence	Score	Confidence	Score	Confidence	Score	Confidence
Primary Determinants										
1. Rare & Endangered Species	2	4	2	4	2	4	1	4	2	3
2. Populations of Unique Species	1	4	1	4	1	4	1	4	2	3
3. Species/taxon Richness	2	4	1	4	1	4	1	3	2	4
4. Diversity of Habitat Types or Features	2	3	1	4	2	3	1	3	2	3
5. Migration route/breeding and feeding site for wetland faunal and avifaunal species	3	3	2	3	2	3	1	3	2	3
6. PES as determined by WET Health assessment	3	4	3	4	4	4	3	4	4	4
7. Importance in terms of function and service provision	3	4	2	4	2	4	2	3	3	4
Modifying Determinants										
8. Protected Status according to NFEPA WetVeg	4	4	4	4	4	4	4	4	4	4
9. Ecological Integrity	3	3	2	3	2	3	4	3	3	3
Total	**26**		**18**		**20**		**18**		**24**	
Mean	**2.89**		**2.0**		**2.22**		**2.0**		**2.67**	
Overall EIS	**B**		**B**		**B**		**B**		**B**	

Table 22: Wetland EIS Score for the wetland features with only temporary and seasonal zones

Determinant	Permanent Wetland Feature							
	Pan 4		Pan 5		Wetland 2		Wetland 1, 3-7	
	Score	Confidence	Score	Confidence	Score	Confidence	Score	Confidence
Primary Determinants								
1. Rare & Endangered Species	0	3	0	3	0	3	0	4
2. Populations of Unique Species	1	4	1	3	1	3	0	4
3. Species/taxon Richness	1	4	1	3	1	2	1	4
4. Diversity of Habitat Types or Features	1	4	1	3	1	3	1	3
5. Migration route/breeding and feeding site for wetland faunal and avifaunal species	1	3	0	4	1	3	1	3
6. PES as determined by WET Health assessment	3	4	3	4	4	4	3	4
7. Importance in terms of function and service provision	1	3	1	3	1	3	1	4
Modifying Determinants								
8. Protected Status according to NFEPA WetVeg	4	4	4	4	4	4	4	4
9. Ecological Integrity	1	3	1	3	1	4	1	4
Total	**13**		**12**		**14**		**12**	
Mean	**1.44**		**1.33**		**1.56**		**1.33**	
Overall EIS	**C**		**C**		**C**		**C**	

Aquatic Ecology

This section was compiled utilising information contained in the Aquatic Ecology Assessment undertaken by Scientific Aquatic Services, which is included in **Appendix 24** for further information. The aquatic assessment was undertaken during two site visits (October 2011 and January 2014) at two identified sites on the Selons River namely RV1 (upstream of the proposed Rietvlei Mine) and RV2 (downstream of the proposed Rietvlei Mine).

Physico-Chemical Water Quality

Table 23 reflects the biota specific water quality for the two assessment sites. In general the water quality can be considered fair although it is evident that dissolved salts are elevated in the region and there is some variability in salt concentrations between the two assessment sites. It is evident that the electrical conductivity (EC) between the two assessment sites on the Selons River during 2011 and 2014 indicate that salinisation of the upper catchment is likely to be occurring, most likely as a result of agricultural activities in the area. The pH may be considered natural and no impact on the aquatic ecology of the system is deemed likely at the current time and for the 2011 site survey period. The dissolved oxygen (DO) concentration is acceptable and can be regarded as suitable for supporting a diverse and sensitive aquatic community. Temperatures can be regarded as normal for the time of year and time of day when assessment took place.

Table 23: Biota specific water quality data along the Selons River

Site	Year	Electrical Conductivity (EC) (mS/m)	pH	Dissolved Oxygen (DO) (mg/l)	Temperature (°C)
RV1	2011	23.0	8.10	N/A	15.8
RV2	2011	17.8	8.80	N/A	16.5
RV1	2014	11.7	8.07	7.38	21.9
RV2	2014	10.9	7.94	6.55	28.1

Riparian Vegetation Response Assessment

The Riparian Vegetation Response Assessment Index (VEGRAI) is designed for qualitative assessment of the response of riparian vegetation to impacts in such a way that qualitative ratings translate into quantitative and defensible results (Kleynhans et al, 2007).

The results of this assessment indicate that both the upstream RV1 and downstream RV2 sites fall within an Ecological Category Class C (Kleynhans et al, 2007) for year 2011 and 2014, indicating a loss and change of natural habitat having occurred, but the basic ecosystem functions are still predominately unchanged (Kleynhans et al, 2007). The primary modifier to this system is likely to be the water quality and flow modification, due to the proximity to historical and current agricultural activities, that include livestock farming, which may contribute to the moderately modified vegetation in the system.

Invertebrate Habitat Integrity Assessment (IHIA)

It is important to assess the habitat of each site, in order to aid in the interpretation of the results of the community integrity assessments by taking habitat conditions and impacts into consideration. The general habitat integrity of the site should be discussed based on the application of the Intermediate Habitat Integrity Assessment for (Kemper; 1999). By calculating the mean of the instream and riparian Habitat Integrity scores, an overall Habitat Integrity score can be obtained for each site. This method describes the Present Ecological State (PES) of both the in-stream and riparian habitats of the site. The method classifies Habitat Integrity into one of six classes, ranging from unmodified/natural (Class A), to critically modified (Class F). The detailed data for this assessment in included in the Aquatic Ecology Assessment included in **Appendix 24.**

- **2011 IHIA summary**

  The RV1 site achieved an IHIA score of 49% while the RV2 site achieved a score of 54%. Based on the classification system of Kemper 1999 both sites have habitat conditions that can be described as largely modified (Class D), where a loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.

- **2014 IHIA summary**

  During the 2014 site survey, the two Selons River sites achieved an IHIA rating of 70% (RV1) and 72% (RV2), where an increase from class D to a class C was observed since the 2011 early spring late winter survey. Currently in 2014 the habitat is deemed moderately modified indicating a loss and change of natural habitat and biota, but the basic ecosystem functions are still predominantly unchanged (Kemper, 1999).

Aquatic Macro-Invertebrates Assessment (SASS5)

Aquatic Macro-invertebrates were sampled using the qualitative kick sampling method called SASS5 (South African Scoring System version 5) (Dickens and Graham, 2001). The results of this assessment can be summarised as follows:

- **2011**
  - During the early spring 2011 assessment, the two assessment sites can be considered as Class D (largely impaired) sites according to the Dickens and Graham (2001). With mostly tolerant taxa present.
  - According to Dallas (2007) classification systems the upstream RV1 site and the downstream RV2 sire are classed a Class E/F (severely/critically impaired). This is due to the naturally limited habitat that is available and the lack of flow in the river at the time of assessment (early spring 2011).
  - Based on the available habitat conditions with special mention of the lack of flow and the lack of bankside vegetation cover, the poor aquatic macro-invertebrate community score in the system is most likely due to the limited availability of natural habitat at the RV1 and RV2 sites.
- **2014**
  - During the early 2014 assessment, the two assessment sites can be considered as Class D (largely impaired) sites according to the Dickens and Graham (2001).
  - According to Dallas (2007) classification systems both upstream RV1 site and downstream RV2 sites are classed a Class E/F (severely/critically impaired). Even with an increase in flow these classifications have remained the same since the 2011 site survey at both sites.
  - Based on the available habitat conditions the poor aquatic macro-invertebrate community score in the system is most likely due to the limited availability of natural habitat at the RV1 and RV2 sites.

Aquatic Macro-Invertebrates Assessment (MIRAI)

The Macro-invertebrate Response Assessment Index (MIRAI) provides an approach to deriving and interpreting aquatic invertebrate response to driver changes. The index has been applied to the aquatic sites following methodology described by Thirion (2007). Aquatic macro-invertebrates expected at each point were derived both from previous studies of rivers near the area as well as habitat, flow and water parameters (Thirion 2007).

The MIRAI results (in terms of Ecological Category classification) follow similar trends as those obtained using the SASS class classifications. The PES obtained from the application of MIRAI (Thirion, 2007) were as follows; for 2011 RV1 was a class D (41%) and RV2 class D (43%). During the 2014 site survey, RV1 was a class D (45%) and RV2 a class D (47%). The overall general deterioration in terms of macro-invertebrate community integrity is clearly evident throughout the two assessment sites along the Selons River at both low flow as well as the high flow periods. The MIRAI results confirm the SASS results for these sites.

Fish Community Integrity

During the 2011 early spring survey no fish were observed or captured at the RV1 or RV2 site on the Selons River during the survey period. Similarly no fish was observed or sampled within the non-perennial pans which occur within the site. Habitat Cover Rating (HCR) results for the two sites on the Selons River (RV1 and RV2) showed that the habitat conditions during this period were suited for slow flowing shallow and deep water species.

- The absence of fish in the system is indicative of long term impacts on the system, with special mention of loss of spawning habitat due to upstream and downstream migration barriers.
- Some limitations due to natural distribution patterns and constraints are also deemed highly possible.
- Instream modifications such as sedimentation and impacts from impoundments are considered to significantly impact on the fish community of the system and interfering with fish migrations along the rivers.
- Due to the limited integrity, diversity and sensitivity of the fish community, it is not deemed likely that any highly significant additional impacts on the fish community of the aquatic resources in the area due to the proposed mining operation will occur.

During the 2014 site survey period, the HCR results for the two sites on the Selons River (RV1 and RV2) are provided below:

- It is clear that shallow-fast conditions predominate in the Selons River system followed by deep-fast conditions. The fish expected in the area will therefore be limited to fish with high intolerance values for slow flowing water habitats and to a lesser degree species with a high intolerance value for shallow slow water habitats and water column cover.
- Electro-shocking for fish was conducted within the Selons River within a 100m radius upstream and downstream from the sites over a 20 to 30 minute period. Fish species that were caught were photographed and then released during the survey done within the Selons River sites.
- Along the upstream site RV1, *Clarias gariepinus* (Sharptooth Catfish) and *Barbus anoplus* (Chubbyhead barb) species were captured while at the downstream site RV2 *B. anoplus* and *Barbus neefi* (Sidespot barb) were identified in the catch.

Biodiversity Sensitivity Mapping

An overall sensitivity map was created with the use of the results from the aquatic, floral, faunal and wetland assessments (**Figure 51**). High sensitivity areas included pan feature 1 and 3 and the Selons River with associated 100m buffers. Pan 2 and 6 were considered of medium sensitivity. The majority of the faunal species with a probability of occurrence of 60% or more also inhabit the wetland areas. Low sensitivity was allocated to the seasonal wetland sections. The remainder of the site is considered very low due to the complete vegetation transformation of agricultural and plantation activities.

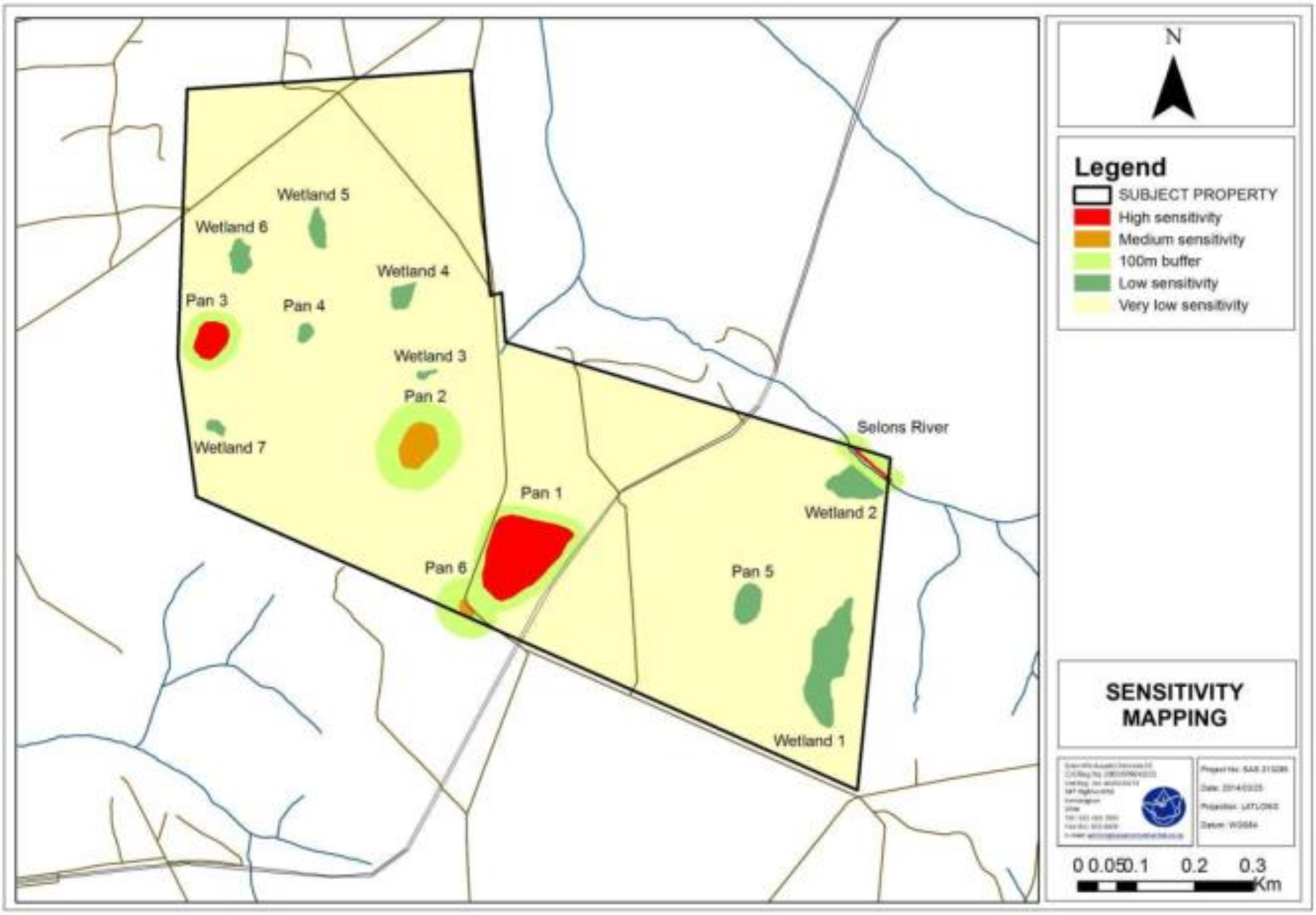


Figure 51: Overall Sensitivity Map for the Study Area

Air Quality

This section was compiled utilising information contained in the Air Quality Impact Assessment undertaken by Airshed Planning Professionals, which is included in **Appendix 18** for further information.

The main pollutant of concern associated with the proposed mining site is particulates. Particulates are divided into different particle size categories with total suspended particulates (TSP) associated with nuisance impacts and the finer fractions of PM_{10} (particulates with a diameter less than 10µm) and $PM_{2.5}$ (diameter less than 2.5µm) linked with potential health impacts. Gaseous pollutants (such as sulphur dioxide, oxides of nitrogen, carbon monoxide etc.) will come from vehicle exhausts but are regarded as negligible in comparison to particulate emissions

Ambient Air Quality within the Mpumalanga Highveld Region

A comprehensive emissions inventory has recently been completed for the region as part of the Highveld Priority Area (HPA) baseline study. From this study it has shown that the portion of Steve Tshwete area in which the proposed Rietvlei mine will be located is indicated to have little or no exceedences with respect to PM_{10}. Sources of pollution within this area include power generation, mining activities, farming and residential, contributing vehicle tailpipe emissions, household fuel combustion, biomass burning and various fugitive dust sources such as unpaved and paved roads.

General Pollution Generators in the Region

Sources identified as impacting the air quality in the region include, but are not limited to:

- *Power generation*

  Multiple operational power stations fall within the Mpumalanga Highveld region. The main emissions from such electricity generation are carbon dioxide, sulphur dioxide, nitrogen dioxides and ash (particulates). Fly-ash particles emitted comprise various trace elements such as arsenic, chromium, cadmium, lead, manganese, nickel, vanadium and zinc. Small quantities of volatile organic compounds are also released from such operations. The power stations in close proximity to the proposed Rietvlei mine area include Arnot Power Station located ~31 km south east, Hendrina Power Station (~40 km south), Komati (~49 km south west), Duvha Power Station (~45 km south west), Kriel Power Station (~80 km south west), Kendal (~83 km south west) and Matla Power Station located approximately ~85 km south west of Mafube Colliery.

- *Mining operations*

  There are a number of different mines located all around the proposed Rietvlei mine. Fugitive emissions are generated from open cast and underground mining operations during land clearing operations, vehicle movement along roads, wind erosions from open pits and blasting.

- *Fugitive dust sources*

  Unpaved roads contribute significantly to the atmosphere and air quality. Traffic congestion and the silt load on the road will determine how significant the impact could be.

- *Domestic fuel combustion*

  Domestic households can contribute significantly to poor air quality. Individual households are low volume emitters, but their cumulative impact can have a major effect. As the communities surrounding the Proposed Rietvlei mine are generally informal, their main source of energy comes from burning of wood and coal which can contribute to reduced air quality.

- *Biomass burning*

  This includes burning of all vegetation forests, woodlands, grasslands, and agricultural lands within the vicinity of the proposed site. In addition to the impact of biomass burning within the vicinity of the proposed mining activity, long-range transported emissions from this source can be expected to impact on the air quality between the months August to October.

- *Vehicle tailpipe emissions*

  The increase in vehicle usage will increase the amount of pollutants released into the atmosphere by vehicle emissions. These can be divided into primary and secondary pollutants.

- *Informal refuse burning*

  Additional sources of emissions come from the waste sector and typically includes informal refuse and tyre burning. The informal burning of refuse tips within former township areas and burning of waste at local municipal landfill sites represents a source of concern in all provinces.

Ambient Monitoring at the Proposed Site

Ambient monitored data for at least one year is required for a comprehensive baseline. Eight single dust fallout buckets were installed in April 2014 (**Figure 52**). A PM_{10} minivol sampler was not installed due to a lack of security on-site. The monitoring network will serve to measure background dust deposition. Available data are included in this study to provide an indication of the background dust fallout rates and PM10 concentrations prior to the commencement of mining operations.

The locations of the single dust buckets in relation to the project site are shown in **Figure 52**. A total of eight dust buckets are located close to potential sources of particulates such as the proposed unpaved roads, paved road, overburden stockpiles, topsoil stockpiles and pit area. Two of the single dust units are located in close proximity to farmsteads near the mine boundary. Three months dustfall data was available for incorporation into this report. The data is for the period 08 April 2014 to 09 May 2014 (31 days), 09 May 2014 to 10 June 2014 (32 days) and 10 June 2014 to 11 July 2014 (31 days). The monitored dust fallout results for the period April 2014 to June 2014 are shown in **Table 24** and **Figure 53**.

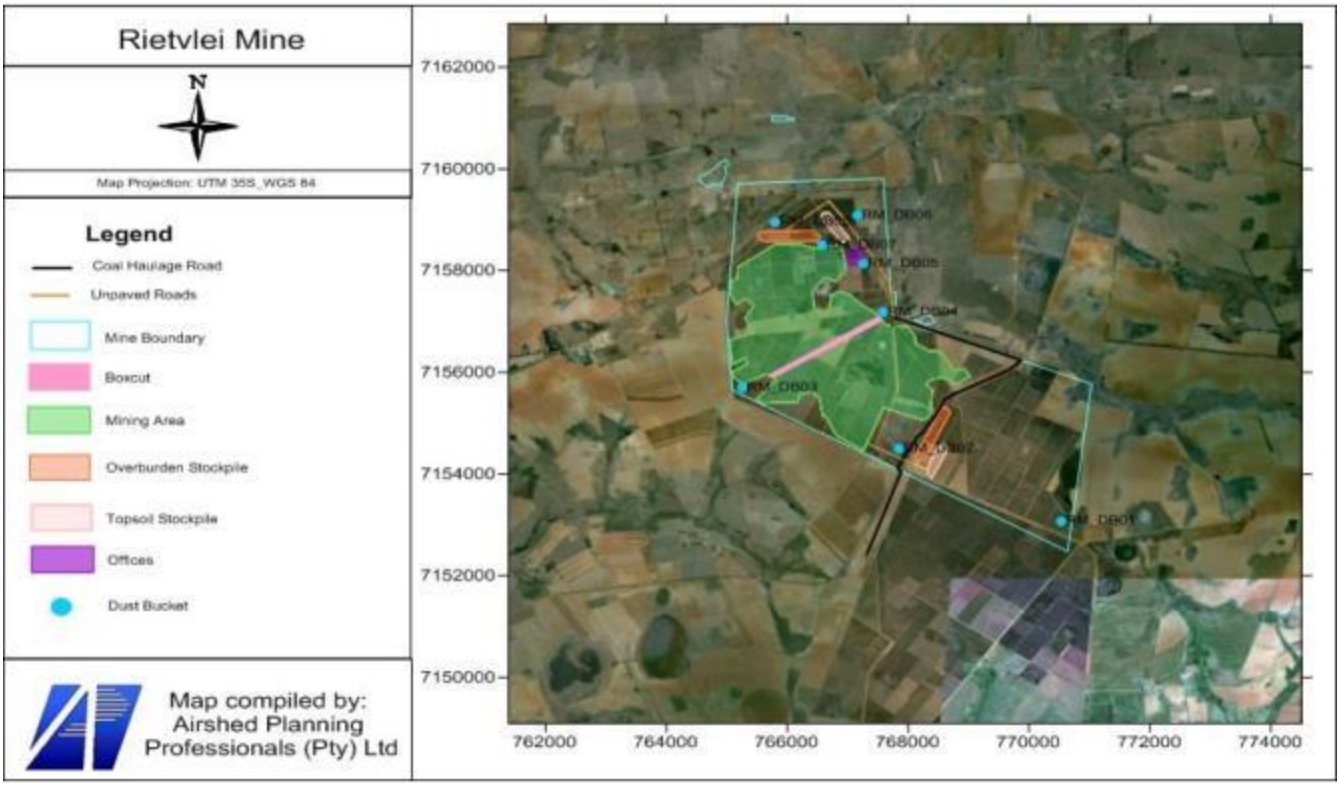


Figure 52: The current monitoring network in relation to the proposed operations

Table 24: Dustfall results for April 2014 to June 2014

Site	Dustfall (mg/m^2-day)				
	April 2014	May 2014	June 2014	Maximum	Average
RM_DB01	242	142	70	242	151
RM_DB02	61	120	103	120	95
RM_DB03	117	116	62	117	98
RM_DB04	101	181	82	181	121
RM_DB05	313	166	82	313	187
RM_DB06	253	85	62	253	133
RM_DB07	176	83	73	176	111
RM_DB08	152	105	99	152	119

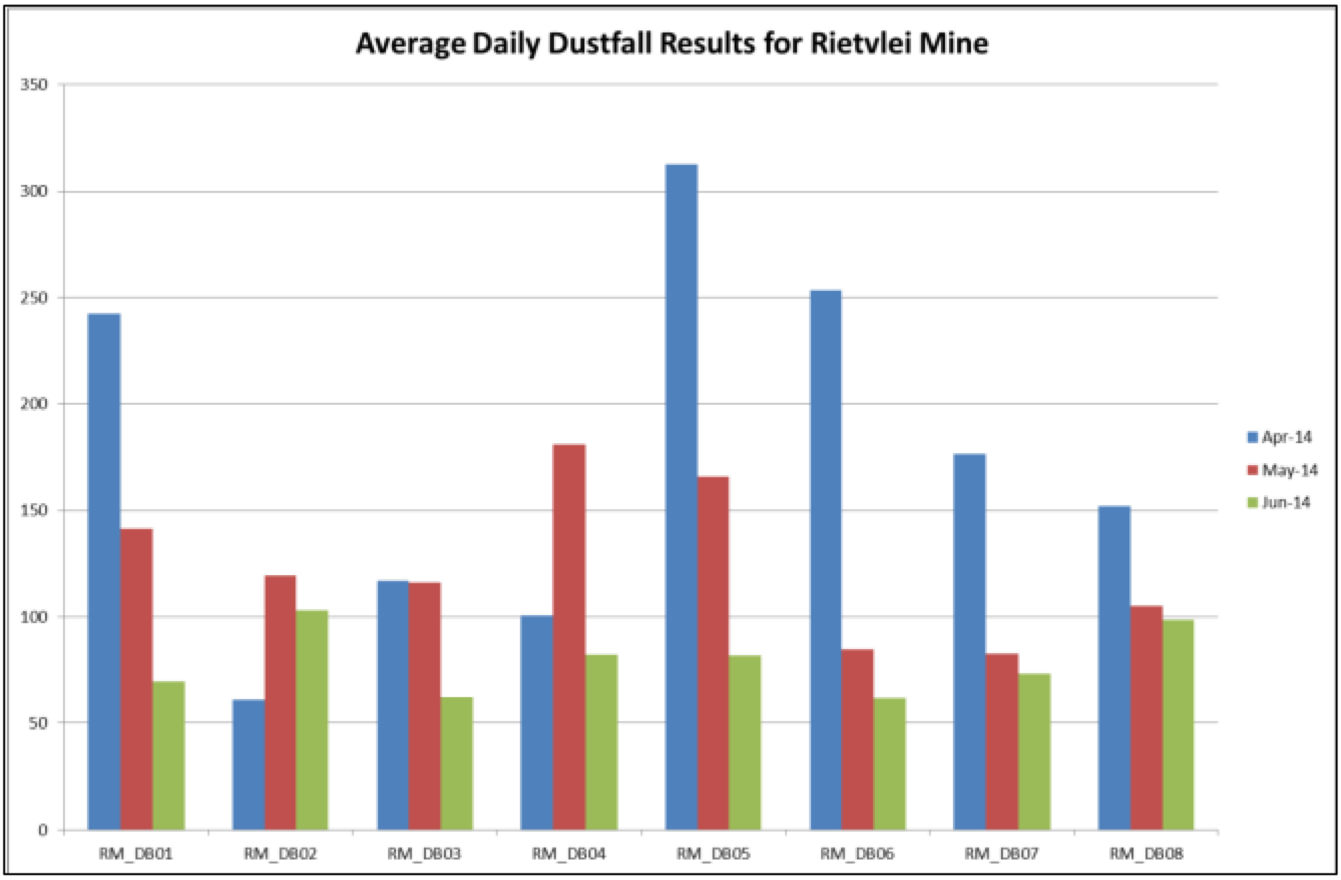


Figure 53: Dustfall results for April 2014 to June 2014

All results showed dustfall rates below the residential dustfall limit of 600 mg/m²/day (**Table 24** and **Figure 53**). The highest dustfall rates over the entire period were collected at DB05 (313 mg/m²/day in April 2014) and DB06 (253 mg/m²/day in April 2014). The DB01 indicated the third highest dustfall of 242 mg/m²/day over the period (in April 2014). These dust buckets recording the highest dustfall rates (i.e. DB01, DB04 and DB05) are located near current unpaved roads, assumed to be utilized by the surrounding residents. The month of June had on average, lower dust fallout rate than the previous two months.

Noise

This section was compiled utilising information contained in the Noise Assessment undertaken by JH Consulting, which is included in **Appendix 27** for further information.

The proposed mining area is currently a greenfield site utilised for forestry and agriculture, therefore minimal noise is experienced. Existing noise sources include:

- Natural sounds of the bush;
- Livestock and agricultural activity on surrounding land;
- Local community and domestic noise;
- Remote vehicles and other transport serving the local community; and
- Noise from traffic on the R555 road.

Ambient noise measurements were carried out at three positions (MP1, MP2, and MP3) on or near the property boundary (**Figure 54**).

Figure 54: Ambient Measurement Positions (MP1 - MP3) as well as the Closest Dwellings to the Proposed Rietvlei Mine (SR1 - SR9)

Table 25 shows the detailed results at each of the three measurement positions.

Table 25: Ambient noise results at the three measurement positions (MP1 - MP3)

Day/Date	Time	Temp (°C)	RH (%)	Wind (M/s)	L_{eq}	L_{Min}	Comments
MP1							
Wed 20/04/11	13:33-13:43	26.6	38	3.8	71.7	40.4	C=32, HGV=9
Wed 20/04/11	13:45-13:55	26.6	38	3.8	69.8	40.0	C=35, HGV=5
Wed 20/04/11	13:45-13:55	26.6	38	3.8	71.6	42.2	C=50, HGV=6
Wed 09/04/14	23:38-23:48	10.5	58	Still	59.4	22.7	C=4
Wed 09/04/14	23:51-00:01	10.5	58	Still	60.1	22.9	C=2, HGV=1
Thur 10/04/14	01:12-01:22	10.5	58	Still	63.0	23.5	HGV=3
MP2							
Mon 28/02/11	12:45-12:55	26.8	38	4.6	49.3	40.7	No vehicles
Mon 28/02/11	12:56-13:06	26.8	38	4.6	44.7	40.0	No vehicles
Mon 28/02/11	13:07-13:17	26.8	38	4.6	46.6	41.7	No vehicles
Thur 10/04/14	00:14-00:24	10.5	58	Still	25.9	22.5	No vehicles
Thur 10/04/14	00:51-01:01	10.5	58	Still	25.8	22.5	No vehicles
MP3							
Tues 21/05/13	07:10-07:20	5.8	69	1.5	42.8		No Traffic
Tues 21/05/13	07:23-07:33	6.6	76	0.9	44.5		No Traffic
Tues 21/05/13	10:05-10:15	17.5	49	2.4	58.9		HGV=1

Day/Date	Time	Temp (°C)	RH (%)	Wind (M/s)	L_{eq}	L_{Min}	Comments
Tues 21/05/13	10:17-10:27	18.1	51	1.0	41.9		No Traffic, A/c=1
Wed 20/04/11	12:15-12:25	26.5	36	4.3	47.5	34.1	No Traffic
Wed 20/04/11	12:27-12:37	26.8	38	4.3	46.4	33.7	No Traffic
Tues 21/05/13	12:52-13:02	22.2	42	2.8	45.0		No Traffic
Tues 21/05/13	13:04-13:14	22.7	43	2.4	43.0		C=1
Mon 20/05/13	15:10-15:20	22.2	42	2.5	53.2		No Traffic, Bird calls
Mon 20/05/13	15:23-15:33	20.6	43	2.1	43.5		No Traffic, Bird calls
Tues 21/05/13	18:20-18:30	7.8	50	0.7	43.9		No Traffic
Tues 21/05/13	18:40-18:50	4.8	47	0.7	34.7		No Traffic
Thur 10/04/14	00:33-00:43	10.5	58	Still	28.6	24.2	No Traffic

Note 1: All noise levels in this report are A-weighted noise levels expressed in dB(A).

Note 2: $\mathbf{L_{Aeq,I}}$ is the A-weighted equivalent sound level using the ‘I’ (Impulse) dynamic response characteristic as recommended in SANS 10103:2008 (ref. 1)

Note 3: The minimum A-weighted noise level recorded during the measurement period ($\mathbf{L_{AMin}}$) is taken as an expression of the lowest background noise in the absence of intrusive noisy events, primarily road traffic and random noise events such as pedestrians, animals, birds, and local road or air traffic

Note 4: In the Comments column of the noise tables, C - Car, Minibus or LDV, HGV – Heavy Goods Vehicle or Bus, A/c – Commercial airliner, La/c – light aircraft, H – Helicopter, cN - noise level calculated from traffic count, for the measurement period, usually (but at least) 10 Minutes

The following observations were noted at each of the ambient noise monitoring positions:

- MP1 - These values are highly consistent lying between 70 and 72 dB(A), and very typical of a trafficked main road through a rural area, with the noise climate, L_{eq}, dominated by the road. The minimum background noise, the L_{Min}, represents natural sounds such as birds, insects, rustling vegetation, and farming activities is also highly consistent lying between 40 and 42 dB(A). Night-time noise levels are approximately 10 dB below the daytime level primarily associated with the night-time operation of coal transport trucks.
- MP2 - These values are highly consistent lying between 45 and 50 dB(A), and very typical of a rural area, with the noise climate, L_{eq}, dominated by natural sounds such as birds, insects, rustling vegetation, and farming and forestry activities, with very occasional remote vehicles on the local dirt roads. The minimum background noise, the L_{Min}, is also highly consistent lying between 40 and 42 dB(A). Night-time noise levels are typically 10 dB lower than recommended for a rural area, as low as 25 dB(A).
- MP3 - These values are very uniform, generally falling around 45 dB(A) in the absence of traffic on the gravel road, which is typical for a rural area, the normal noise source being natural sounds such as birds, insects, and rustling vegetation unless there is a vehicle pass-by during the measurement. Night-time noise levels are typically 10dB lower than those recommended for a rural area, as low as 25 dB(A).

Archaeology and Cultural Heritage

This section was compiled utilising information contained in the Heritage Assessment undertaken by J Pistorius an independent Archaeologist and Heritage Consultant, which is included in **Appendix 28** for further information.

Five graveyards were found in the proposed mining area. The graveyards occur in open spaces in the Eucalyptus forests. These areas are devoid of any building rubble or other ecological indicators which suggest that small groups of people have lived in the plantations in the past. **Table 26** provides the details regarding the graveyards located within the study area. **Figure 55** provides an indication of the location of the five graveyards.

Table 26: Details regarding the Five Graveyards identified within the Study Area

Graveyard	Co-ordinates	Comments	Photograph
GY01	25˚ 40' 32.21"S 29˚ 40' 01.93"E	Thirty five graves occur on the shoulder of the main dirt road which runs from the north to the south across the Project Area. GY01 is older than sixty years.	
GY02.	25˚ 41.625"S 29˚ 40.226"E	Situated near a number of informal dwellings located to the north of a pan. GY02 holds approximately thirty graves most of whom are merely covered with heaps of stone. This graveyard is older than sixty years.	
GY03.	25˚ 40.703"S 29˚ 39.661"E	Three graves are located in the midst of Blue Gum plantations. GY03 is older than sixty years.	
GY04.	25˚ 40.649"S 29˚ 39.346"E	Located in a Blue Gum plantation near a surveyors beacon near the edge of an agricultural field. According to a spokesperson GY04 may hold as many as nineteen graves. It is highly likely that GY04 is older than sixty years.	
GY05.	25˚ 41.599"S 29˚ 40.001"E	Approximately 7 graves are located in the midst of a Blue Gum plantation near the main road that transverses the Project Area from the north to the south. GY05 is older than sixty years.	

Figure 55: The Location of the Five Graveyards Identified within the Study Area

Visual Aspects

This section was compiled utilising information contained in the Visual Impact Assessment undertaken by Outline Landscape Architects CC, which is included in **Appendix 25** for further information

Visual Character

Visual character is based on human perception and the observer's response to the relationships between and composition of the landscape, the land uses and identifiable elements in the landscape.

The description of the visual character includes an assessment of the scenic attractiveness regarding those landscape attributes that have aesthetic value and contribute significantly to the visual quality of the views, vistas and/or viewpoints of the study area.

Gentle undulating plains and valleys dominate the regional topography. The lines are smooth, extending into the horizon. The smoothly textured and uniform grassland vegetation is interrupted with cultivated fields and plantations.

The colour of the landscape is dictated by seasonal change. It cycles between lush green and rich colours during summer and dull yellow and browns during winter.

The region has an agricultural character, and remains largely undeveloped. Exceptions are the existing coal mines, which are visually apparent when in close proximity.

Roads include the N4 national road in the far south of the study area, the R555, which bisects the north western corner of the site, and the R104, some 7km to the south of the site. The latter arterial roads are unmaintained and very little traffic makes use of them. A number of gravel secondary roads also occur, giving access to the farms and mines.

Two railway lines traverse the study area, one running east to west, and a second crossing over the site, and running in a north east direction.

The visual character of the landscape is undisputedly undeveloped and rural.

Visual Receptors

When looking at an environment, different viewers (visual receptors) experience different views of the visual resource and value it differently. The visual receptors for the proposed mining area include:

- Residents of rural and agricultural settlements and homesteads;
- Commuters travelling along national, arterial and secondary routes; and
- Recreational users, tourists and sightseers travelling along national, arterial and secondary routes.

The incidence of visual receptors in the Proposed Project area is expected to be the highest along the national road (the N4) and to a lesser extent along the arterial roads (the R555 and R105) and secondary roads. Commuters and tourists using these roads could be negatively impacted upon by visual exposure to the proposed mine. Other than along the above roads, viewer incidence within a 10km radius of the proposed mine is concentrated in the relatively high number of rural and agricultural homesteads and settlements.

Viewer Sensitivity

Residents of rural and agricultural settlements and homesteads within the affected environment are classified as visual receptors of high sensitivity owing to their sustained visual exposure to the proposed development as well as their attentive interest towards their living environment.

Commuters (by vehicle and foot) are generally classified as visual receptors of moderate sensitivity due to their temporary view and experience of the proposed development. As a commuter’s speed increases (e.g. motorists), the sharpness of lateral vision declines and the commuter tends to focus on the line of travel (USDOT, 1981). It can be concluded that the visual impact on commuters travelling along national, arterial and secondary routes will be moderately affected.

Recreational users of outdoor recreational facilities (such as the Middelburg Dam) and tourists visiting or passing through the area are classified as visual receptors of high sensitivity. Their attention is focused towards the landscape and essentially utilise it for enjoyment purposes and appreciation of the quality of the landscape. The incidence of tourists and sightseers off the N4 in close proximity to the proposed mine is expected to be moderate.

Socio-Economic

The proposed Rietvlei Mine is situated within the Steve Tshwete Local Municipality area of jurisdiction. It must be noted that there a small illegal community of immigrants situated on the proposed site. In addition a number of farms and an informal settlement can be found situated around the site itself.

The mine will aid in the creation in jobs for both skilled and unskilled labour. It is predicted that the mine will provide over 15 permanent jobs. In addition, a number of contractors will benefit from the proposed mining operation, with specific reference to transport, mining supplies, catering and security. The operation will have a continued need for suppliers and services, which will be procured both locally and regionally.

Population density, growth and location

According to the 2011 Census, the Steve Tshwete Local Municipality had a total population of 229 831 people, of which the majority (73.6%) are black African (**Table 27**) and 70.7% of the population fall into the working age of 15 to 65 (**Figure 56**). The gender ratio is fairly equal, with 52% of the population male and 48% of the population female.

Table 27: Ethnic delineation

Race	Population
Black African	169 156
Coloured	5 976

Race	Population
Indian/Asian	3 677
White	50 103
Other	919

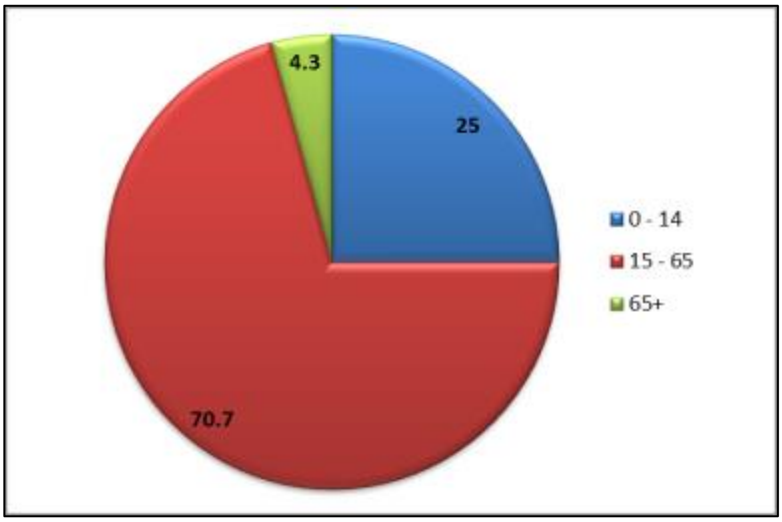


Figure 56: Age Groups (Stats SA Community Survey 2011)

Major economic activity and sources of employment

107 069 people are economically active (employed or unemployed but looking for work) and of these, 19.7% are unemployed. The majority of the 53 630 economically active youth (15 – 34 years) are employed, with only 27.1% being unemployed (**Figure 57**).

12.8% of the population have no household income, while the biggest income bracket (17%) has a household income of R38 201 – R76 400 (**Figure 58**).

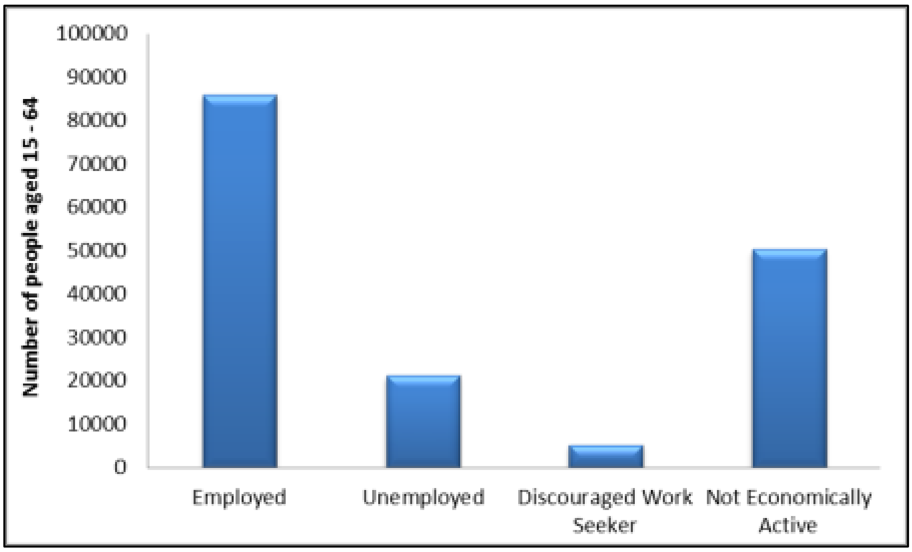


Figure 57: Employment for those aged 15 - 64 (Stats SA Community Survey 2011)

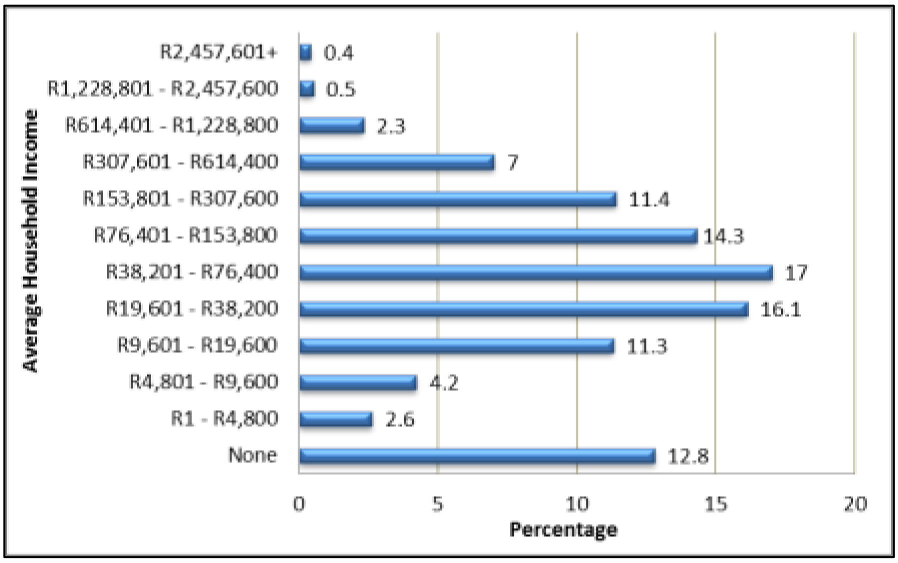


Figure 58: Average Household Income (Stats SA Community Survey 2011)

Basic services provision

- *Water and sanitation*

  The provision of water within the municipality is detailed in **Table 28**. The majority of households (62.2%) have piped water available inside the dwelling, 23.5% of households have access to piped water in their yard and 1.8% have no access to piped water.

Table 28: Household water sources (Stats SA Community Survey 2011)

Source of Water	Percentage (%)
Regional/Local water scheme (operated by municipality or other water services provider)	90.7
Borehole	4.8
Spring	0.3
Rain-water tank	0.2
Dam/Pool/Stagnant water	0.6
River/Stream	0.2
Water vendor	0.3
Water tanker	1.6
Other	1.3

As seen in **Figure 59**, the sanitation type for 81.9% of the population is a flush toilet connected to sewerage, 8.8% make use of pit toilet sanitation facilities and 5.2% make use of other forms of sanitation such as bucket and chemical toilets. A minor 2.1% of the population has no access to any form of toilet sanitation facility.

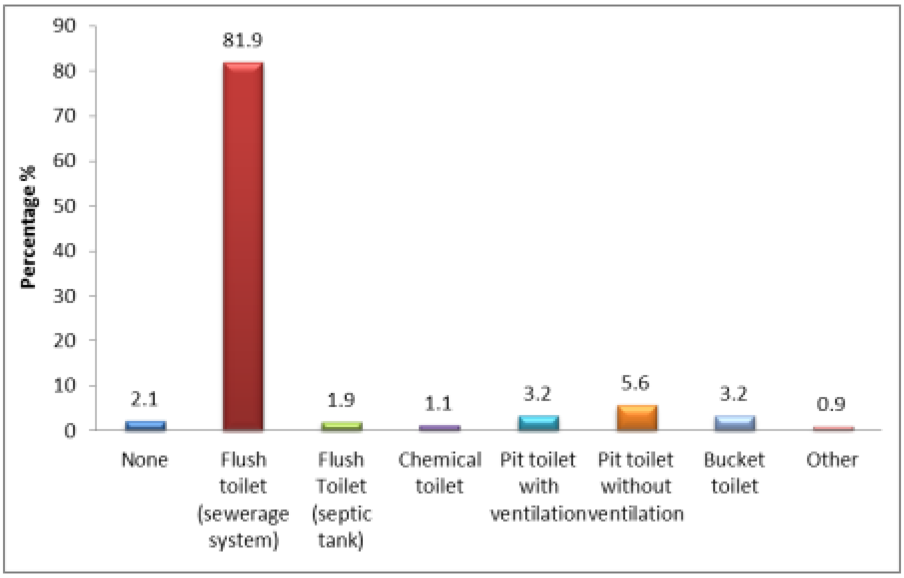


Figure 59: Sanitation Types (Stats SA Community Survey 2011)

- *Refuse removal*

  The majority (84.7%) of the population in the municipality have their refuse removed on a regular basis by the local authority, whist 11% utilise either a communal refuse dump or their own refuse dump as a means of refuse disposal. 2.4% of the population have no means of refuse disposal (**Figure 60**).

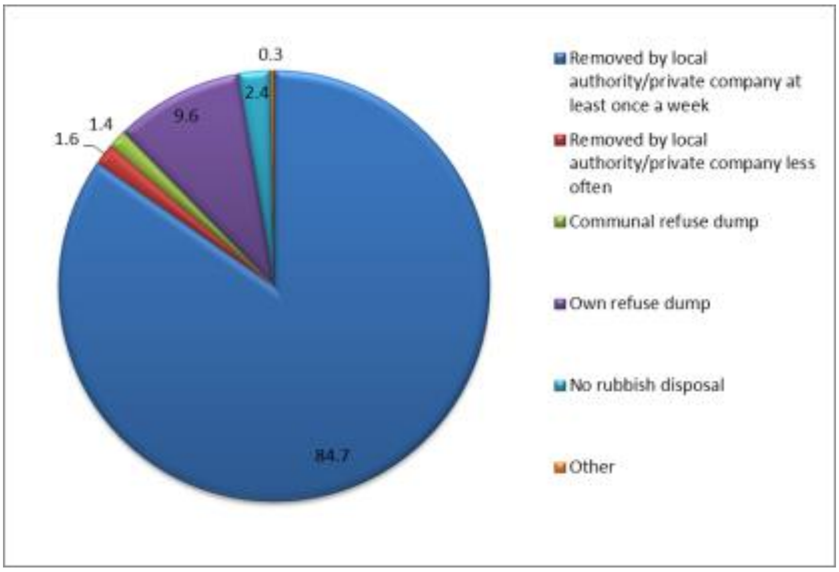


Figure 60: Refuse Removal (Stats SA Community Survey 2011)

- *Electricity provision*

  The provision of energy in the municipality is shown in **Figure 61** and details the energy sources used for cooking, heating and lighting. 90.8% of the population have access to electricity for lighting, while 81.7% use electricity for cooking.

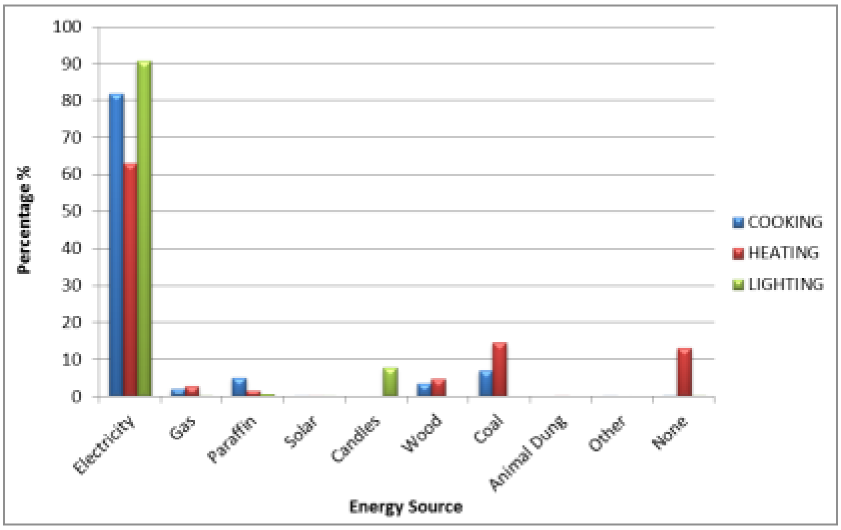


Figure 61: Provision of Electricity (Stats SA Community Survey 2011)

- *Social services provision – housing*

  There are 64 971 households in the municipality, with an average household size of 3.3 persons per household and 29.4% of households are headed by females. The majority (88.7%) of the population live in an urban area and 11.3% of the population live on a farm (**Figure 62**).

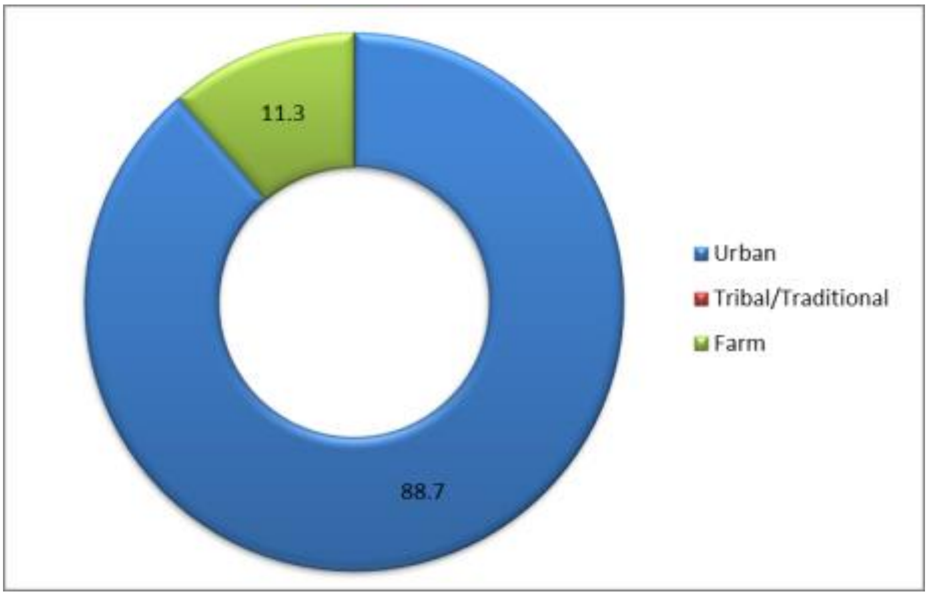


Figure 62: Settlement Types (Stats SA Community Survey 2011)

- *Social services provision – education*

  The educational profile of the population within the municipality is described in **Figure 63**. Due to the low income range that the majority of the population are situated in, the majority of the population have only partially completed Primary and/or Secondary Education. 3.1% have not undergone any form of education (and are most likely illiterate).

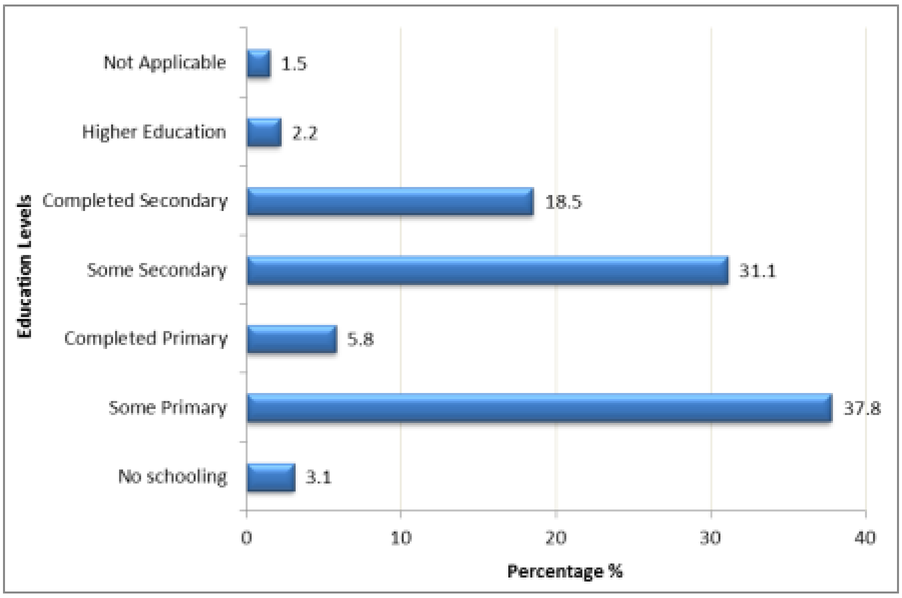


Figure 63: Education Levels (Stats SA Community Survey 2011)

Traffic

Existing Road Network

The proposed mine is situated along the R555 between Middelburg and Stofberg. The majority of the site is situated south of the R555. The section of the R555 past the site is a paved two lane, undivided road, with a speed limit of 120km/h. The road is in a fair condition to the west of the site, but the section east of the site contains a greater amount of patching and surface defects. Access to the site will be via the D1433 off the R555 towards the Afgri Pan Siding. The D1433 to the siding includes a rail level crossing south of the site. The following intersections have been identified:

- Intersection 1 is the intersection of Meyer Street (R555) and Cowen Ntuli Street which later becomes the N11. It is the first intersection in Middelburg (when traveling from the site) which allows trucks larger than 9 ton to make left and right turns. The other intersections provide access to residential areas and only allow trucks smaller than 9 ton.
- Intersection 2 is the D1433 (dirt road to Afgri Pan Siding) off the R555 that will provide access to the mine.
- Intersection 3 is the intersection of the R555 and the R33 to Belfast and the N4. It is the first large intersection east of the site. Belfast is approximately 38km south of Intersection 3. The distance between Intersection 2 and 3 is approximately 35km.

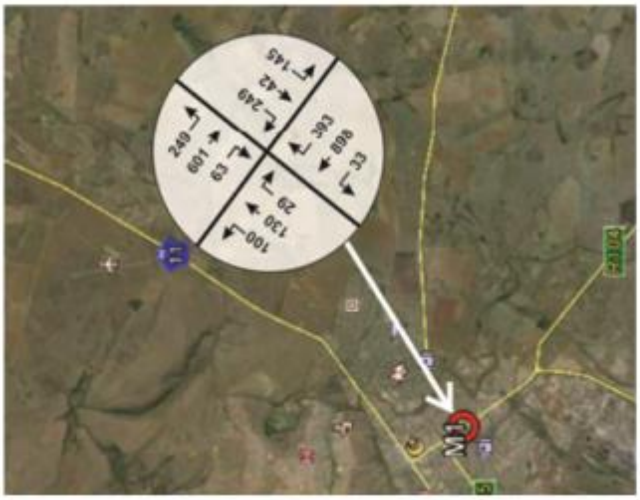
Existing Traffic Data

Manual, classified traffic counts were carried out on Wednesday, 9 April 2014 from 06:00 to 18:00 (12-hours) at 3 intersections along the R555. The intersections were:

- M1: R555 and Cowen Ntuli Street (N11)
- M2: R555 and D1433 (Access to Afgri Pan Siding)
- M3: R555 and R33

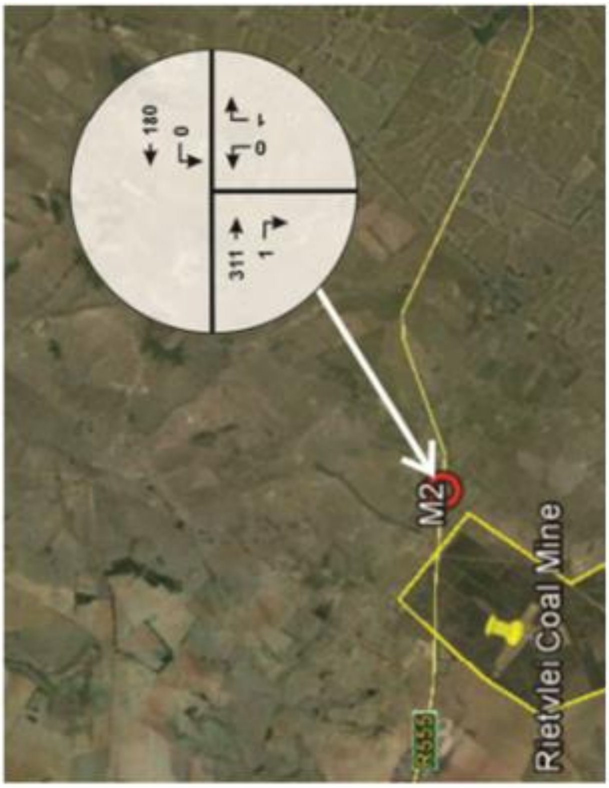
The peak hour traffic volumes at each intersection are shown in **Figure 64**, **Figure 65** and **Figure 66**. The volumes shown below are given in passenger car units (PCU's). It was assumed that 1 heavy vehicle is equivalent to 8 passenger car units, based on the observed existing heavy vehicle composition.

Existing AM Peak Hour Traffic Volumes

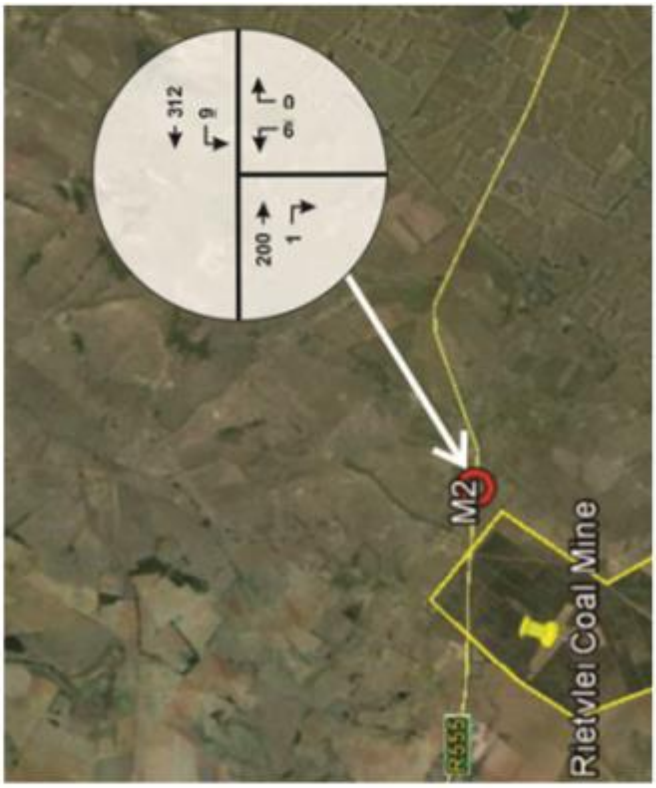


Existing PM Peak Hour Traffic Volumes

Figure 64: Traffic volumes for Intersection M1



Existing AM Peak Hour Traffic Volumes



Existing PM Peak Hour Traffic Volumes

Figure 65: Traffic volumes for intersection M2

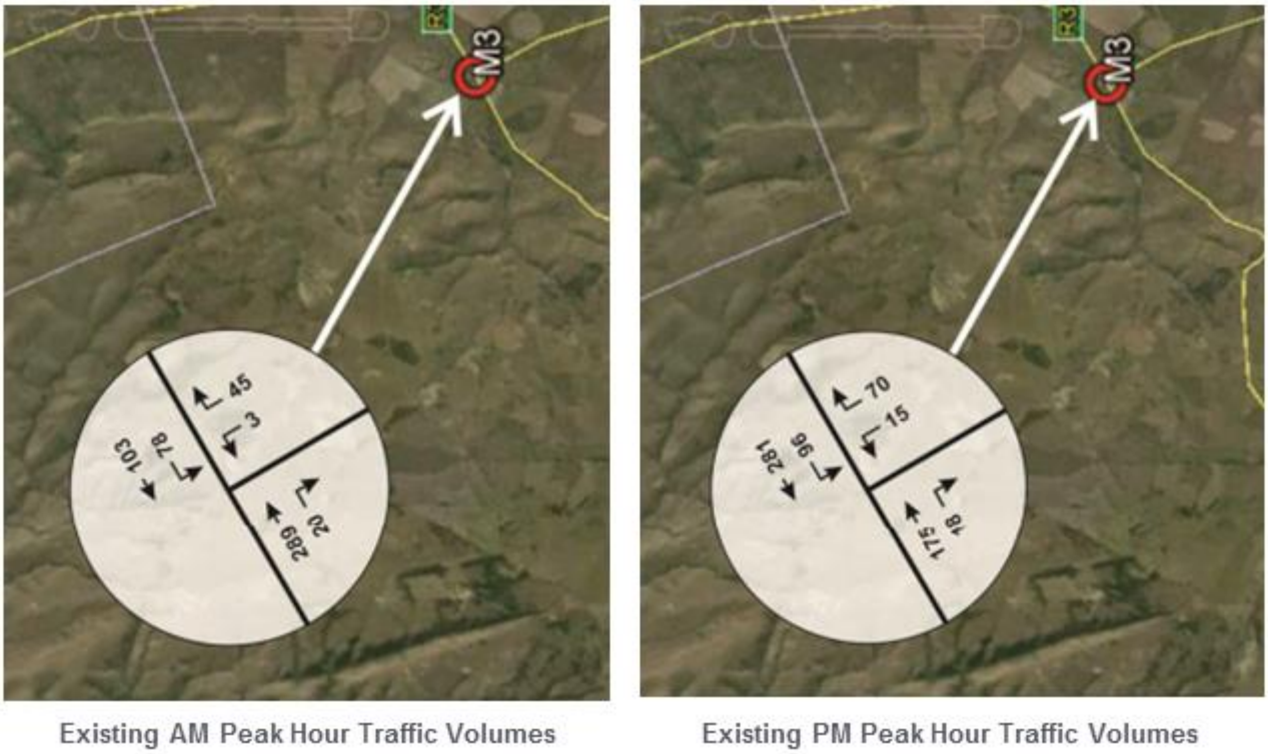


Figure 66: Traffic volumes for intersection M3

Electronic traffic count data that was conducted along the R33 for a study area in close proximity to the site was used to convert the 12-hour data to average daily traffic volumes. The resulting average daily traffic volumes are summarised in **Table 29**.

Table 29: Seven day Average Volumes (24 hours)

Vehicle Classification	Eastbound	Westbound	Both Directions
Light	1114	1129	2187
Heavy	283	324	607
All	1393	1390	2783

(b) Description of the current land uses.

This section was compiled utilising information contained in the Soil, Land Capability and Land Use Assessment that was undertaken by Rehab Green Monitoring Consultants CC, which is included in **Appendix 21** for further information.

Some mining activity is evident along the railway line (to the east of the site), the R555 (to the west and north-east of the site) and the R104 (to the south-west of the site). The Vuna Colliery lies less than 2.5km east of the proposed site. This mining is predominantly opencast coal mining similar to that proposed for the site. Mines present in the area include Mafube Mine, Kopermyne Colliery, Klippan Colliery, Steelcoal Colliery, Arnot Colliery, Glisa Colliery, Optimum Colliery, Blackwattle Colliery, Middelburg Mine and Bank Colliery. Other industrial land uses within the study area include railway lines and power lines. **Figure 67** and **Figure 68** indicate the land uses and linear infrastructure on site respectively.

Approximately 75% of the area within the proposed Rietvlei Mine footprint is utilized for forestry (*Eucalyptus* trees), 12.27% for cultivation (soybeans), 5.96% for grazing (mainly cattle) and 7.05% are vacant spots (ecological land use) where forestry or cultivation cannot take place due to wetness (i.e. wetland areas). Small land uses such as graveyards, a quarry and housing footprint of the local community occupy 0.03% of the study area. The pre-mining land uses are illustrated in **Figure 69**.

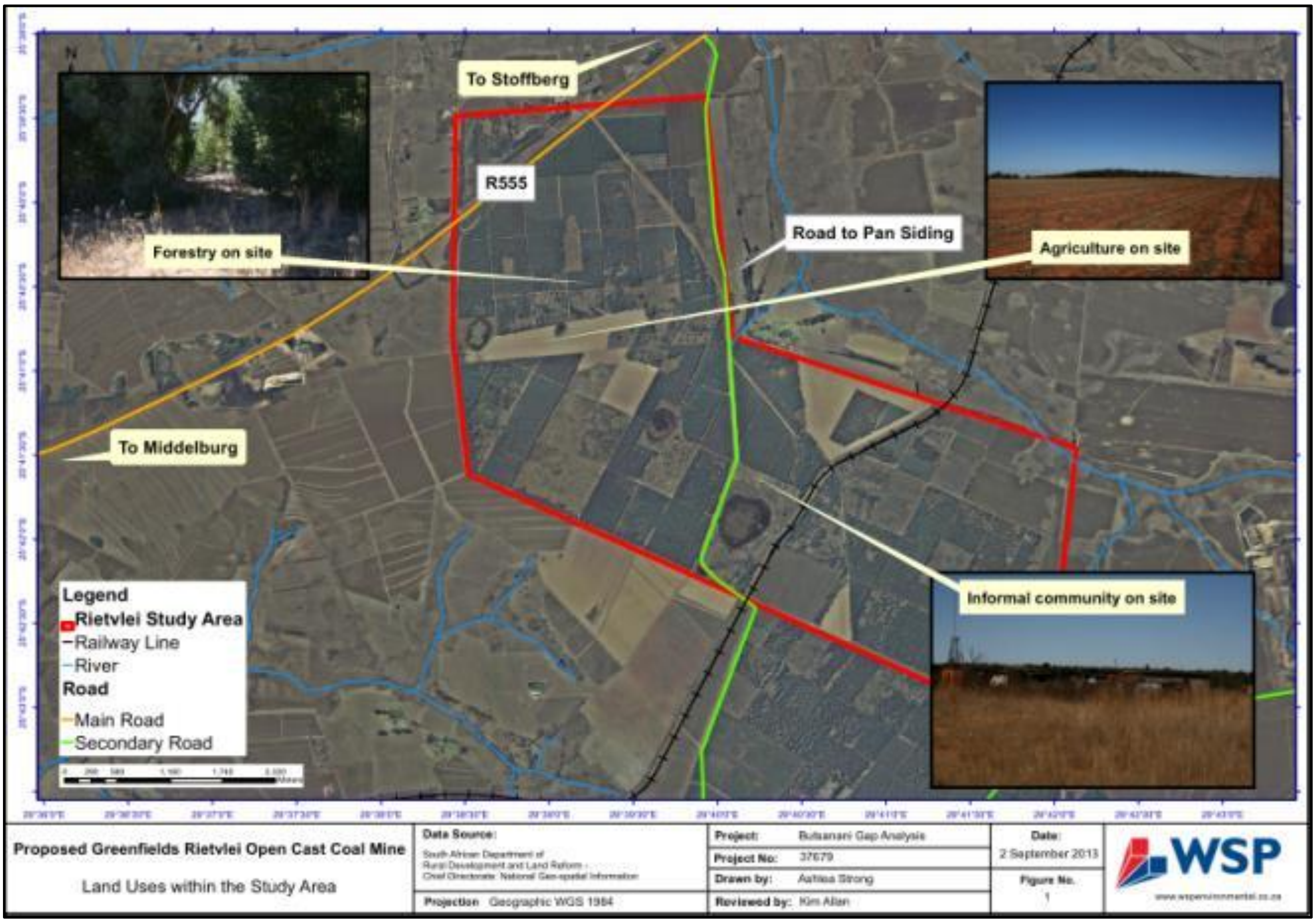


Figure 67: Locality map indicating the various land uses on site

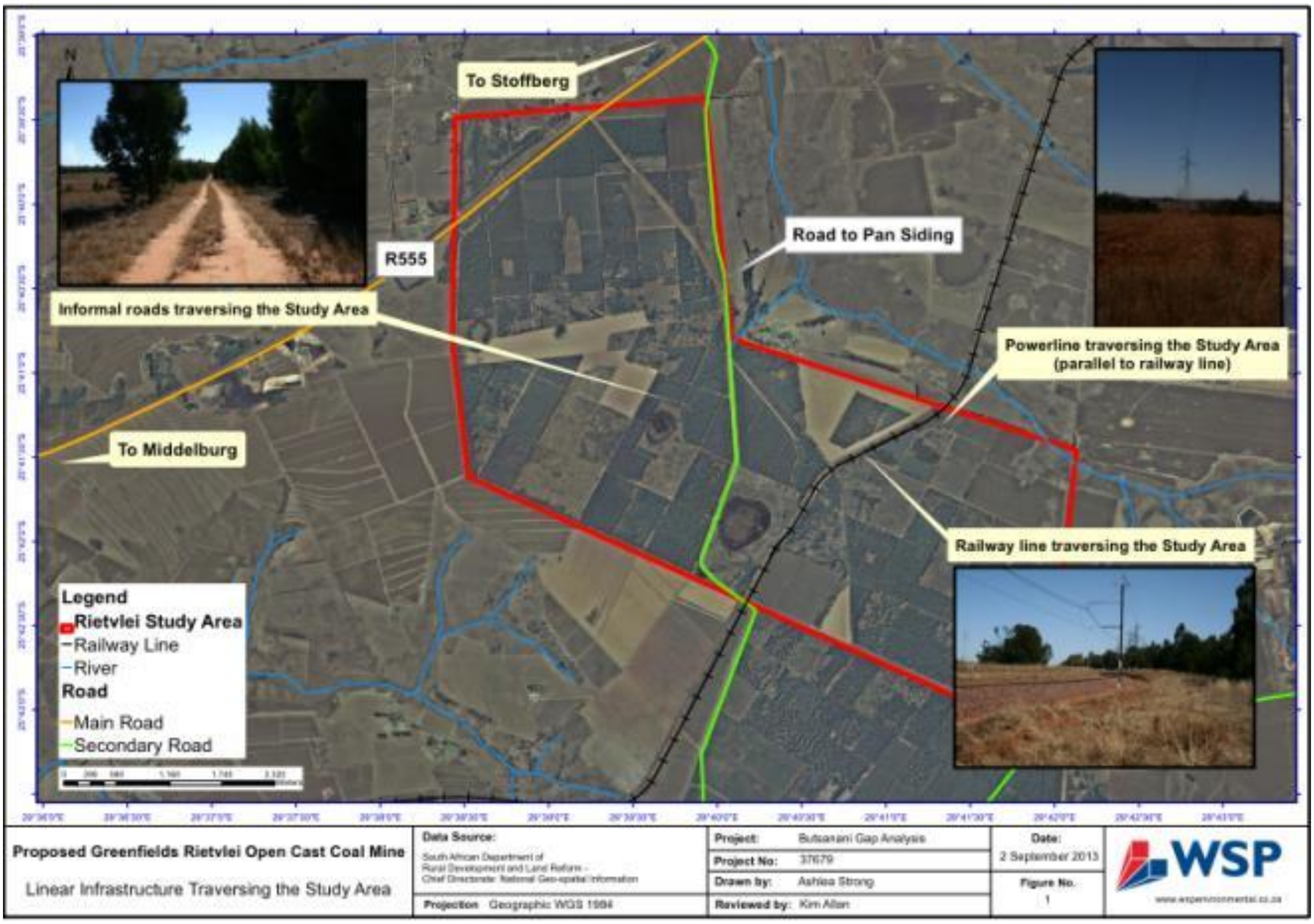
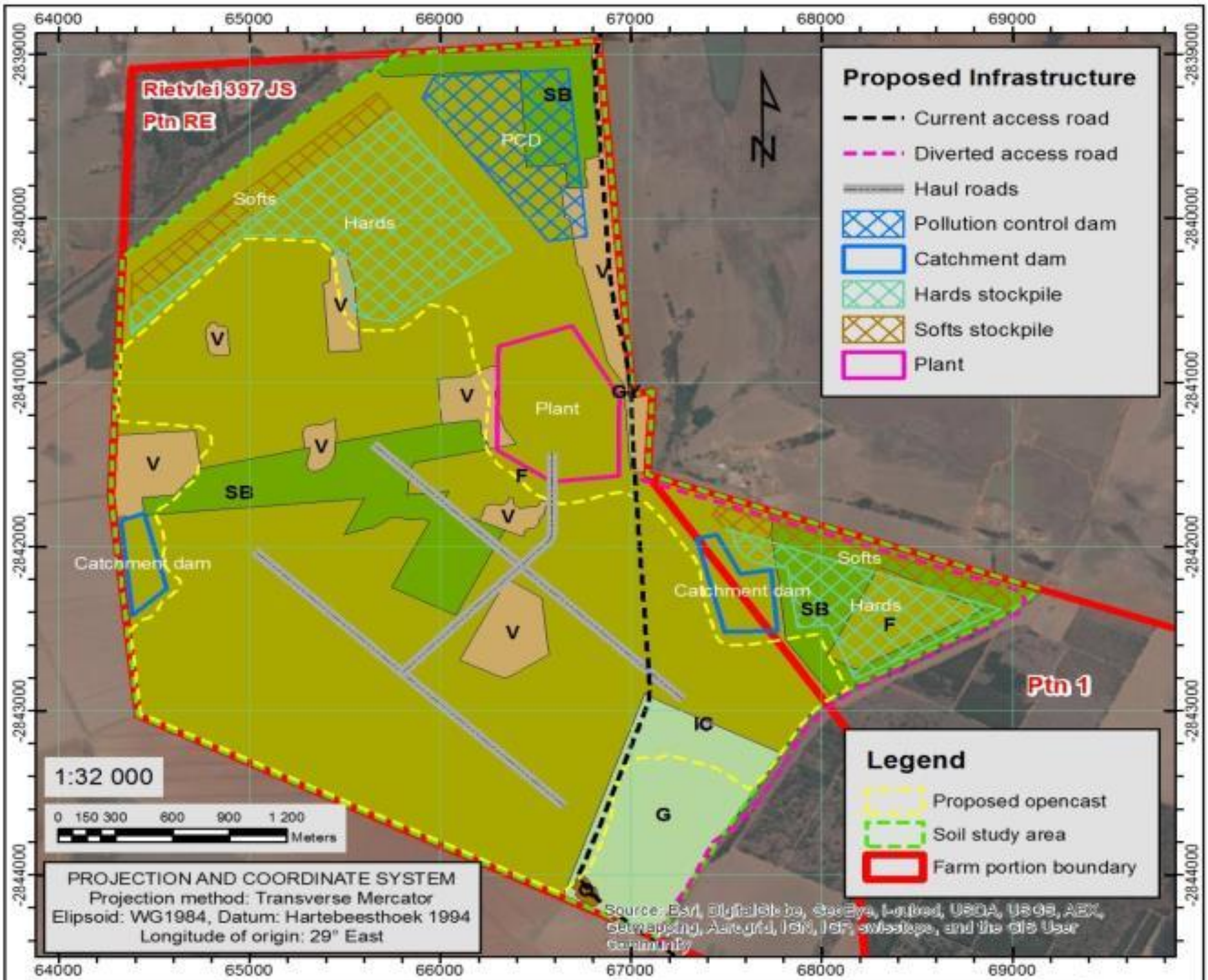


Figure 68: Locality map indicating the various linear infrastructure on site



LEGEND – PRE-MINING LAND USE				
Land Use Code	**Pre-mining Land Use**	**Unit Count**	**Area (ha)**	**Area (%)**
F	Forestry - Eucalyptus trees	2	1058.40	74.59
SB	Cultivation - Soybeans	3	174.15	12.27
G	Grazing by local people - mainly cattle	1	84.55	5.96
V	Vacant - no specific land use - mainly wet zones	8	99.94	7.05
GY	Graveyard	1	0.02	0.00
Q	Quarry	1	1.57	0.11
IC	Informal community	1	0.28	0.02
	TOTAL	**17**	**1418.91**	**100.0**

Figure 69: Pre-mining land use map of the proposed Rietvlei opencast mining area

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

Refer to section g(iv)(1)(a) above.

(d) Environmental and current land use map.

(Show all environmental, and current land use features)

Refer to **Figure 69** above.

v) Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts

(Provide a list of the potential impacts identified of the activities described in the initial site layout that will be undertaken, as informed by both the typical known impacts of such activities, and as informed by the consultations with affected parties together with the significance, probability, and duration of the impacts. Please indicate the extent to which they can be reversed, the extent to which they may cause irreplaceable loss of resources, and can be avoided, managed or mitigated).

Alternative Land Use Assessment

The evaluation of alternative land uses and development assesses the potential activities that can be undertaken on the project site in the event that the Proposed Project does not go ahead. The following alternatives have been identified:

- Agriculture and forestry; and
- Mining.

Due to the fact that agriculture and forestry are the existing land uses on Portion 1 and the Remaining Portion of Rietvlei 397 JS. Therefore, the alternative land uses were not subject to an impact assessment due to the fact that the status quo will remain and no impacts are anticipated albeit the exisiting forestry is predominantly alien in nature.

Phases of Development during the Life of Mine

Potential impacts have been identified and assessed according to the phases of mine development. For purposes of this report, these phases have been generically defined below.

- **Construction Phase:**

  The construction phase includes the preparatory works/activities typically associated the creation of surface infrastructure, the pit footprint, access ramps and haul roads, the development of waste, residue and product stockpiles, handling areas, water reticulation and electrical power. The activities most relevant to this phase include:

  - Topsoil stripping and stockpiling;
  - Haul road construction;
  - Upgrading of the D1433;
  - Construction of the surface infrastructure including the coal processing plant, buildings and offices, perimeter fence and sewage plant;
  - Establishment of the coal discard facility;
  - Installation of water and power supply infrastructure including stomr water control infrastructure; and
  - Construction of the clean and dirty water system, including 2 pollution control dams
- **Operation Phase:**

  The operational phase includes the daily activities associated with the extraction of coal from the open cast pit. The activities most relevant to this phase include:

  - Excavation and blasting, as well as overburden stockpiling;
  - Coal removal, transport and processing;
  - Coal storage;
  - Utilisation of vehicles, equipment and machinery; and
  - Concurrent rehabilitation including, initial backfilling, levelling and placement of topsoil, fertiliser, vegetation and maintenance.
- **Decommissioning and Closure:**

  The decommissioning and closure phase includes the activities associated with the removal/dismantling of machinery/equipment/infrastructure no long necessary to the operation. This phase also includes the implementation and completion of rehabilitation goals as well as the implementation of agreed monitoring and maintenance prescribed for the cessation of operations. The activities most relevant to this phase include:

- Dismantling surface infrastructure;
- Rehabilitation of haul and access roads;
- Rehabilitation of final void(s);
- Monitoring and maintenance of ground and surface water; and
- Monitoring and maintenance of rehabilitation areas, specifically in terms of land use and capability.

The following tables provide a summary of the potential impacts identified for the proposed project, according to phase. These impacts represent both biophysical (**Table 30**) and socio-economic (**Table 31**) impacts.

Table 30: Potential Environmental Impacts

Phase	Environmental Aspect	Potential Impact
Construction Phase	Geology	Removal of overburden and rock for infrastructure development.
		Blasting and subsequent removal of geology.
	Topography	The development of the construction infrastructure (building structures, access roads, fencing, etc.)
		Disturbance of natural lie of the land resulting from site clearing and topsoil removal
		Disturbance of natural/ or existing flow of topography and the free drainage of the area resulting from surface infrastructure.
	Soil	Stripping of topsoil at the initial box cut footprint
		Possible contamination of soil by spillages of fuel or oil by mechanical means
		Construction of topsoil, soft and hard overburden stockpiles during initial box cuts
		Construction of haul roads
		Construction of access roads and diversion of existing access road
		Construction of Pollution control dam
		Construction of office workshop complex including offices, heavy vehicle workshop, stores, vehicle parking areas
	Land Capability	Stripping of topsoil at the initial box cut footprint
		Possible contamination of soil by spillages of fuel or oil by mechanical
		Construction of topsoil, soft and hard overburden stockpiles during initial box cuts
		Construction of haul roads
		Construction of access roads and diversion of existing access road
		Construction of Pollution control dam
		Construction of office workshop complex including offices, heavy vehicle workshop, stores, vehicle parking areas
	Land Use	Stripping of topsoil at the initial box cut footprint
		Possible contamination of soil by spillages of fuel or oil by mechanical
		Construction of topsoil, soft and hard overburden stockpiles during initial box cuts
		Construction of haul roads
		Construction of access roads and diversion of existing access road
		Construction of Pollution control dam
		Construction of office workshop complex including offices, heavy vehicle workshop, stores, vehicle parking areas
	Flora	Impacts on Habitat for Floral Species
		Impacts on Floral Diversity
		Impacts on Floral Species of Conservational Concern
	Fauna	Impact on faunal habitat and ecological structure
		Impact on faunal diversity and ecological integrity
		Impact on faunal species of conservational concern

Phase	Environmental Aspect	Potential Impact
	Aquatic Ecology	Impacts on water quality
		Impacts on loss of aquatic habitat
		Impacts on loss of aquatic biodiversity and sensitive taxa
		Impacts on loss of instream flow
	Surface Water	Siltation due to soil disturbance
		Erosion due to rerouting of storm water runoff
		Water quality deterioration due to Spill and /or leaking of hydrocarbon product from construction vehicles, equipment's, and storage
		Water quality deterioration due to seepage from construction waste site to the surface water resource
	Wetlands	Loss of wetland habitat and ecological structure
		Changes to wetland ecological and sociocultural service provision
		Impact on wetland hydrological function
	Groundwater	Decreasing of the soils buffering capacity and increasing of infiltration rates
		Altered Flow systems due to probable dewatering (if required)
		Deterioration of water quality due to construction waste (Chemical in construction material)
		Deterioration of water quality due to hydrocarbon spills from storage (organic contaminants)
		Groundwater contamination due to groundwater seeps standing in the construction's footprint area.
		Acid Mine Drainage
	Air Quality	Impact due to the generation of particulate matter (dust)
		Impact due to the generation of gases
	Noise	Construction of the Opencast Pit
		Construction noise and its effect on livestock
Operational Phase	Geology	Permanent loss in a natural, non-renewable resource and associated geology.
	Topography	The development of the pit will result in the altering of the topology in this area
		The development of the pit will impact on the surface water flow dynamics
		Infrastructure that is utilised on the site will alter the topology and surface water flow of the area
	Soil	Progressive stripping of topsoil at opencast footprint and stockpiling thereof before direct replacing is initiated
		Expansion of topsoil, soft and hard overburden stockpiles during the operational phase as open pit
		Progressive stripping of topsoil at opencast footprint and direct replacing
		Use of haul
		Use of pollution control
		Use of diesel, petroleum and oil storage on site
		Use of coal stockpiles and ROM tip
	Land Capability	Progressive stripping of topsoil at opencast footprint and stockpiling thereof before direct replacing is initiated
		Expansion of topsoil, soft and hard overburden stockpiles during the operational phase as open pit expands
		Progressive stripping of topsoil at opencast footprint and direct replacing thereof
		Use of haul roads
		Use of pollution control dams
		Use of diesel, petroleum and oil storage on site
		Use of coal stockpiles and ROM tip
	Land Use	Progressive stripping of topsoil at opencast footprint and stockpiling thereof before direct replacing is initiated
		Expansion of topsoil, soft and hard overburden stockpiles during the operational phase as open pit expands
		Progressive stripping of topsoil at opencast footprint and direct replacing thereof

Phase	Environmental Aspect	Potential Impact
		Use of haul roads
		Use of pollution control dams
		Use of diesel, petroleum and oil storage on site
		Use of coal stockpiles and ROM tip
	Flora	Impacts on Habitat for Floral Species
		Impacts on Floral Diversity
		Impacts on Floral Species of Conservational Concern
	Fauna	Impact on faunal habitat and ecological structure
		Impact on faunal diversity and ecological integrity
		Impact on faunal species of conservational concern
	Aquatic Ecology	Impacts on water quality
		Impacts on loss of aquatic habitat
		Impacts on loss of aquatic biodiversity and sensitive taxa
		Impacts on loss of instream flow
	Surface Water	Deterioration of clean storm water runoff quality
		Increasing of water removal activities due to in pit dewatering
		Ponding due to storm water falling onto operating (mining pit, crushing and screening, stockpiling) areas
		Erosion due to surface water runoff rerouting
		Siltation due to surface water runoff rerouting
		Water quality deterioration due spill and/or leaking of hydrocarbon
		Water quality deterioration due to septic tank
		Water quality deterioration due to seepage from waste disposal facility to the surface water resource
		Water quality deterioration due to spillage, seepage and/or leak from waste disposal, storage, handling facility to surface water
		Water quality deterioration due to Spillage of dirty water from dirty water control system (Dams, trenches, berms etc)
	Wetlands	Loss of wetland habitat and ecological structure
		Changes to wetland ecological and sociocultural service provision
		Impact on wetland hydrological function
	Groundwater	Drop of groundwater levels due to open pit dewatering
		Deterioration of groundwater quality due to rock dumps.
		Deterioration of groundwater quality due to open pit mining
		Deterioration of groundwater quality due to coal processing
		Deterioration of groundwater quality due to tailings disposal
		Deterioration of groundwater quality due to leaks/spillages from dirty water quality dams and drain
		Deterioration of groundwater quality due to handling and transport of waste material
		Acid Mine Drainage
	Air Quality	Impact as a result of the increase in fugitive dust emissions
	Noise	Transport of Coal from the mine to the treatment plant
		Operational phase of the Opencast Pit
		Blasting for the operation of the Opencast Mine
		Vibration on Surrounding Structures
		Operational Noise and its effect on Livestock
		Blast Noise and its effect on Livestock
Decommissioning Phase	Topography	Decommissioning of the pit
		Decommissioning of infrastructure
	Soil	Rehabilitation of remaining open pit and final
		Removal of all stockpiles and dumps and rehabilitation of the footprints
		Demolishing and rehabilitation of roads and haul

Phase	Environmental Aspect	Potential Impact
		Demolishing of Pollution control
		Demolishing and rehabilitation of the office workshop complex
		Demolishing and rehabilitation of coal stockpiles and ROM tip area
	Land Capability	Rehabilitation of remaining open pit and final
		Removal of all stockpiles and dumps and rehabilitation of the footprints
		Demolishing and rehabilitation of roads and haul roads
		Demolishing of Pollution control dams
		Demolishing and rehabilitation of coal stockpiles and ROM tip area
	Land Use	Rehabilitation of remaining open pit and final
		Removal of all stockpiles and dumps and rehabilitation of the footprints
		Demolishing and rehabilitation of roads and haul roads
		Demolishing of Pollution control dams
		Demolishing and rehabilitation of coal stockpiles and ROM tip area
	Flora	Impacts on Habitat for Floral Species
		Impacts on Floral Diversity
		Impacts on Floral Species of Conservational Concern
	Fauna	Impact on faunal habitat and ecological structure
		Impact on faunal diversity and ecological integrity
		Impact on faunal species of conservational concern
	Aquatic Ecology	Impacts on water quality
		Impacts on loss of aquatic habitat
		Impacts on loss of aquatic biodiversity and sensitive taxa
		Impacts on loss of instream flow
	Surface Water	Erosion due to increase of runoff speed and velocity
		Siltation related to erosion
		Deterioration of water quality due to spill and/or leaking from hydrocarbon storage area
		Deterioration of water quality due to seepage and/or spillage from waste site facility
		Deterioration of the surface water quality due decanting water
		Flood risk due decant to surface
		Erosion due decant water runoff
	Wetlands	Loss of wetland habitat and ecological structure
		Changes to wetland ecological and sociocultural service provision
		Impact on wetland hydrological function
	Groundwater	During decommissioning handling of waste and transport of building material can cause various types of spills (domestic waste, sewage water, hydrocarbons) which can infiltrate and cause contamination of the groundwater system.
		Flooding and decanting of open pit
		Acid Mine Drainage
	Air Quality	Impacts created as a result of the generation of TSP and PM10
		Impact due to the generation of gases
	Noise	Decommissioning of the Opencast Pit

Table 31: Potential Impacts of Socio-economic Conditions

Phase	Environmental Aspect	Potential Impact
Construction Phase	Visual Aspects	Movement of Construction Vehicles
		Visual impacts of construction on visual receptors in close proximity to the proposed mine
	Socio-Economic	Increased Health and Risk due to Noise, Air Emissions, Traffic, Communicable Diseases and Crime
		Social Tensions and Disruptions due to Construction Activities and Labour Force

Phase	Environmental Aspect	Potential Impact
		Creation of Employment Opportunities
		Growth of Skills and Business Development
	Traffic	Traffic generation around the site
		Creation of dust as a result of the movement of construction vehicles
		Operation of vehicles may impact pedestrian safety
		Construction vehicles may result in an increase in road accidents
		Increase in traffic could result in the deterioration of the surrounding road network.
	Archaeology and Cultural Heritage	Destruction of Graveyard.
Operational Phase	Visual Aspects	Effect of the areas in close proximity to the Operating Mine
		Effect of the mine on landscape characteristics
		Impact on Settlement and homesteads in close proximity to the proposed mine
		Mine's impact on the residents of settlements and homesteads within the region
		Visual impacts on users of major and secondary roads in close proximity to the proposed mine
		Visual impacts on users of major and secondary roads within the region
		Visual impacts on recreational users, tourists and sightseers in close proximity to the proposed mine
		Visual impacts on recreational users, tourists and sightseers within the region
		Visual impact of lighting at night on visual receptors in close proximity to the proposed mine
	Socio-Economic	Employment Opportunities
		Local Economic Development
		Increased Health and Safety Risk, due to Traffic, Blast/vibration, Noise and dust, Influx of population and Crime
		Increase in Social Conflict
	Blasting and Vibration	Ground vibration impact on houses, boreholes, roads and railways
		Air blast impact on houses, boreholes and roads
		Fly Rock impact on houses, boreholes, roads and railways
		Impact of Fumes – Houses, boreholes, roads and railways
	Traffic	Traffic generation around the site from transportation and operational vehicles
		Creation of dust as a result of the movement of operational vehicles
		Heavy vehicles may result in an increase in road accidents
		Increase in traffic could result in the deterioration of paved and haul routes
		Shoulder Sight Distance
		Operation of vehicles may impact pedestrian safety
Decommissioning Phase	Socio-Economic	Reduction in Employment Opportunities and Associated Decline in Economic Activities
		Improve Health and Safety
	Traffic	Creation of dust as a result of the movement of decommissioning vehicles

Activities Matrix

The impacts below have been assessed according to environment. **Table 32** provides an indication of how these environments are linked to the various NEMA listed activities outlined in Section 3(d)(i) above.

Table 32: Activities Matrix

Activity Description	Geology	Topography	Surface Water	Groundwater	Soil	Land Capability	Land USe	Flora	Fauna	Wetlands	Aquatic Ecology	Air Quality	Noise	Archaeology and Heritage	Visual	Socio-Economic	Blasting	Traffic
GNR 983 (4 December 2014)																		
Activity 9: The development of infrastructure exceeding for 1000 metres in length the bulk transportation of water or storm water- i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more.	-	-	C, DC	-	C, DC	-	-	C, DC	-	-	C, DC	-	-	-	C	-	-	-
Activity 10 The development and related operation of infrastructure exceeding 1000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more..	-	-	C, DC	-	C, DC	-	-	C, DC	-	-	C, DC	-	-	-	C	-	-	-
Activity 12: The development of- (i) canals exceeding 100 square metres in size; (ii) channels exceeding 100 square metres in size; (iii) bridges exceeding 100 square metres in size; (iv) dams, where the dam, including infrastructure and water surface area,	-	C, DC	-	C, DC	-	-	C, DC	-	-	C, DC	-	-	-	C	-	-	-	-

Activity Description	Geology	Topography	Surface Water	Groundwater	Soil	Land Capability	Land USe	Flora	Fauna	Wetlands	Aquatic Ecology	Air Quality	Noise	Archaeology and Heritage	Visual	Socio-Economic	Blasting	Traffic
exceeds 100 square metres in size; (v) weirs, where the weir, including infrastructure and water surface area, exceeds 100 square metres in size; (vi) bulk storm water outlet structures exceeding 100 square metres in size; (xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; -																		
Activity 13: The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014..	-	-	C, O, DC	-	C, DC	-	-	C, DC	-	C, DC	C, DC	-	-	-	C, O, DC	-	-	-
Activity 14: The development of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	-	-	C, O, DC	C, O, DC	C, O, DC	-	-	C, DC	-	C, DC	C, DC	-	-	-	-	-	-	-
Activity 19 The infilling or depositing of any material of more than 5 cubic metres into, or the	-	C, DC	-	C, DC	-	-	C, DC	-	-	C, DC	-	-	-	C	-	-	-	-

Activity Description	Geology	Topography	Surface Water	Groundwater	Soil	Land Capability	Land USe	Flora	Fauna	Wetlands	Aquatic Ecology	Air Quality	Noise	Archaeology and Heritage	Visual	Socio-Economic	Blasting	Traffic
dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- (i) a watercourse;																		
Activity 24: The development of- (ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;	-	C, O, DC	C, O, DC	-	C, DC	C, DC	C, DC	C, DC	C, DC	C, DC	C, DC	C, O, DC	C, O, DC	-	-	C, O	-	C. O
Activity 25 The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2000 cubic metres but less than 15000 cubic metres			C, O, DC	C, O, DC							C, O, DC							
Activity 28: Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;.		C, O, DC	C, O, DC		C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC			C, O, DC	C, O, DC	C, O, DC	C, O, DC	
Activity 56: The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre- (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres;	-	C, O, DC	C, O, DC	-	C, DC			C, DC	C, DC			C, O, DC	C, O, DC	-	-	C, O	-	C. O

Activity Description	Geology	Topography	Surface Water	Groundwater	Soil	Land Capability	Land USe	Flora	Fauna	Wetlands	Aquatic Ecology	Air Quality	Noise	Archaeology and Heritage	Visual	Socio-Economic	Blasting	Traffic
excluding where widening or lengthening occur inside urban areas.																		
GNR 984 (4 December 2014)																		
Activity 4: The development of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.	-	-	C, DC	C, O, DC	C, DC	-	-	C, DC	-	C, DC	C, DC	-	-	-	-	-	-	-
Activity 6: The development of facilities or infrastructure for any process or activity which requires a permit or licence on terms of national or provincial legislation governing the generation or release or emissions, pollution or effluent, excluding- (i) activities which are identified and included in Listing Notice 1 of 2014; (ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; or (iii) the development of facilities or infrastructure for the treatment of effluent, wastewater or sewage where such facilities have a daily throughput capacity of 2000 cubic metres or less.			C, O, DC	C, O, DC						C, O, DC	C, O, DC	C, O, DC					C, O, DC	
Activity 15: Physical alteration of undeveloped land for industrial use where the total area to be		C, O, DC	C, O, DC		C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC			C, O, DC	C, O, DC	C, O, DC	C, O, DC	

Activity Description	Geology	Topography	Surface Water	Groundwater	Soil	Land Capability	Land USe	Flora	Fauna	Wetlands	Aquatic Ecology	Air Quality	Noise	Archaeology and Heritage	Visual	Socio-Economic	Blasting	Traffic
transformed is greater than 20ha.																		
Activity 16: The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the high- water mark of the dam covers an area of 10 hectares or more..	-	-	C, O, DC	-	C, DC	-	-	C, DC	-	C, DC	C, DC	-	-	-	C, O, DC	-	-	-
Activity 17: Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource, including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC
Activity 19: The removal and disposal of minerals contemplated in terms of section 20 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to prospecting of a mineral resource, including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC
Activity 20: Any activity including the operation of that	C, O,	C, O,	C, O,	C, O,	C, O,	C, O,	C, O,	C, O,	C, O,	C, O,	C, O,	C, O,	C, O,	C, O,	C, O,	C, O,	C, O,	C, O,

Activity Description	Geology	Topography	Surface Water	Groundwater	Soil	Land Capability	Land USe	Flora	Fauna	Wetlands	Aquatic Ecology	Air Quality	Noise	Archaeology and Heritage	Visual	Socio-Economic	Blasting	Traffic
activity which requires a production right as contemplated in section 83 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to the primary processing of a petroleum resource.	DC	DC	DC	DC	DC	DC	DC	DC	DC	DC	DC	DC	DC	DC	DC	DC	DC	DC
Activity 21: Any activity including the operation of that activity associated with the primary processing of a mineral resource including winning, reduction, extraction, classifying, concentrating, crushing, screening and washing but excluding the smelting, beneficiation, refining, calcining or gasification of the mineral resource in which case activity 6 in this Notice applies.	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC	C, O, DC
Activity 25: The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage with a daily throughput capacity of 15000 cubic metres or more.			C, O, DC	C, O, DC							C, O, DC							
C – Construction, O – Operation, DC – Decommissioning and Closure																		

Geology

No specialist study was undertaken, however, a description of the potential impacts associated with geology has been included below.

Nature of the Impact

- *Construction Phase*

  The construction phase will require the removal of topsoil and the establishment of equipment and infrastructure on site in order to commence mining activities. The earthworks required to build the relevant plant infrastructure will not require blasting. It is not anticipate that such activities will have an impact on the geology in the Proposed Project area.

- *Operational Phase*

  The Rietvlei opencast operation will consist of one pit. The pit will be divided into northern and southern sections by a single box cut situated toward the centre of the opencast pit. The development of the pit will necessitate the removal of the underlying geology (site specific). The operational phase may result in the following geological impacts:

  - Ground vibration during drilling and blasting of both overburden and coal in the pit may impact the geological structures in the surrounding areas;
  - Continual removal of both the overburden and coal will result in the permanent loss of a natural, non-renewable resource and associated alteration of current geology; and
  - Sequential backfilling of opencast pits using the overburden, topsoil's and vegetating - without the coal seam present – will permanently alter the geology at the Proposed Project area.

  Sequential backfilling of opencast pits using the overburden, topsoil's and vegetating may result in subsidence should the backfill material shift or become loosened as a result of concurrent mining nearby e.g. continued mechanical excavation and blasting, as well as vehicles driving into rehabilitated areas

- *Decommissioning and Closure Phase*

  The closure phase may result in the following geological impacts:

  - Sequential backfilling of the final void(s) opencast pits using overburden absent the removed coal, topsoil's and vegetation will permanently alter the geology in the Proposed Project area; and
  - Potential subsidence following the rehabilitation of the final void(s) may result should backfilled material shift or become loosened.

Significance Rating

Table 33 outlines the significance ratings for relevant geological impacts both with and without mitigation measures.

Table 33: Significance Rating for Operational Phase Geological Impacts

Operational Phase								
Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status
Permanent loss of a natural, non-renewable resource and associated geology.	Without Mitigation	3	3	6	5	**60**	**Medium**	-
	With Mitigation	2	3	6	5	**55**	**Medium**	-

Topography

No specialist study was undertaken, however, a description of the potential impacts associated with topography have been included below.

Nature of the Impact

- *Construction Phase*

  The development of infrastructure such as building structures, access roads, fencing, etc. will create a visible, artificial landscape for the LOM. The construction of this infrastructure will result in a permanent change in the topography of the site. The surface infrastructure is likely to disturb the natural and/or existing flow of the topography and free drainage of the area. The Construction Phase may result in the following topographical impacts:

  - Levelling of areas to provide for:
    - Haul roads at appropriate gradient and curvatures will be developed may impact the local topography and drainage of the Proposed Project area during site establishment;
    - Placement of equipment, machinery and plant infrastructure may require levelling to ensure safe operation of such machinery or equipment, which may impact topography of the immediate area;
  - Levelling and topsoil removal ahead of pit establishment will be required to ensure soil availability during rehabilitation and provide for the operation phase drilling and excavation machinery placement; and
  - Stockpiling topsoil and soil materials in the mine lease area may have an impact as the soils will be removed from one area and stored on another – therefore altering existing topography and drainage in the area.

- *Operational Phase*

  The development of the pit will permanently alter the topography and disrupt the natural vegetation and features present on site. The Operational Phase may result in the following topographical impacts:

  - Levelling of areas to allow mining to progress southward:
    - Haul roads at appropriate gradient and curvatures will be continually altered to following mining progression and this may impact the local topography and drainage of the Proposed Project area during site establishment;
    - Placement of equipment, machinery and plant infrastructure may require levelling to ensure safe operation of such machinery or equipment, which may impact topography of the immediate area;
  - Levelling and topsoil removal ahead of pit establishment will be required to ensure soil availability during rehabilitation and provide for the operation phase drilling and machinery placement;
  - Removal of overburden thus creating a large void/vacant pit may impact the immediate topography and drainage;
  - Stockpiling of overburden materials for rehabilitation activities will be required and may impact the local topography and drainage;
  - Sequential backfilling and levelling of opencast pit using stockpiled materials to mimic pre-mining conditions and align with the surrounding topography will be completed. However, the exact conditions and local topography may not be matched and this may impact the local topography and drainage; and
  - Subsidence of rehabilitated areas may result in topographical depressions not in line with existing factures.

  The topography of the Proposed Project area is considered permanently altered however, the infilling activities associated with rehabilitation may reduce the long term impact of the

Proposed Project. Rietvlei Mine will follow the natural gradient of the earth's surface to achieve a topography and gradient consistent with the surrounding areas.

- *Decommissioning and Closure Phase*

  The demolition of the surface infrastructure will return the topography to its pre-mine state. The decommissioning and closure phase may result in the following topographical impacts:

  - Sequential backfilling and levelling of the final void(s) using stockpiled materials to mimic pre-mining conditions and align with the surrounding topography will be completed. However, the exact conditions and local topography may not be matched which may cause topographical and drainage impacts; and
  - Subsidence of rehabilitated areas may result in topographical depressions not in line with existing factures.

  Upon mine closure, the rehabilitation activities are considered successfully completed. The closure phase will not result in any further impact on the topography of the area.

Significance Rating

Table 34, Table 35 and **Table 36** outline the significance ratings for relevant topographical impacts both with and without mitigation measures.

Table 34: Significance Ratings for the Construction Phase Topographical Impacts

Construction Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
The development of the surface infrastructure (building structures, access roads, fencing, etc.)	Without Mitigation	2	2	8	4	**48**	**Medium**	-
	With Mitigation	2	2	6	4	**40**	**Medium**	-
Disturbance of natural lie of the land resulting from site clearing and topsoil removal	Without Mitigation	1	2	8	4	**44**	**Medium**	-
	With Mitigation	1	2	6	4	**36**	**Medium**	-
Disturbance of natural/existing flow of topography and the free drainage of the area resulting from surface infrastructure.	Without Mitigation	1	2	8	5	**55**	**Medium**	-
	With Mitigation	1	2	6	4	**36**	**Medium**	-

Table 35: Significance Ratings for the Operational Phase Topographical Impacts

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
The	Without	1	5	10	5	**80**	**High**	-

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
development of the pit will result in the altering of the topography in this area	Mitigation							
	With Mitigation	1	5	10	5	**80**	**High**	-
The development of the pit will impact on the surface water flow dynamics	Without Mitigation	1	5	8	5	**70**	**High**	-
	With Mitigation	1	5	8	5	**70**	**High**	-
Infrastructure that is utilised on the site will alter the topography and surface water flow of the area	Without Mitigation	1	5	8	5	**70**	**High**	-
	With Mitigation	1	5	6	5	**60**	**Medium**	-

Table 36: Significance Ratings for the Decommissioning and Closure Phase Topographical Impacts

Decommissioning Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Decommissioning and Closure of the pit	Without Mitigation	1	5	10	5	**80**	**High**	-
	With Mitigation	1	5	6	5	**60**	**Medium**	+
Decommissioning of surface infrastructure	Without Mitigation	1	5	8	5	**70**	**High**	-
	With Mitigation	1	3	6	5	**50**	**Medium**	+

Surface Water

A Surface Water Assessment was conducted by Aqua Earth in July 2014, which is included in **Appendix 20** for further information.

Nature of the Impact

- *Construction Phase*

  The mine is situated in the headwater of the catchments and no major build-up of flows is expected.

  The clearing of topsoil for footprint areas associated with construction activities can increase siltation to the surface water resource during soil turning activities. Drainage lines flowing into the mining area will however have to be diverted to prevent clean water from entering the mining area and increase the risk of flooding. Slopes associated with berms, and rerouting of the storm water runoff may enhance erosion and siltation, and flood risk at the receiving stream (river).

  The construction activities are likely to be associated with accidental spills of hydrocarbons (oils, diesel etc.) from the construction vehicles and other potentially hazardous chemicals.

Such spills together with the construction waste constitute potential source of surface water contamination if not properly handled.

The following impacts have been considered and quantified during the construction phase:

- Siltation due to soil disturbance;
- Erosion due to rerouting of storm water runoff;
- Water quality deterioration due to Spill and /or leaking of hydrocarbon product from construction vehicles, equipment and storage; and
- Water quality deterioration due to seepage from construction waste to the surface water resource.

- *Operational Phase*

During operational phase, surface water runoff may enter the operating open pit, coal processing plant, stockpiles and waste disposal area if not properly managed. This would result on the contamination of clean surface water runoff. Water (groundwater and rainfall) will need to be pumped from the pit for mine safety. Water from the operating areas, is considered dirty, and when not handled adequately constitutes a potential source of surface water pollution. Exposed water may increase evaporation rate on site.

Mine activities that may impact on surface water are:

- Overburden dumping: the exposure of rock dumps, result in dirty water that may contaminate surface water, if not properly managed;
- Stockpiling and transport: the exposure of stockpiling and transporting of coal, to water and oxygen, together with hydrocarbon spills from storage (organic contaminants) may also result in contamination of surface water;
- Coal processing: coal will be exposed at the washing plant area to water (with chemical) and oxygen, resulting in dirty water, and spills/slurry from the site can contaminate surface water;
- Tailing disposal: residual from coal processing will be disposed of onsite at designated are or in pit. Such disposal when not handled correctly, constitute a potential source of water contamination; and
- Septic tank: spillage from septic may constitute source of bacteriological contamination to surface water. If not properly managed.

Dirty water from any of these activities should be drained, or pumped (where required) to pollution control dams. Pollution control dams, and contaminated water drains constitute potential sources of surface water contamination as result of leakage trough improper barrier system (absent, or leaking).

Handling and transport of waste material have some potential of contaminating surface water, including domestic waste, sewage water, hydrocarbons (storage).

The following impacts have been considered and quantified during the operation phase:

- Deterioration of clean storm water runoff quality;
- Increasing of water removal activities due to in pit dewatering;
- Ponding due to storm water falling onto operating (mining pit, crushing and screening, stockpiling) areas;
- Erosion due to surface water runoff rerouting;
- Siltation due to surface water runoff rerouting;
- Water quality deterioration due spill and/or leaking of hydrocarbon;
- Water quality deterioration due to septic tank;
- Water quality deterioration due to seepage from waste disposal facility to the surface water resource;

- Water quality deterioration due to spillage, seepage and/or leak from waste disposal, storage, handling facility to surface water; and
- Water quality deterioration due to Spillage of dirty water from dirty water control system (Dams, trenches, berms etc).

- *Decommissioning Phase*

  The closing of mining activities and rehabilitation will be undertaken concurrently. All disused infrastructure will be demolished, and waste from demolition has to be removed from site and disposed at designated site.

  Surface water contaminants from the mine (including backfilled opencast pits and return water dams) can be enhanced.

  Activities such as covering of the spillages with sand and collection and possibly treatment etc are likely to be associated with accidental spills of hydrocarbons (oils, diesel etc).

  Dewatering would be stopped at that stage, and open pit flooding will occur, as recovering of groundwater levels, and subsequent decant to the surface is expected at the lowest mining area. The closure phase is usually too short to see the any evidence of decant. Decommissioning/closure is only complete once the proponent demonstrates no significant impacts. The following impacts have been considered and quantified during the closure phase:

  - Erosion due to increase runoff speed and velocity (compaction, shaping);
  - Siltation due to increase runoff speed and velocity (compaction, shaping);
  - Deterioration of surface water quality due to:
    - Spillage, leaking of hydrocarbon product;
    - waste, and spills related to closure activities;

  At post closure phase, the main potential surface water impacts to be considered and quantify are:

  - Deterioration of surface water quality by decanting water;
  - Flooding due to decanting water; and
  - Erosion associated with runoff of decanting water.

  Without any mitigation measures the impacts significance from closure of the proposed Rietvlei Mine are rated from Very Low to Very High.

- *Cumulative Impacts*

  No significant pollution source has been identified on site or surrounding, that may cumulatively with the project impact on background water quality. However the background water quality, as established from two sampling points (Selons River, Dam), is assumed to be related to surrounding activities (agricultural). As no historical observation is available locally, the background flow variation is not known, but it is assumed that flow may be reducing as regional trend. The following impacts have been considered as cumulative impacts:

  - Cumulating of reduction of water flow as result of water management (storage, diversion); and
  - Cumulating of water quality deterioration from mine activities with existing contaminants.

<u>*Significance Rating*</u>

Table 37, Table 38, Table 39 and **Table 40** outline the significance ratings for relevant surface water impacts both with and without mitigation measures.

Table 37: Significance Ratings for the Construction Phase Surface Water Impacts

Construction Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Siltation due to soil disturbance	Without Mitigation	1	2	2	5	**25**	**Low**	-
	With Mitigation	1	1	2	3	**12**	**Low**	-
Erosion due to rerouting of storm water runoff	Without Mitigation	1	2	2	3	**15**	**Low**	-
	With Mitigation	1	1	2	2	**8**	**Low**	-
Water quality deterioration due to Spill and /or leaking of hydrocarbon product from construction vehicles, equipment's, and storage	Without Mitigation	3	1	6	4	**40**	**Medium**	-
	With Mitigation	1	1	2	2	**8**	**Low**	-
Water quality deterioration due to seepage from construction waste site to the surface water resource	Without Mitigation	2	3	6	4	**44**	**Medium**	-
	With Mitigation	1	1	2	3	**12**	**Low**	-

Table 38: Significance Ratings for the Operational Phase Surface Water Impacts

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Deterioration of clean storm water runoff quality	Without Mitigation	3	4	6	5	**65**	**High**	-
	With Mitigation	1	2	2	3	**15**	**Low**	-
Increasing of water removal activities due to in pit dewatering	Without Mitigation	2	2	2	4	**24**	**Low**	-
	With Mitigation	1	1	2	3	**12**	**Low**	-
Ponding due to storm	Without Mitigation	2	2	2	4	**24**	**Low**	-

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
water falling onto operating (mining pit, crushing and screening, stockpiling) areas	With Mitigation	1	1	2	2	**8**	**Low**	-
Erosion due to surface water runoff rerouting	Without Mitigation	1	2	2	4	**20**	**Low**	-
	With Mitigation	1	1	2	2	**8**	**Low**	-
Siltation due to surface water runoff rerouting	Without Mitigation	1	2	2	4	**20**	**Low**	-
	With Mitigation	1	1	2	2	**8**	**Low**	-
Water quality deterioration due spill and/or leaking of hydrocarbon	Without Mitigation	2	3	6	4	**44**	**Medium**	-
	With Mitigation	1	1	2	3	**12**	**Low**	
Water quality deterioration due to septic tank	Without Mitigation	2	3	6	4	**44**	**Medium**	-
	With Mitigation	1	2	2	3	**15**	**Low**	-
Water quality deterioration due to seepage from waste disposal facility to the surface water resource	Without Mitigation	2	3	6	5	**55**	**Medium**	-
	With Mitigation	2	2	2	3	**18**	**Low**	-
Water quality deterioration due to spillage, seepage and/or leak from waste disposal, storage, handling facility to surface water	Without Mitigation	2	3	6	4	**44**	**Medium**	-
	With Mitigation	2	1	2	3	**15**	**Low**	-
Water quality deterioration due to Spillage of dirty water from dirty water control system	Without Mitigation	2	3	6	5	**55**	**Medium**	-
	With Mitigation	2	1	2	3	**15**	**Low**	-

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
(Dams, trenches, berms etc)								

Table 39: Significance Ratings for the Decommissioning Phase Surface Water Impacts

Decommissioning Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Erosion due to increase of runoff speed and velocity	Without Mitigation	1	2	2	4	**20**	**Low**	-
	With Mitigation	1	1	2	2	**8**	**Low**	-
Siltation related to erosion	Without Mitigation	1	2	2	4	**20**	**Low**	-
	With Mitigation	1	1	2	2	**8**	**Low**	-
Deterioration of water quality due to spill and/or leaking from hydrocarbon storage area	Without Mitigation	3	3	6	5	**60**	**Medium**	-
	With Mitigation	1	2	2	3	**15**	**Low**	-
Deterioration of water quality due to seepage and/or spillage from waste site facility	Without Mitigation	3	3	6	5	**60**	**Medium**	-
	With Mitigation	1	2	2	3	**15**	**Low**	-
Deterioration of the surface water quality due decanting water	Without Mitigation	4	4	8	5	**80**	**High**	-
	With Mitigation	3	2	4	4	**36**	**Medium**	-
Flood risk due decant to surface	Without Mitigation	3	4	6	4	**52**	**Medium**	-
	With Mitigation	1	1	4	3	**18**	**Low**	-
Erosion due decant water runoff	Without Mitigation	1	2	2	4	**20**	**Low**	-
	With Mitigation	1	1	2	2	**8**	**Low**	-

Table 40: Significance Ratings for the Cumulative Surface Water Impacts

Cumulative Impacts								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Reduction of water flow as result of water management (storage, diversion)	Without Mitigation	3	3	2	4	**32**	**Medium**	-
	With Mitigation	2	2	2	3	**18**	Low	-
surface water quality deterioration from mine activities with existing contaminants	Without Mitigation	3	3	2	5	**40**	**Medium**	-
	With Mitigation	2	2	2	3	**18**	Low	-

Groundwater

A Groundwater Assessment was conducted by Aqua Earth in July 2014, which is included in **Appendix 19** for further information

Nature of the Impact

- *Groundwater Modelling*
  - **Scenario 1: Mine dewatering (operation)**

    In the first scenario the opencast pit is dewatered. The cone of depression extends up to 3km away from site when pit floor will reaches lower seem bottom (50mgl). The expected inflow is in the vicinity of 300m^3/d. It should be noted that no concurrent rehabilitation has been included in this scenario and therefore it can be seen as the 'worst-case' scenario. The wetlands are groundwater dependent and will be affected by the dewatering cone, but the current model did not account for such effect. The simulated cone of depression at 20 years is shown in **Figure 70**. The effect of dewatering on selected boreholes surrounding proposed Rietvlei Mine, are illustrated in **Figure 71**. **Figure 72** shows the simulated groundwater elevations and drainage at 20 years of operation. All identified boreholes on site will be impacted together with few offsite boreholes (RGW10, RGW23, RGW22, RGW1, and RGW2).

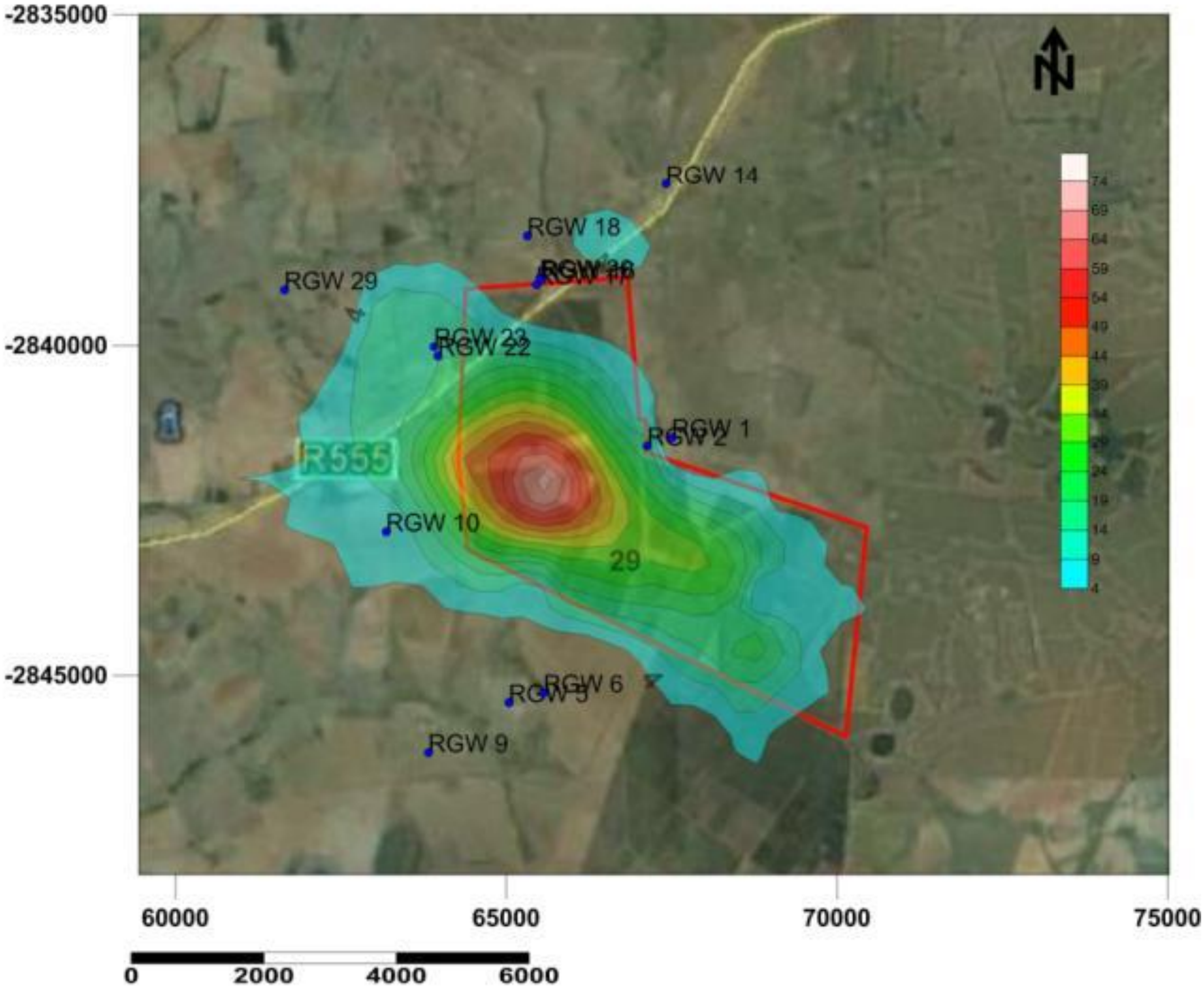


Figure 70: Simulated Drawdown due to Dewatering at 20 years

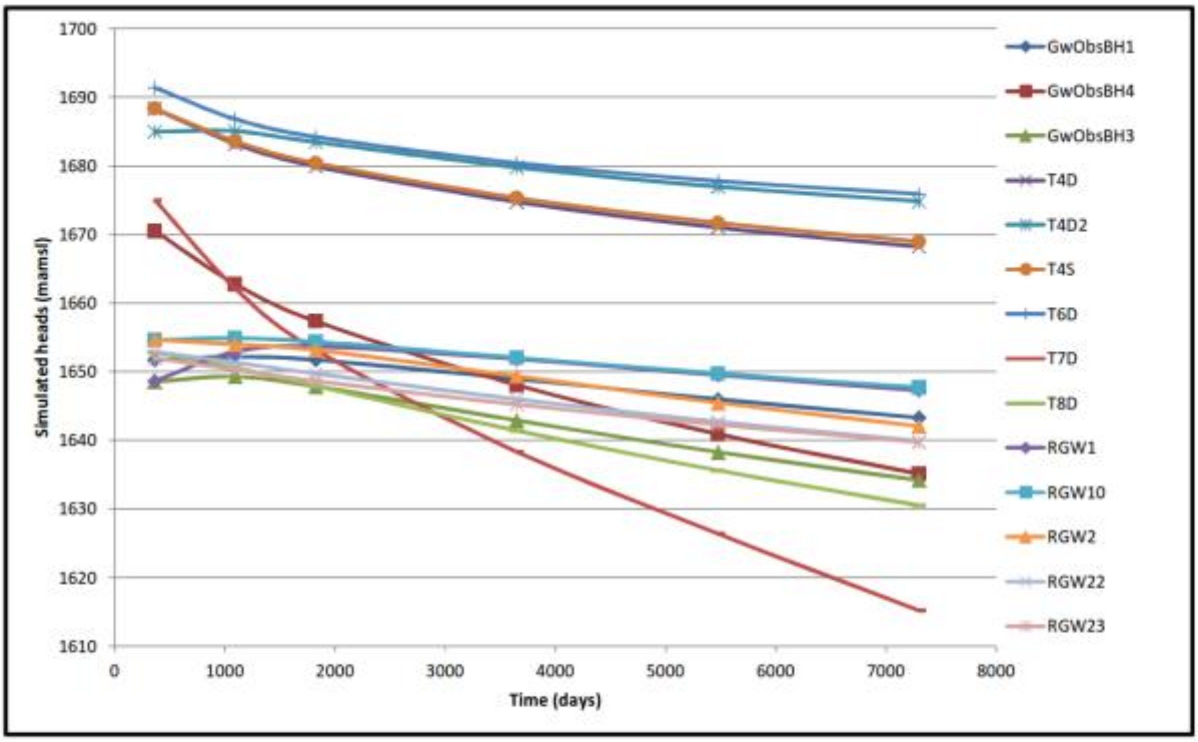


Figure 71: Simulated Drawdown of selected boreholes over time

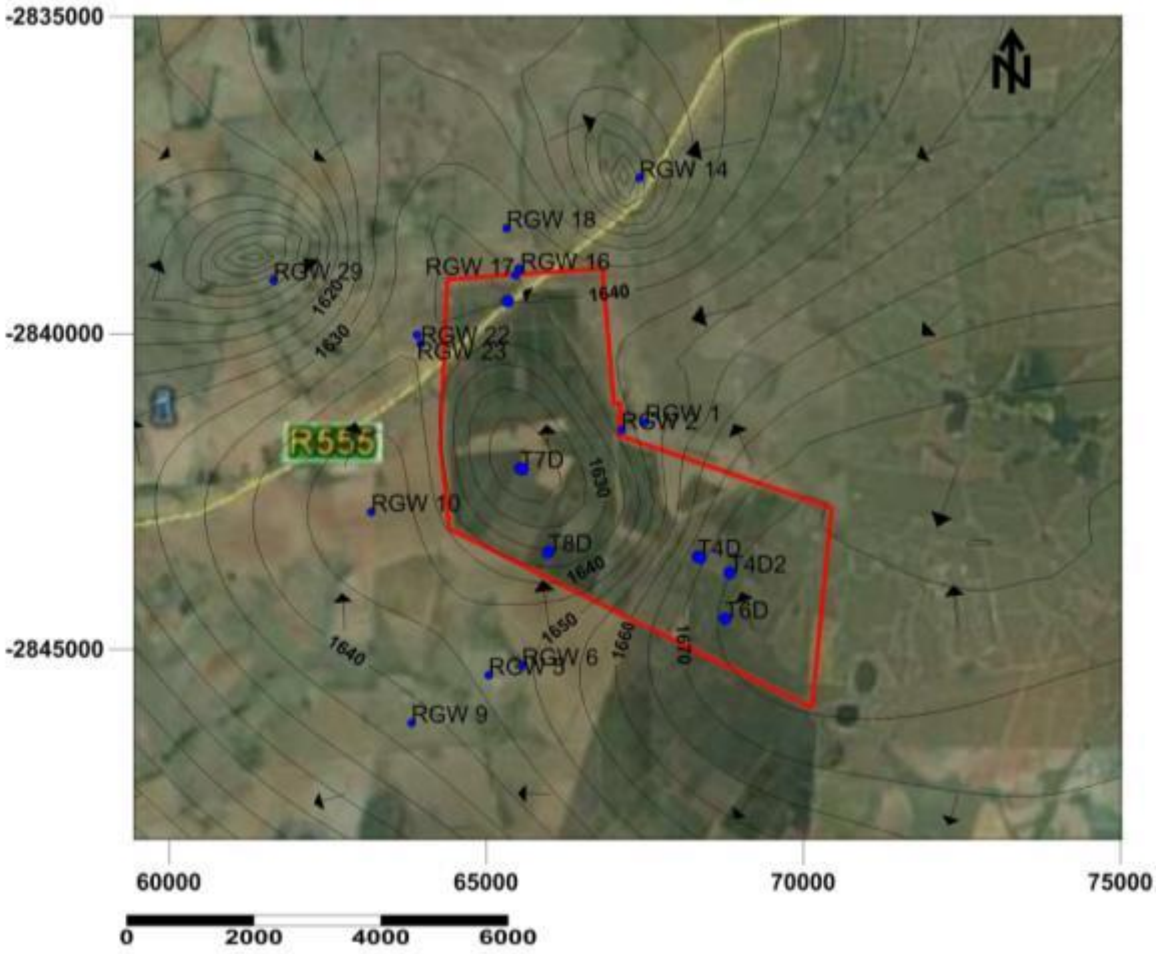


Figure 72: Simulated groundwater elevations drainage after 20 years of pit dewatering

- **Scenario 2: Pollution plume (operation)**

  Groundwater flow during active mining will be towards the open pit. Any pollution plumes emanating from mining activities (dumps, processing plant, water and tailing dams, drains, etc...) will move towards the open pit. The open pit area will be kept dry for mine safety and polluted water seeping through the backfill should be pumped to dirty water dams. Pollution during active mining is expected to be restricted to the mine property. Neighbouring boreholes will not be affected during active mining.

- **Scenario 3: Backfilled pit flooding (closure)**

  Dewatering would be stopped when mining will reach its full capacity, and open pit flooding will occur, as recovering of groundwater levels. Groundwater flow directions will return to pre-mining conditions. The flooding of the mine is dependent on a number of factors including preferential flow zones such as geological lineaments. Not all preferential influx zones are known at this point, so the volumes might increase, as more information becomes available. It will take 40 years for the pit to flood, thereafter decanting will commence. The position of the expected decant point is shown in **Figure 73**. The decant volume is estimated at 1420 m^3/d, where as it was estimated (1200 m^3/d) from the initial numerical model.

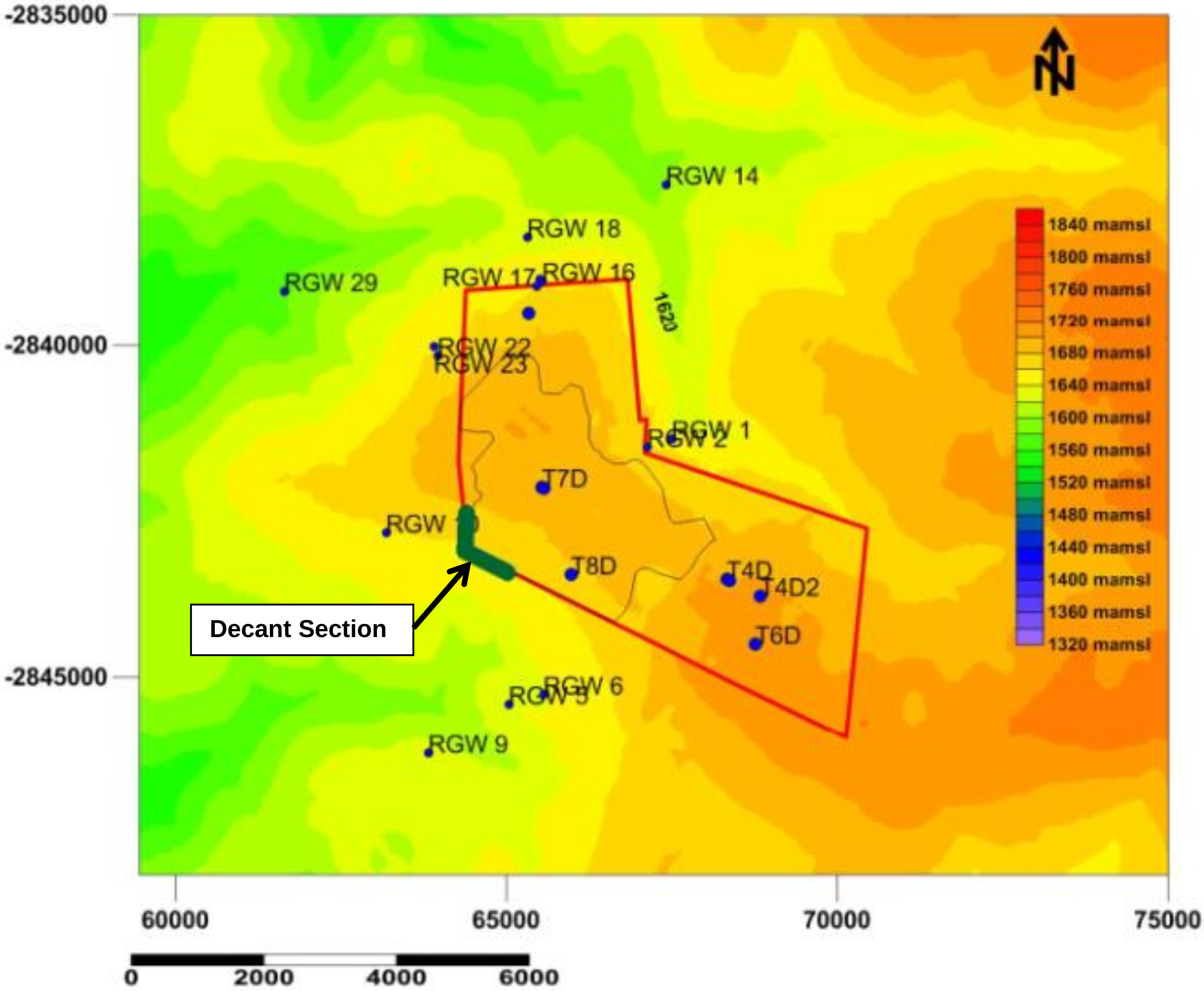


Figure 73: Decant Zone

- **Scenario 4: Pollution plume (post-closure)**

At this point in time it is calculated that it is likely for the mine to decant. It is expected that poorer quality groundwater will be present in the backfilled pit when total flooding is completed, as result of chemical reaction between backfill material and oxygenated water. The polluted waters in the opencast pit will start to move into the groundwater system if no water management measures are implemented. The pollution plume at 10 and 20 years after flooding is shown respectively in **Figure 74** and **Figure 75**. The boreholes affected by pollution include: RGW4 and RGW11. Slight impacts could be seen in RGW2 and RGW22.

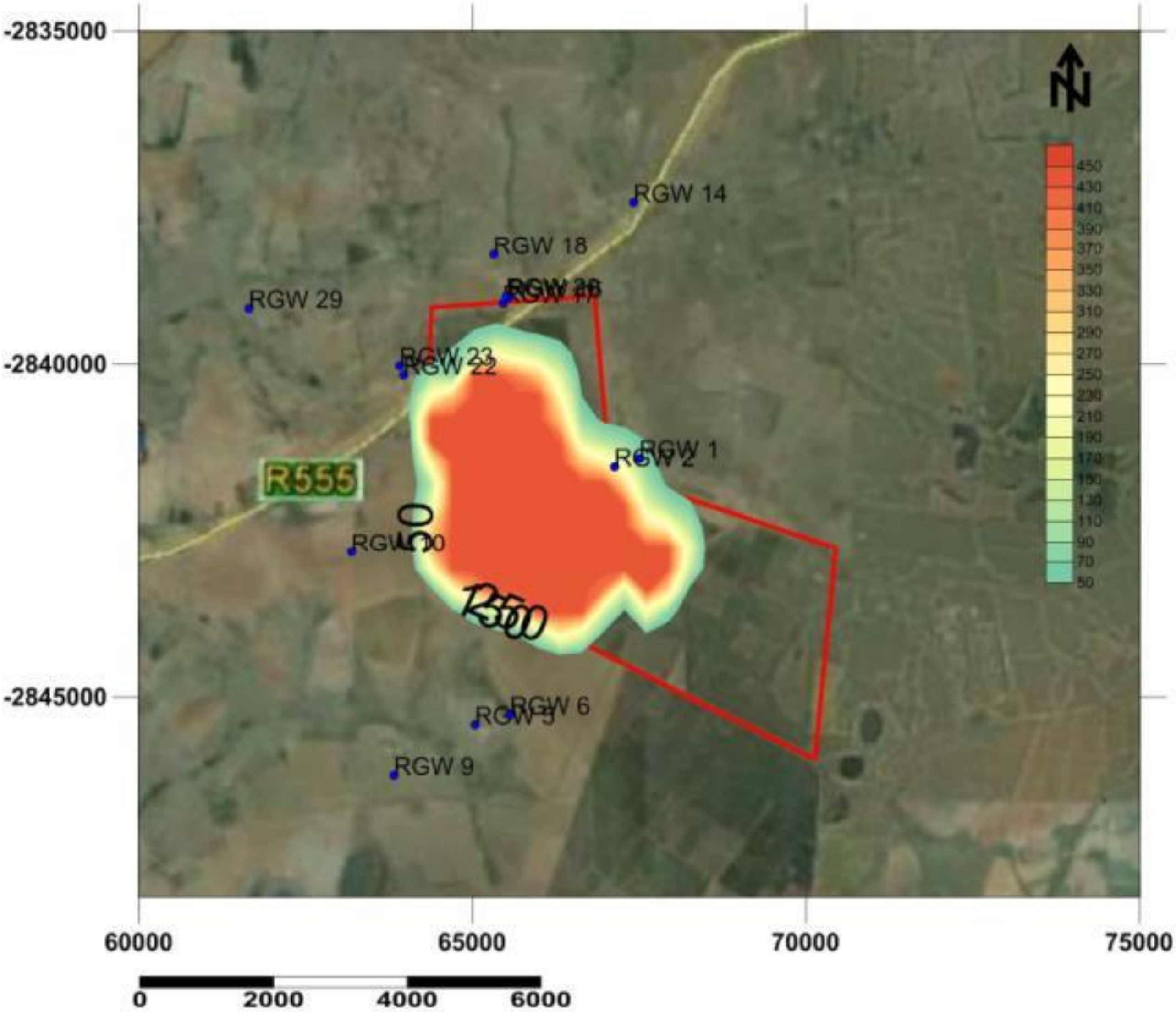


Figure 74: Pollution plume from backfilled pit 10 years after flooding

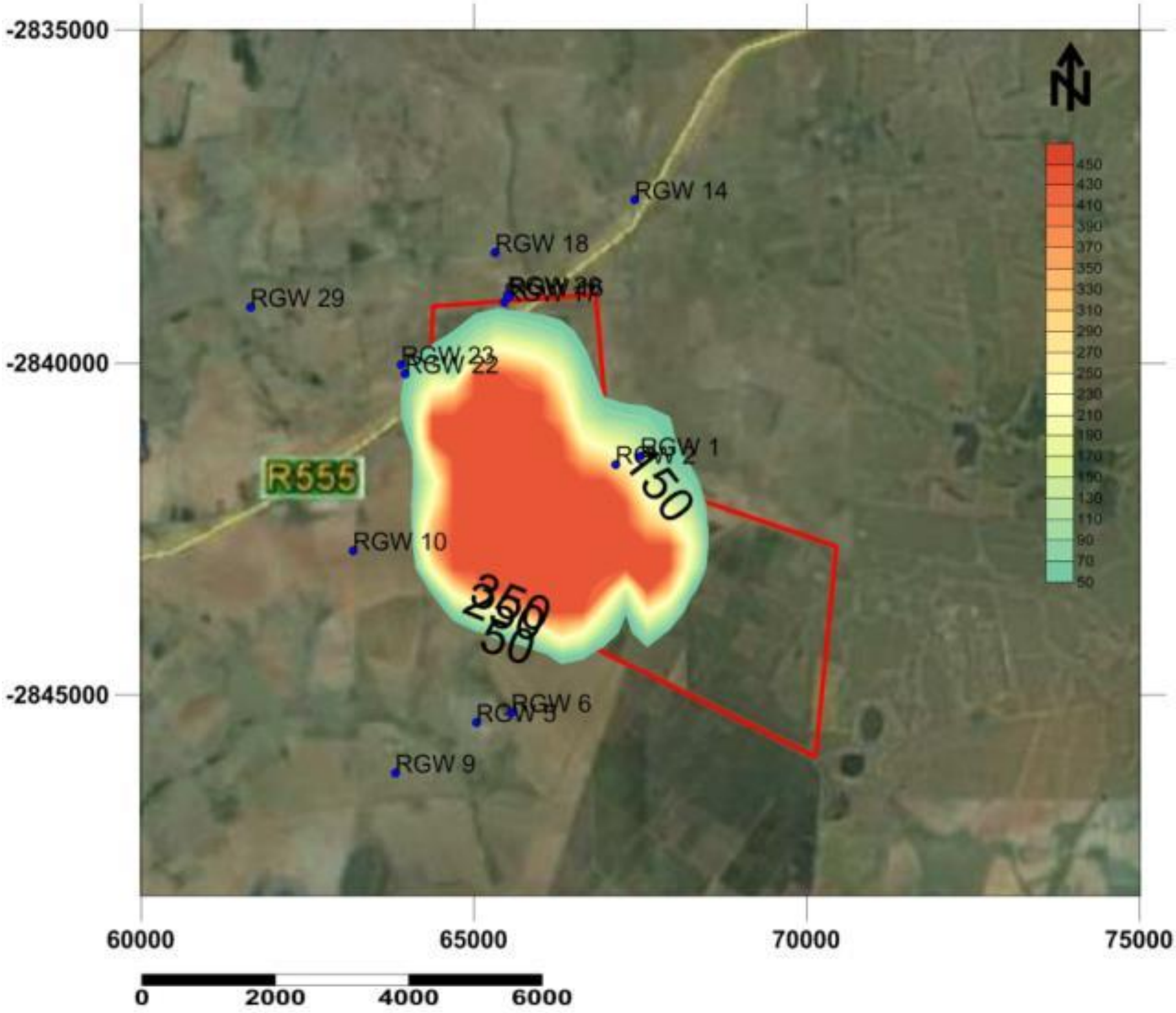


Figure 75: Pollution plume from backfilled pit 20 years after flooding

- *Construction Phase*

  The clearing of topsoil for footprint areas associated with the waste site construction can increase infiltration rates of water to the groundwater system and decrease buffering capacity of soils to absorb contaminants from possible spills on surface. Groundwater recharge from surface may increase, especially in the potential recharge area.

  During construction phase, it would be necessary to construct the berms to prevent storm water runoff to enter working area within the prospecting area. The cut and fill activities associated with the construction of infrastructures (waste site, water control infrastructures) may intercept shallow groundwater as static levels are found shallow as 1.7mbgl. In cases where the construction will intercept groundwater, lowering of the groundwater level by dewatering may be needed during construction. This will cause localise cones of groundwater depressions around the waste site area.

  Contamination of groundwater can occur as a result of groundwater seeps standing in the footprint area. The construction activities are likely to be associated with accidental spills of hydrocarbons (oils, diesel etc) from the construction vehicles, and other potentially hazardous chemicals during the construction phase. Such spills together with the construction waste can infiltrate and cause contamination of the groundwater system if not properly handled.

The design of the waste disposal sites (rock dumps, tailings) will take into account the specification stipulated in GN 36784. Thus construction will result in:

- The reduction of the recharge potential at proposed site, and
- The disturbance of Sub-catchment storm water runoff.

The following impacts have been considered and quantified during the construction phase:

- Decreasing of the soils buffering capacity and increasing of infiltration rates;
- Deterioration of water quality due to construction waste (Chemical in construction material);
- Deterioration of groundwater quality due to hydrocarbon spills from storage (organic contaminants);
- Altered flow systems due to probable dewatering (if required); and
- Groundwater contamination due to groundwater seeps standing in the construction's footprint area.

Without any mitigation measures the impacts significance from construction of the proposed Rietvlei Mine are rated from very low to low.

- *Operational Phase*

Opencast mining of coal will result in groundwater inflows into the pits, which needs to be pumped out for mine safety. The dewatering of the groundwater system in the immediate vicinity of the pits will become more important and results in wider cone of depression as depth to pit floor will increase. According to the importance of cone of depression surrounding users' boreholes can be impacted.

Exposure of geological strata to rainfall in the opencast areas will result in deterioration in quality of groundwater flowing into the opencast areas. Groundwater will initially be of good quality but will with time deteriorate, due to oxidation of pyrite and/or other chemical processes that can occur as a result of mining activities. This can take place for years, until the neutralizing potential is depleted. Such dirty water in opencast pit, together with groundwater ingress, if not properly handle may infiltrate and contaminate deeper aquifer system. Others mine activities that may impact on groundwater quality are:

- Overburden dumping: the exposure of rock dumps, to water and oxygen, may result in dirty water that may contaminate groundwater systems, if not properly managed;
- Stockpiling and transport: the exposure of stockpiling and transporting of coal, to water and oxygen, together with hydrocarbon spills from storage (organic contaminants) may also result in contamination of the groundwater systems;
- Coal processing: coal will be exposed at the washing plant area to water and oxygen, resulting in dirty water, and spills/slurry from the site can contaminate groundwater; and
- Tailing disposal: residual from coal processing will be disposed of onsite as tailings dam. Tailings constitute a potential source of groundwater contamination.

Dirty water from any of these activities should be drained, or pumped (where required) to pollution control dams. Pollution control dams, and contaminated water drains constitute potential sources of groundwater contamination as result of infiltration trough improper barrier system (absent, or leaking). Unlined dams will contribute highly to contamination of the groundwater system, while lined dams might still contaminate but to a lesser degree.

Handling and transport of waste material have some potential of contaminating groundwater, including domestic waste, sewage water, hydrocarbons (storage).

The following impacts have been considered and quantified during the operation phase:

- Deterioration of groundwater quality due to rock dumps;
- Deterioration of groundwater quality due to open pit mining;
- Deterioration of groundwater quality due to coal processing;

- Deterioration of groundwater quality due to tailings disposal;
- Deterioration of groundwater quality due to leaks/spillages from dirty water quality dams and drain; and
- Deterioration of groundwater quality due to handling and transport of waste material.

Without any mitigation measures the impacts significance from operation of the proposed Rietvlei Mine are rated from Low Medium to High. The High impacts significance, are associated with the potential impacts of groundwater dewatering and deterioration of groundwater quality due to tailing dams.

- *Decommissioning Phase*

The closing of mining activities and rehabilitation will be concurrently undertaken. All disused infrastructure will be demolished, and waste from demolition has to be removed from site and disposed at designated site.

Contaminants from the mine (including backfilled opencast pits and return water dams) can seep through the unsaturated zone into the groundwater system. Lateral groundwater movement will allow the spread of the contamination within the groundwater system. If this groundwater feeds surface water bodies such as wetlands and streams, these can also be polluted. However dilution will take place therefore the impacts thereof are considered to be moderate.

Activities such as covering of the spillages with sand and collection and possibly treatment etc are likely to be associated with accidental spills of hydrocarbons (oils, diesel etc).

Dewatering would be stopped at that stage, and open pit flooding will occur, as recovering of groundwater levels. At this point in time it is calculated that it is likely for the mine to decant. It is expected that poorer quality groundwater will be present on the mine horizon when total flooding is completed.

Water management activities associated with closure activities will be conducted as appropriate. Generally decommissioning/closure phase is too short to see significant impacts on the groundwater, but in the present context where closure would be progressive, significant reduction of impacts could occur. The risk of such impacts will be reduced over time. With strong management options, the risk is expected to reduce even further. Decommissioning/closure is only complete once the proponent demonstrates no significant impacts

The following impacts have been considered and quantified during the closure phase:

- Flooding and decanting of open pit; and
- Deterioration of groundwater quality due to waste, and spills related to closure activities.

Without any mitigation measures the impacts significance from closure of the proposed Rietvlei Mine are rated from Very Low to High. The High impact is mainly associated with the potential impacts of flooding and decanting of the backfilled pit.

At post closure phase, the main potential groundwater impacts to be considered and quantify is:

- Flooding and decanting of open pit.

Without any mitigation measures the impacts significance from post-closure of the proposed Rietvlei Mine are rated as Very High.

- *Cumulative Impacts*

No significant pollution source has been identified on site or surrounding, that may cumulatively with the project impact on background water quality. However the background high concentration of NO3-N noticed from two sampling points may be associated with surrounding agricultural activities (fertilizer, pumping). Slight cone of depressions are already developing at local points surrounding proposed Rietvlei Mine.

The following impacts have been considered as cumulative impacts:

- Cumulating of impacts due mine dewatering with existing local cone of depressions; and

- Cumulating of contaminants from mine activities with existing contaminants.

Significance Rating

Table 41, Table 42, and **Table 43** outline the significance ratings for relevant groundwater impacts both with and without mitigation measures.

Table 41: Significance Ratings for the Construction Phase Groundwater Impacts

Construction Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Decreasing of the soils buffering capacity and increasing of infiltration rates	Without Mitigation	1	2	2	5	**25**	**Low**	-
	With Mitigation	1	2	2	5	**25**	**Low**	-
Altered Flow systems due to probable dewatering (if required)	Without Mitigation	2	2	4	5	**40**	**Medium**	-
	With Mitigation	2	2	4	5	**40**	**Medium**	-
Deterioration of water quality due to construction waste (Chemical in construction material)	Without Mitigation	2	1	6	5	**45**	**Medium**	-
	With Mitigation	1	1	2	2	**8**	**Low**	-
Deterioration of water quality due to hydrocarbon spills from storage (organic contaminants)	Without Mitigation	2	3	6	5	**55**	**Medium**	-
	With Mitigation	1	2	2	3	**15**	**Low**	-
Groundwater contamination due to groundwater seeps standing in the construction's footprint area.	Without Mitigation	1	3	6	5	**50**	**Medium**	-
	With Mitigation	1	1	2	2	**8**	**Low**	-

Table 42: Significance Ratings for the Operational Phase Groundwater Impacts

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Drop of groundwater levels due to open pit dewatering	Without Mitigation	3	4	8	5	**75**	**High**	-
	With Mitigation	3	4	8	5	**75**	**High**	-

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Deterioration of groundwater quality due to rock dumps.	Without Mitigation	3	4	4	4	**44**	**Medium**	-
	With Mitigation	1	1	2	3	**12**	**Low**	-
Deterioration of groundwater quality due to open pit mining.	Without Mitigation	3	4	6	5	**65**	**High**	-
	With Mitigation	2	3	6	4	**44**	**Medium**	-
Deterioration of groundwater quality due to coal processing	Without Mitigation	3	4	8	5	**75**	**High**	-
	With Mitigation	2	1	4	2	**14**	**Low**	-
Deterioration of groundwater quality due to tailings disposal	Without Mitigation	3	4	8	5	**75**	**High**	-
	With Mitigation	3	1	2	4	**24**	**Low**	-
Deterioration of groundwater quality due to leaks/spillages from dirty water quality dams and drain	Without Mitigation	3	4	8	4	**60**	**Medium**	-
	With Mitigation	1	1	2	3	**12**	**Low**	-
Deterioration of groundwater quality due to handling and transport of waste material.	Without Mitigation	3	4	6	3	**39**	**Medium**	-
	With Mitigation	1	2	2	3	**15**	**Low**	-

Table 43: Significance Ratings for the Decommissioning Phase Groundwater Impacts

Decommissioning Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
During decommissioning handling of waste and transport of building material can cause various types of spills (domestic waste, sewage water,	Without Mitigation	3	3	6	4	**48**	**Medium**	-
	With	2	3	4	4	**36**	**Medium**	-

Decommissioning Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
hydrocarbons) which can infiltrate and cause contamination of the groundwater system.	Mitigation							
Flooding and decanting of open pit	Without Mitigation	3	5	8	5	**80**	**High**	-
	With Mitigation	2	3	6	4	**44**	**Medium**	-

Soil, Land Capability and Land Use

A Soil, Land Capability and Land Use Assessment was conducted by Rehab Green Monitoring Consultants CC in July 2014, which is included in **Appendix 21** for further information.

Nature of the Impact

- *Construction Phase*

  The following construction phase impacts were identified with regards to soils:

  - Complete removal of all topsoil from the boxcut footprint;
  - The land capability at the footprint of the box cut will reduce from mainly arable land to none because there will be no topsoil;
  - Changes to the physical and chemical properties of the soil as a result of the potential contamination of soils by spillages of fuel or oil by mechanical equipment;
  - Topsoil and overburden stockpiles will cover the natural productive soil surface and cause the majority of soil functions (growth and nutrient medium and habitat) at the footprint of the stockpiles to cease;
  - Severe soil compaction caused by the weight of the stockpiled material;
  - Disturbance and removal of the A-horizon by storing it as a berm along the haul roads;
  - Compaction of the B-horizon will alter the soils physical properties negatively;
  - Covering the soil surface with base materials will cause productive soil functions (growth and nutrient medium and habitat) at the road footprint to cease completely;
  - Disturbance and removal of the A-horizon by storing it as a berm along the road;
  - Compaction of the B-horizon will alter the soils physical properties negatively;
  - Covering the soil surface at the footprint of the road with base materials will cause natural soil functions (growth and nutrient medium and habitat) to cease completely;
  - Removal of the topsoil at the dam footprint will cause all soil functions to cease completely;
  - The A-horizon will be stockpiled for later rehabilitation and such topsoil stockpiles will cover the productive soil surface and cause the majority of soil functions (growth and nutrient medium and habitat) to cease;
  - Compaction of the soil surface for building foundations, parking areas etc. will alter the soil's physical properties negatively; and
  - Covering the soil surface with concrete, tar or paving will cause productive functioning of the soil to cease.

- *Operational Phase*

  The following operational phase impacts were identified with regards to soils:

  - Complete removal of all topsoil at open pit footprint;
  - Stripping and replacing result in mixing of the soil's A and B-horizons with subsequent reduction in fertility, water holding capacity and buffer capacity against compaction;
  - Possible stripping of lower quality subsoil together with high quality topsoil result in a reduction of soil quality and subsequent land capability;
  - Topsoil and overburden stockpiles will cover the natural productive soil surface and cause the majority of soil functions (growth and nutrient medium and habitat) at the footprint of the stockpiles to cease;
  - Severe soil compaction caused by the weight of the stockpiled material;
  - Complete removal of all topsoil at open pit footprint;
  - Stripping and replacing result in mixing of the soil's A and B-horizons with subsequent reduction in fertility, water holding capacity and buffer capacity against compaction;
  - Possible stripping of lower quality subsoil together with high quality topsoil result in a reduction of soil quality and subsequent land capability;
  - Coal and coal dust pollution along haul roads will cause salt pollution which will alter soil chemical status negatively;
  - Possible contamination of soils by salts due to leaking dams or overspills of pollution control dams during the rainy season will alter soil chemical status negatively;
  - Possible contamination of soils by spillages of diesel, petroleum and oil will alter soil chemical status negatively; and
  - Possible salt pollution by surface runoff and leachates from the stockpile will alter soil chemical status negatively in the immediate surrounding area.

- *Decommissioning Phase*

  The decommissioning phase impacts are anticipated to be mainly positive impacts as a result of the final rehabilitation and closure of the Rietvlei mine. The following activities are not seen as impacts but rather as a continuation of the operational mitigation measures:

  - Replacement of stockpiled topsoil on backfilled remaining open pit area and possibly some final voids;
  - Complete removal of all stockpile topsoil and dumped overburden material;
  - Complete removal of all roads building material;
  - Removal of polluted material and levelling of wall embankments;
  - Complete removal of all structures and foundations; and
  - Removal of all coralliferous material.

- *Cumulative Impacts*

  Approximately 805 ha will be mined by opencast method and a further approximately 150 ha will be occupied by mining related structures for the lifespan of the mine. The irreversible impacts and loss of resource will mainly take place at the opencast footprint. Soils on a portion of this 805 ha opencast will be subject to stripping and stockpiling and the remaining portion on stripping and direct replacing. No matter what method is used the natural soil horizon sequence in terms of an A-horizon with specific properties underlain by a B-horizon with specific properties (developed over thousands of years) will be mixed and the very important functions of this sequence will be destroyed. Many other soil characteristics such as the incremental clay content lower down in the B-horizon which gradually increases water holding capacity and almost exponentially increase crop production potential will be destroyed to a large extent.

The open pit area consists of 434 ha red, arable soils of which the majority has an effective depth of at least 1.5 meter. A further 333 ha consists of yellow brown, arable soils of which the majority has an effective soil depth of at least 1.2 meter. The remaining 37 ha consists of grey, leached sandy soils with grazing or wetland potential. Even if the mitigation measures in the impact assessment are applied precisely a notable decrease in post-mining soil potential will occur in at least the 767 ha arable land.

Furthermore the soils will probably not be stockpiled on 3 separate or adjacent stockpiles according to soil types (red soils, yellow brown soil and grey soils) as required according to the proposed mitigation measures. Normally the mine planners provide only for 1 topsoil stockpile no matter what the mitigation measures for soils require. The contractor or operators who do the soil stripping will probably not have any idée of what the required soil stripping depths per soil type are and the soil stripping plan provided in the soil report will probably never be used. The post-mining effective soil depth will probably be significant shallower than pre-mining. The topography will probably differ significantly from pre-mining to post-mining causing blind drainage and severe erosion sensitive spots.

In reality, not much effort are done to follow simple but effective rehabilitation procedures in order to prevent loss of soil potential and quality as far as possible. Prescribed rehabilitation procedures are always claimed to be impractical and too costly. Therefore the entire opencast footprint of 805 ha will probably suffer a significant loss of soil potential and quality to such an extent that is will be not be suitable and utilized for productive crop farming ever.

The cumulative impact on soil can therefore probably be described as another at least 805 ha of unproductive or very low productive land that can be added to thousands of hectares of abandoned unproductive poorly rehabilitated mine property on the Eastern Highveld.

The impact on soils causing deteriorating of soil potential and soil quality equally reflects the deterioration in land capability. Therefore the cumulative impact on land capability in reality can probably be described as another at least 805 ha of high potential arable land that will deteriorate to such an extent that it will not be possible to be phased back to viable crop farming as prior to mining. Another 805 ha can to add to the existing thousands of hectare of unproductive or very low productive mined land.

How much of rehabilitated mined land are sold back to commercial farmers and what is the difference in land uses from pre-mining to post-mining and what is the viability and profit from post-mining land uses compared to pre-mining land uses? If these questions are asked the answer is probably that hardly any rehabilitated land is sold back to commercial farmers which imply that land are permanently withdrawn from private ownership in the agricultural sector as prior to mining. Rehabilitated land are occasionally leased to farmers which are then mainly used for cattle grazing and are hardly ever used for crop farming as prior to mining which implies that there is a significant change from pre-mining to post-mining land uses due to the reduction of land capability and restriction on possible post-mining land uses. Pre-mining crop farming such as maize with yields of 4-7 tons per ha are replace with occasional cattle grazing which implies a huge loss of income and profit per hectare.

The cumulative impact on land use can therefore probably be describe as at least another 805 ha with loss of private ownership and effective land management by an experienced farmer, another at least 805 ha with significant loss of land use potential and another at least 805 ha with a significant loss of income and profit per hectare for the agricultural sector.

Significance Rating

Table 44, Table 45, and **Table 46** outline the significance ratings for relevant soil, land capability and sand use impacts both with and without mitigation measures.

Table 44: Significance Ratings for the Construction Phase Soil, Land Capability and Land Use Impacts

Construction Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Stripping of topsoil at the	Without Mitigation	1	5	10	5	**80**	**High**	-

Construction Phase								
Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status
initial box cut footprint	With Mitigation	1	5	10	5	80	High	-
Possible contamination of soil by spillages of fuel or oil by mechanical equipment	Without Mitigation	1	1	8	4	40	Medium	-
	With Mitigation	1	1	4	4	24	Low	-
Construction of topsoil, soft and hard overburden stockpiles during initial box cuts	Without Mitigation	1	4	10	5	75	High	-
	With Mitigation	1	4	10	5	75	High	-
Construction of haul roads	Without Mitigation	1	4	10	5	75	High	-
	With Mitigation	1	4	10	5	75	High	-
Construction of access roads and diversion of existing access road	Without Mitigation	1	4	10	5	75	High	-
	With Mitigation	1	4	10	5	75	High	-
Construction of Pollution control dam	Without Mitigation	2	4	10	5	80	High	-
	With Mitigation	1	4	10	5	75	High	-
Construction of office workshop complex including offices, heavy vehicle workshop, stores, vehicle parking areas	Without Mitigation	1	4	10	5	75	High	-
	With Mitigation	1	4	10	5	75	High	-

Table 45: Significance Ratings for the Operational Phase Soil, Land Capability and Land Use Impacts

Operational Phase								
Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status
Progressive stripping of topsoil at opencast footprint and stockpiling thereof before direct	Without Mitigation	1	5	10	5	80	High	-
	With Mitigation	1	5	10	5	80	High	-

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
replacing is initiated								
Expansion of topsoil, soft and hard overburden stockpiles during the operational phase as open pit expands	Without Mitigation	1	4	10	5	**75**	**High**	-
	With Mitigation	1	4	6	4	**44**	**Medium**	+
Progressive stripping of topsoil at opencast footprint and direct replacing thereof	Without Mitigation	1	5	10	5	**80**	**High**	-
	With Mitigation	1	5	6	4	**48**	**Medium**	-
Use of haul roads	Without Mitigation	1	4	10	5	**75**	**High**	-
	With Mitigation	1	4	6	4	**44**	**Medium**	+
Use of pollution control dams	Without Mitigation	2	4	10	5	**80**	**High**	-
	With Mitigation	1	4	6	4	**44**	**Medium**	+
Use of diesel, petroleum and oil storage on site	Without Mitigation	1	1	8	4	**40**	**Medium**	-
	With Mitigation	1	1	4	4	**24**	**Low**	-
Use of coal stockpiles and ROM tip	Without Mitigation	1	4	10	5	**75**	**High**	-
	With Mitigation	1	4	6	4	**44**	**Medium**	+

Table 46: Significance Ratings for the Decommissioning Phase Soil, Land Capability and Land Use Impacts

Decommissioning Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Rehabilitation of remaining open pit and final voids	Without Mitigation							
	With Mitigation	1	5	8	4	**56**	**Medium**	+
Demolishing and	Without Mitigation							

Decommissioning Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
rehabilitation of the office workshop complex	With Mitigation	1	4	4	4	**36**	**Medium**	+

Flora

A Floral Assessment was conducted by Scientific Aquatic Services in April 2014, which is included in **Appendix 22** for further information.

<u>Nature of the Impact</u>

- *Construction Phase*

  The following construction phase impacts were identified with regards to flora:

  - Impacts on Habitat for Floral Species

    The following activities have been identified which may result in potential adverse impacts to the floral ecology during the construction phase of the project: site clearing and the removal of vegetation, the encroachment of construction activities into more sensitive areas within the site, site clearance and the disturbance of soils, movement of construction vehicles, the dumping of construction material and compaction of soil. These construction-related activities will result in adverse impacts to the following aspects of floral ecology: impacts on the floral wetland habitat, loss of floral biodiversity, contamination of soils, contamination of surface and groundwater, compaction and loss of soils and sedimentation and erosion.

  - Impacts on Floral Diversity

    Construction-related activities that may have negative impacts on floral diversity include: site clearance and removal of vegetation, construction of infrastructure and access roads through more sensitive wetland areas, proliferation of alien species, soil compaction as a result of construction activities, heavy vehicle movement, increased fire frequency and intensity, as well as uncontrolled fires due to increased human activity and potential blasting and drilling. These activities may lead to a loss of floral biodiversity, contamination of ground and surface water on which wetland floral species are reliant and compaction and loss of soils leading to a loss of floral biodiversity.

  - Impacts on Floral Species of Conservational Concern

    Site clearance and removal of vegetation, construction for infrastructure and access roads through wetland areas, poor control of vehicular movement and management of edge effects may lead to sedimentation and erosion which may lead to loss of important plant species and alteration of the floral community structure.

- *Operational Phase*

  The following operational phase impacts were identified with regards to flora:

  - Impacts on Habitat for Floral Species

    Ongoing disturbance of soils from general operational activities may lead to an alteration of the floral habitat. Discharge and contamination from operational facilities may pollute the receiving environment. Seepage from site contaminants may affect the soils and the groundwater regime. Runoff and seepage from operational facilities may lead to habitat loss. Ongoing disturbance may lead to erosion and sedimentation of wetland features. Ineffective monitoring during operational activities due to poor management may impact on floral diversity. Impacts emanating from the construction phase may result in impacts to floral wetland habitat, loss of floral biodiversity, contamination of soils, contamination of surface and groundwater, compaction and loss of soils and sedimentation and erosion.

  - Impacts on Floral Diversity

    It is anticipated that there will be an increase in alien plant species leading to altered plant community structure and composition within wetland features. Erosion and sedimentation will result from operational activities. There may be an increased fire frequency and intensity, as well as uncontrolled fires during mining operations due to increased human activity. Potential blasting and drilling during the construction phase will lead to an increase in dust. Aspects of floral ecology that will be impacted upon during the operational phase include: loss of floral biodiversity, contamination of soils due to a lack of infrastructure maintenance, contamination of ground and surface water and alteration of floral community structure due to alien invasive vegetation leading to a loss of floral biodiversity.

  - Impacts on Floral Species of Conservational Concern

    During the operational phase there may be an increase in alien plant species leading to a loss of medicinal, protected and potential RDL floral species from out-competition of these species. Erosion and sedimentation may result from operational activities leading to a loss of important plant species. There may be an alteration of floral community structure due to alien invasive vegetation leading to loss of important plant species.

- *Decommissioning Phase*

  The following decommissioning phase impacts were identified with regards to flora:

  - Impacts on Habitat for Floral Species

    Ineffective rehabilitation of exposed and impacted areas and failure to implement an alien floral control plan may lead to an ongoing loss of floral habitat. Disturbance of soils as part of demolition activities may alter floral habitats. Ongoing seepage and runoff as well as the ongoing risk of discharge from mining facilities may affect the groundwater regime beyond closure. Ineffective rehabilitation of exposed and impacted areas and failure to control alien floral species may lead to ongoing loss of floral habitat. Insufficient aftercare and maintenance leading to post closure impacts may impact on floral habitat due to poor management. Insufficient aftercare and maintenance may lead to unchecked erosion and sedimentation. Ineffective monitoring of rehabilitation due to poor management may result in a loss of floral diversity. In addition the following impacts may result from activities related to decommissioning and closure phase of the project: ongoing contamination of soils, ongoing contamination of surface and groundwater after decommissioning, compaction and loss of soils, sedimentation and erosion and changes to the floral communities due to alien invasive vegetation leading to altered habitat conditions.

  - Impacts on Floral Diversity

    Adverse impacts to floral diversity may result from the following activities during the decommissioning phase: ineffective rehabilitation of exposed and impacted areas and failure to implement alien floral control, erosion and sedimentation, failure to monitor rehabilitation efforts and implement an alien floral control plan and increased fire frequency and intensity, as well as uncontrolled fires during closure and decommissioning. These activities may result in a loss of floral biodiversity and an alteration of floral community vegetation leading to a loss of floral biodiversity.

  - Impacts on Floral Species of Conservational Concern

    During decommissioning there may be ineffective rehabilitation of exposed and impacted areas and failure to implement a comprehensive alien floral control plan. Continued erosion and sedimentation may lead to a loss of important plant species. There may be an alteration of floral community structure due to alien invasive vegetation leading to a loss of important plant species.

- *Cumulative Impacts*

  Due to extensive mining and beneficiation of minerals occurring in Middelburg and surrounding areas, along with extensive agriculture, the regional cumulative impacts as a result of loss of natural vegetation and plant life is considered to be highly significant.

  Cumulative impacts include:

  - The loss of the Rand Highveld Grassland, which is considered to be an endangered vegetation type with a small fraction currently statutorily conserved;
  - The spread of alien plant species within this vegetation type is considered to be significant and disturbance of natural vegetation as a result of forestry and loss of vegetation structure in the region may contribute towards lowering of the overall sensitivity of plant communities within this vegetation type; and
  - The cumulative impact from alien plant species proliferation in the region is considered to be high as these species replace indigenous vegetation and contribute to an overall loss of biodiversity.

  Effective rehabilitation and well executed closure of the mining operation during the closure and decommissioning phase is essential in order to minimise cumulative impacts resulting from the mining activities.

Significance Rating

Table 47, Table 48, and **Table 49** outline the significance ratings for relevant flora impacts both with and without mitigation measures.

Table 47: Significance Ratings for the Construction Phase Flora Impacts

Construction Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Impacts on habitat for floral species	Without Mitigation	3	5	6	4	**56**	**Medium**	-
	With Mitigation	3	4	4	3	**33**	**Medium**	-
Impacts on floral diversity	Without Mitigation	3	5	6	5	**70**	**High**	-
	With Mitigation	3	5	4	3	**36**	**Medium**	-
Impact on floral species of conservational concern	Without Mitigation	1	5	2	3	**24**	**Low**	-
	With Mitigation	2	4	2	2	**16**	**Low**	-

Table 48: Significance Ratings for the Operational Phase Flora Impacts

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Impacts on habitat for floral species	Without Mitigation	3	5	6	4	**56**	**Medium**	-
	With Mitigation	3	4	4	3	**33**	**Medium**	-
Impacts on floral diversity	Without Mitigation	3	5	6	5	**70**	**High**	-

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
	With Mitigation	3	5	4	3	**36**	**Medium**	-
Impact on floral species of conservational concern	Without Mitigation	1	5	2	3	**24**	Low	-
	With Mitigation	2	4	2	2	**16**	Low	-

Table 49: Significance Ratings for the Decommissioning Phase Flora Impacts

Decommissioning Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Impacts on habitat for floral species	Without Mitigation	3	5	6	4	**56**	**Medium**	-
	With Mitigation	3	4	4	3	**33**	**Medium**	-
Impacts on floral diversity	Without Mitigation	3	5	6	5	**70**	High	-
	With Mitigation	3	5	4	3	**36**	**Medium**	-
Impact on floral species of conservational concern	Without Mitigation	1	5	2	3	**24**	Low	-
	With Mitigation	2	4	2	2	**16**	Low	-

Fauna

A Faunal Assessment was conducted by Scientific Aquatic Services in April 2014, which is included in **Appendix 23** for further information.

<u>*Nature of the Impact*</u>

- *Construction Phase*

  The following construction phase impacts were identified with regards to fauna:

  - Impact on faunal habitat and ecological structure

    It is anticipated that changes to faunal habitat through alien floral species proliferation may lead to a loss of faunal habitat within the construction footprint. There may be changes to the faunal community due to habitat loss and transformation. Activities that may result in these impacts include: site clearing and removal of vegetation, construction of infrastructure leading to migratory corridor alterations, erosion as a result of infrastructure development and storm water runoff, indiscriminate driving through surrounding open veld, construction of access roads within habitat areas, risk of discharge, spillages and deliberate dumping of pollutants and increased fire hazards.

  - Impact on faunal diversity and ecological integrity

    There may be a decline in faunal diversity due to disturbance in the study area. It is anticipated that there may be collisions between construction vehicles and faunal species. Vehicles may access the site through sensitive faunal habitat areas. The construction phase may involve greater numbers of personnel onsite, therefore there is a greater risk of poaching.

- Impact on faunal species of conservational concern

  Activities that result in impacts to species of conservational concern include: vegetation and habitat clearing resulting in foraging habitat loss for potential RDL faunal species, collision of construction vehicles with potential species of conservational concern, increased poaching risk of potential species of conservational concern and due to increased human activity on site and increased risk of informal fires due to increased human activity on site. These activities may result in a loss of species of conservational concern and changes of the species of conservational concern, within the greater region, due to habitat loss and transformation.

- *Operational Phase*

  The following operational phase impacts were identified with regards to fauna:

  - Impact on faunal habitat and ecological structure

    Operational activities that may result in adverse faunal impacts include: the on-going disturbance of the faunal habitat within surrounding areas, the risk of introduction of alien plant species, erosion as a result of stomr water runoff, indiscriminate driving through open veld and the risk of discharge as well as spillages and dumping of pollutants. The resultant impacts to the faunal environment include: changes to faunal habitat, alien faunal species proliferation during operational activities and changes to the faunal community due to habitat loss and transformation.

  - Impact on faunal diversity and ecological integrity

    Collision of operational vehicles with faunal species may lead to a loss of faunal biodiversity leading to changes in faunal behavioural patterns. Poaching due to increased personnel may lead to changes to the faunal community assemblage.

  - Impact on faunal species of conservational concern

    Vegetation and habitat clearing may result in foraging habitat loss for potential RDL faunal species. Collision of construction vehicles with potential species of conservational concern, the increased risk of poaching, and the increased risk of informal fires may lead to loss of species of conservational concern and changes to the species of conservational concern faunal community, within the greater region, due to habitat loss and transformation.

- *Decommissioning Phase*

  The following decommissioning phase impacts were identified with regards to fauna:

  - Impact on faunal habitat and ecological structure

    Disturbance of the faunal habitat as part of demolition and closure activities may result in direct impacts on the faunal habitat during decommissioning. Insufficient aftercare and maintenance leading to post closure impacts on faunal habitat due to poor management may occur. Ineffective monitoring of rehabilitation due to poor management may lead to changes to the faunal community due to habitat loss and transformation.

  - Impact on faunal diversity and ecological integrity

    Insufficient aftercare and maintenance leading to post closure impacts on faunal diversity due to poor management and rehabilitation of faunal habitat may occur. Ineffective monitoring of rehabilitation due to poor management may lead to a loss of faunal biodiversity and changes to the faunal community assemblage.

  - Impact on faunal species of conservational concern

Changes to the potential RDL faunal community, within the greater region, due to ineffective monitoring of rehabilitation may lead to habitat loss and transformation.

- *Cumulative Impacts*

  Extensive mining and agricultural activities in the surrounding areas has resulted in limited suitable natural faunal habitat. As a result the cumulative animal diversity of the area is to be considered to be of a low abundance.

  Cumulative impacts include:

  - The loss of habitat through future mining activities and other activities associated to mining activities. This may contribute towards lowering of the overall sensitivity of faunal communities within the region. The cumulative impact from habitat encroachment on the site may be considered to be high as the loss of habitat will contribute to an overall loss of faunal biodiversity.

  No RDL faunal species were observed during the site survey. There are six (6) RDL species that have a Probability of Occurrence (POC) greater than 60%, namely; *Sagittarius serpentarius* (Secretarybird), *Circus ranivorus* (African Marsh Harrier), *Falco peregrinus minor* (Peregrine Falcon), *Tyto capensis* (African Grass Owl), the *Geronticus calvus* (Bald Ibis) and *Pyxicephalus adspersus* (Giant Bullfrog). Cumulative transformation and loss of habitat within the region may result in these species, as well as a number of common species known to occur within the Middelburg region, relocating and leading to the disappearance of these species in the region.

  Effective rehabilitation and effective closure of the mining operation during the closure and decommissioning phase is essential in order to minimise cumulative impacts resulting from the mining activities on the faunal assemblage of this area.

<u>*Significance Rating*</u>

Table 50, Table 51, and **Table 52** outline the significance ratings for relevant fauna impacts both with and without mitigation measures.

Table 50: Significance Ratings for the Construction Phase Fauna Impacts

Construction Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Impact on faunal habitat and ecological structure	Without Mitigation	2	5	8	5	**75**	**High**	-
	With Mitigation	3	5	4	5	**60**	**Medium**	-
Impact on faunal diversity and ecological integrity	Without Mitigation	3	5	6	5	**70**	**High**	-
	With Mitigation	3	5	4	3	**36**	**Medium**	-
Impact on faunal species of conservational concern	Without Mitigation	3	5	4	3	**36**	**Medium**	-
	With Mitigation	2	5	2	2	**18**	**Low**	-

Table 51: Significance Ratings for the Operational Phase Fauna Impacts

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**

Operational Phase								
Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status
Impact on faunal habitat and ecological structure	Without Mitigation	2	5	8	5	75	High	-
	With Mitigation	3	5	4	5	60	Medium	-
Impact on faunal diversity and ecological integrity	Without Mitigation	3	5	6	5	70	High	-
	With Mitigation	3	5	4	3	36	Medium	-
Impact on faunal species of conservational concern	Without Mitigation	3	5	4	3	36	Medium	-
	With Mitigation	2	5	2	2	18	Low	-

Table 52: Significance Ratings for the Decommissioning Phase Fauna Impacts

Decommissioning Phase								
Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status
Impact on faunal habitat and ecological structure	Without Mitigation	2	5	8	5	75	High	-
	With Mitigation	3	5	4	5	60	Medium	-
Impact on faunal diversity and ecological integrity	Without Mitigation	3	5	6	5	70	High	-
	With Mitigation	3	5	4	3	36	Medium	-
Impact on faunal species of conservational concern	Without Mitigation	3	5	4	3	36	Medium	-
	With Mitigation	2	5	2	2	18	Low	-

Wetlands

A Wetland Assessment was conducted by Scientific Aquatic Services in April 2014, which is included in **Appendix 26** for further information.

Nature of the Impact

- *Construction Phase*

  The following construction phase impacts were identified with regards to wetlands:

  - Loss of wetland habitat and ecological structure

    Site clearing and the removal of vegetation may result in loss of wetland biodiversity due to vegetation clearance. There may be direct impacts on wetland habitat due to erosion, sedimentation and increased runoff. Contamination of wetland soils and surface water may impact foraging and breeding habitats for wetland/riverine species. Contamination of water within wetlands could result from topsoil stockpiling adjacent to wetlands and runoff from stockpiles. Dumping of hazardous and non-hazardous waste into the wetland areas may result in a loss of wetland habitat and ecological structure. Earthworks in the vicinity of wetland areas may lead to increased runoff and erosion and altered runoff patterns. Compaction and loss of wetland soils may occur.

- Changes to wetland ecological and sociocultural service provision

  The Impacts on wetland ecology and sociocultural service is as a result of site clearing and the removal of vegetation which can lead in the loss of ecological and social cultural services depend on abundance of vegetation present and surface roughness. The construction of infrastructure can lead in the changes to instream habitat that would reduce assimilation capacity. It can also result in changes to riparian and instream characteristics that are important in terms of flood attenuation, stream flow regulation and sediment trapping. Any changes to the wetland ecology and sociocultural would result in the loss of phosphate, nitrate and toxicant removal abilities, loss of carbon storage capabilities, inability to support biodiversity and loss of water supply to the local community.

- Impact on wetland hydrological function

  The Impacts on the disruption of the hydrological functioning of the wetland habitats is as a result of site clearing, disturbance of soil and the removal of vegetation leading to increased runoff and erosion. Earthworks in the vicinity of wetland areas can lead to increased runoff and erosion and altered runoff patterns. Construction of stream crossings can alter stream and base flow patterns and water velocities. Topsoil stockpiling deposited adjacent to wetlands can result in runoff from stockpiles leading to sedimentation of the system. The movement of construction vehicles within wetlands can have an impact on the hydrological functioning of the wetlands.-Increased runoff volumes due to increased paved and other impervious surfaces can have an effect on the hydrology of wetlands. A change in flood peak flows, concentration and canalisation of flow, incision of wetland areas and erosion of wetland habitat and sediment deposition can result in a change in the hydrological functioning of the wetlands.

- *Operational Phase*

  The following operational phase impacts were identified with regards to wetlands:

  - Loss of wetland habitat and ecological structure

    There may be ongoing disturbance of soils due to general operational activities. Spillages and seepage of hazardous waste material into the groundwater may occur. There is a risk of discharge from the mining infrastructure. Potential contamination from mining infrastructure, general dirty water areas as well as spillages of hydrocarbons, has the potential to contaminate the groundwater environment which in turn can affect water quality in surface water sources in the area. Runoff, seepage and potential discharge from mining infrastructure such as pipelines is anticipated. Dumping of hazardous and non-hazardous waste into the wetland areas may occur. Erosion and sedimentation of wetlands may occur. There may be inadequate separation of clean and dirty water areas. A loss of instream flow due to abstraction for water for production and the formation of a cone of dewatering from open pits may occur. Topsoil stockpiling adjacent to wetlands and runoff from stockpiles may contaminate wetland features. These activities may lead to direct impacts on the wetland, loss of wetland biodiversity, contamination of wetland soils, contamination of water within wetlands, compaction and loss of wetland soils, changes to the wetland community due to alien invasive vegetation leading to altered habitat conditions, dewatering of wetlands and loss of habitat.

  - Changes to wetland ecological and sociocultural service provision

    The Impacts on wetland habitat as a result of ongoing disturbance of soils with general operational activities include spillages and seepage of hazardous waste material into the groundwater. There is a high risk of discharge from the mining infrastructure. This can lead to potential contamination from mining infrastructure general dirty water areas as well as spillages of hydrocarbon, has the potential to contaminate the groundwater environment which in turn can affect water quality in surface water sources in the area. Runoff, seepage and potential discharge from mining infrastructure such as pipelines can change wetland ecology. Dumping of hazardous and non-hazardous waste into the wetland areas can also lead to contamination and degradation of the wetland habitats. Erosion and sedimentation of wetlands, inadequate separation of clean and dirty water areas and loss of instream flow due to abstraction for water for production and the formation on a cone of dewatering from open pits can all contribute to the change in wetland ecological and sociocultural provision. Wetlands ecology and biodiversity may change as a result alien floral encroachment, Contamination of wetland soils, Contamination of water within wetlands, Compaction and loss of wetland soils, Sedimentation and incision leading to altered habitats, Changes to the wetland community due to alien invasion vegetation leading to altered habitat conditions, Dewatering of wetlands and loss of habitat. Topsoil stockpiling adjacent to wetlands and runoff from stockpiles may contaminate the wetlands.

- Impact on wetland hydrological function

  The Impacts as a result of a change in hydrological functioning of the wetland habitats is as a result of ongoing disturbance of soils with general operational activities. Earthworks in the vicinity of wetland areas can lead to increased runoff and erosion and altered runoff patterns. Topsoil stockpiling adjacent to wetlands can result in runoff from stockpiles leading to sedimentation of system. The movement of construction vehicles within wetlands, altered hydrology due to Stomr water channels and dams, increased runoff volumes due to increased paved and other impervious surfaces, dewatering of wetlands and loss of habitat, change in flood peak flows, concentration and canalisation of flow, incision of wetland areas and erosion of wetland habitat and sediment deposition.

- *Decommissioning Phase*

  The following decommissioning phase impacts were identified with regards to wetlands:

  - Loss of wetland habitat and ecological structure

    Disturbance of soils as part of demolition activities, ongoing seepage and runoff from mining infrastructure to the groundwater regime as well as the ongoing risk of discharge from mining infrastructure beyond closure may occur. Other activities that may result in negative impacts include; potential contamination from the decommissioning of mining infrastructure, vehicular use and ineffective rehabilitation. These activities may result in direct impacts on wetland, loss of wetland biodiversity due to alien floral encroachment and mismanagement of wetland rehabilitation habitat during decommissioning, ongoing contamination of wetland soils, ongoing contamination of water within wetlands, compaction and loss of wetland soils during decommissioning, sedimentation incision leading to altered habitats, changes to the wetland community due to alien invasion vegetation leading to altered habitat conditions and continued dewatering of wetlands and loss of habitat.

  - Changes to wetland ecological and sociocultural service provision

    The Impacts on wetland ecology and sociocultural service is as a result of closure related activities within wetland and riparian features presently considered important in terms of biodiversity, tourism and recreation. Site clearing and the removal of vegetation can lead to the loss in ecological and sociocultural services dependent on abundance of vegetation present and surface roughness. Seepage from any latent discard dumps and dirty water areas can lead to a loss in ecological and sociocultural services. The decommissioning and closure related activities can result in changes to riparian and instream characteristics that are important in terms of flood attenuation, streamflow regulation and sediment trapping. The loss of phosphate, nitrate and toxicant removal abilities, loss of carbon storage capabilities, inability to support biodiversity and loss of water supply to the local community can lead to a change in wetland ecology and sociocultural service provision.

  - Impact on wetland hydrological function

    The Impacts on the disruption of the hydrological functioning of the wetland habitats is as a result of disturbance of soils as part of demolition activities, earthworks in the vicinity of wetland areas leading to increased runoff and erosion and altered runoff patterns, movement of construction vehicles within wetlands, altered hydrology due to in channel Stomr water dams, movement of construction vehicles within wetlands, incision of wetland areas and erosion of wetland habitat and sediment deposition.

- *Cumulative Impacts*

  Due to extensive mining and beneficiation in the Middelburg and surrounding areas, along with extensive agriculture, the regional cumulative impacts as a result of loss of wetlands is considered to be highly significant. It is also critically important to consider the general impact from mining activities in the greater Olifants catchment, which includes coal mining as well as platinum group metals and the severe impact from the urban areas of Mpumalanga. In particular, specific mention is made of the impact of urban runoff and the release of treated and raw sewage effluent into the riverine systems in the area. Seepage from mining facilities such as waste dumps, TSF and general dirty water areas, agricultural activities, as well as spillages of hydrocarbons, has the potential to contaminate the groundwater environment which in turn can affect water quality in surface water sources in the area.

  Within the Olifants catchment there has been significant impact on wetlands due to erosion, incision, and sedimentation into the wetlands. These impacts have led to the loss of wetlands and the loss of the wetland's ability to function naturally.

  Cumulative impacts associated with the mine include:

  - The loss of wetland habitat, functioning and ecoservice provision as a result of mining activities within the Middelburg region, which may in turn impact on water resources and vegetation structure.
  - Loss of wetland connectivity and dewatering of wetlands due to mining activities will have a detrimental impact on faunal species utilising riparian zones as migratory corridors and the overall biodiversity in the area.

  The impact on the wetland resources in the vicinity of the Middelburg operations could lead to an overall reduction of the assimilative capacity of wetlands in the Olifants catchment and lead to a general loss of ecological and socio-cultural services within this important water resource.

<u>*Significance Rating*</u>

Table 53, Table 54, and **Table 55** outline the significance ratings for relevant wetland impacts both with and without mitigation measures.

Table 53: Significance Ratings for the Construction Phase Wetland Impacts

Construction Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Loss of wetland habitat and ecological structure	Without Mitigation	3	5	8	4	**64**	**High**	-
	With Mitigation	2	4	6	4	**48**	**Medium**	-
Changes to wetland ecological and sociocultural service provision	Without Mitigation	3	5	8	4	**64**	**High**	-
	With Mitigation	3	3	6	3	**36**	**Medium**	-
Impact on wetland hydrological function	Without Mitigation	3	5	6	3	**42**	**Medium**	-
	With Mitigation	2	4	4	2	**20**	**Low**	-

Table 54: Significance Ratings for the Operational Phase Wetland Impacts

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Loss of wetland habitat and ecological structure	Without Mitigation	3	5	8	4	**64**	**High**	-
	With Mitigation	2	4	6	4	**48**	**Medium**	-
Changes to wetland ecological and sociocultural service provision	Without Mitigation	3	5	8	4	**64**	**High**	-
	With Mitigation	3	3	6	3	**36**	**Medium**	-
Impact on wetland hydrological function	Without Mitigation	3	5	6	3	**42**	**Medium**	-
	With Mitigation	2	4	4	2	**20**	**Low**	-

Table 55: Significance Ratings for the Decommissioning Phase Wetland Impacts

Decommissioning Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Loss of wetland habitat and ecological structure	Without Mitigation	3	5	8	4	**64**	**High**	-
	With Mitigation	2	4	6	4	**48**	**Medium**	-
Changes to wetland ecological and sociocultural service provision	Without Mitigation	3	5	8	4	**64**	**High**	-
	With Mitigation	3	3	6	3	**36**	**Medium**	-
Impact on wetland hydrological function	Without Mitigation	3	5	6	3	**42**	**Medium**	-
	With Mitigation	2	4	4	2	**20**	**Low**	-

Aquatic Ecology

An Aquatic Ecological Assessment was conducted by Scientific Aquatic Services in April 2014, which is included in **Appendix 24** for further information.

Nature of the Impact

- *Construction Phase*

  The following construction phase impacts were identified with regards to aquatic ecology:

  - Impacts on water quality

    Clean and dirty water systems not being constructed to the required specifications to prevent contamination of clean water areas may impact on water quality. Major earthworks and construction activities may lead to impacts on water quality. Poor housekeeping and management may lead to impacts on water quality. Spills and other unplanned events may also impact on water quality. Impaired water quality may impact on riparian vegetation structures. Build-up of contaminants in sediments may lead to the creation of a sediment sink and a chronic source of potential water contamination.

  - Impacts on loss of aquatic habitat

    Site clearing and the removal of vegetation leading to increased runoff and erosion may alter the aquatic habitat. Site clearing and road construction and the disturbance of soils leading to increased erosion may alter the aquatic habitat. Earthworks in the vicinity of drainage systems leading to increased runoff and erosion and altered runoff patterns may alter the aquatic habitat. Construction of bridge crossings altering streamflow patterns and water velocities may alter the aquatic habitat. Alien vegetation encroachment will impact on and alter the aquatic habitat. Aspects of the instream habitat affected include: erosion and incision of the riparian zone, altered wetting patterns leading to impacts on riparian zone continuity, loss of low flow refugia, altered substrate conditions from sandy conditions from to more muddy conditions, altered depth and flow regimes in the major drainage systems and alien vegetation proliferation.

  - Impacts on loss of aquatic biodiversity and sensitive taxa

    Site clearing and the removal of vegetation may lead to a loss in aquatic biodiversity. Site clearing and road construction may lead to a loss in aquatic biodiversity. Earthworks and other mining construction activities in the vicinity of wetland and riparian areas may lead to a loss in aquatic biodiversity. Placement of infrastructure within non-perennial drainage lines with special mention of the overburden stockpile areas, open pits as well as road crossings and bridges may lead to a loss in aquatic biodiversity. Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity. Aspects of aquatic biodiversity that may be affected include: sedimentation and loss of natural substrates, altered stream channel forms, increased turbidity of water, loss of refugia, deterioration in water quality, loss of flow sensitive macro-invertebrates and fish, loss of water quality sensitive macro-invertebrates and fish and loss of riparian vegetation species.

  - Impacts on loss of instream flow

    Construction of possible small stream diversions may impact on the instream flow of the receiving systems. Construction of clean and dirty water separation structures for pollution control purposes may lead to altered flow levels. Clearing of areas for the initiation of the production pits may lead to reduced instream flow. Use of surface water runoff and groundwater as a water supply during construction mining project may alter the flow in the receiving systems. Aspects of instream flow that may be affected include: loss of instream surface and base flow, loss of streamflow regulation and stream recharge, loss of aquatic habitats for aquatic macro- invertebrates and fish and increased moisture stress on riparian vegetation.

- *Operational Phase*

  The following operational phase impacts were identified with regards to aquatic ecology:

  - Impacts on water quality

    Mining activities and the establishment of mining waste may impact on water quality and thus needs to be managed to prevent pollution. Clean and dirty water systems not being maintained and operated to the required specifications to prevent contamination of clean water areas may impact on water quality. Poor housekeeping and management during the operational phase may lead to impacts on water quality. Spills and other unplanned events during the operational phase may impact on water quality. There may be impacts on riparian vegetation due to impaired water quality. Build-up of contaminants in sediments may lead to the creation of a sediment sink and chronic source of potential water contamination. Impacts on groundwater quality could manifest in surface water sources.

- Impacts on loss of aquatic habitat

  Ongoing disturbance of soils during general operational activities may alter the aquatic habitat. Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the operational phase. Mining related activities leading to increased disturbance of soils and drainage lines may alter the aquatic habitat. Any activities which lead to the reduction of flow in the system with special mention of the open pits and the use of face and groundwater sources for production water may alter the aquatic habitat. Alien vegetation encroachment will impact on and alter the aquatic habitat. Aspects of instream habitat that may be affected include: erosion and incision of riparian zone, altered wetting patterns leading to impacts on riparian zone continuity, loss of low flow refugia, altered substrate conditions from sandy conditions from to more muddy conditions, altered depth and flow regimes in the major drainage systems and alien vegetation proliferation.

- Impacts on loss of aquatic biodiversity and sensitive taxa

  Ongoing disturbance of soils with general operational activities may lead to a loss in aquatic biodiversity. Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity. Loss of instream flow due to abstraction for water for production and the formation of a cone of dewatering from open pits may lead to a loss in aquatic biodiversity. Seepage from the discard dumps and overburden stockpiles may lead to a loss in aquatic biodiversity. Discharge from the mine process water system with special mention of Return Water Dams and any Pollution Control Dams may lead to a loss in aquatic biodiversity. Sewage discharge from mine offices and camps may lead to a loss in aquatic biodiversity. Nitrates from blasting leading to eutrophication of the receiving environment and may lead to a loss in aquatic biodiversity. Aspects of aquatic biodiversity that may be affected include: sedimentation and loss of natural substrates, altered stream channel forms, increased turbidity of water, loss of refugia, deterioration in water quality with special mention of impacts from cyanide, heavy metals and AMD, eutrophication of the aquatic ecosystems, loss of flow sensitive macro-invertebrates and fish, loss of water quality sensitive macro-invertebrates and fish and loss of riparian vegetation species.

- Impacts on loss of instream flow

  Loss of water through clean and dirty water separation may alter instream flow on the receiving systems. The formation of a cone of dewatering created by open pits may lead to loss of stream flow. Use of surface water runoff and groundwater as a water supply during the operational phase of the mine may lead to reduced instream flow. Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area may lead to altered instream flow. Aspects of instream flow that may be affected include: loss of instream surface and base flow, loss of streamflow regulation and stream recharge, loss of aquatic habitats for aquatic macro- invertebrates and fish and increased moisture stress on riparian vegetation.

- *Decommissioning Phase*

  The following decommissioning phase impacts were identified with regards to aquatic ecology:

  - Impacts on water quality

    Inadequate closure and rehabilitation leading to ongoing pollution from contaminating sources such as discard dumps may impact on water quality. Clean and dirty water systems not being maintained or decommissioned properly to the required specifications to prevent contamination of clean water areas may impact on water quality. Poor housekeeping and management during decommissioning phase may lead to impacts on water quality. Spills and other unplanned events during decommissioning phase may impact on water quality. Impacts from riparian vegetation structure may result due to impaired water quality. Latent release of contaminants in sediments may lead to the formation of an ongoing source of potential water contamination. Impacts on groundwater quality could manifest in surface water sources.

- Impacts on loss of aquatic habitat

  Disturbance of soils as part of demolition activities may alter the aquatic habitat. Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the decommissioning phase. Ongoing pollution from inappropriately decommissioned structures may alter the aquatic habitat. Alien vegetation encroachment will impact on and alter the aquatic habitat. Aspects of instream habitat that may be affected include: erosion and incision of riparian zone, altered wetting patterns leading to impacts on riparian zone continuity, loss of low flow refugia, altered substrate conditions from sandy conditions from to more muddy conditions and alien vegetation proliferation.

- Impacts on loss of aquatic biodiversity and sensitive taxa

  Disturbance of soils as part of demolition activities, inadequate separation of clean and dirty water areas, seepage from any latent discard dumps and dirty water areas, inadequate closure leading to post closure impacts and ongoing erosion of disturbed areas that have not been adequately rehabilitated may lead to a loss in aquatic biodiversity. Aspects of aquatic biodiversity that may be affected include: sedimentation and loss of natural substrates, altered stream channel forms, increased turbidity of water, loss of refugia, deterioration in water quality with special mention of impacts from cyanide, heavy metals and salinisation, eutrophication of the aquatic ecosystems, loss of flow sensitive macro-invertebrates and fish and loss of riparian vegetation species.

- Impacts on loss of instream flow

  Loss of water to inadequately rehabilitated areas such as discard dumps and open pits may still have an impact on the flow post operational phase. The formation of a cone of dewatering created by final voids may impact on the flow in the post operational phase. Use of surface water runoff and groundwater as a water supply during the closure phase of the mine may impact on the flow. Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area may impact on the flow post operational phase. Aspects of instream flow that may be affected include: loss of instream surface and base flow, loss of streamflow regulation and stream recharge, loss of aquatic habitats for aquatic macro- invertebrates and fish and increased moisture stress on riparian vegetation.

Significance Rating

Table 56, Table 57, and **Table 58** outline the significance ratings for relevant aquatic ecology impacts both with and without mitigation measures.

Table 56: Significance Ratings for the Construction Phase Aquatic Ecology Impacts

Construction Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Impacts on water quality	Without Mitigation	4	4	8	4	**64**	**High**	-
	With Mitigation	3	4	6	4	**52**	**Medium**	-
Impacts on loss of	Without Mitigation	3	4	8	4	**60**	**Medium**	-

Construction Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
aquatic habitat	With Mitigation	3	4	6	4	**52**	**Medium**	-
Impacts on loss of aquatic habitat	Without Mitigation	3	4	8	4	**60**	**Medium**	-
	With Mitigation	3	4	6	4	**52**	**Medium**	-
Impacts on loss of instream flow	Without Mitigation	4	5	8	4	**68**	**High**	-
	With Mitigation	3	4	6	4	**52**	**Medium**	-

Table 57: Significance Ratings for the Operational Phase Aquatic Ecology Impacts

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Impacts on water quality	Without Mitigation	4	4	8	4	**64**	**High**	-
	With Mitigation	3	4	6	4	**52**	**Medium**	-
Impacts on loss of aquatic habitat	Without Mitigation	3	4	8	4	**60**	**Medium**	-
	With Mitigation	3	4	6	4	**52**	**Medium**	-
Impacts on loss of aquatic habitat	Without Mitigation	3	4	8	4	**60**	**Medium**	-
	With Mitigation	3	4	6	4	**52**	**Medium**	-
Impacts on loss of instream flow	Without Mitigation	4	5	8	4	**68**	**High**	-
	With Mitigation	3	4	6	4	**52**	**Medium**	-

Table 58: Significance Ratings for the Decommissioning Phase Aquatic Ecology Impacts

Decommissioning Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Impacts on water quality	Without Mitigation	4	4	8	4	**64**	**High**	-
	With Mitigation	3	4	6	4	**52**	**Medium**	-
Impacts on loss of aquatic habitat	Without Mitigation	3	4	8	4	**60**	**Medium**	-
	With	3	4	6	4	**52**	**Medium**	-

Decommissioning Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
	Mitigation							
Impacts on loss of aquatic habitat	Without Mitigation	3	4	8	4	**60**	**Medium**	-
	With Mitigation	3	4	6	4	**52**	**Medium**	-
Impacts on loss of instream flow	Without Mitigation	4	5	8	4	**68**	**High**	-
	With Mitigation	3	4	6	4	**52**	**Medium**	-

Biodiversity Sensitivity Mapping

An overall sensitivity map was created with the use of the results from the aquatic, floral, faunal and wetland assessments (**Figure 76**). High sensitivity areas included pan feature 1 and 3 and the Selons River with associated 100m buffers. Pan 2 and 6 were considered of medium sensitivity. The majority of the faunal species with a probability of occurrence of 60% or more also inhabit the wetland areas. Low sensitivity was allocated to the seasonal wetland sections. The remainder of the site is considered very low due to the complete vegetation transformation of agricultural and plantation activities.

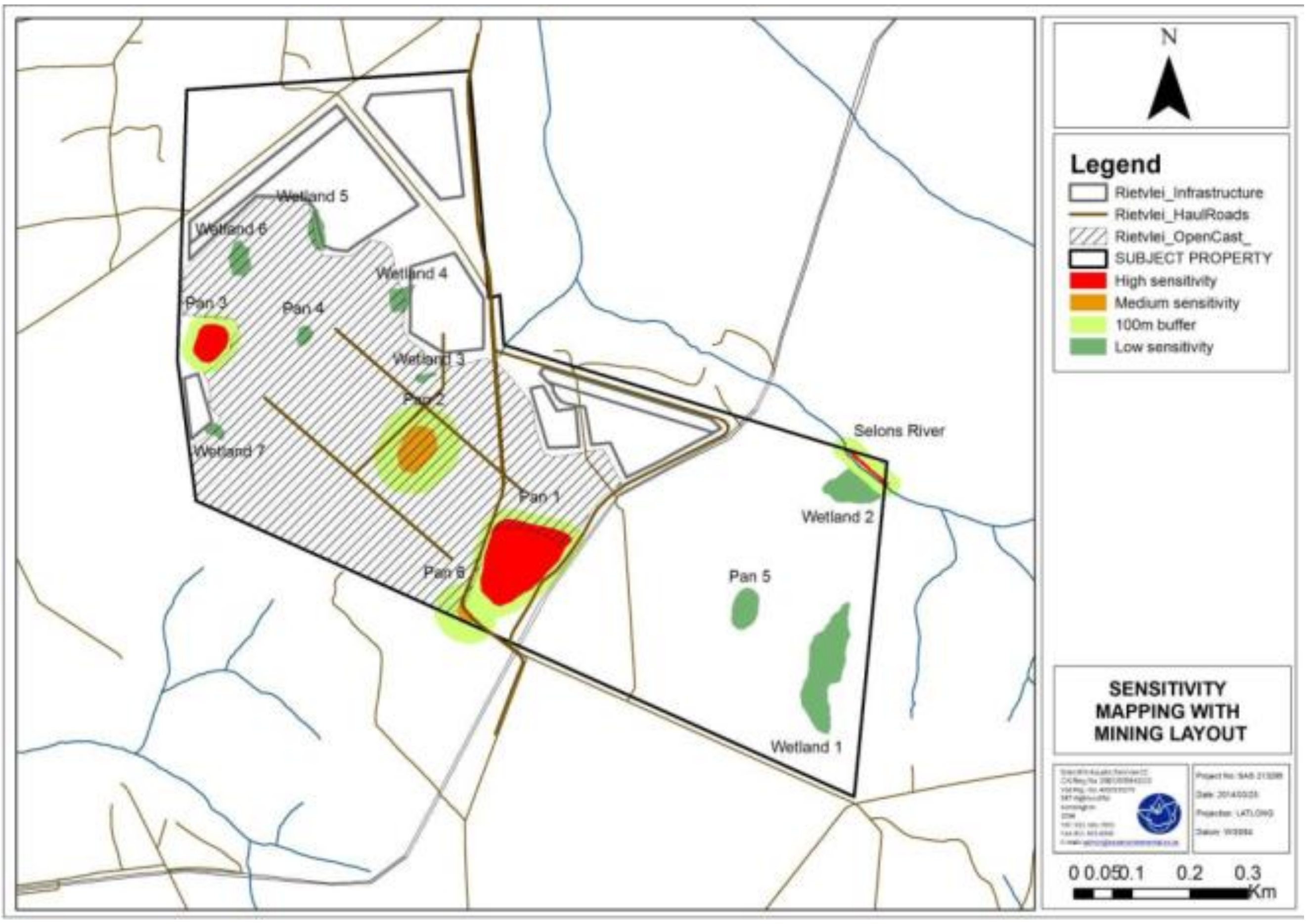


Figure 76: Overall Sensitivity Map for the Study Area showing the impact of the proposed mine layout

Air Quality

An Air Quality Assessment was conducted by Airshed Planning Professionals in September 2011, which is included in **Appendix 18** for further information.

Nature of the Impact

- *Construction Phase*

  The construction phase will comprise land clearing and site development operations at the proposed Rietvlei mine site and the associated infrastructure.

  Topsoil and overburden storage piles prone to wind erosion will result from land clearing activities. Vehicle-entrainment of dust from construction sites represents a relatively large source of fugitive dust emissions during construction. Gaseous and particulate emissions from vehicle tailpipes are far lower and therefore of less significance in terms of their impacts. Surface blasting activities is another main source of concern resulting mainly in particulate emissions and to a lesser extent gaseous emissions which are directly related to the type of explosives used.

  A detailed construction plan is required to quantitatively assess air pollution. Due to the lack of information and the relatively short duration of most of the activities associated with the construction phase, no dispersion simulations were undertaken and a qualitative assessment was done.

  From the proposed operations, the main construction activities likely to result in noticeable impacts of PM10 and TSP include vehicle entrainment from unpaved roads, drilling and blasting and wind erosion from the topsoil stockpiles. According to the Australian Environment Protection Agency's guidelines for separation distances (AEPA, 2001), a generic buffer zone of 500m is set for quarrying or processing activities where blasting takes place. In addition, dustfall impacts are generally confined to the near-field (<1 km to 3 km) of sources. This is due to the fact that larger particles, which contribute most to dustfall rates given their mass, are likely to settle out in close proximity to the source (assuming a ground-based source). The area influenced by the operations of course depends on the dispersion potential of the site and the extent of the construction operations.

  Blasting is considered an upset emission source due to the intermittent nature of the activity (usually once or twice per day). Furthermore, drilling and blasting will only be conducted for a limited period of time.

  Vehicle entrainment from unpaved roads is likely to be one of the main sources resulting in impacts of sensitive receptors (Liebenberg-Enslin & Petzer, 2006). The magnitude of the impacts will depend on the distances travelled between the various construction operations, the number of vehicles and the average travelling speed. Since the roads within the proposed construction site are unlikely to be paved during the construction phase, the force of the wheels travelling on unpaved roadways causes pulverisation of surface material.

  Particles are lifted and dropped from the rotating wheels, and the road surface is exposed to strong air currents in turbulent shear with the surface. The turbulent wake behind the vehicle continues to affect the road surface once the vehicle has passed. The quantity of dust emissions from unpaved roads varies linearly with the volume of traffic. In addition to traffic volumes, emissions also depend on a number of parameters which characterise the condition of a particular road and the associated vehicle traffic, including average vehicle speed, mean vehicle weight, average number of wheels per vehicle, road surface texture, and road surface moisture (EPA, 2003). Wind-blown dust from open and exposed surfaces could result in considerable emissions under high wind speeds. Significant emissions arise due to the mechanical disturbance of granular material from open areas and storage piles.

  Parameters which have the potential to impact on the rate of emission of fugitive dust include the extent of surface compaction, moisture content, ground cover, the shape of the storage pile, particle size distribution, wind speed and precipitation. As with blasting, these incidences usually occur for limited time periods, but when it occurs the impacts could be significant.

- *Operational Phase*

Emissions are estimated for pollutants generally associated with opencast mining. The category of emissions that will occur at the proposed mine is fugitive dust emissions. Fugitive emissions refer to emissions that are spatially distributed over a wide area and not confined to a specific discharge point (IFC, 2007).

Dispersion modelling was undertaken to determine highest daily and annual average ground level concentrations for PM10 and total daily dust fallout rates. These averaging periods were selected to facilitate the comparison of predicted pollutant concentrations/ deposition with relevant air quality standards and SANS limits, respectively. Predicted GLCs are screened against the NAAQS and the dust fallout limits. In addition, dust fallout was also screened against the European threshold for vegetation impact.

Ground level concentration (GLC) isopleths plots presented in this section depict interpolated values from the concentrations predicted by AERMOD for each of the receptor grid points specified. Plots reflecting daily averaging periods contain only the 99.73th percentile of predicted ground level concentrations, for those averaging periods, over the entire period for which simulations were undertaken. It is therefore possible that even though a high daily average concentration is predicted at certain locations, this may only be true for one day during the period.

Typically, ambient air quality applies to areas where the Occupational Health and Safety regulations do not apply, thus outside the mine property or lease area. Ambient air quality standards are therefore not occupational health indicators but applicable to areas where the general public has access i.e. off-site. Farm houses and homesteads were included as discrete receptors.

- **PM10 concentrations due to operational phase activities**

  The PM10 concentrations were simulated for two scenarios and the description is outlined in **Table 59**.

Table 59: Scenarios simulated for the PM10 concentrations

Operational Scenario	■ All sources were simulated to determine the unmitigated impacts of the proposed operations. ■ All sources were simulated to determine the mitigated impacts of the proposed operations. ■ Mitigation measures applied result in the following mitigation efficiencies: 75% control efficiency for the unpaved roads, 50% for wind erosion sources.

- The predicted unmitigated and mitigated daily average ground level concentrations for the proposed mining operations don't exceed the daily NAAQS limit for 2015 of 75µg/m³ at any of the sensitive receptor sites.
- The predicted unmitigated (**Figure 77**) and mitigated (**Figure 78**) highest daily PM10 concentrations at the mine boundary exceeds the daily 2015 NAAQS limit of 75 µg/m³ over a small portion in the lower left region.
- The predicted unmitigated and mitigated highest daily PM10 concentrations on-site reach the daily 2015 NAAQS limit of 75 µg/m³, at and surrounding the stockpiles and over a portion of the pit. However, the frequency of exceedence is below four and thus within the standard.
- The predicted unmitigated (**Figure 79**) annual average PM10 concentrations for the mining operations exceed the annual 2015 NAAQS of 40 µg/m³ at a small portion of the mine boundary.
- The predicted unmitigated (**Figure 79**) and mitigated (**Figure 80**) annual average PM10 concentrations for the mining operations exceeds the annual 2015 NAAQS of 40 µg/m³, at and surrounding the stockpiles and over a portion of the pit.

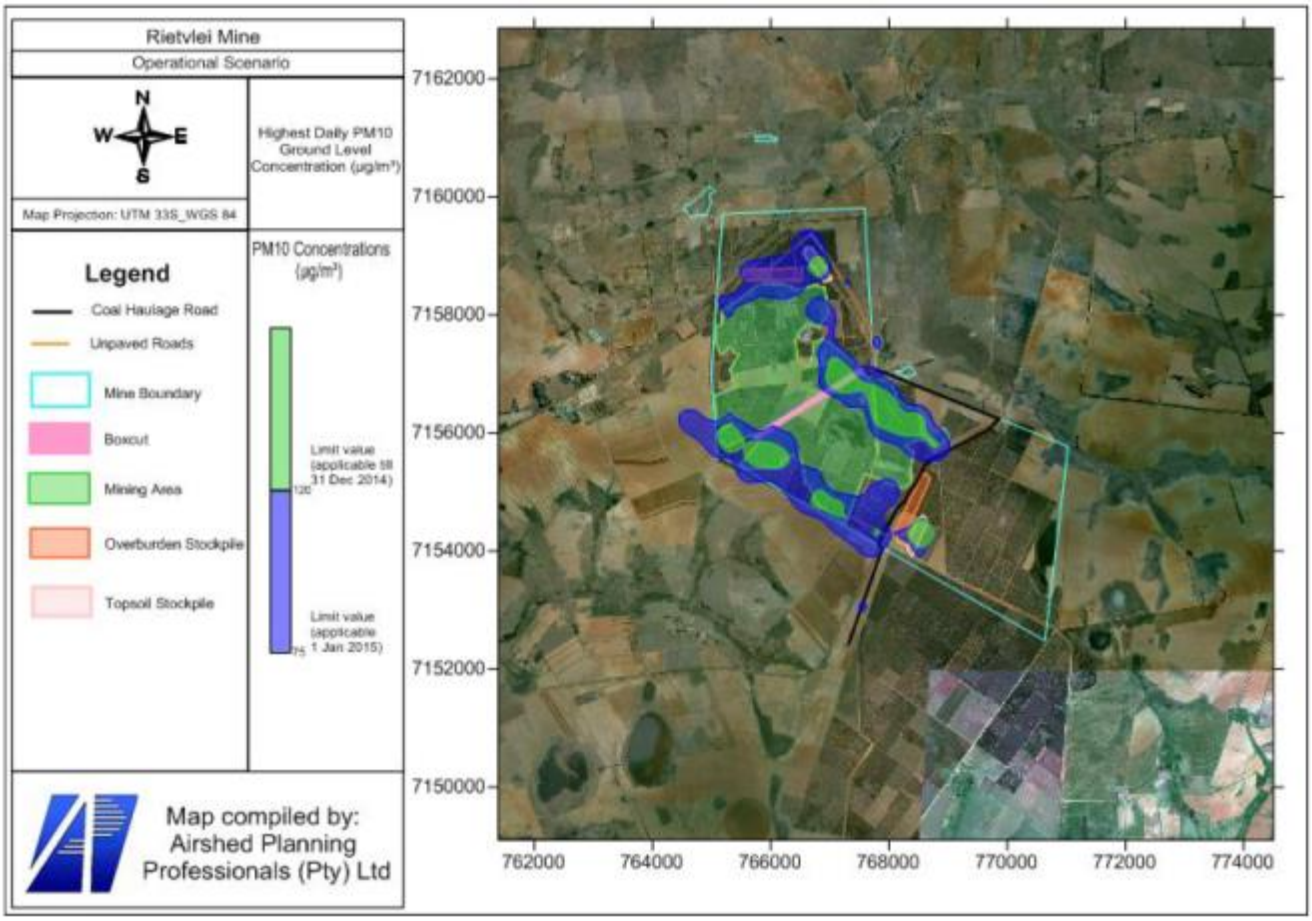


Figure 77: Highest daily average predicted PM10 ground level concentrations (µg/m³) for all sources due to uncontrolled emissions

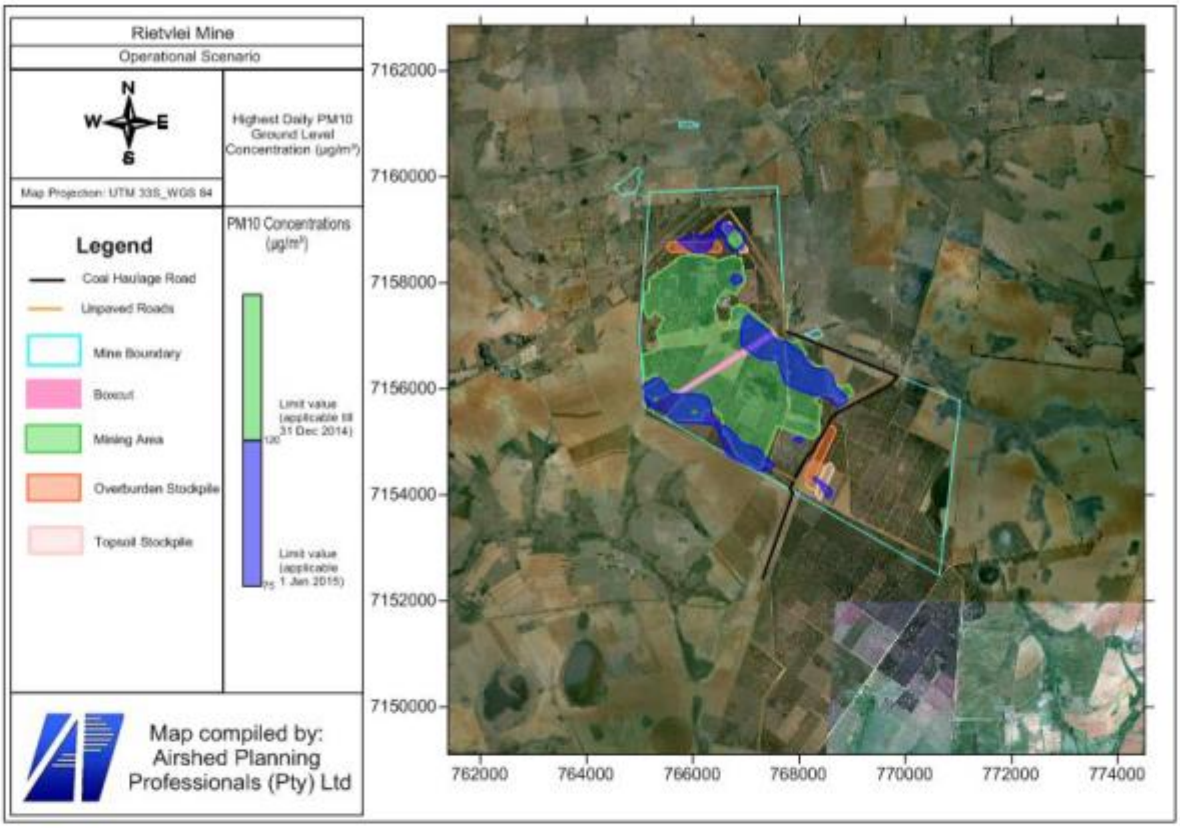


Figure 78: Highest daily average predicted PM10 ground level concentrations (µg/m³) for all sources due to controlled emissions for

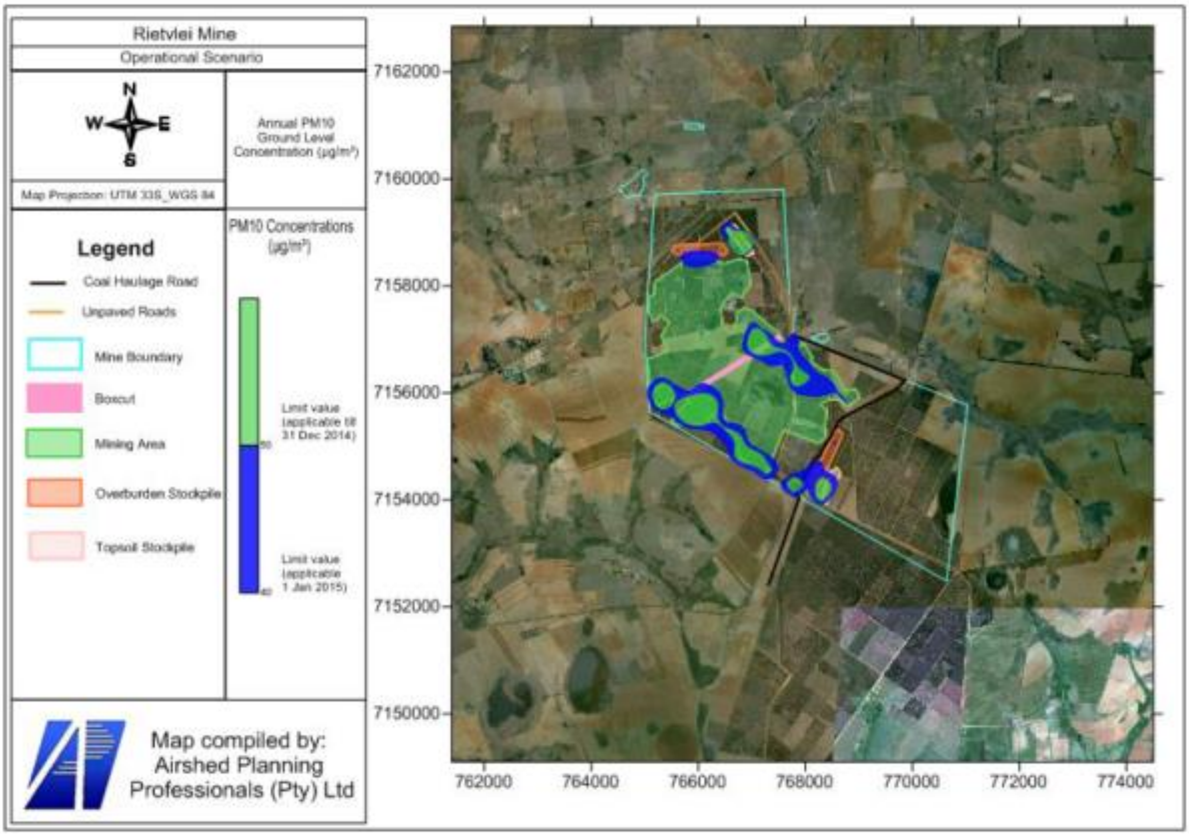


Figure 79: Annual average predicted PM10 concentrations (µg/m³) for all sources due to uncontrolled emissions for the proposed

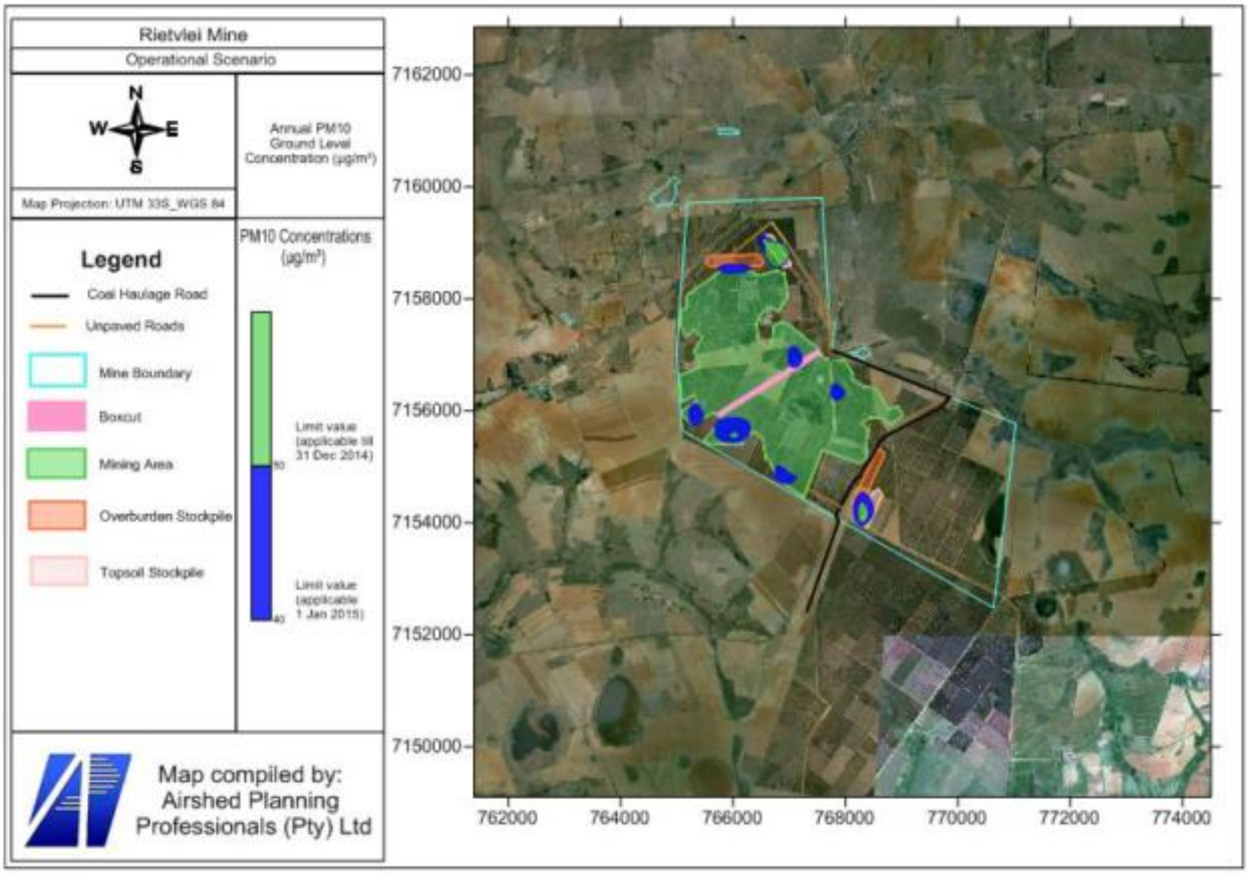


Figure 80: Annual average predicted PM10 concentrations (µg/m³) for all sources due to controlled emissions for the proposed

- **Dust deposition due to operational phase activities**

  Dust impacts are generally confined to the near-field (<1km to 3km) of sources. This is due to the fact that the larger particles, which contribute most to dust fall rates given their mass, are likely to settle out in close proximity to the source (assuming a ground-base source).

  The US-EPA (1992) estimates that for a typical mean wind speed (16km/hr (~4.4m/s), particles larger than about 100µm are likely to settle out within 6 to 9 metres from the edge of the source. Particles that are between 30µm and 100µm are subject to impeded settling, and are likely to settle out within 100 metres from the source.

  Similar scenarios to those of PM10 were simulated for total suspended particulates (TSP) (**Table 59**).

  - The predicted unmitigated (**Figure 81**) and mitigated (**Figure 82**) maximum daily dust deposition rates for the proposed Rietvlei Mine operations do not exceed the SANS residential dust fallout limit of 600 mg/m²/day at the sensitive receptor sites for all sources;
  - The predicted unmitigated and mitigated maximum daily dust deposition rates for the proposed Rietvlei Mine operations at the mine boundary do not exceeded the SANS residential limit of 600 mg/m²/day;
  - The SANS residential dust fallout limit of 600 mg/m²/day was only predicted to be exceeded on-site, at and surrounding the northern topsoil stockpile; and
  - The SANS industrial dust fallout limit of 1200 mg/m²/day was only predicted to be exceeded on-site, at and surrounding the northern topsoil stockpile.

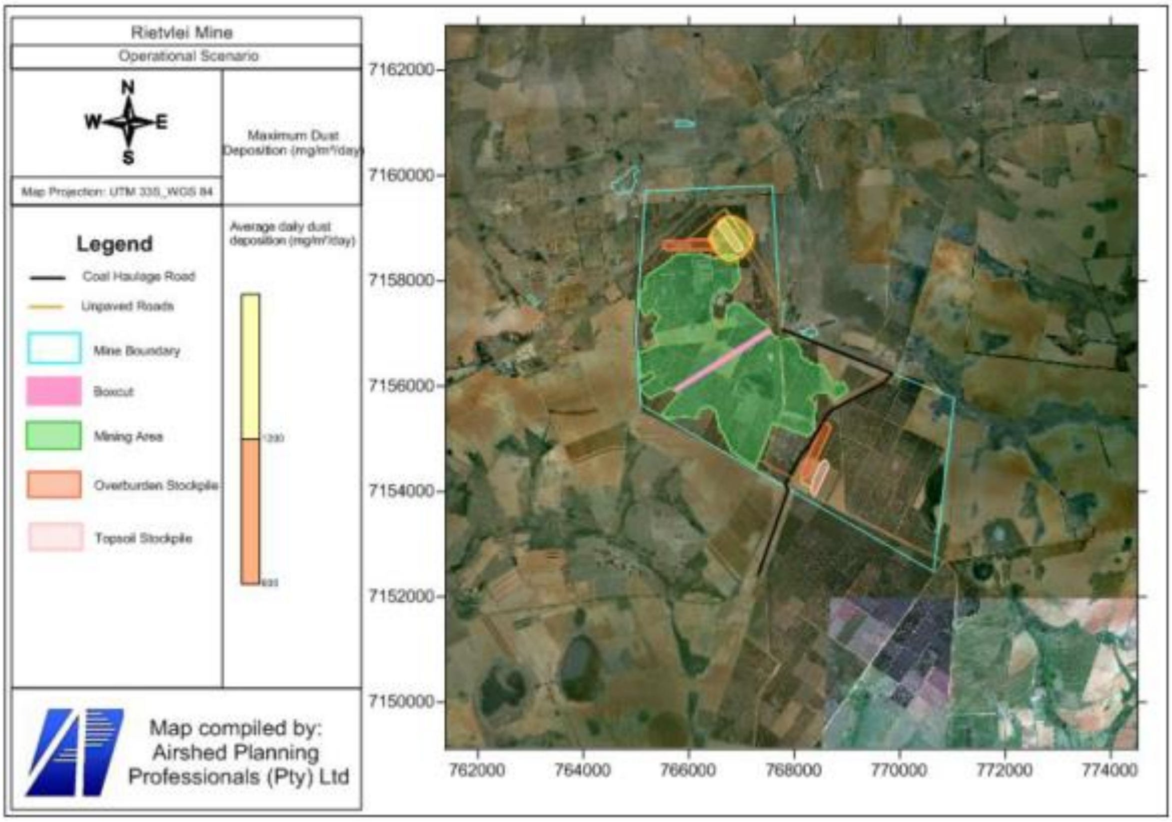


Figure 81: Maximum daily dust deposition rates (mg/m²/day) for all sources due to uncontrolled emissions during Rietvlei Mine

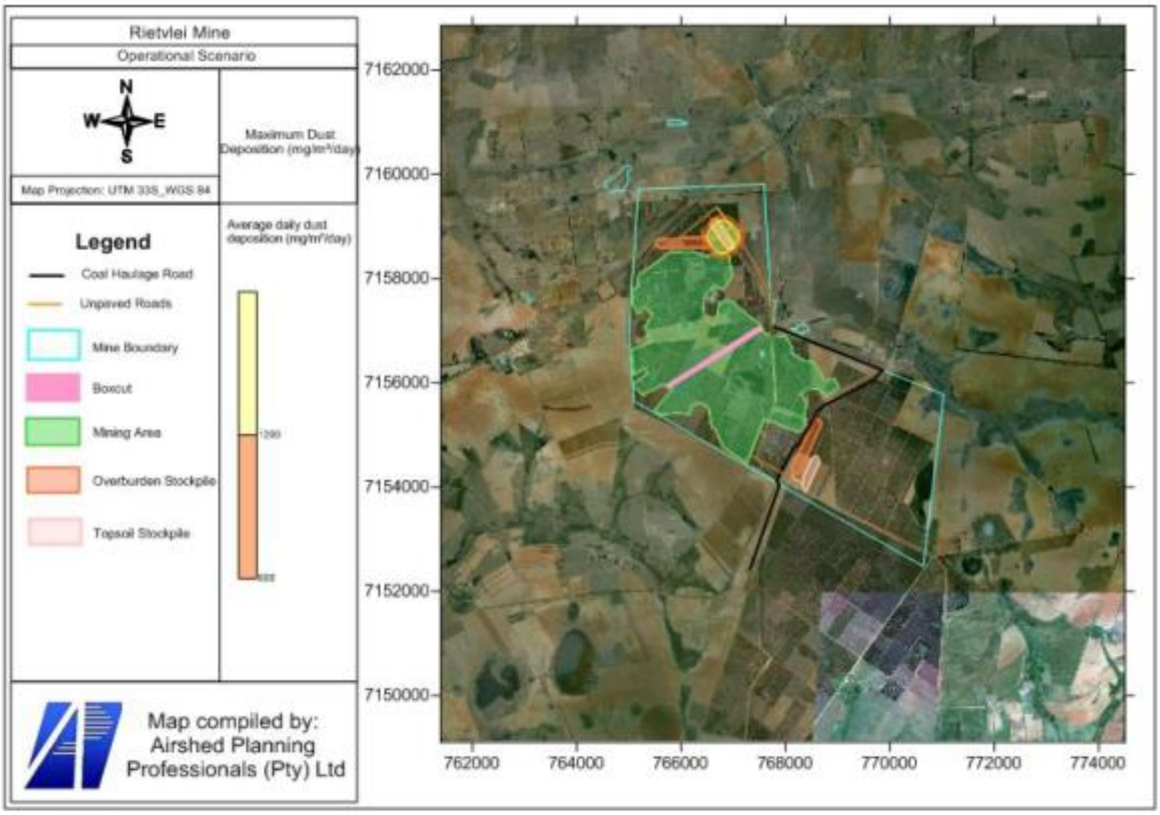


Figure 82: Maximum daily dust deposition rates (mg/m²/day) for all sources due to controlled emissions during Rietvlei Mine

- *Decommissioning Phase*

  It is assumed that all mining activities and processing operations will have ceased by the closure phase of the project. The potentials for impacts during this phase will depend on the extent of demolition and rehabilitation efforts during closure. Decommissioning impacts are anticipated to include:

  - Impacts created as a result of the generation of TSP and PM10 as a result of unpaved road usage, recovery of topsoil from stockpiles as an attempt to re-vegetate the site and overburden removed from the stockpiles for rehabilitation purposed; and
  - Impact due to the generation of gases as a result of emissions generated from vehicles used during the closure of the proposed mine.

- *Cumulative Impacts*

  The region is dominated by a number of coal reserves which have now started to be mine. The emissions from these multiple coal mines including the proposed mine may have a significant impact on the air quality found in the region. However the individual contribution to this degradation air in the region would be minimal compared to the combined impact of all the mines in the area.

<u>*Significance Rating*</u>

Table 60, Table 61, and **Table 62** outline the significance ratings for relevant air quality impacts both with and without mitigation measures.

Table 60: Significance Ratings for the Construction Phase Air Quality Impacts

Construction Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Impact due to the generation of particulate matter (dust)	Without Mitigation	3	1	8	4	**48**	**Medium**	-
	With Mitigation	3	1	4	3	**24**	**Low**	-
Impact due to the generation of gases	Without Mitigation	2	1	4	4	**28**	**Low**	-
	With Mitigation	2	1	2	3	**15**	**Low**	-

Table 61: Significance Ratings for the Operational Phase Air Quality Impacts

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Impact as a result of the increase in fugitive dust emissions	Without Mitigation	3	4	8	4	**60**	**Medium**	-
	With Mitigation	2	4	4	3	**30**	**Low**	-

Table 62: Significance Ratings for the Decommissioning Phase Air Quality Impacts

Decommissioning Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Impacts created as a result of the generation of TSP and PM10	Without Mitigation	2	1	6	4	**36**	**Medium**	-
	With Mitigation	2	1	4	3	**21**	**Low**	-
Impact due to the generation of gases	Without Mitigation	2	1	4	4	**28**	**Low**	-
	With Mitigation	2	1	2	3	**15**	**Low**	-

Noise

A Noise Assessment was conducted by JH Consulting in July 2014, which is included in **Appendix 27** for further information.

Nature of the Impact

- *Construction Phase*

  It is anticipated that construction noise will be limited to the following low significance impacts:

  - The use of drilling and shovel machinery during the construction of the initial box cut where this equipment is located at the nearest point to the boundary within the pit;
  - The use of construction equipment and vehicles during the construction of the plant and associated infrastructure; and
  - The impact of construction noise on livestock and wildlife as they are sensitive to noise.

- *Operational Phase*

  Due to the highly mobile manner of opencast operation, this type of operation does not lend itself to simple static calculations of noise levels either at the site boundaries or at specific noise-sensitive locations for the following reasons:

  - The noise generating machinery migrates around the site in the long term as the material is extracted, with the consequent varying of distance from noise-sensitive areas;
  - Much of the machinery itself is mobile in the short term, e.g. excavators, front loaders, trucks, and road graders, giving rise to highly intrusive noise events for short periods, which stand out above the general background level, and are therefore more noticeable; and
  - Noise sources may be more or less screened from receiver positions depending on the progress of the excavations. This is especially true of rock and soil removal, which may be well screened by their depth in the pit for long periods of their total operating time.

  The following noise generating operational activities can be identified:

  - **The Opencast Pit**

    The two continuously noisy activities within the opencast pit are the drilling and the shovel and truck loading processes. The combination of both these sources operating simultaneously at similar distances from the assessment position is the worst possible case. This gives a predicted value of 87.2 dB(A) at 15m. As all these activities will be within the pit and therefore screened by the pit wall, a very conservative allowance for the noise barrier effect of the pit wall is taken as 12dB, giving an effective value of 75.2 dB(A) at the surface, which is the same as the predicted noise from the surface crusher.

The investigation shows that activities within the proposed pit will have a minor impact on the noise climate of the surrounding environment. In the worst case, with no mitigating measures, there will be no daytime impact beyond a distance of 275m (870m should there be pit operations at night (22:00 to 06:00)) from the pit and a low impact at 193m (610m at night) from the pit.

Few dwellings are indicated within these distances from the nearest point of the pit boundary, the nearest being at 700m. For the opencast situation, the values represent the worst case, where equipment is always assumed to be located at the nearest point to the boundary within the pit. This will only happen while the pit is being excavated in that position, and this worst case noise level will therefore only be applicable close to this position for a short period while this is the case. As the excavations progress, different areas will be affected by this worst case noise level, and other areas will be exposed to lower levels of noise as extraction progresses to a more remote location, and/or deeper. For the noisiest opencast operations, these are thus generating no noise impact during the daytime and night-time (should mining activities occur between 22:00 and 06:00 hours), depending on their proximity to this location and the extent of the local noise shielding provided by the pit sides, positioning of temporary stockpiles, and local ground contours, all of which mitigate the noise impact to a greater or lesser extent.

- **The Transport route**

  The transport route is located from the mine to the coal treatment plant along a stretch of the existing gravel road through the centre of the site to the south. It is assumed that transport occurs only at times defined as daytime in the relevant SANS Standard. The noise generated by these journeys is predicted to be an LAeqI of 61 dB(A) at 10m from the road centerline. It is anticipated that no noise impact will be generated at distances greater than 250m from the transport route. There are no dwellings within this distance.

- **Effect of Operating Noise and Blast Noise on Livestock**

  Very little information exists on the response of livestock, or indeed wildlife, to noise, blast noise, and ground vibration. There is no evidence whether or not these will be adversely affected by the noise of blasting operations and how, or how much, they will be affected. The impact on livestock of operating noise is considered very low, whereas the impact of blast noise, because its occurrence is sudden and unpredictable and its effects also unpredictable is probably moderate.

- *Decommissioning Phase*

  It is anticipated that the noise related to the decommissioning and rehabilitation of the opencast pit, the plant and associated infrastructure will be of low significance once operation has ceased.

- *Cumulative Impacts*

  No cumulative impacts are expected as the required assessment comparisons are made with existing noise levels where these are significant and no significant noise sources exist which add to the noise expected from the operation of the mine.

Significance Rating

Table 63, Table 64, and **Table 65** outline the significance ratings for relevant noise impacts both with and without mitigation measures.

Table 63: Significance Ratings for the Construction Phase Noise Impacts

Construction Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Construction of the Opencast Pit	Without Mitigation	1	1	4	3	**18**	**Low**	-
	With Mitigation	1	1	2	3	**12**	**Low**	-

Construction Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Construction Noise and its effect on Livestock	Without Mitigation	1	1	4	3	**18**	**Low**	-
	With Mitigation	1	1	2	3	**12**	**Low**	-

Table 64: Significance Ratings for the Operational Phase Noise Impacts

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Transport of Coal from the mine to the treatment plant	Without Mitigation	1	4	4	3	**27**	**Low**	-
	With Mitigation	1	4	0	3	**15**	**Low**	-
Operational phase of the Opencast Pit	Without Mitigation	1	4	4	3	**27**	**Low**	-
	With Mitigation	1	5	2	2	**16**	**Low**	-
Blasting for the operation of the Opencast Mine	Without Mitigation	2	4	8	4	**56**	**Medium**	-
	With Mitigation	2	4	6	2	**24**	**Low**	-
Vibration on Surrounding Structures	Without Mitigation	2	4	4	3	**30**	**Low**	-
	With Mitigation	2	1	2	2	**10**	**Low**	-
Operational Noise and its effect on Livestock	Without Mitigation	1	4	4	3	**27**	**Low**	-
	With Mitigation	1	4	2	3	**21**	**Low**	-
Blast Noise and its effect on Livestock	Without Mitigation	2	4	8	4	**56**	**Medium**	-
	With Mitigation	2	4	4	3	**30**	**Low**	-

Table 65: Significance Ratings for the Decommissioning Phase Noise Impacts

Decommissioning Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Decommissioning of the Opencast Pit	Without Mitigation	1	2	2	3	**15**	**Low**	-
	With Mitigation	1	2	2	3	**15**	**Low**	-

Archaeology and Cultural Heritage

A Heritage Assessment was conducted by J Pistorius and independent Archaeologist and Heritage Consultant in June 2014, which is included in **Appendix 28** for further information.

Nature of the Impact

- *Construction Phase*

  The graveyards and graves identified on site can be considered to be of high significance and are protected by various pieces of legislation including Section 36 of the National Heritage Resources Act (No 25 of 1999).

  It is clear that all the graveyards will be affected during the construction phase when the open cast mining activities commences except GY01 and GY03 which will be affected when the construction activities for the mine's surface infrastructure commences.

  The significance of any possible impact on the graveyards is High. However, the impacts on the graveyards are partially reversible and will only result in a partially irreplaceable loss of the graveyards.

- *Cumulative impact*

  The cumulative impact on the graveyards (local and national) can be seen as low when considering the current state of the graveyards which are abandoned, neglected and which are deteriorating as a result of natural occurrences. The impact is even less significant after the graveyards have been exhumed and relocated (mitigated) in consultation with descendants of the deceased. Mitigation will imply that the graveyards are removed to preferred localities where they are maintained, monitored and where descendants can pay homage to the deceased.

Significance Rating

Table 66 outlines the significance ratings for relevant heritage impacts both with and without mitigation measures.

Table 66: Significance Ratings for the Construction Phase Heritage Impacts

Construction Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Destruction of Graveyard	Without Mitigation	1	5	10	5	**80**	**High**	-
	With Mitigation	1	1	2	4	**16**	**Low**	-

Visual Aspects

A Visual Assessment was conducted by Outline Landscape Architects CC in September 2011, which is included in **Appendix 25** for further information.

Nature of the Impact

- *Construction Phase*

  The following construction phase impacts were identified with regards to visual impact:

  - **Movement of Construction Vehicles**

    Construction vehicles used during the development of the mine will result in an increase of dust which can affect the visual aspects of the site

  - **Potential visual impact of construction on visual receptors in close proximity to the proposed mine.**

    The anticipated visual impact of construction of the mine on visual receptors in close proximity to the proposed mine (i.e. within 5km) is expected to be of moderate significance, but may be mitigated to low significance. Receptors (residents, commuters and recreational users) beyond the 5km radius zone are not likely to experience the impact of construction activities. It should be noted that the study area is relatively sparsely populated, and as such, the probability of this impact occurring is somewhat reduced.

- *Operational Phase*

  The following operational phase impacts were identified with regards to visual impact:

  - **Impact on the landscape character of the area in close proximity to the proposed mine**

    The anticipated visual impact of the proposed mine on the landscape character of the area in close proximity to the proposed mine (i.e. within 5km) is expected to be of moderate significance both before and after mitigation.

  - **Impact on the landscape character of the region**

    The anticipated visual impact of the proposed mine on the landscape character of the area beyond the 5km radius is expected to be of low significance both before and after mitigation.

  - **Impact on residents of rural and agricultural settlements and homesteads in close proximity to the proposed mine**

    The anticipated visual impact of the proposed mine on the residents of rural and agricultural settlements and homesteads in close proximity to the proposed mine (i.e. within 5km) is expected to be of moderate significance both before and after mitigation. It should be noted that the study area is relatively sparsely populated. In addition, homesteads are likely to include trees and domestic scale structures, which would both contribute to localised absorption of the visual impact. As such, the probability of this impact occurring is somewhat reduced.

  - **Impact on the residents of settlements and homesteads within the region**

    The anticipated visual impact of the proposed mine on the residents of rural and agricultural settlements and homesteads beyond the 5km radius is expected to be of low significance both before and after mitigation. It should be noted that the study area is relatively sparsely populated. In addition, homesteads are likely to include trees and domestic scale structures, which would both contribute to localised absorption of the visual impact. As such, the probability of this impact occurring is somewhat reduced.

  - **Impacts on users of major and secondary roads in close proximity to the proposed mine**

    The anticipated visual impact of the proposed mine on commuters travelling on the R555 and secondary roads in close proximity to the proposed mine (i.e. within 5km) is expected to be of moderate significance both before and after mitigation.

  - **Impacts on users of major and secondary roads within the region**

    The anticipated visual impact of the proposed mine on commuters travelling on the R104, the R555 and secondary roads beyond the 5km radius is expected to be of low significance both before and after mitigation.

  - **Impacts on recreational users, tourists and sightseers in close proximity to the proposed mine**

    The anticipated visual impact of the proposed mine on recreational users, tourists and sightseers in close proximity to the proposed mine (i.e. within 5km) is expected to be of low significance both before and after mitigation. It should be noted that the study area is relatively sparsely populated, and is not known as a tourist destination. As such, the probability of this impact occurring is reduce.

  - **Impacts on recreational users, tourists and sightseers within the region**

    The anticipated visual impact of the proposed mine on recreational users, tourists and sightseers beyond the 5km radius is expected to be of low significance both before and after mitigation. It should be noted that the study area is relatively sparsely populated, and is not known as a tourist destination. As such, the probability of this impact occurring is reduced.

- **Impact of lighting at night on visual receptors in close proximity to the proposed mine**

  The anticipated visual impact of security and operational lighting of the mine on visual receptors in close proximity to the proposed mine (i.e. within 5km) is expected to be of moderate significance both before and after mitigation. Receptors (residents, commuters and recreational users) beyond the 5km radius are not likely to experience the direct impact of lighting, but may well be exposed to the effects of sky glow. It should be noted that the study area is relatively sparsely populated, and as such, the probability of this impact occurring is somewhat reduced.

- *Cumulative Impacts*

  The development of the proposed mine will increase the cumulative visual impact of mining and related infrastructure within the region.

Significance Rating

Table 67 and **Table 68** outline the significance ratings for relevant heritage impacts both with and without mitigation measures.

Table 67: Significance Ratings for the Construction Phase Visual Impacts

Construction Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Movement of Construction Vehicles	Without Mitigation	1	1	8	4	**40**	**Medium**	-
	With Mitigation	1	1	4	3	**18**	**Low**	-
Visual impacts of construction on visual receptors in close proximity to the proposed mine	Without Mitigation	4	1	6	3	**33**	**Medium**	-
	With Mitigation	4	1	6	2	**22**	**Low**	-

Table 68: Significance Ratings for the Operational Phase Visual Impacts

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Effect of the areas in close proximity to the Operating Mine	Without Mitigation	4	2	6	4	**48**	**Medium**	-
	With Mitigation	4	2	6	4	**48**	**Medium**	-
Effect of the mine on landscape characteristics	Without Mitigation	3	2	4	2	**18**	**Low**	-
	With Mitigation	3	2	4	2	**18**	**Low**	-
Impact on Settlement and homesteads in close proximity to	Without Mitigation	4	2	10	3	**48**	**Medium**	-
	With	4	2	10	3	**48**	**Medium**	-

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
the proposed mine	Mitigation							
Mine's impact on the residents of settlements and homesteads within the region	Without Mitigation	3	2	8	2	**26**	**Low**	-
	With Mitigation	3	2	8	2	**26**	**Low**	-
Visual impacts on users of major and secondary roads in close proximity to the proposed mine	Without Mitigation	4	2	8	3	**42**	**Medium**	-
	With Mitigation	4	2	8	3	**42**	**Medium**	-
Visual impacts on users of major and secondary roads within the region.	Without Mitigation	3	2	6	2	**22**	**Low**	-
	With Mitigation	3	2	6	2	**22**	**Low**	-
Visual impacts on recreational users, tourists and sightseers in close proximity to the proposed mine	Without Mitigation	4	2	6	2	**24**	**Low**	-
	With Mitigation	4	2	6	2	**24**	**Low**	-
Visual impacts on users of major and secondary roads within the region.	Without Mitigation	3	2	4	2	**18**	**Low**	-
	With Mitigation	3	2	4	2	**18**	**Low**	-
Visual impact of lighting at night on visual receptors in close proximity to the proposed mine.	Without Mitigation	4	2	8	3	**42**	**Medium**	-
	With Mitigation	4	2	8	3	**42**	**Medium**	-

Socio-Economic

Nature of the Impact

- *Construction Phase*

The construction phase is anticipated to result in the following impacts on the social environment:

- **Increased Health and Safety Risk**

  The proposed construction phase is likely to result in a number of possible health and safety risks to the surrounding communities, as outlined below.

  - **Noise** – Construction phase noise resulting from construction vehicles and equipment is likely to be limited to the immediate study area. Noise emissions are likely to be of low significance during the construction phase.
  - **Air Emissions** – A number of construction-related activities may generate particulate matter. This will affect the sensitive receptors immediately adjacent to the construction area and the (unpaved) access road to the site. Particulate matter is unlikely to have significant impacts on these receptors, due to the temporary nature of the construction phase. Despite this a number of mitigation and management measures have been recommended for implementation during the construction phase.
  - **Traffic** - The presence of construction vehicles could also pose a safety risk to farmers and surrounding communities as individuals use the main access road (D1344). An increase in traffic (specifically construction vehicles) could potentially result in an increased number of accidents resulting in injury or even mortality.
  - **Communicable Diseases** - The potential influx of labour and job-seekers into the area could result in health concerns around communicable diseases, such as HIV/AIDS and Tuberculosis (TB). There is currently a low rate of HIV/AIDs and related diseases within the Steve Tswete Local Municipality, which could increase with the presence of additional external labour. Education and awareness campaigns are vital to managing and mitigating this risk to the local communities, as it has been indicated that labour is likely to be housed within the existing communities and Middleburg.
  - **Crime** - There is the potential for crime events to increase within the local area, with additional, non-residents being present in the local environment. This is likely, however, to be restricted during the construction phase, as the number of people and access to the site will be limited. It is recommended that education and awareness campaigns are developed and implemented prior to the construction phase, and security is maintained within the mining area as a preventative measure.

- **Social Tensions and Disruptions due to Construction Activities and Labour Force**

  The presence of non-residents, perceived "outsiders" and contractors within the local environment could cause localised social tension and a change in nature of the area during construction which could result in the disruption of the construction activities.

- **Creation of Employment Opportunities**

  It is anticipated that approximately 80 employment opportunities will be generated through the construction phase. Due to the fact that specialist skills will be required during the construction phase experienced contractors are likely to be sourced from outside the local area to undertake and manage the construction activities. However, these contractors will be required to source both skilled and unskilled labour from the surrounding areas.

- **Growth of Skills and Business Development**

  The proposed mine is unlikely to provide significant skills development opportunities during the construction phase of the project. The limited number of employees required during this phase, and the specialist requirements, may result in experienced contractors being sourced from outside the local area to undertake and manage the construction activities.

  The degree to which downstream economic impacts provide local stimulus to the economy is based on the degree to which value added services can be locally sourced.

There may be an opportunity for business and entrepreneurial development within the local area.

- **Informal Settlement Relocation**

  A small in informal settlement is located on the south eastern edge of the mining right area. This settlement will not be immediately affected by the mining activities; however it is proposed that RMC will relocate the settlement to a more suitable location during the construction phase.

- *Operational Phase*

The operational phase is anticipated to result in the following impacts on the social environment:

- **Employment Opportunities**

  It is proposed that all the work undertaken on the mine during the operational phase will be undertaken by suitable mining contractors. The RMC itself will employ limited staff on the mine. In accordance with the MRPDA, the RMC has developed and submitted a social and labour plan (SLP) as part of the application for mining rights. It is anticipated that the mining contractors will be sourced from the local area (i.e. Middelburg) as far as possible. All labour will be sourced from the local population so as to avoid the need to provide housing.

- **Skill Development**

  A Workplace Skills Plan will be submitted to the DMR within 3 months of commencement of mining operations. The Workplace Skills Plan will address the operational requirements of the mine and meet the future employment and career aspirations of employees. This plan will also set targets which will be based on the education and skills levels of the employees. Underpinning the Skills Plan is the overarching objective of equipping historically disadvantaged South Africans (HDSAs) with the necessary skills to enable them to apply for increasingly senior level and ultimately management positions within RMC. In this regard the key components of the skills development plan are:

  - Assessment of current skills levels and identification of an HDSA talent pool;
  - Creation of opportunities for women and promoting their participation in the day-to-day activities of RMC;
  - Establishment of mentorship programmes aimed at supporting HDSAs to achieve their goals and career paths, and;
  - Providing funding for HDSAs in the form of bursaries.

- **Local Economic Development**

  The prioritisation of local procurement for the provision of services such as the provision of materials, transport, catering and cleaning will contribute towards the development of local services and business development in the local area.

  The presence of the mine could also result in secondary investment in the local area, through the development of infrastructure, and tertiary sector services (e.g. retail, banking, etc.). It is however, imperative that the local community, organisations, leadership and government are involved in the development and procurement, in order to maximise local benefits from the mine for the local communities.

- **Increased Health and Safety Risk**

  There is the potential for the proposed mining operations to result in an increased health and safety risk at a local level. This is likely to be a result of a number of factors, including the following:

  - **Traffic** – There is likely to be a distinct increase in traffic (predominantly large trucks transporting coal) along the mine access road along the D1344, R555 and through Middelburg. The presence of these trucks, as well as other mining vehicles, could result in an increase in potential vehicular accidents as well as pedestrian injuries and fatalities in the Middelburg area.

- **Blasting/vibration** – Blasting and resultant vibration could result in damage to homesteads in the surrounding areas.
- **Noise and dust** – There is the potential for the operational phase to result in noise and particulate matter emissions from blasting, material removal, coal removal, crushing and screening activities, stockpiles, loading activities and vehicle movement. The impact of these emissions are predicted to be medium to high and localised to the area immediately adjacent to the operational area and access road. These emissions could result not only in a nuisance factor for local residents, but also health impacts from inhalation and exposure over long periods of time.
- **Influx of labour** – The potential influx of labour and job-seekers into the area could result in health concerns around communicable diseases, such as HIV/AIDS and TB. There is currently a low rate of HIV/AIDs and related diseases within the Steve Tswete Local Municipality, which could increase with the presence of additional external labour. This is likely to be limited during operation, with limited labour needed on site. Education and awareness campaigns are vital to managing and mitigating this risk to the local communities, as it has been indicated that labour is likely to be housed within the existing communities and Middleburg.
- **Crime** – There is the potential for crime events to increase within the local area, with additional, non-residents being present in the local environment. This is likely, however, to be restricted during the operational phase, as access to the site will be strictly controlled. It is recommended that education and awareness campaigns are developed and implemented prior to the operational phase, and security is maintained within the mining area as a preventative measure.

- **Increase in Social Conflict**

  The potential for the influx of labour and job seekers into the area could result in social changes such as conflict for resources, conflict of cultures, and a change in nature of the area resulting in social change and the potential for disputes.

  In addition, labour conflict with the mining company, regarding aspects such as wages and resources, could result in local social unrest. This could potentially adversely impact the local population should this not be managed correctly. Conflict management by RMC and the mining contractors (i.e. managing labour demands, issues and communications) is therefore a key aspect to preventing long-term social unrest.

- *Decommissioning and Closure Phase*

  The decommissioning and closure phase is anticipated to result in the following impacts on the social environment:

  - **Reduction in Employment Opportunities and Associated Decline in Economic Activities**

    The mine is proposed to have a lifespan of approximately 20 years. The closure of the mine will result in the loss of direct employment as well as associated indirect employment through contractors and service providers for the mine. In addition, locally sourced employees may not be able to move to other areas for mining employment. The loss of employment could, therefore, impact the socio-economic environment through the loss of income and livelihoods, and the affect this may have on the local economic and quality of life for local populations.

  - **Health and Safety Risks**

    The coal discard facility for the mine is likely to remain on site in the long-term (excess of 20 years), and will need to be managed to ensure acid mine drainage does not contaminate water and soil resources. This could be seen as a long-term health and safety risk if not managed correctly.

    Following the closure of the mine, it is anticipated that noise and dust emissions will cease, resulting in a minor improvement of health and quality of life.

Significance Rating

Table 69, **Table 70** and **Table 71** outline the significance ratings for relevant geological impacts both with and without mitigation measures.

Table 69: Significance Ratings for the Construction Phase Socio-Economic Impacts

Construction Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Employment opportunities for local labour resulting from the construction phase.	Without Mitigation	2	1	6	3	**27**	**Low**	+
	With Mitigation	2	1	8	4	**44**	**Medium**	+
Increased health and safety issues resulting from noise emissions, dust emissions and trucks using the roads during the construction phase.	Without Mitigation	3	1	8	4	**48**	**Medium**	-
	With Mitigation	2	1	6	3	**27**	**Low**	-
Unmanaged contractors might cause an increase in influx of job seekers and the establishment of informal settlements	Without Mitigation	3	2	8	4	**52**	**Medium**	-
	With Mitigation	3	2	4	2	**18**	**Low**	-
Construction and closure activities could contribute to social ills, such as HIV/ AIDS, petty crime, stock theft, etc.	Without Mitigation	4	2	8	4	**56**	**Medium**	-
	With Mitigation	3	2	6	3	**33**	**Medium**	-
The presence of non-residents, perceived “outsiders” and contractors within the local environment could cause localised social tension	Without Mitigation	2	1	8	4	**44**	**Medium**	-
	With Mitigation	2	1	4	2	**14**	**Low**	-

Construction Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Growth in skills development resulting from the employment of unskilled labour from nearby communities	Without Mitigation	2	1	6	3	**27**	**Low**	+
	With Mitigation	2	1	8	4	**44**	**Medium**	+
Opportunities for entrepreneurial development as a result of the construction activities.	Without Mitigation	3	2	6	4	**44**	**Medium**	+
	With Mitigation	3	2	8	5	**65**	**High**	+

Table 70: Significance Ratings for the Operational Phase Socio-Economic Impacts

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
The development of the mine will have a positive impact on the economic development	Without Mitigation	2	4	6	3	**36**	**Medium**	+
	With Mitigation	2	4	8	5	**70**	**High**	+
Employment opportunities for local labour resulting from the operational phase.	Without Mitigation	2	4	6	3	**36**	**Medium**	+
	With Mitigation	2	4	8	5	**70**	**High**	+
Increased health and safety issues resulting from noise emissions, dust emissions and trucks using the roads during the operational phase.	Without Mitigation	3	4	8	5	**75**	**High**	-
	With Mitigation	2	4	6	3	**36**	**Medium**	-
Unmanaged contractors might cause an increase in	Without Mitigation	3	4	8	4	**60**	**Medium**	-

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
influx of job seekers and the establishment of informal settlements	With Mitigation	3	4	6	2	**26**	**Low**	-
Construction, operational and closure activities could contribute to social ills, such as HIV/ AIDS, petty crime, stock theft, etc.	Without Mitigation	4	4	8	4	**64**	**High**	-
	With Mitigation	3	4	6	3	**39**	**Medium**	-
The presence of non-residents, perceived "outsiders" and contractors within the local environment could cause localised social tension	Without Mitigation	2	4	8	4	**56**	**Medium**	-
	With Mitigation	2	4	4	2	**20**	**Low**	-
Growth in skills development resulting from the employment of unskilled labour from nearby communities	Without Mitigation	2	4	6	3	**36**	**Medium**	+
	With Mitigation	2	4	8	4	**56**	**Medium**	+
Opportunities for entrepreneurial development as a result of the operational activities.	Without Mitigation	3	4	6	4	**52**	**Medium**	+
	With Mitigation	3	4	8	5	**75**	**High**	+

Table 71: Significance Ratings for the Decommissioning and Closure Phase Socio-Economic Impacts

Decommissioning Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Employment opportunities for local labour	Without Mitigation	2	1	6	3	**27**	**Low**	+

Decommissioning Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
resulting from the decommissioning phase.	With Mitigation	2	1	8	4	**44**	**Medium**	+
Increased health and safety issues resulting from noise emissions, dust emissions and trucks using the roads during the decommissioning phase.	Without Mitigation	3	1	8	4	**48**	**Medium**	-
	With Mitigation	2	1	6	3	**27**	**Low**	-
Construction and closure activities could contribute to social ills, such as HIV/ AIDS, petty crime, stock theft, etc.	Without Mitigation	4	2	8	4	**56**	**Medium**	-
	With Mitigation	3	2	6	3	**33**	**Medium**	-
Growth in skills development resulting from the employment of unskilled labour from nearby communities	Without Mitigation	2	1	4	3	**21**	**Low**	+
	With Mitigation	2	1	6	3	**27**	**Low**	+
Opportunities for entrepreneurial development as a result of the decommissioning activities.	Without Mitigation	3	2	6	4	**44**	**Medium**	+
	With Mitigation	3	2	8	5	**65**	**High**	+

Blasting and Vibration

A Blasting and Vibration Assessment was conducted by Blast Management and Consulting in April 2014, which is included in **Appendix 29** for further information.

Nature of the Impact

- *Construction Phase*

  No blasting will take place during the construction of the Proposed Rietvlei Mine, therefore in impacts are anticipated.

- *Operational Phase*

  The following impacts are anticipated to be associated with blasting during the operational phase:

  - **Ground Vibration**

    The opencast operation was evaluated for expected levels of ground vibration from future blasting operations. Review of the site and the surrounding installations/houses/buildings showed that structures varied in distances from the opencast pit area. The closest structures found are the gravel road, buildings, monitoring boreholes, railroad and pan, ranging from 57m to 369m from the eastern, southern and western boundary of the pit area. The planned minimum and medium charges evaluated showed little influence. Based on the allowed limit of 25mm/s for the buildings, the maximum charge shows possible influence. Ground vibration could also be experienced as intolerable on the human perception scale. The Monitoring Borehole, located 194m from the pit area, could be problematic. The railroad is identified as a possible concern as well as the Pan's, located on the southern and western side of the pit area. The road that is routed directly through the project area could be in danger of being damaged if consideration is not given to re-routing.

In some cases structures or installations are directly next to the opencast area. This creates situations where very high ground vibration values are predicted. It must be noted that this is clear indication that care must be taken when blasting is conducted in the areas close to points of interest and proper planning must be done.

There are no other structures identified that are of concern within the evaluated area. Structures are located such that levels of ground vibration are well within the accepted norms and limits.

- **Ground Vibration and human perception**

  After a review of the maximum charge in relation to human perception it is seen that 2500m from the blast people could possibly experience the ground vibration as "Perceptible". At 900m the expected ground vibration levels are still less than the lower safe blasting limit – less than 6mm/s but will be experienced by people as "unpleasant". At distance of 500m and closer there is strong indication that people will experience the ground vibration as "Intolerable". Distances closer than 800m will exceed the minimum 6mm/s proposed safe limit for poorly constructed structures.

- **Vibration impact on roads**

  The R555 on the north western side of the project area provides access to the project area via Middelburg and is at closest distance 369m from the pit area with no specific concern. The R104 is approximately 7km to the south of the site. The gravel road giving access to the farms and mines is routed directly through the project area and could be in danger of being damaged if consideration is not given to re-routing. The R555 located at 369 m is a concern with regards to safe boundary from blasting. Blasting the northern side of the pit may include the R555 when a 500m safe blasting area is established. The R555 is a very busy road and specific management of blasting operations in the northern side and management of the road during these blasts will have to be considered.

- **Potential that vibration will upset adjacent communities**

  Ground vibration and air blast generally upset people living in the vicinity of mining operations. There are communities, farming areas and roads that are within the evaluated area of influence. There are structures in close proximity of the project area – 369m to 705m on the eastern and north western side of the Pit. Ground vibration levels could be regarded as unpleasant and intolerable. Levels predicted for the maximum charge are within the limits of 25mm/s. Ground vibration levels at the rest of the structures are less than the limits proposed and will not require mitigation measures.

- **Cracking of houses and consequent devaluation**

  The structures found in the areas of concern range from informal building style to brick and mortar structures. There are various farmsteads and farm workers housing found within the 3500m range from the mining area. Building style and materials will certainly contribute to additional cracking apart from influences such as blasting operations. The presence of general vertical cracks, horizontal and diagonal cracks that are found in all structures does not need to indicate devaluation due to blasting operations but rather devaluation due to construction, building material, age, standards of building applied. Thus damage in the form of cracks will be present. Exact costing of devaluation for normal cracks observed is difficult to estimate. Mining operations may not have influence to change the status quo of any property if correct precautions are considered.

The proposed limits as recommended in the Blasting and Vibration Report (**Appendix 29**) i.e. 6mm/s, 12.5mm/s and 25mm/s are considered sufficient to ensure that additional damage is not introduced to the different categories of structures. It is expected that, should levels of ground vibration be maintained within these limits, the possibility of inducing damage is limited.

- **Summary of findings for air blast**

  Review of the air blast levels indicates fewer concerns than ground vibration. Air blast predicted for the maximum charge ranges between 102.8 and 127.6dB where structures are of concern. The minimum and medium charge showed lower levels. Structures within 250m from the pit boundaries could possibly experience air blast that is problematic and structures found up to 1000m could experience levels of air blast that could contribute to complaints particularly from maximum charge used. Complaints from air blast are normally based on the actual effects that are experienced due to rattling of roof, windows, doors etc.

  These effects could startle people and raise concern of possible damage. The possible negative effects from air blast are expected to be less than that of ground vibration. It is maintained that if stemming control is not exercised this effect could be greater with greater range of complaints or damage. This pit is located such that “free blasting” – meaning no controls on blast preparation – will not be possible.

- **Fly-rock Modelling Results and Impact of fly rock**

  Review of the factors that contribute to fly rock it is certain that if no stemming control is exerted there will be fly rock. The designed stemming length of 4.2m for blasting will yield possible fly rock up to distances of 126m. Possible reduction of stemming length will see increased fly rock travel distances. The R555 is worth mentioning although located at 369m and further than 126m. If stemming lengths are not maintained fly rock could be problematic specifically with the traffic on the R555. The railway on the southern side and gravel roads are also of concern. The pit area is close to the railway. Train schedules and management of blasting times with stemming controls will be required.

- **Noxious fumes Influence Results**

  The occurrence of fumes in the form the NOx gaseous format is not a given and very dependent on various factors. However the occurrences of fumes should be closely monitored. It is not assumed that fumes will travel to any part nearby farm stead but again if anybody is present in the path of cloud travel it could be problematic.

- **Water well influence**

  13 Monitoring Boreholes are located in the area at distances ranging from 194m to 3285m from the pit area. Ground vibration levels at one of these boreholes are higher than their limit at 60.7mm/s, the rest of the boreholes are within their limits of 50mm/s. It is expected that ground vibration due to blasting operations will have no influence on these boreholes.

- **Vibration impacts on productivity of farm animals (cattle, chickens, pigs, etc.)**

  The topography is classed as moderately undulating plains and pans and the landscape is characterized by relatively little topographic variation. Land use in the study area is dominated by cultivation and grazing and typical crops under irrigation with a possibility of cattle in the area. There are farm animal structures located east of the pit area at approximately 1788m away. It may be anticipated that cattle could be present at close proximity in the area. It is however considered important that the aspect of influence from blasting is addressed as well.

  The influence on productivity of animals over period of time due to blasting operations is not clearly defined and difficult to estimate. Social behaviour and change of social behaviour is unfortunately problematic. At larger distances, estimated in the region of 500m and greater, cattle or game will get accustomed to the blasting and related noise. This is based on observations made by the specialist when blasting is done and cattle are present.

Considering the above information it is certain that injury to animals such as cattle / goats is highly unlikely due to the fact that cattle should never be allowed on top of a blast area. The effect from the blast itself is then more likely to be lethal. It is anticipated that the mining area will be fenced off and animals not be present inside the mining area. The above excludes the impact on social behaviour in animals. This subject is not yet fully understood in the industry as little research or work has been done on this.

- *Decommissioning Phase*

  No blasting will take place during the decommissioning phase of the Rietvlei Mine, therefore in impacts are anticipated.

Significance Rating

Table 72 outlines the significance ratings for relevant blasting impacts both with and without mitigation measures.

Table 72: Significance Rating for the Operational Phase Blasting Impacts

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Ground vibration impact on houses	Without Mitigation	2	3	4	4	**36**	**Medium**	-
	With Mitigation	2	3	4	2	**18**	**Low**	-
Ground vibration impact on boreholes	Without Mitigation	2	3	6	4	**44**	**Medium**	-
	With Mitigation	2	3	6	2	**22**	**Low**	-
Ground vibration impact on roads	Without Mitigation	2	3	6	2	**22**	**Low**	-
	With Mitigation	2	3	6	2	**22**	**Low**	-
Ground vibration impact on railways	Without Mitigation	2	3	6	4	**44**	**Medium**	-
	With Mitigation	2	3	6	2	**22**	**Low**	-
Air Blast impact on houses	Without Mitigation	2	2	6	4	**40**	**Medium**	-
	With Mitigation	2	3	6	2	**22**	**Low**	-
Air Blast impact on boreholes	Without Mitigation	2	3	2	1	**7**	**Low**	-
	With Mitigation	2	3	2	1	**7**	**Low**	-
Air Blast impact on roads	Without Mitigation	2	3	2	1	**7**	**Low**	-
	With Mitigation	2	3	2	1	**7**	**Low**	-

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Fly Rock impact on houses	Without Mitigation	2	3	4	3	**27**	**Low**	-
	With Mitigation	2	3	4	3	**27**	**Low**	-
Fly Rock impact on boreholes	Without Mitigation	2	3	2	1	**7**	**Low**	-
	With Mitigation	2	3	2	1	**7**	**Low**	-
Fly Rock impact on roads	Without Mitigation	2	3	6	4	**44**	**Medium**	-
	With Mitigation	2	3	4	3	**27**	**Low**	-
Fly Rock impact on railways	Without Mitigation	2	3	6	4	**44**	**Medium**	-
	With Mitigation	2	3	4	3	**27**	**Low**	-
Impact of Fumes Houses	Without Mitigation	2	3	4	1	**9**	**Low**	-
	With Mitigation	2	3	4	1	**9**	**Low**	-
Impact of Fumes - Boreholes	Without Mitigation	2	3	2	1	**7**	**Low**	-
	With Mitigation	2	3	2	1	**7**	**Low**	-
Impact of Fumes - Roads	Without Mitigation	2	3	2	1	**7**	**Low**	-
	With Mitigation	2	3	2	1	**7**	**Low**	-
Impact of Fumes - Railways	Without Mitigation	2	3	2	1	**7**	**Low**	-
	With Mitigation	2	3	2	1	7	**Low**	-

Traffic

Nature of the Impact

- *Construction Phase*

  The following traffic impacts are anticipated during the construction phase:

  - **Traffic generation around the site**

    The increase of construction vehicles in and around the site may contribute to the increased road usage leading to traffic congestion. The roads to the west of the site are in better condition than the roads to the east. Road users may experience traffic during peak hours in which construction vehicle movement would be at its highest.

- **Creation of dust as a result of the movement of construction vehicles**

  The movement of construction vehicles along unpaved roads surrounding and within the construction areas would contribute significantly to the generation of dust in the areas located in close proximity to the mine.

- **Operation of vehicles may impact pedestrian safety**

  The increased use of construction vehicles during the development of the mine can have an impact on pedestrian safety that uses the roads. Due to the size and weight of the vehicles, quick sudden movements of these vehicles are unlikely and could contribute to accidents involving pedestrians crossing the road during low visibility hours.

- **Construction vehicles may result in an increase in road accidents**

  The increased road use of construction vehicles could result in an increase in road accidents on the roads leading away or towards the mine.

- **Increase in traffic could result in the deterioration of the surrounding road network.**

  The increased traffic congestion on the surrounding road networks can lead to the deterioration of the roads if unmanaged. The roads to the west of the site are in better condition than the roads to the east. The increased in traffic could lead to the development of potholes and degradation of the paved and unpaved roads.

- *Operational Phase*

  The export coal will be transported from site to the Afgri Pan Siding, south of the site using 30 ton coal transport trucks. These trucks will use the road to the siding only and will not affect traffic along the R555.

  The coal that will be going to Eskom will be transported either by road from the site or to the Afgri Pan Siding where it will be transported to a selected Eskom Power Station. For the worst case scenario it was assumed that all the Eskom coal will be transported by road along the R555. It was assumed that road haulage will occur from 06:00 to 18:00 (12-hours) six days a week.

  Utilising the above information it is assumed that approximately 8 loaded trucks will leave the mine per hour during the operational phase.

  Based on the staff requirement of similar developments the total staff complement of Rietvlei Mine was estimated to be a maximum of 400 people with the following operational shifts:

  - 06:00 to 16:00 (day shift, 10 hours);
  - 15:00 to 01:00 (night shift, 10 hours) ; and
  - 01:00 to 06:00 (early morning shift, 5 hours).

  The distribution between skilled, semi-skilled and unskilled staff was assumed to be 30%, 15% and 55% respectively. The skilled workers will work predominantly during the day-shift. It was assumed that 80% of the staff will travel from Middelburg (from the west) and 20% from Belfast (from the east) It was assumed that 50% of the skilled employees will have private vehicles, i.e. most private vehicle trips are expected during the day-shift. For a worst case scenario a vehicle occupation of 1 person per private vehicle was assumed. It was assumed employees without private vehicles will use minibus taxis which can transport approximately 15 passengers. Based on these assumptions the employee trip generation is outlined in **Table 73**.

Table 73: Employee Trip Generation (number of vehicles)

Description	Total	Day Shift (06:00-16:00) 55%	Night Shift (15:00-01:00) 35%	Early Morning Shift (01:00–06:00) 10%
Private Cars	**60**	**48**	**9**	**3**

From Middelburg (80%)		39	8	3
From Belfast (20%)		10	2	1
Minibus Taxis	**24**	**12**	**9**	**3**
From Middelburg (80%)		10	7	2
From Belfast (20%)		2	2	1
Total	**84**	**60**	**18**	**6**

The following traffic impacts are anticipated during the operational phase:

- **Traffic generation around the site from transportation and operational vehicles**

  The increase of operational vehicles in and around the site may contribute to the increased road usage leading to traffic congestion. The roads to the west of the site are in better condition than the roads to the east. Road users may experience traffic during peak hours in which the vehicle movement would be at its highest.

- **Creation of dust as a result of the movement of operational vehicles**

  Dust may be a problem at the access to the site as there will be coal transported by truck along the R555. Fine coal dust could impair driver visibility and impact on the aesthetics of the area. The use of operational vehicles along both paved and unpaved roads can lead to the generation of dust which can impact on surrounding areas.

- **Heavy vehicles may result in an increase in road accidents**

  The increased road use of heavy vehicles could result in an increase in road accidents leading away or towards the mine. Accidents could occur if specific signage is not used to indicate where operational vehicles would be turning into the mining area. The gravel shoulders are unsafe along most of the road length, as they are driven out and overgrown. Slight edge breaks occur along the road length. This could also contribute to road accidents.

- **Increase in traffic could result in the deterioration of paved and haul routes**

  The increased traffic congestion on the surrounding road networks can lead to the deterioration of the roads if unmanaged. The roads to the west of the site are in better condition than the roads to the east. Bleeding of the roads has occurred especially around the wheel paths. The increased in traffic could lead to the development of potholes and degradation of the paved and unpaved roads.

- **Shoulder Sight Distance**

  Shoulder sight distance is the distance that the driver of a vehicle that is stationary at the stop line of a minor road can see along the major road, to be able to enter or cross the major road before an approaching vehicle reaches the intersection. It is therefore a function of speed of vehicles traveling on the major road, the width of the major road and the type of vehicles that are trying to cross. Increased heavy vehicle traffic along the haul route will impact on pedestrian safety

- **Operation of vehicles may impact pedestrian safety**

  The increased use of operational vehicles during the development of the mine can have an impact on pedestrian safety that uses the roads. Due to the size and weight of the vehicles, quick sudden movements of these vehicles are unlikely and could contribute to accidents involving pedestrians crossing the road during low visibility hours.

- *Decommissioning Phase*

  The following traffic impact is anticipated during the decommissioning phase:

  - **Creation of dust as a result of the movement of decommissioning vehicles**

The movement of decommissioning vehicles along haul roads surrounding and within the mining area would contribute significantly to the generation of dust in the areas located in close proximity to the mine.

- *Cumulative Impacts*

  The following cumulative traffic impacts were identified:

  - **Increased Traffic Congestion on the roads in surrounding area**

    The Rietvlei area is dominated by a number of coal mines. With the development of the proposed mine there would be an increase usage of the roads for mine vehicles. This could have a cumulative effect on traffic congestion in the areas due to other mining vehicles already using the roads.

  - **Creation of dust as a result of the movement of operational vehicles**

    Dust may be a problem due to the cumulative generation of dust from the other mines located in the areas created by the transportation of coal by trucks along theR555. Fine coal dust could impair driver visibility and impact on the aesthetics of the area. The use of mining vehicles along both paved and unpaved roads on the surrounding roads networks can lead to the generation of dust which can impact on surrounding areas.

<u>*Significance Rating*</u>

Table 74, Table 75, Table 76 and **Table 77** outline the significance ratings for relevant traffic impacts both with and without mitigation measures.

Table 74: Significance Ratings for the Construction Phase Traffic Impacts

Construction Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Traffic generation around the site	Without Mitigation	2	1	4	4	**28**	**Low**	-
	With Mitigation	2	1	2	3	**15**	**Low**	-
Creation of dust as a result of the movement of construction vehicles	Without Mitigation	3	2	8	4	**52**	**Medium**	-
	With Mitigation	2	2	4	3	**24**	**Low**	-
Operation of vehicles may impact pedestrian safety	Without Mitigation	1	1	6	3	**24**	**Low**	-
	With Mitigation	1	1	2	2	**8**	**Low**	-
Construction vehicles may result in an increase in road accidents	Without Mitigation	1	1	6	4	**32**	**Medium**	-
	With Mitigation	1	1	2	3	**12**	**Low**	-
Increase in traffic could result in the deterioration of the surrounding	Without Mitigation	3	2	6	5	**55**	**Medium**	-
	With	2	2	4	3	**24**	**Low**	-

Construction Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
road network.	Mitigation							

Table 75: Significance Ratings for the Operational Phase Traffic Impacts

Operational Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Traffic generation around the site from transportation and operational vehicles	Without Mitigation	3	4	6	4	**52**	**Medium**	-
	With Mitigation	2	4	4	4	**40**	**Medium**	-
Creation of dust as a result of the movement of operational vehicles	Without Mitigation	3	4	8	5	**75**	**High**	-
	With Mitigation	2	4	4	3	**30**	**Low**	-
Heavy vehicles may result in an increase in road accidents	Without Mitigation	3	4	6	4	**52**	**Medium**	-
	With Mitigation	3	4	4	2	**22**	**Low**	-
Increase in traffic could result in the deterioration of paved and haul routes	Without Mitigation	3	4	8	4	**60**	**Medium**	-
	With Mitigation	2	4	6	2	**24**	**Low**	-
Shoulder Sight Distance	Without Mitigation	2	4	6	4	**48**	**Medium**	-
	With Mitigation	2	4	2	3	**24**	**Low**	-
Operation of vehicles may impact pedestrian safety	Without Mitigation	2	4	6	3	**36**	**Medium**	-
	With Mitigation	2	4	2	2	**16**	**Low**	-

Table 76: Significance Ratings for the Decommissioning and Closure Phase Traffic Impacts

Decommissioning Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status**
Creation of dust as a result of the movement of decommissioning vehicles	Without Mitigation	3	4	6	4	**52**	**Medium**	-
	With Mitigation	2	4	4	2	**20**	**Low**	-

Table 77: Significance Ratings for the Cumulative Traffic Impacts

Cumulative Impacts								
Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status
Increased Traffic Congestion on the roads in surrounding area	**Without Mitigation**	**3**	**4**	**6**	**4**	**52**	**Medium**	**-**
	With Mitigation	**3**	**4**	**4**	**3**	**33**	**Medium**	**-**
Creation of dust as a result of the movement of operational vehicles	**Without Mitigation**	**3**	**4**	**8**	**5**	**75**	**High**	**-**
	With Mitigation	**3**	**4**	**4**	**3**	**33**	**Medium**	**-**

vi) Methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;

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

The objective of the assessment of impacts is to identify and assess all the significant impacts that may arise as a result of the proposed Rietvlei mine. The process of assessing the impacts of the project encompasses the following four activities:

- Identification and assessment of potential impacts
- Prediction of the nature, magnitude, extent and duration of potentially significant impacts
- Identification of mitigation measures that could be implemented to reduce the severity or significance of the impacts of the activity
- Evaluation of the significance of the impact after the mitigation measures have been implemented i.e. the significance of the residual impact

The possible impacts associated with the project were primarily identified in the Scoping phase through on-site and desktop study and public consultation. In the EIR phase, additional impacts will be identified through the more in-depth specialist investigations to be undertaken and through the ongoing consultation process with interested and affected parties.

In accordance with GNR 543, promulgated in terms of Section 24 of the National Environmental Management Act, 1998 (Act 107 of 1998), the significance of potential impacts were assessed in terms of the following criteria:

- The nature, a description of what causes the effect, what will be affected and how it will be affected
- The physical extent, wherein it is indicated whether:
  - 1 - the impact will be limited to the site;
  - 2 - the impact will be limited to the local area;
  - 3 - the impact will be limited to the region;
  - 4 - the impact will be national; or
  - 5 - the impact will be international.
- The duration, wherein it is indicated whether the lifetime of the impact will be:
  - 1 - of a very short duration (0–1 years);
  - 2 - of a short duration (2-5 years);
  - 3 - medium-term (5–15 years);
  - 4 - long term (> 15 years); or
  - 5 – permanent.
- The magnitude of impact on ecological processes, quantified on a scale from 0-10, where a score is assigned:
  - 0 - small and will have no effect on the environment;
  - 2 - minor and will not result in an impact on processes;
  - 4 - low and will cause a slight impact on processes;
  - 6 - moderate and will result in processes continuing but in a modified way;
  - 8 - high (processes are altered to the extent that they temporarily cease); or
  - 10 - very high and results in complete destruction of patterns and permanent cessation of processes.
- The probability of occurrence, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale where:
  - 1 - very improbable (probably will not happen);
  - 2 - improbable (some possibility, but low likelihood);
  - 3 - probable (distinct possibility);
  - 4 - highly probable (most likely); or
  - 5 - definite (impact will occur regardless of any prevention measures).
- The significance, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high;
- The status, which is described as either positive, negative or neutral;
- The degree to which the impact can be reversed;
- The degree to which the impact may cause irreplaceable loss of resources; and
- The degree to which the impact can be mitigated.

The significance is determined by combining the criteria in the following formula:

$$S = (E+D+M)*P$$

Where: **S** = Significance weighting **M** = Magnitude **P** = Probability

E = Extent **D** = Duration

The significance weightings for each potential impact are outlined in **Table 78**.

Table 78: Significance Weightings

Points	Significance Weighting	Description
< 30 points	**Low**	Where this impact would not have a direct influence on the decision to develop in the area
31-60 points	**Medium**	Where the impact could influence the decision to develop in the area unless it is effectively mitigated
> 60 points	**High**	Where the impact must have an influence on the decision process to develop in the area

vii) The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected.

(Provide a discussion in terms of advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties)

The location of a mining operation is based on the availability of a viable coal resource. Anglo American Thermal Coal obtained a prospecting right (MP30/5/1/1/2/57) on 18 November 2006. Subsequently a Competent Person's Report and a Feasibility Study were compiled in order to ascertain the viability of the coal resource. These studies established that a viable coal resource is available on the Remaining Portion of Rietvlei 397 JS and Portion 1 of Rietvlei 397 JS. RMC has recently acquired the prospecting right and seek to obtain the mining rights for these properties. Due to the above there are no location alternatives.

Advantages

As no alternative locations can be proposed, the layout of the mine has been developed in such a way that minimal damage will occur to the natural environment with specific reference to the wetlands. The largest wetlands will be preserved and management plans implemented to minimise the negative impacts on these ecosystems.

Disadvantages

Due to the location of the coal reserve no alternative location can be provided and therefore some wetlands will have to be removed in order to make the mining operation profitable.

viii) The possible mitigation measures that could be applied and the level of risk.

(With regard to the issues and concerns raised by affected parties provide a list of the issues raised and an assessment/ discussion of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered).

Geology

The impact of the Proposed Project is not one that can be mitigated due to the nature of the opencast mining resulting in the permanent removal of coal from the local geology. The key management measures include the following:

- *Construction Phase*
  - Soil stripping is to be limited to the footprint of the infrastructure requirements.

- *Operational Phase*
  - Formulate and implement a blasting design that will ensure the least impact on the environment;
  - The minimal amount of soils will be stripped on the sections to be blasted in order to reduce the potential for air blasts;
  - Blasting may only be undertaken by registered personnel;
  - Blasting schedules must be distributed to all surrounding residents;
  - Warning sirens must sound prior to the initiation of blasting to inform the surrounding employees and other stakeholders and to ensure safety of all people in the vicinity of the blast area;
  - The blasting area must be cordoned off prior to each blasting activity;
  - Sequential rehabilitation of opencast pits with overburden, ensuring adequate compaction and levelling, prior to topsoiling and rehabilitation;
  - Undertake regular subsidence surveys. Areas identified as potential concern should be mapped and frequently inspected/monitored; and
  - Areas of subsidence should be rehabilitated as appropriate.

Topography

The key topographical impacts are related to elevated areas due to material stockpiles, depressions and large voids during coal removal, and potential for subsidence post-rehabilitation. This may alter the existing drainage lines on the Proposed Project area and the interaction with the local drainage lines in adjacent areas. The following mitigation and management measures should be considered:

- *Construction Phase*
  - The areas on which new infrastructure will be placed, constructed, installed or sunk will be clearly demarcated and communicated to contractors and staff members;
  - All structures and infrastructure must be designed and operated with the aim of closure in mind;
  - Monitoring methods (i.e. visual inspections) will be implemented from the start of construction to monitor the surface stability (baseline) prior to the commencement of mining activities;
  - Contractors and employees will be limited to the clearly defined access routes and areas to be constructed in order to limit site disturbance;
  - Design appropriate storm management measures that allows drainage of the site; and
  - All structures must be designed and developed in specific locations as to avoid excessive damage to topography and the free drainage of the area.
- *Operational Phase*
  - Concurrent replacement of overburden and topsoil and resultant re-vegetation during the operational phase may improve the natural surface flow dynamics and topography;
  - Limit the height of stockpiled materials and preferable place these outside known drainage lines;
  - Align backfilling and levelling activities to the existing topography and post-mining land use. The rehabilitation and levelling activities should be frequently reviewed to ensure consistency with potential changing landscapes and land use in the area;
  - Conduct regular subsidence surveys to prevent the occurrence of such. Where subsidence has occurred, it should be investigated and mitigated;

- The rehabilitated areas should be contoured to prevent pooling of surface water run-off and excessive erosion is not/does not occur i.e. promote free drainage away from mining and rehabilitated areas;
- Complete regular maintenance and management of rehabilitated areas to ensure these areas are aligned with the surrounding areas and free draining e.g. pooling or areas of excessive erosion are not obviously/visibly present;
- Design appropriate storm management measures that allows drainage of the site;
- All fixed infrastructure must be designed and developed in specific locations as to avoid excessive damage to topography and the free drainage of the area;
- The areas on which new infrastructure will be placed, constructed, installed or sunk will be clearly demarcated and communicated to contractors and staff members; and
- All structures and infrastructure must be designed and operated with the aim of closure in mind.

■ *Decommissioning and Closure Phase*

- The final replacement of overburden, topsoil and resultant re-vegetation will result in the improvement of natural surface flow dynamics and topography in the post-mining environment.

Surface Water

The development of proposed Rietvlei Mine poses risks to surface water as assessed. The proper design, construction and operation, and maintenance of the appropriate draining and storing facilities, as well as the rehabilitation of the open mine, are part of the key focus areas to mitigate surface water impacts. The following precautions have to be taken into consideration to reduce possible surface water risks posed by the development of proposed Rietvlei Mine:

■ *Construction Phase*

- During design phase, the waste and water management infrastructures at proposed Rietvlei Mine (included dams, drains, waste area) must be designed with the appropriate water barrier system if required, and comply with the DWA minimum requirements (1998/2012/2013), with special focus on the R634, R635, R636 of the NEMWA 2008;
- Design of the mine facilities to be conducted by an accredited or recognised professional designer;
- All dirty surface water control facilities (dam, drain) must be designed to have a minimum freeboard above full supply level, at such manner that they can always handle 1:50 year flood-event on top of its mean operational level;
- Water management infrastructure (separate clean and dirty water systems) should be in place before the commencement of construction activities.
- Storage area for hydrocarbons or any toxic construction material should be bounded according to DWA minimum requirement;
- Compaction of the area should take place during base preparation. t on top of its mean operation level;
- Sloping of the area as to allow for free runoff, towards designated pollution control structures;
- Management of speed versus velocity aspects if and when required as to prevent erosion gullies from forming.
- Surface water management strategic plan must be implemented to prevent risk of water pollution;

- Surface water monitoring network should be installed before the starting of any construction activities on site and monitoring network can be updated according to the DWA minimum requirements, if required;
- Waste classification is required in order to influence design parameters and make recommendations with regards to design and monitoring requirements. These must be adhered to in order to prevent or minimise seepage from waste disposal areas;
- Any waste and spills (especially during construction, operation and closure) need to be cleaned up immediately according to the DWA minimum requirements;
- Authorities need to be notified in the event of a spill or leachate during construction, operation and closure;
- Clean and dirty water is to be separated;
- Regular maintenance of vehicles must be implemented;
- Trucks need to be capped to minimise spillage of coal or wastes, on roads;
- The reusing dirty water from mine activities must be assessed and implemented as much as possible;
- All hazardous substances must be handle according to the requirements of relevant legislation relating to the transport, storage and use of the substance; and
- The area to be used for storage of any hazardous waste and items which contains hazardous substance must be lined with bounded walls to prevent pollution of surface water should a leakage/spillage occur.

- *Operational Phase*
  - Contaminated water drain (within the waste site) and dam must be properly operated and maintained;
  - All surface dirty water control facilities (dam, drain) must be operated to have a minimum freeboard above full supply level, at such manner that they can always handle 1:50 year flood-event on top of its mean operation level;
  - Keep contamination to a minimum by keeping the pit as dry as possible (dewatering) to reduce contact time of water and oxygen with exposed strata;
  - Reduce the amount of water to be removed from the pit area by keeping the operating pit area as small as possible, and by continuously rehabilitating the closed pit area;
  - Equip trenches and gullies with energy dissipater, and conduct frequent inspections and maintenances;
  - Suspended solids should filter out (silt trap) before dirty water enters pollution control dams, and regular inspections and maintenances should follow;
  - Routing of sewage to the municipality sewage works; and
  - Water and mass balance should be determined and updated regularly.
- *Decommissioning and Closure Phase*
  - Implement closure of open pit progressively;
  - Effectiveness of existing surface water monitoring network should be re-evaluated;
  - Rubble from waste or contaminated areas should be dismantled and disposed of accordingly;
  - Backfill material to be fully compacted and covered, and the entire foot print of waste to be shaped for free-draining;
  - Rehabilitation to follow backfilling compaction;
  - Rehabilitation should consist of re-vegetating the site using appropriately chosen indigenous grasses. Control of vegetation cover over the rehabilitated area;

- A rehabilitation plan must be implemented and the plan should be done in the line with the contents of NWA (Act No 36 of 1998), to avoid subsequent negative environmental impacts that may occur;
- Continue monitoring until it can be demonstrated that vegetation is self-sustaining and no erosion channels exist;
- Clean water system and dirty water system should be maintained on site; and
- Inspection and maintenance should be implemented after removal of materials associated with mining on site.

Groundwater

The development of proposed Rietvlei Mine poses risks to groundwater as assessed. The proper design, construction and operation, and maintenance of the appropriate respective liner system below dirty water dams, tailing dams should be implemented as well as the rehabilitation of the open mine, are part of the key focus areas to mitigate groundwater impacts. The following precautions have to be taken into consideration to reduce possible groundwater risks posed by the development of proposed Rietvlei Mine:

- *Construction Phase*
  - During design phase, the waste and water management infrastructures at proposed Rietvlei Mine (included dams, drains, waste area) must be designed with the appropriate water barrier system if required, and comply with the DWA minimum requirements (1998/2012/2013), with special focus on the R634, R635, R636 of the NEMWA 2008;
  - Design of the mine facilities to be conducted by an accredited or recognised professional designer;
  - The design of the dirty water drains, dams, as well as the waste storage areas should ensure their long term integrity;
  - All dirty surface water control facilities (dam, drain) must be designed to have a minimum freeboard above full supply level, at such manner that they can always handle 1:50 year flood-event on top of its mean operation level;
  - A proper construction phase should be carried out under the supervision of an accredited or recognised professional civil engineer, as approved by the designer;
  - Storage area for hydrocarbons or any toxic construction material should be bunded according to DWA minimum requirement;
  - Groundwater management strategies must be implemented to prevent risk of water pollution;
  - Groundwater monitoring network should be installed before the starting of any construction activities on site;
  - The monitoring network can be updated according to the DWA minimum requirements, if required;
  - Monitoring of groundwater must be done once per Quarter;
  - Any waste and spills (especially during construction, operation and closure) need to be cleaned up immediately according to the DWA minimum requirements;
  - Authorities need to be notified in the event of a spill or leachate during construction, operation and closure;
  - Clean and dirty water is to be separated, and any containment of dirty water should be lined;
  - Vehicle storage and maintenance areas to be hard-surfaced;
  - Regular maintenance of vehicles must be implemented;

- Trucks need to be capped to minimise spillage of coal or wastes, on roads;
- Separate clean water from the stockpiling area to minimise water infiltrating from the site;
- The reusing dirty water from mine activities must be assessed and implemented as much as possible;
- All hazardous substances must be handle according to the requirements of relevant legislation relating to the transport, storage and use of the substance;
- The area to be used for storage of any hazardous waste and items which contains hazardous substance must be lined with bunded walls to prevent pollution of surface or groundwater should a leakage/spillage occur;
- Application for WULA amendment as per DWA requirements must be made for proposed new abstraction boreholes if any required; and
- The migration of leachate into the groundwater regime around any potential pollution sources as identified must be prevented at all times.

▪ *Operational Phase*

- Contaminated water drain (within the waste site) and dam must be properly operated and maintained;
- All surface dirty water control facilities (dam, drain) must be operated to have a minimum freeboard above full supply level, at such manner that they can always handle 1:50 year flood-event on top of its mean operation level;
- Effectiveness of existing monitoring borehole position should be re-evaluated;
- The monitoring network can be updated according to the DWA minimum requirements, if required to incorporate the unsaturated zones around proposed Rietvlei Mine;
- Keep contamination to a minimum by keeping the pit as dry as possible (dewatering) to reduce contact time of water and oxygen with exposed strata; and
- Spills from the coal processing (crushing, screening and washing) in the plant area needs to be cleaned up immediately according to the DWA minimum requirements and rehabilitation should follow.

▪ *Decommissioning and Closure Phase*

- Implement closure of open pit progressively;
- Effectiveness of existing monitoring borehole position should be re-evaluated;
- Rubble from waste or contaminated areas should be dismantled and disposed of accordingly;
- Backfill material to be fully compacted and covered, and the entire foot print of waste to be shaped for free-draining. This will minimise infiltration of oxygen rich water, and reduce geochemical reactions that should occur;
- Rehabilitation to follow backfilling compaction;
- Rehabilitation should consist of re-vegetating the site using appropriately chosen indigenous grasses;
- A rehabilitation plan must be implemented and the plan should be done in the line with the contents of NWA (Act No 36 of 1998), to avoid subsequent negative environmental impacts that may occur;
- Continue monitoring until it can be demonstrated that vegetation is self-sustaining and no erosion channels exist; and
- Effectiveness of existing monitoring borehole position should be re-evaluated.

Soil, Land Capability and Land Use

Detailed rehabilitation recommendations are included in the Soil, Land Capability and Land Use Assessment Report which is included in **Appendix 21**. The following mitigation and management measures should be considered with regards to soil, land capability and land use:

- *Construction Phase*
  - Soils will be stripped at specified depths in order to prevent stripping of lower quality subsoil together with topsoil;
  - Topsoil will be stripped and stockpiled based on soil type groups (red soils, yellow brown soils and grey wetland soils) in order to preserve pre-mining soil potential and land capability as far as possible;
  - All accidental fuel and oil spillages will be cleaned up immediately;
  - Contaminated soil will be disposed at a suitable disposal facility;
  - All mechanical equipment will be serviced at an approved facility;
  - The footprint size of all stockpiles will be contained as far as possible;
  - The topsoil and overburden stockpiles will probably remain through the entire construction and operational phase but it will be removed as soon as possible;
  - The soil's A-horizon will be stored as a berm along the edges for later replacement;
  - The soil's A-horizon will be stored as a berm along the edges for later replacement;
  - The upper 300 mm of topsoil (A-horizon) will be removed and stockpiled for final rehabilitation;
  - The dam floor and embankments will be lined with a polyethylene membrane to prevent soil pollution by low quality mine water; and
  - Dirty water channels will be lined with concrete or a polyethylene membrane.
- *Operational Phase*
  - Soils will be stripped at specified depths in order to prevent stripping of lower quality subsoil together with topsoil;
  - Topsoil will be stripped and stockpiled based on soil type groups (red soils, yellow brown soils and grey wetland soils) in order to preserve pre-mining soil potential and land capability as far as possible;
  - Soils will be stripped at specified depths in order to prevent stripping of lower quality subsoil together with topsoil;
  - Open pits will be backfilled and spoil surfaces will be levelled and shaped to a free draining topography;
  - Topsoil will be dumped in sufficient quantities to render a soil depth similar to the stripping depth after levelling;
  - Soil amelioration and re-vegetation will be done as described in section 7 of the Soil, Land Capability and Land Use Assessment Report included in **Appendix 21;**
  - Frequent dust suppression by water trucks;
  - Implementation of an effective storm water management system along haul roads;
  - Continuous monitoring of pollution control dam levels in order to prevent overspills;
  - Frequent inspections to identify leaks and immediate reparation thereof;
  - Immediate removal of sludge after overspills;

- All accidental fuel spillages will be cleaned up immediately and contaminated soil will be removed to a suitable disposal facility; and
- Implementation of an efficient storm water management system.

■ *Decommissioning Phase*

- The remaining open pit area and possibly some final voids will be backfilled and spoil surfaces will be levelled and shaped to a free draining topography;
- Topsoil will be dumped in sufficient quantities to render a soil depth after levelling which is similar to the stripping depth;
- Soil amelioration and re-vegetation will be done as described in section 7 of the Soil, Land Capability and Land Use Assessment Report included in **Appendix 21;**
- All stockpiled overburden material will be moved to the open pit and all stockpiled topsoil will be used for rehabilitation of the open pit. The stockpile footprints will be thoroughly cleaned and then ripped to alleviate soil compaction. After ripping the rough surface will be smoothed with a disc or multiple tooth implement and then graded to a smooth surface. The topsoil will be ameliorated according to soil chemical analysis;
- The footprint will be re-vegetated with a grass seed mixture;
- The footprint will be thoroughly cleaned and all road building material will be removed to a suitable disposal facility;
- The footprint will be ripped to alleviate soil compaction. After ripping the rough surface will be smoothen with a disc or multiple tooth implement and then graded to a smooth surface;
- Topsoil stored as berms on the road edges will be spread over the road footprint. The topsoil will be ameliorated according to soil chemical analysis;
- The footprint will be re-vegetated with a grass seed mixture;
- The dam floor will be thoroughly cleaned and all polluted material will be removed to a suitable disposal facility;
- Soil material used for wall embankments will be spread over the floor of the borrow pit;
- The stockpiled topsoil (A-horizon) will be replaced on the surface;
- Compaction will be alleviated by ripping;
- Soil amelioration will be done according to analyses of soil samples taken after replacement of the stored topsoil;
- The footprint will be re-vegetated with a grass seed mixture;
- During the decommissioning phase the footprint will be thoroughly cleaned;
- The footprint will be ripped to alleviate compaction;
- Stored topsoil will be replaced (if any) and the footprint will be graded to a smooth surface;
- The topsoil will be ameliorated according to soil chemical analysis;
- The footprint will be re-vegetated with a grass seed mixture;
- The footprint will be thoroughly cleaned and all coralliferous and soft overburden material will be removed to a discard dump or suitable disposal facility;
- The footprint will be loosened with a multiple tooth implement to a depth of at least 300 mm to alleviate compaction;
- The topsoil will be replaced and ameliorated according to soil chemical analysis; and
- The footprint will be re-vegetated with a grass seed mixture.

Flora

The following mitigation and management measures should be considered for the construction, operation and decommissioning phases of the project with regards to flora impacts:

- *Mitigation measures for Impacts on Habitat for Floral Species*
  - A sensitivity map has been developed for the site, indicating the Wetland habitat units, which are considered to be of increased ecological importance. It is recommended that this sensitivity map be considered during all development phases to aid in the conservation of floral habitat within the site;
  - No activities are to infringe upon these sensitive areas or associated buffer zones;
  - The boundaries of the development footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas;
  - Edge effects of all construction and operational activities, such as erosion and alien plant species proliferation, which may affect floral habitat, need to be strictly managed in all areas of increased ecological sensitivity;
  - All areas of increased ecological sensitivity should be designated as No-Go areas and be off limits to all unauthorised vehicles and personnel. Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed development activities;
  - Planning of temporary roads and access routes should take the site sensitivity plan into consideration. If possible, such roads should be constructed a distance from the more sensitive wetland areas and not directly adjacent thereto;
  - It must be ensured that mining related waste or spillage and effluent do not affect the sensitive habitat boundaries and associated buffer zones;
  - It must be ensured that the mine process water system is managed in such a way as to prevent discharge to the receiving environment;
  - In the event of a vehicle breakdown, maintenance of vehicles must take place with care and the recollection of spillage should be practiced near the surface area to prevent ingress of hydrocarbons into topsoil and subsequent habitat loss;
  - Proliferation of alien and invasive species is expected within any disturbed areas. These species should be eradicated and controlled to prevent their spread beyond the mine expansion and development footprint areas. Alien plant seed dispersal within the top layers of the soil within footprint areas, that will have an impact on future rehabilitation has to be controlled;
  - All soils compacted as a result of construction activities falling outside of development footprint areas should be ripped and profiled. Special attention should be paid to alien and invasive control within these areas. Alien and invasive vegetation control should take place throughout all development including decommissioning phases to prevent loss of floral habitat;
  - To prevent the erosion of top soils, management measures may include berms, soil traps, hessian curtains and stomr water diversion away from areas susceptible to erosion. It must be ensured that topsoil stockpiles are located outside of any drainage lines and areas susceptible to erosion. Stockpiles should be placed away from areas known to contain hazardous substances such as fuel and if any soils are contaminated, it should be stripped and disposed of at a registered hazardous waste dumping site;
  - All disturbed habitat areas must be rehabilitated and planted with indigenous floral species as soon as possible to ensure that floral ecology is re-instated;
  - During the construction and operational phases of the proposed mining expansion, erosion berms may be installed to prevent gully formation and siltation of the wetland resources. The following points should serve to guide the placement of erosion berms:

- Where the track has a slope of less than 2%, berms every 50m should be installed;
- Where the track slopes between 2% and 10%, berms every 25m should be installed;
- Where the track slopes between 10% and 15%, berms every 20m should be installed; and
- Where the track has a slope greater than 15%, berms every 10m should be installed.

- *Mitigation measures for Impacts on Floral Diversity*
  - A sensitivity map has been developed for the site, indicating wetland areas which are considered to be of increased ecological importance. It is recommended that this sensitivity map be considered during all development phases to aid in the conservation of floral habitat within the site;
  - All development footprint areas and areas affected by the proposed mine development should remain as small as possible and should not encroach onto surrounding more sensitive wetland areas and the associated buffer zones. It must be ensured that these areas are off-limits to construction vehicles and personnel;
  - Removal of the alien and weed species encountered during the operational and decommissioning and closure phase must take place in order to comply with existing legislation (amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 and Section 28 of the National Environmental Management Act, 1998). Species specific and area specific eradication recommendations:
    - Care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used;
    - Footprint areas should be kept as small as possible when removing alien plant species; and
    - No vehicles should be allowed to drive through designated sensitive wetland areas during the eradication of alien and weed species.
  - Informal fires in the vicinity of mining areas should be prohibited during all development phases;
  - It must be ensured that all roads and construction areas are regularly sprayed with water in order to curb dust generation. This is particularly necessary during the dry season when increased levels of dust generation can be expected. These areas should not be over-sprayed causing water run-off and subsequent sediment loss into waterways and drainage lines in the vicinity of the site; and
  - The local communities residing within and in the vicinity of the site, as well as mining and construction personnel, should be informed about fire control and prevention measures to reduce the frequency of uncontrolled veld fires in areas surrounding and within the site.
- *Mitigation measures for Impacts on Floral Species of Conservational Concern*
  - A sensitivity map has been developed for the site, indicating wetland areas which are considered to be of increased ecological importance. It is recommended that this sensitivity map be considered during all development phases to aid in the conservation of floral habitat within the site;
  - All development footprint areas and areas affected by the proposed mine development should remain as small as possible and should not encroach onto surrounding more sensitive wetland areas and the associated buffer zones. It must be ensured that these areas are off-limits to construction vehicles and personnel;
  - Sensitive floral species, if discovered, are to be handled with care and the relocation of sensitive plant species is to be overseen by a botanist;

- Should any RDL or protected plant species be encountered within the proposed development footprint areas, the following should be ensured:
  - If any threatened species, or nationally or provincially protected floral will be disturbed, ensure permit applications are required from the relevant authorities before construction activities commence; and
  - All rescue and relocation plans should be overseen by a suitably qualified specialist.

Fauna

The following mitigation and management measures should be considered for the construction, operation and decommissioning phases of the project with regards to fauna impacts:

- *Impact on faunal habitat and ecological structure*
  - Development should be excluded from the riparian habitat, as indicated on the sensitivity map;
  - No areas falling outside of the site may be cleared for construction purposes;
  - Areas of increased ecological importance and sensitivity, such as the river and wetland habitat areas, should be considered during all phases of the proposed mine;
  - The boundaries of the development footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas;
  - The proposed development footprint areas should remain as small as possible;
  - All areas of increased ecological sensitivity should be marked as such and be off limits to all unauthorised construction and maintenance vehicles and personnel;
  - Edge effects of all construction and operational activities, such as erosion and alien plant species proliferation, which may affect faunal habitat within surrounding areas, need to be strictly managed in all areas of increased ecological sensitivity;
  - Ensure that construction and maintenance related waste or spillage and effluent do not affect the sensitive habitat and impact on the associated buffer zones;
  - In the event of a breakdown, maintenance of vehicles must take place with care and the recollection of spillage should be practiced to prevent the ingress of hydrocarbons into the topsoil;
  - No trapping or hunting of fauna is to take place. Access control must be implemented to ensure that no illegal trapping or poaching takes place;
  - Alien and invasive vegetation control should take place throughout all phases of the development;
  - All construction and operational mining related vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed mine development activities;
  - Any natural areas beyond the development footprint, which have been affected by the construction activities, must be rehabilitated using indigenous grass species;
  - Rehabilitate all faunal habitat areas to ensure that faunal ecology is re-instated;
  - Fence construction footprint areas to contain all activities within designated areas;
  - It is recommended that a speed limit of 40km/h is implemented on all maintenance and mining roads running through the site in order to minimise risk to RDL and other fauna from vehicles; and
  - Education and awareness campaigns on RDL faunal species and their habitat are recommended to help increase awareness, respect and responsibility towards the environment for all staff and contractors.

- *Impact on faunal diversity and ecological integrity*
  - The proposed development footprint areas should remain as small as possible and where possible be confined to already disturbed areas;
  - Sensitivity map needs to be taken into consideration during the construction phase;
  - Ensure that migratory connectivity is maintained where appropriate, especially in the sensitive faunal habitat unit areas;
  - Should any RDL or other common faunal species be found within the development footprint area, these species should be relocated to similar habitat within the vicinity of the site with the assistance of a suitably qualified specialist;
  - No trapping or hunting of fauna is to take place;
  - All informal fires in the vicinity of construction areas should be prohibited;
  - Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed development activities;
  - Education of identification for any RDL faunal species that may be found within the site;
  - It is recommended that a speed limit of 40km/h is implemented on all roads running through the site during the construction as well as operational phase in order to minimise risk to RDL and other fauna from vehicles;
  - Speed humps should be constructed to help manage vehicle speed to mitigate collision with faunal species; and
  - Education and awareness campaigns on faunal species and their habitat are recommended to help increase awareness, respect and responsibility towards the environment for all staff and contractors.
- *Impact on faunal species of conservational concern*
  - All areas of increased ecological sensitivity should be marked as such and be off limits to all unauthorised construction and operational vehicles and personnel;
  - No trapping or hunting of fauna is to take place;
  - Edge effects of all construction and operational activities, such as erosion and alien plant species proliferation, which may affect faunal habitat, need to be strictly managed in these areas;
  - Should any RDL species be noted within the site, these species should be relocated to similar habitat within or in the vicinity of the site with the assistance of a suitably qualified specialist;
  - All informal fires in the vicinity of construction areas should be prohibited;
  - Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed development activities;
  - Education on identification for any potential RDL faunal species that may be found within the site;
  - Awareness campaigns are recommended to highlight the conservation of RDL faunal species, specifically for the avifaunal species highlighted in this report;
  - It is recommended that a speed limit of 40km/h is implemented on all roads running through the site during the construction phase in order to minimise risk to RDL and other fauna from vehicles; and
  - Speed humps may be constructed to help slow vehicles and help mitigate collision with faunal species.

Wetlands

The following mitigation and management measures should be considered for the construction, operation and decommissioning phases of the project with regards to wetland impacts:

- *Loss of wetland habitat and ecological structure*
  - A sensitivity map has been developed for the site, indicating the various wetland features, which are considered to be of increased ecological importance. It is recommended that this sensitivity map be considered during the planning/ pre-construction and construction phases of the proposed development activities to aid in the conservation of ecology within the site;
  - It must be ensured that planning of mining infrastructure includes consideration of adjacent wetland / pan areas to ensure that these areas are avoided as far as possible;
  - Development / mining impacts on the affected wetland features should be managed to minimise impacts on adjacent wetland features;
  - Edge effects of activities including erosion and alien / weed control need to be strictly managed in these areas;
  - Access into adjacent wetland / pan areas, particularly by vehicles, is to be strictly controlled;
  - All vehicles should remain on designated roads with no indiscriminate driving through adjacent wetland / pan areas;
  - Ensure that all stockpiles are well managed and have measures such as berms and hessian curtains implemented to prevent erosion and sedimentation;
  - Run-off from dirty water areas entering wetland habitats must be prevented and clear separation of clean and dirty water in the vicinity of the proposed infrastructure must take place. Oil must be prevented from entering the clean water system;
  - Pollution control dams should be off stream structures and not within the natural drainage system of the area, thereby minimising impacts loss of instream flow and downstream recharge;
  - Ensure that seepage from dirty water systems is prevented as far as possible;
  - It must be ensured that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. All vehicles must be regularly inspected for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil;
  - All spills should be immediately cleaned up and treated accordingly;
  - Appropriate sanitary facilities must be provided for the life of the mine and all waste removed to an appropriate waste facility;
  - Effective waste management must be implemented in order to prevent construction related waste from entering the wetland environment;
  - All adjacent wetland systems must be monitored for erosion and incision;
  - Erosion berms may be installed in any areas where soil disturbances within the vicinity of the wetland features have occurred to prevent gully formation and siltation of the aquatic resources. The following points should serve to guide the placement of erosion berms:
    - Where the track has slope of less than 2%, berms every 50m should be installed;
    - Where the track slopes between 2% and 10%, berms every 25m should be installed;
    - Where the track slopes between 10% and 15%, berms every 20m should be installed; and

    - Where the track has slope greater than 15%, berms every 10m should be installed.
  - Restrict construction to the drier winter months if possible to avoid sedimentation of wetland features in the vicinity of the proposed mine development areas; and
  - Desilt all adjacent wetland areas affected by mining and runoff from dirty water areas.
- *Changes to wetland ecological and sociocultural service provision*
  - It must be ensured that planning of mining infrastructure includes consideration of adjacent wetland areas to ensure that these areas are avoided as far as possible;
  - All demarcated sensitive zones outside of the construction area must be kept off limits during any development and closure phases of the mine;
  - The development footprint area must be limited to what is absolutely essential in order to minimise environmental damage;
  - Run-off from dirty water areas entering adjacent wetland habitats must be prevented and clear separation of clean and dirty water in the vicinity of the proposed shaft must take place;
  - Oil must be prevented from entering the clean water system;
  - It must be ensured that seepage from dirty water systems is prevented as far as possible;
  - It must be ensured that the mine process water system is managed in such a way as to prevent discharge to the receiving environment;
  - Edge effects of activities including erosion and alien / weed control need to be strictly managed in wetland areas;
  - As much vegetation growth as possible should be promoted within the proposed mine development area in order to protect soils. In this regard, special mention is made of the need to use indigenous vegetation species where hydroseeding, wetland and rehabilitation planting (where applicable) are to be implemented;
  - Implement effective waste management in order to prevent construction related waste from entering the wetland environment; and
  - All wetland areas must be rehabilitated upon decommissioning to ensure that wetland functions are reinstated during decommissioning and all disturbed wetland areas adjacent to the mining development must be re-vegetated with indigenous wetland species.
- *Impact on wetland hydrological function*
  - It must be ensured that planning of mining infrastructure includes consideration of adjacent wetland areas to ensure that these areas are avoided as far as possible;
  - Keep all demarcated sensitive zones outside of the construction area off limits during development phases;
  - Prevent run-off from dirty water areas entering wetland habitats;
  - Ensure that seepage from dirty water systems is prevented as far as possible;
  - Ensure that the mine process water system is managed in such a way as to prevent discharge to the receiving environment;
  - Implement effective waste management in order to prevent construction related waste from entering the wetland environment;
  - All wetland areas must be rehabilitated upon decommissioning to ensure that wetland functions are re-instated during decommissioning and all disturbed wetland areas adjacent to the mining development must be re-vegetated with indigenous wetland species;

- It must be ensured that all activities potentially impacting on geohydrological resources are managed according to the relevant DWA Licensing regulations and groundwater monitoring requirements;
- Post closure groundwater management will need to be very carefully managed to ensure that no impact on the wetland areas takes place after mine closure has taken place; and
- Future mine planning should ensure that mining activities does not lead to a reduction of stream flow or dewatering of any wetland areas.

Aquatic Ecology

The following mitigation and management measures should be considered for the construction, operation and decommissioning phases of the project with regards to aquatic ecology impacts:

- *Impacts on water quality*
    - Ensure that as far as possible all infrastructures are placed outside of wetland, riparian, drainage and stream areas. In particular mention is made of the need to not encroach on the riparian systems on the Selons River within the proposed mine area and a minimum buffer of 100m around all wetland and riparian systems should be maintained in line with the requirements of regulation GN704 of the National Water Act;
    - Very clear and well managed clean and dirty water separation must take place in line with the requirements of regulation GN704 of the National Water Act;
    - Pollution control dams must be adequately designed to contain a 1:50 24 hour storm water event;
    - All pollution control facilities must be managed in such a way as to ensure that storage and surge capacity is available if a rainfall event occurs;
    - Limit the footprint area of the construction activity to what is absolutely essential in order to minimise the loss of clean water runoff areas and the concomitant recharge of streams in the area;
    - Permit only essential construction personnel within 32m of all riparian systems;
    - Keep all demarcated sensitive zones outside of the construction area off limits during the construction phase of the development;
    - All hazardous chemicals must be stored on specified surfaces;
    - Ensure that all spills are immediately cleaned up;
    - Monitor all pollution control facilities using toxicological screening methods and implement the calculation of discharge dilution factors by means of the Direct Estimation of Ecological Effect Potential (DEEEP) protocol;
    - Ongoing aquatic ecological monitoring must take place on a 6 monthly basis by an SA RHP Accredited assessor;
    - The extent of all operations which may impact the Selons River must be kept to an absolute minimum; and
    - No infrastructure or open pits should encroach into any major drainage lines.
- *Impacts on loss of aquatic habitat*
    - Ensure that as far as possible all infrastructures are placed outside of wetland, riparian, drainage and stream areas. In particular mention is made of the need to not encroach on the riparian systems on the Selons River within the proposed mine area and a minimum buffer of 100m around all wetland and riparian systems should be maintained in line with the requirements of regulation GN704 of the national Water Act;
    - Limit the footprint area of the construction activity to what is absolutely essential in order to minimise the loss of aquatic habitat in the area;

- Ensure that all stockpiles are well managed and have measures such as berms and hessian sheets implemented to prevent erosion and sedimentation which may ultimately lead to transformation of aquatic habitat areas;
- Pollution control dams should be off stream structures and not within the natural drainage system of the area, thereby minimising impacts loss or transformation of aquatic habitat;
- Permit only essential construction personnel within 100m of all riparian systems;
- Keep all demarcated sensitive zones outside of the construction area off limits during the construction phase of the development as well as during operational phase of the mine;
- Implement alien vegetation control program within wetland and riverine areas with special mention of water loving tree species;
- Ongoing aquatic ecological monitoring must take place on a 6 monthly basis by an SA RHP Accredited assessor;
- The extent of all operations which may impact aquatic habitat must be kept to an absolute minimum;
- No infrastructure or open pits should encroach into any major drainage lines; and
- Re-vegetate all disturbed areas with indigenous tree species and make use of indigenous species with an affinity for riparian zones.

■ *Impacts on loss of aquatic biodiversity and sensitive taxa*

- Ensure that as far as possible all infrastructure is placed outside of sensitive wetland areas, streams and rivers;
- Pollution control dams should be off stream structures and not within the natural drainage system of the area, thereby minimising impacts form inundation and siltation;
- Permit only essential construction personnel within 100m of the wetland habitat;
- Keep all demarcated sensitive zones outside of the construction area off limits during the construction phase of the development;
- Use of water must be minimised as far as possible in order to minimise the loss of recharge of the Selons River system;
- Limit the footprint area of the construction activity to what is absolutely essential in order to disturbance of soils leading to runoff, erosion and sedimentation and loss of instream flow and stream recharge;
- Prevent run-off from dirty water areas entering stream and river systems through ensuring clear separation of clean and dirty water areas;
- Ensure that the mine process water system is managed in such a way as to prevent discharge to the receiving environment and to prevent discharge of dirty water;
- Implement measures to contain seepage as far as possible to prevent contamination of the groundwater regime;
- Implement alien vegetation control program within wetland and riparian areas;
- Monitor all systems for erosion and incision;
- Any areas where active erosion is observed must be rehabilitated and berms utilised to slow movement of water;
- Ongoing aquatic biomonitoring should take place in order to identify any emerging issues in the receiving environment;
- Toxicological monitoring of the receiving and process water systems on a quarterly basis;

- The extent of all operations which may impact aquatic habitat must be kept to an absolute minimum;
- No infrastructure or open pits should encroach into any major drainage lines; and
- Monitoring of sediment heavy metal concentrations.

■ *Impacts on loss of instream flow*

- Ensure that as far as possible all infrastructures are placed outside of drainage and river areas. In particular mention is made of the need to not encroach on the riparian systems near the Selons River with a minimum buffer of 100m around all wetland and riparian systems should be maintained in line with the requirements of regulation GN704 of the National Water Act;
- Limit the footprint area of the construction activity to what is absolutely essential in order to minimise the loss of clean water runoff areas;
- No use of clean surface water or any groundwater which potentially recharges the watercourses in the area should take place. In this regard specific mention is made of any water use which will affect the instream flow in the Selons River;
- Very strict control of water consumption must take place and detailed monitoring must take place and where all water usage must continuously be optimised;
- Upstream dewatering boreholes should be utilised to minimise the creation of dirty water and this clean water should be used to recharge the natural systems downstream of the mining rights areas;
- Pollution control dams should be off stream and tributary structures and not within the natural drainage system of the area, thereby minimising impacts loss of instream flow and downstream recharge;
- Permit only essential construction personnel within 32m of all riparian systems;
- Keep all demarcated sensitive zones outside of the construction area off limits during the construction phase of the development;
- Implement alien vegetation control program within wetland areas with special mention of water loving tree species;
- Monitor all affected riparian systems for moisture stress;
- Monitor all potentially affected riparian zones for changes in riparian vegetation structure;
- Ongoing aquatic ecological monitoring must take place on a 6 monthly basis by an SA RHP (South African River Health Program) Accredited assessor;
- The extent of the operations in the mining rights area must be kept to an absolute minimum; and
- No infrastructure or open pits should encroach into any major drainage lines.

Air Quality

The following mitigation and management measures should be considered with regards to air quality impacts

■ *Construction Phase*

Although incremental concentrations and deposition rates due to the construction phase of the proposed Rietvlei Mine project are estimated to be of low environmental significance, it is recommended that effective dust control measures be implemented based on good practice. The implementation of effective controls during this phase would also serve to set the precedent for mitigation during the operational phase.

Control techniques for fugitive dust sources generally involve watering, chemical stabilization, and the reduction of surface wind speed though the use of windbreaks and source enclosures. Proposed dust control measures which may be implemented during the construction phase are as follows:

- Debris handling - wind speed reduction through sheltering and wet suppression;
- Truck transport - wet suppression or chemical stabilization of unpaved roads;
- Dust entrainment – reduction of unnecessary traffic and strict speed control, require haul trucks to be covered, and ensure material being hauled is wet;
- Materials storage, handling and transfer operations - wet suppression;
- Earthmoving and dozing operations - wet suppression;
- General construction - wind speed reduction, wet suppression and early paving of permanent roads. Phasing of earthmoving activities to reduce source size; and
- Open areas (wind-blown emissions) - early vegetation, compaction and stabilization of disturbed soil and reduction of the frequency of disturbance.

Mitigation measures can be implemented as an attempt to reduce the production of gases from both vehicles use and surface blasting. Catalytic converters can be fitted to construction vehicles to aid in the reduction of gases produced. Regular maintenance of construction vehicles can also reduce the gases produced. Well planned blasting can reduce the production of gases**.**

- *Operational Phase*
  - Due to the generally high existing background particulate air concentrations in the region, it is recommended to control major contributing sources. Wind erosion of exposed areas should be kept to a minimum through watering programs and avoiding unnecessary disturbance of stabilised areas.;
  - Dust fallout monitoring should continue to be carried out close to the sensitive receptors around the mine area. It is recommended that dust deposition sampling continue to be confined to sites within close proximity (< 2 km) to the proposed mine operations. Monitoring is undertaken using the American Society for Testing and Materials standard test method for the collection and analysis of dustfall (ASTM D-1739); and
  - Implementation of the air quality management plan as outlined in the Air Quality Impact Assessment Report included in **Appendix 18**.

Noise

The following mitigation and management measures should be considered with regards to noise impacts

- *Construction Phase*
  - Machinery and equipment must be maintained in good working order; and
  - Regular monitoring of the exposed livestock should be undertaken in order to ascertain if there are any adverse reactions.
- *Operational Phase*
  - Maintenance of equipment and operational procedures:
    - Proper design and maintenance of silencers on diesel-powered equipment,
    - Systematic maintenance of all forms of equipment, and
    - Training of personnel to adhere to operational procedures that reduce the occurrence and magnitude of individual noisy events.
  - Placement of material stockpiles:

- Where possible earthworks and material stockpiles should be placed so as to protect the boundaries from noise from individual operations and especially from haul roads, which for greatest effect should be placed directly behind them; and
- If a levee is constructed, it should be of such a height as to effectively act as a noise barrier, if line of sight calculations show this to be practicable.

- Equipment noise audits:
  - Standardised noise measurements should be carried out on individual equipment at the delivery to site to construct a reference data base and regular checks carried out to ensure that equipment is not deteriorating and to detect increases which could lead to increase in the noise impact over time and increased complaints.
- Environmental noise monitoring:
  - This should be carried out by an independent agency regularly at six-monthly intervals close to MP2 at the nearest mine boundary to Rietvlei Farm to detect deviations from predicted noise levels and enable corrective measures to be taken where warranted.
  - In addition it is recommended to carry out continuous blast monitoring to check on the levels of air blast and groundborne vibration generated by individual blasts at the same position.
- Mobile equipment noise:
  - Select vehicle routes carefully by internalising the roads;
  - Fit efficient silencers and enclose engine compartments;
  - Damp mechanical vibrations;
  - Maintain equipment conscientiously; and
  - Erect berms, screens or barriers at permanent sites and haul roads.
- Fixed plant noise:
  - Carefully select permanent plant site remote from sensitive receptors;
  - Reduce noise at source by acoustic treatment;
  - Isolate source by acoustic enclosure, etc. Compressors and generators, if used on site, should be installed in separate acoustically treated buildings; and
  - The crusher and front end loaders supplying the transport trucks should be centred within the coal stockpiles which should encircle the operation and maintained at a height of 4-5 meters as far as possible so they continuously act as noise berms. The essential situation is that there should be no line of sight from sensitive receptors outside the mine boundary to the operating equipment.
- Correct calculation of the charge size to keep air blast and ground vibration levels below pre-determined acceptable values;
- Monitoring blast, ground vibration and human response to ensure accepted levels are in fact acceptable and are being adhered to, and to modify the blasting regime as appropriate;
- Pre-notification of affected persons of the intention to blast and the time of blast;
- Correct stemming of blastholes;
- Monitor sensitive structures for signs of attributable damage;
- Vibration monitoring of the structure to ascertain actual vibration levels; and
- Regular monitoring of the exposed livestock should be undertaken in order to ascertain if there are any adverse reactions.

Archaeology and Cultural Heritage

The graveyards must be mitigated by means of exhumation and relocation. The exhumation of human remains and the relocation of graveyards are regulated by various laws, regulations and administrative procedures. This task is undertaken by forensic archaeologists or by reputed undertakers who are acquainted with all the administrative procedures and relevant legislation that have to be adhered to whenever human remains are exhumed and relocated. This process also includes social consultation with a 60 days statutory notice period for graves older than sixty years. Permission for the exhumation and relocation of human remains have to be obtained from the descendants of the deceased (if known), the National Department of Health, the Provincial Department of Health, the Premier of the Province and the local police.

The relocation (mitigation) of the graveyards has high potential for better conservation as these cemeteries will be managed whilst the current graveyards are abandoned, neglected and are falling into disrepair.

A Conservation Management Plan for graveyards which may be left unaffected must be included in the mine's EMP to ensure their continued existence during the construction, operation and decommissioning phase of the Rietvlei Coal Mine. This plan must provide for the following:

- Demarcation of graveyards with fences or walls and fitted entrance gates to provide access to family and friends;
- Regulated visitor hours compatible with mine safety rules; and
- Maintaining corridors of at least 30m between graveyard borders and developmental activities.

Visual Aspects

The following mitigation and management measures should be considered with regards to visual impacts

- *Planning Phase*
  - Make use of existing roads wherever possible, and minimise the requirement for roads around the perimeter of the mine;
  - Where grading and earth moving is required adjacent to public roads, make use of the spoil to create berms along the road to shield visual impact. Vegetate and monitor erosion on these berms;
  - Where new roads are required, these should be planned taking due cognisance of the topography. Construction of roads should be undertaken properly, with adequate drainage structures in place to forego potential erosion problems;
  - Implement an environmentally responsive planning approach to roads and infrastructure to limit cut and fill requirements. Plan with due cognisance of the topography;
  - Paint all project facilities, fences and sign boards with muted earth-toned colours that will blend with the background colour of the vegetation;
  - Ensure that all surface treatments are non-reflective;
  - Pro actively plan the lighting requirements for the mine, both for construction and operations. Possible measures include the following:
    - Shielding the sources of light by physical barriers (walls, vegetation, or the structure itself);
    - Directing light sources away from residential units and roads;
    - Limiting mounting heights of lighting fixtures;
    - Making use of minimum lumen or wattage in fixtures;
    - Making use of down-lighters, or shielded fixtures;

- Making use of Low Pressure Sodium lighting or other types of low impact lighting; and
- Making use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.

- *Construction Phase*
  - Reduce the construction period through careful planning and productive implementation of resources;
  - Plan the placement of lay-down areas and temporary construction equipment camps in order to minimise vegetation clearing;
  - Avoid or minimise the clearing of existing vegetation wherever possible;
  - Screen the construction camp and lay-down yards by enclosing the entire area with a dark green or black shade cloth of no less than 2m height;
  - Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads;
  - Ensure that rubble, litter and disused construction materials are managed and removed regularly;
  - Ensure that all infrastructure and the site and general surrounds are maintained in a neat and appealing way;
  - Reduce and control construction dust through the use of approved dust suppression techniques, especially on windy days;
  - Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting; and
  - Rehabilitate all disturbed areas, construction areas, road servitudes and cut and fill slopes as soon as possible to acceptable visual standards.
- *Operational Phase*
  - Maintain the general appearance of the facility in an aesthetically pleasing way;
  - Reduce and control construction dust through the use of approved dust suppression techniques, especially on windy days;
  - Refrain from using the coal as infill material in road works; and
  - Monitor rehabilitated areas, and implement remedial action as and when required.
- *Decommissioning Phase*
  - Remove infrastructure and buildings not required for the post-decommissioning use of the site;
  - Backfill and rehabilitate all voids and unnatural landforms to resemble local topography;
  - Rip and rehabilitate all access roads not required for the post-decommissioning use of the site; and
  - Monitor rehabilitated areas, and implement remedial action as and when required.

Socio-Economic

The following mitigation and management measures have been identified for the social environment:

- *Construction Phase*
  - As far as possible, labour must be sourced from the local area and Middleburg, where appropriate skills exist;

- Contractors must make every effort to obtain services and consumables from local entrepreneurs;
- Non-core activities related to the construction phase of the project will be identified and out-sourced to local service providers, where the skills exist;
- PPE must be made available to all employees and contractors, during the construction phase;
- Public awareness programmes must be developed by the mine with the community to identify areas of particular risk and approaches to reduce risk;
- Dust suppression measures such as watering must be implemented on the access road during the construction period to reduce the amount of dust created;
- Speed limits must be stipulated and enforced for vehicles using the surrounding roads;
- Noisy activities must be undertaken during regular working hours during the construction phase. In the event that noisy activities are required to be undertaken outside of these hours the surrounding communities and residents must be informed;
- No accommodation will be permitted on site;
- The mine will ensure that an HIV/ AIDS strategy is in place and effectively implemented at the mine;
- Condoms will be made available to all staff and workers;
- Strict penalties will be built into tenders to deal with issues such as petty crime, stock theft, fence cutting, trespassing, the closing of farm gates etc;
- Unauthorised social activities are to be prohibited, which include, but are not limited to, consumption of or illegal selling of alcohol, drug utilisation or selling, and onsite prostitution;
- The contractor is to ensure that all staff on site will be in possession of a South African identity document, or suitable valid work permit from the Department of Home Affairs;
- Skills development programmes will be set up so as to improve the skills of the labour force;
- The Social Labour Plan must be followed to ensure the development of skilled labour; and
- The mine will ensure that a transportation system is implemented from the potential housing areas to the mine to reduce the potential impact on the roads and aid in the creation of entrepreneurial opportunities.

■ *Operational Phase*

- The mine should encourage local business to provide services for the mine to allow for economic development of the local area;
- As far as possible, labour will be sourced from the local area and Middleburg, where appropriate skills exist;
- Contractors must make all efforts to obtain services and consumables from local entrepreneurs;
- PPE must be made available to all employees and contractors, during the operational phase;
- The mine will routinely inspect the boundary fences around the mine;
- Public awareness programmes will be developed by the mine with the community to identify areas of particular risk and approaches to reduce risk;
- No accommodation will be permitted onsite;

- The mine will ensure that an HIV/ AIDS strategy is in place and effectively implemented at the mine;
- Condoms will be made available to all staff and workers;
- Strict penalties will be built into tenders to deal with issues such as petty crime, stock theft, fence cutting, trespassing, the closing of farm gates etc;
- Unauthorised social activities are to be prohibited, which include, but are not limited to, consumption of or illegal selling of alcohol, drug utilisation or selling, and onsite prostitution;
- The contractor is to ensure that all staff onsite will be in possession of a South African identity document, or suitable valid work permit from the Department of Home Affairs;
- Skills development programmes will be set up so as to improve the skills of the labour force;
- The Social Labour Plan must be followed to ensure the development of skilled labour; and
- The mine will ensure that a transportation system is implemented from the potential housing areas to the mine to reduce the potential impact on the roads and aid in the creation of entrepreneurial opportunities.

- *Decommissioning Phase*
  - Contractors must make all efforts to obtain services and consumables from local entrepreneurs;
  - PPE must be made available to all employees and contractors, during the decommissioning and closure phase;
  - The mine will routinely inspect the boundary fences around the mine;
  - Strict penalties will be built into tenders to deal with issues such as petty crime, stock theft, fence cutting, trespassing, the closing of farm gates etc;
  - The mine will ensure that an HIV/ AIDS strategy is in place and effectively implemented at the mine;
  - Unauthorised social activities are to be prohibited, which include, but are not limited to, consumption of or illegal selling of alcohol, drug utilisation or selling, and onsite prostitution; and
  - The Social Labour Plan must be followed to ensure the development of skilled labour.

Blasting and Vibration

- *Mitigation Measures*

  In review of the evaluations made it is certain that specific mitigation will be required with regards to ground vibration, air blast and fly rock. This is specific to the structures closest to the pit area i.e. a monitoring borehole, roads and the railway. The greatest concern is ground vibration but due to the location of the pans the pans could be contaminated by fly rock and debris.

  Ground vibration mitigation can be done in two ways: reduce the charge mass per delay – in other words, plan blasting operations considering different initiation and charging options. Secondly increase distance between the blast and the structure of concern. These are the main factors to be considered for mitigation.

  In order to ensure that levels of ground vibration and that of air blast are within acceptable limits not to induce damage, a combination of reduce charge mass per delay and increased distance from the structures of concern is recommended. The location of these structures is such that specific design changes are required for the blast operations on the northern side of the pit area. This will be dependent on the actual drill depths, quantity of charge per blasthole and the initiation system used. The Blasting and Vibration Report (**Appendix 29**) makes recommendations based on minimum and maximum charge allowed to facilitate acceptable levels of ground vibration.

Charge mass per delay less than that specified will allow for shorter distances. The possible options in order to obtain acceptable ground vibration are more than what is given here but without final blast design and actual position of the specific blast the table below gives the best solution for the moment. Air blast and fly rock can be controlled using proper charging methodology. Blasting operations in any area in the pit further than the distances given below will yield lower levels of ground vibration. It is advisable that a detail plan of action is put in place to manage ground vibrations in the areas of concern.

- *Monitoring*

It is highly recommended that a blast monitoring program be put in place. This includes monitoring ground vibration and air blast for every blast. Ground vibration and air blast is monitored using a seismograph. Monitoring can be done in permanent stations or on ad hoc basis – per blast basis monitoring. Additionally to this it is recommended that a video of each blast is done as a standard. Monitoring of ground vibration and air blast is done to ensure that the generated levels of ground vibration and air blast comply with recommendations.

Proposed positions were also selected to indicate the nearest points of interest at which levels of ground vibration and air blast should be within the accepted norms and standards as proposed in this report. The monitoring of ground vibration will also qualify the expected ground vibration and air blast levels and assist in mitigating these aspects properly. This will also contribute to proper relationships with the neighbours. Currently 10 monitoring positions have been identified and are indicated in **Figure 80**.

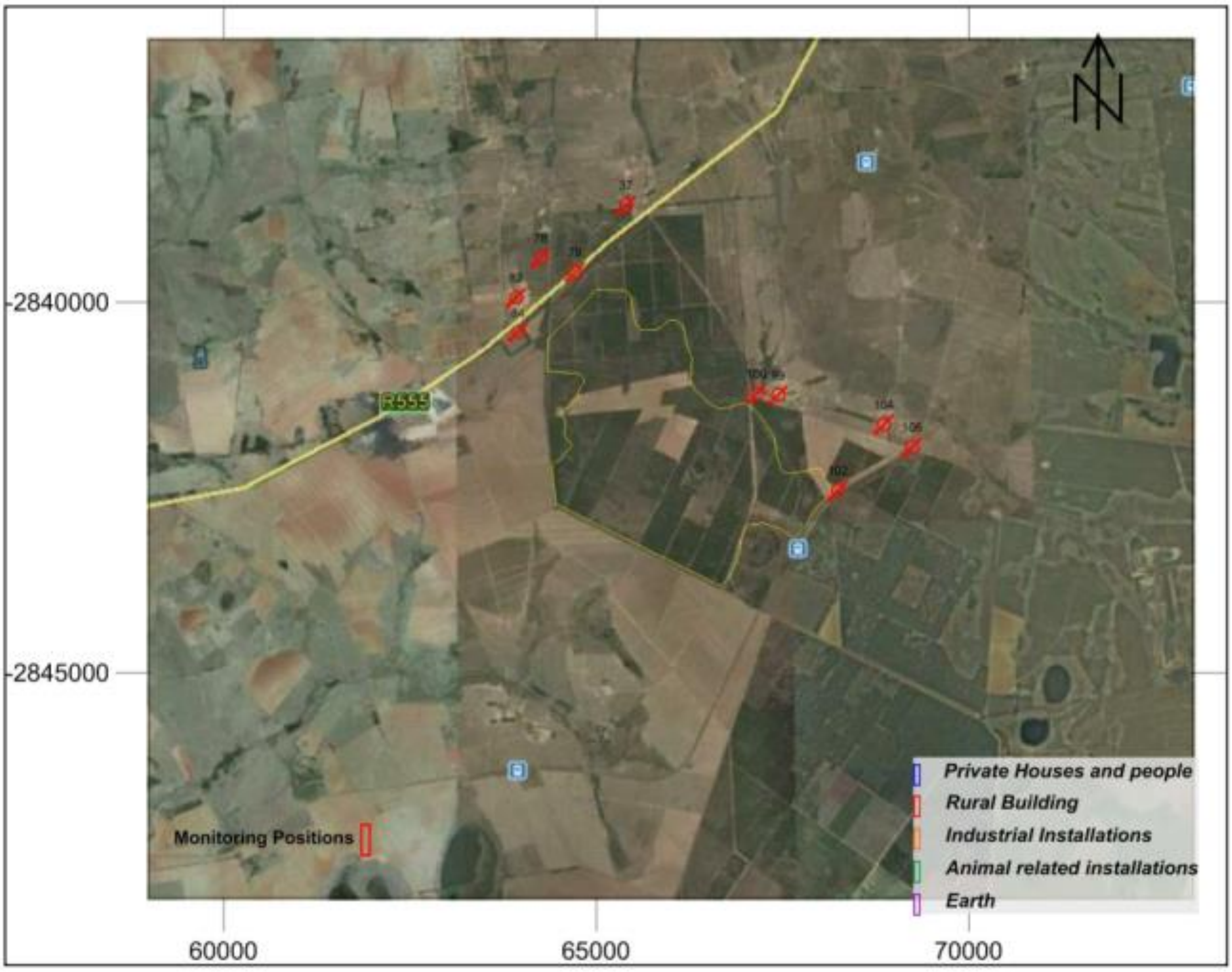


Figure 83: Recommended Ground Vibration Monitoring Points

- *Additional Recommendations*

  The following additional recommendations have been made with regards to the mitigation and management of the identified blasting impacts:

  - Safe blasting distance from communities

    A minimum safe distance 150m is required but recommended is that a minimum of 500m must be maintained from any blast done. This may be greater but not less. The blaster has a legal obligation concerning the safe distance and he needs to determine this distance.

  - Evacuation

    All persons and animals within 500m from a blast must be cleared and where necessary evacuation must be conducted with all the required pre-blast negotiations.

  - Road Closure

    There are public and farm roads closer than 500m to the project area. Proper road closure procedures in conjunction with the necessary authorities will be required. All blasting closer than 500m to roads will require road closure procedures. Farm roads that are used daily may exist and should be considered for closure just when blasting is done in vicinity of these roads.

  - Railway

    The railway is located close to the pit area on the southern side. The frequency of trains passing through is unknown at this stage. Specific care and attention will have to be given to the following. Blasting should considered train schedules, distance from the railway, contingency plans if fly rock has occurred, fly rock control for railway electrical lines are some of the actions to be considered.

  - Photographic Inspections

    It will be imperative to conduct a photographic survey (crack survey) of all structures around the pit areas. All structures within 1500m from the pit boundary are to be surveyed prior to any blasting done. A 1500m equates to 2.1mm/s of expected ground vibration for the charge used. This level of ground vibration is already perceptible and people in structures could experience ground vibration negatively.

  - Recommended ground vibration and air blast levels

    The ground vibration and air blast levels recommended in the Blasting and Vibration Report (**Appendix 29**) for blasting operations in this area should be adhered to.

  - Stemming length

    The current proposed stemming lengths at least must be maintained to ensure control on fly rock. Specific designs where distances and blast is known should be considered with this.

  - Blasting times

    A further consideration of blasting times is when weather conditions could influence the effects yielded by blasting operations. Recommended is not to blast too early in the morning when it is still cool or the possibility of inversion is present or too late in the afternoon in winter as well. Do not blast in fog. Do not blast in the dark. Refrain from blasting when wind is blowing strongly in the direction of an outside receptor. Do not blast with low overcast clouds. These ‘do not’s stem from the influence that weather has on air blast. The energy of air blast cannot be increased but it is distributed differently to unexpected levels where it was not expected. It is recommended that a standard blasting time is fixed and blasting notice boards setup at various routes around the project area that will inform the community blasting dates and times.

  - Third party monitoring

    Third party consultation and monitoring should be considered for all ground vibration and air blast monitoring work. Additionally assistance may be sought when blasting is done close to the highways. This will bring about unbiased evaluation of levels and influence from an independent group. Monitoring could be done using permanent installed stations. Audit functions may also be conducted to assist the mine in maintaining a high level of performance with regards to blast results and the effects related to blasting operations.

Traffic

The following mitigation and management measures have been identified for traffic related impacts:

- *Construction Phase*
    - Construction vehicles using the roads will be scheduled to avoid peak-hour traffic i.e. avoid period between 07:00am and 09:00am as well as the period between 16:00pm and 18:00pm;
    - Upgrade of the roads would aid in faster moving vehicles and potholes would be avoided;
    - Construction vehicles should stay to the left hand side of the road and allow faster moving vehicles to pass them if and when it is safe to do so;
    - All construction and maintenance vehicles travelling on public roads must adhere to the relevant traffic laws and regulations;
    - Haul routes should be sprayed with water regularly to avoid the generation of dust;
    - All construction vehicles should abide by speed limits to reduce excessive generation of dust;
    - Construction vehicles must only use the roads during daylight hours. No vehicles should be operational from 6pm to 6am;
    - Construction vehicles should put their headlights on when accessing the roads where pedestrians are commonly found;
    - All construction vehicles should comply with the general road rules as to reduce the possibility of pedestrian incidents;
    - All construction and maintenance vehicles travelling on public roads must adhere to the relevant traffic laws and regulations;
    - In the event that the accident involves another vehicle the relevant authorities are to be notified of the incident and responsive action implemented based on legal and insurance requirements;
    - All construction and maintenance vehicles travelling on public roads must adhere to the relevant traffic laws and regulations to avoid the possibility of accidents;
    - All Construction vehicles should adhere to the speed limits;
    - The proposed mine must be responsible for continued maintenance on the roads used by the construction vehicles; and
    - Upgrade of the roads must occur so that potholes would be avoided and that the roads are safer to use.
- *Operational Phase*
    - Operational vehicles using the roads will be scheduled to avoid peak-hour traffic i.e. avoid period between 07:00 and 09:00 as well as the period between 16:00 and 18:00;
    - Upgrade of the roads would aid in faster moving vehicles and potholes would be avoided;
    - Operational vehicles should stay to the left hand side of the road and allow faster moving vehicles to pass them if and when it is safe to do so;

- All Operational and maintenance vehicles travelling on public roads must adhere to the relevant traffic laws and regulations;
- All vehicles transporting coal should be covered to avoid the generation of dust created by fine coal particulates;
- Haul routes should be sprayed with water regularly to avoid the generation of dust;
- All Operational vehicles should abide by speed limits to reduce excessive generation of dust;
- In the event that the accident involves another vehicle the relevant authorities are to be notified of the incident and responsive action implemented based on legal and insurance requirements;
- All operational vehicles travelling on public roads must adhere to the relevant traffic laws and regulations to avoid the possibility of accidents;
- All operational vehicles should adhere to the speed limits;
- The proposed mine must be responsible for continued maintenance on the roads used by the operational vehicles;
- Upgrade of the roads must occur so that potholes would be avoided and that the roads are safer to use;
- The speed limit on the road surrounding the mining area should be lowered from 120km/h to 60km/h;
- Clear signage should be used to clearly indicate the rules of the road;
- The roads should be upgraded and lengthened to improve the shoulder sight distance for operational vehicles;
- Operational vehicles must only use the roads during daylight hours. No vehicles should be operational from 6pm to 6am;
- Operational vehicles should put their headlights on when accessing the roads where pedestrians are commonly found;
- All operational vehicles should comply with the general road rules as to reduce the possibility of pedestrian incidents; and
- All operational vehicles travelling on public roads must adhere to the relevant traffic laws and regulations.

■ *Decommissioning Phase*

- Haul routes should be sprayed with water regularly to avoid the generation of dust; and
- All decommissioning vehicles should abide by speed limits to reduce excessive generation of dust.

■ *Cumulative Impacts*

- All mining vehicles using the roads should be scheduled to avoid peak-hour traffic i.e. avoid period between 07:00 and 09:00 as well as the period between 16:00 and 18:00;
- Upgrade of the roads would aid in faster moving vehicles and potholes would be avoided;
- All mining vehicles should stay to the left hand side of the road and allow faster moving vehicles to pass them if and when it is safe to do so;
- All mining vehicles travelling on public roads must adhere to the relevant traffic laws and regulations;
- All vehicles transporting coal should be covered to avoid the generation of dust created by fine coal particulates;
- Haul routes should be sprayed with water regularly to avoid the generation of dust; and

- All mining vehicles should abide by speed limits to reduce excessive generation of dust.

ix) Motivation where no alternative sites were considered.

Not Applicable

x) Statement motivating the alternative development location within the overall site. (Provide a statement motivating the final site layout that is proposed)

Refer to Section 3(g)(i) for a discussion on the alternatives.

h) Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (In respect of the final site layout plan) through the life of the activity. (Including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.)

Refer to Section 3(d)(v) for a detailed discussion with regards to the identification and assessment of impacts.

i) Assessment of each identified potentially significant impact and risk

(This section of the report must consider all the known typical impacts of each of the activities (including those that could or should have been identified by knowledgeable persons) and not only those that were raised by registered interested and affected parties).

ACTIVITY whether listed or not listed. **(E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.).**	**POTENTIAL IMPACT** **(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc….etc…)**	**ASPECTS AFFECTED**	**PHASE** In which impact is anticipated **(e.g. Construction, commissioning, operational Decommissioning, closure, post-closure)**	**SIGNIFICANCE** if not mitigated	**MITIGATION TYPE** **(modify, remedy, control, or stop)** **through** **(e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc)** **E.g.** **Modify through alternative method.** **Control through noise control Control through management and monitoring through rehabilitation.**	**SIGNIFICANCE** if mitigated
The activities most relevant to the construction phase include: • Topsoil stripping and stockpiling; • Haul road construction; • Upgrading of the D1433; • Construction of the surface infrastructure	The development of the construction infrastructure (building structures, access roads, fencing, etc.)	Topography	Construction	**Medium**	Control through design measures	**Medium**
	Disturbance of natural lie of the land resulting from site clearing and topsoil removal	Topography	Construction	**Medium**	Control through design measures Remedy through Rehabilitation	**Medium**
	Disturbance of natural/ or existing flow of topography and the free drainage of the area	Topography	Construction	**Medium**	Control through design measures Remedy through	**Medium**

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
including the coal processing plant, buildings and offices, perimeter fence and sewage plant; • Establishment of the coal discard facility; • Installation of water and power supply infrastructure including stomr water control infrastructure; and • Construction of the clean and dirty water system, including 2 pollution control dams	resulting from surface infrastructure.				Rehabilitation	
	Stripping of topsoil at the initial box cut footprint	Soil, Land Capability and Land use	Construction	**High**	Control through Management and Monitoring Remedy through Rehabilitation	**High**
	Possible contamination of soil by spillages of fuel or oil by mechanical means	Soil, Land Capability and Land use	Construction	**Medium**	Control through Management and Monitoring	**Low**
	Construction of topsoil, soft and hard overburden stockpiles during initial box cuts	Soil, Land Capability and Land use	Construction	**High**	Control through Management and Monitoring	**High**
	Construction of haul roads	Soil, Land Capability and Land use	Construction	**High**	Control through design	**High**
	Construction of access roads and diversion of existing access road	Soil, Land Capability and Land use	Construction	**High**	Control through design	**High**
	Construction of Pollution control dam	Soil, Land Capability and Land use	Construction	**High**	Control through design	**High**
	Construction of office workshop complex including offices, heavy vehicle workshop, stores, vehicle parking areas	Soil, Land Capability and Land use	Construction	**High**	Control through design	**High**
	Impacts on Habitat for Floral Species	Flora	Construction	**Medium**	Control through Management and Monitoring	**Medium**
	Impacts on Floral Diversity	Flora	Construction	**High**	Control through Management and Monitoring	**Medium**
	Impacts on Floral Species of Conservational Concern	Flora	Construction	**Low**	Control through Management and Monitoring	**Low**
	Impact on faunal habitat and	Fauna	Construction	**High**	Control through Management	**Medium**

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
	ecological structure				and Monitoring	
	Impact on faunal diversity and ecological integrity	Fauna	Construction	**High**	Control through Management and Monitoring	**Medium**
	Impact on faunal species of conservational concern	Fauna	Construction	**Medium**	Control through Management and Monitoring	**Low**
	Impacts on water quality	Aquatic Ecology	Construction	**High**	Control through Management and Monitoring	**Medium**
	Impacts on loss of aquatic habitat	Aquatic Ecology	Construction	**Medium**	Control through Management and Monitoring	**Medium**
	Impacts on loss of aquatic biodiversity and sensitive taxa	Aquatic Ecology	Construction	**Medium**	Control through Management and Monitoring	**Medium**
	Impacts on loss of instream flow	Aquatic Ecology	Construction	**High**	Control through Management and Monitoring	**Medium**
	Siltation due to soil disturbance	Surface Water	Construction	**Low**	Control through Management and Monitoring	**Low**
	Erosion due to rerouting of storm water runoff	Surface Water	Construction	**Low**	Control through Management, monitoring and design	**Low**
	Water quality deterioration due to Spill and /or leaking of hydrocarbon product from construction vehicles, equipment's, and storage	Surface Water	Construction	**Medium**	Control through Management and Monitoring	**Low**
	Water quality deterioration due to seepage from construction waste site to the surface water resource	Surface Water	Construction	**Medium**	Control through Management and Monitoring	**Low**
	Loss of wetland habitat and ecological structure	Wetlands	Construction	**High**	Control through Management and Monitoring	**Medium**
	Changes to wetland ecological and sociocultural service provision	Wetlands	Construction	**High**	Control through Management and Monitoring	**Medium**

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
	Impact on wetland hydrological function	Wetlands	Construction	**Medium**	Control through Management and Monitoring	**Low**
	Decreasing of the soils buffering capacity and increasing of infiltration rates	Groundwater	Construction	**Low**	Control through Management and Monitoring	**Low**
	Altered Flow systems due to probable dewatering (if required)	Groundwater	Construction	**Medium**	Control through Management and Monitoring	**Medium**
	Deterioration of water quality due to construction waste (Chemical in construction material)	Groundwater	Construction	**Medium**	Control through Management and Monitoring	**Low**
	Deterioration of water quality due to hydrocarbon spills from storage (organic contaminants)	Groundwater	Construction	**Medium**	Control through Management and Monitoring	**Low**
	Groundwater contamination due to groundwater seeps standing in the construction's footprint area.	Groundwater	Construction	**Medium**	Control through Management and Monitoring	**Low**
	Impact due to the generation of particulate matter (dust)	Air Quality	Construction	**Medium**	Control through Management and Monitoring	**Low**
	Impact due to the generation of gases	Air Quality	Construction	**Low**	Control through Management and Monitoring	**Low**
	Construction of the Opencast Pit	Noise	Construction	**Low**	Control through design	**Low**
	Construction noise and its effect on livestock	Noise	Construction	**Low**	Control through Management and Monitoring	**Low**
	Movement of Construction Vehicles	Visual Aspects	Construction	**Medium**	Control through Management and Monitoring	**Low**
	Visual impacts of construction on visual receptors in close proximity to the proposed mine	Visual Aspects	Construction	**Medium**	Control through Management and Monitoring	**Low**

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
	Employment opportunities for local labour resulting from the construction phase.	Socio-Economic	Construction	**Low (+)**	Control through Management and Monitoring	**Medium (+)**
	Increased health and safety issues resulting from noise emissions, dust emissions and trucks using the roads during the construction phase.	Socio-Economic	Construction	**Medium**	Control through Management and Monitoring	**Low**
	Unmanaged contractors might cause an increase in influx of job seekers and the establishment of informal settlements	Socio-Economic	Construction	**Medium**	Control through Management and Monitoring	**Low**
	Construction and closure activities could contribute to social ills, such as HIV/ AIDS, petty crime, stock theft, etc.	Socio-Economic	Construction	**Medium**	Control through Management and Monitoring	**Medium**
	The presence of non-residents, perceived "outsiders" and contractors within the local environment could cause localised social tension	Socio-Economic	Construction	**Medium**	Control through Management and Monitoring	**Low**
	Growth in skills development resulting from the employment of unskilled labour from nearby communities	Socio-Economic	Construction	**Low (+)**	Control through Management and Monitoring	**Medium (+)**
	Opportunities for entrepreneurial development as a result of the construction activities.	Socio-Economic	Construction	**Medium (+)**	Control through Management and Monitoring	**High (+)**
	Traffic generation around the site	Traffic	Construction	**Low**	Control through Management and Monitoring	**Low**
	Creation of dust as a result of the movement of construction	Traffic	Construction	**Medium**	Control through Management and Monitoring	**Low**

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
	vehicles					
	Operation of vehicles may impact pedestrian safety	Traffic	Construction	**Low**	Control through Management and Monitoring	**Low**
	Construction vehicles may result in an increase in road accidents	Traffic	Construction	**Medium**	Control through Management and Monitoring	**Low**
	Increase in traffic could result in the deterioration of the surrounding road network.	Traffic	Construction	**Medium**	Control through Management and Monitoring	**Low**
The operational phase includes the daily activities associated with the extraction of coal from the open cast pit. The activities most relevant to this phase include: • Excavation and blasting, as well as overburden stockpiling; • Coal removal, transport and processing; • Coal storage; • Utilisation of vehicles, equipment and machinery; and • Concurrent rehabilitation including, initial backfilling, levelling and placement of topsoil, fertiliser, vegetation and maintenance	Permanent loss of a natural, non-renewable resource and associated geology	Geology	Operational	**Medium**	Unable to mitigate	**Medium**
	The development of the pit will result in the altering of the topography in this area	Topography	Operational	**High**	Control through design Remedy through Rehabilitation	**High**
	The development of the pit will impact on the surface water flow dynamics	Topography	Operational	**High**	Control through design Remedy through Rehabilitation	**High**
	Infrastructure that is utilised on the site will alter the topography and surface water flow of the area	Topography	Operational	**High**	Control through design Remedy through Rehabilitation	**Medium**
	Deterioration of clean storm water runoff quality	Surface Water	Operational	**High**	Control through Management and Monitoring	**Low**
	Increasing of water removal activities due to in pit dewatering	Surface Water	Operational	**Low**	Control through Management and Monitoring	**Low**
	Ponding due to storm water falling onto operating (mining pit, crushing and screening, stockpiling) areas	Surface Water	Operational	**Low**	Control through Management, monitoring and design	**Low**
	Erosion due to surface water	Surface Water	Operational	**Low**	Control through Management	**Low**

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
	runoff rerouting				and Monitoring	
	Siltation due to surface water runoff rerouting	Surface Water	Operational	**Low**	Control through Management and Monitoring	**Low**
	Water quality deterioration due spill and/or leaking of hydrocarbon	Surface Water	Operational	**Medium**	Control through Management and Monitoring	**Low**
	Water quality deterioration due to septic tank	Surface Water	Operational	**Medium**	Control through Management, monitoring and design	**Low**
	Water quality deterioration due to seepage from waste disposal facility to the surface water resource	Surface Water	Operational	**Medium**	Control through Management, monitoring and design	**Low**
	Water quality deterioration due to spillage, seepage and/or leak from waste disposal, storage, handling facility to surface water	Surface Water	Operational	**Medium**	Control through Management, monitoring and design	**Low**
	Water quality deterioration due to Spillage of dirty water from dirty water control system (Dams, trenches, berms etc)	Surface Water	Operational	**Medium**	Control through Management, monitoring and design	**Low**
	Drop of groundwater levels due to open pit dewatering	Groundwater	Operational	**High**	Control through Management and Monitoring	**High**
	Deterioration of groundwater quality due to rock dumps.	Groundwater	Operational	**Medium**	Control through Management and Monitoring	**Low**
	Deterioration of groundwater quality due to open pit mining.	Groundwater	Operational	**High**	Control through Management and Monitoring	**Medium**
	Deterioration of groundwater quality due to coal processing	Groundwater	Operational	**High**	Control through Management and Monitoring	**Low**
	Deterioration of groundwater quality due to tailings disposal	Groundwater	Operational	**High**	Control through Management and Monitoring	**Low**

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
	Deterioration of groundwater quality due to leaks/spillages from dirty water quality dams and drain	Groundwater	Operational	**Medium**	Control through Management, monitoring and design	**Low**
	Deterioration of groundwater quality due to handling and transport of waste material.	Groundwater	Operational	**Medium**	Control through Management and Monitoring	**Low**
	Progressive stripping of topsoil at opencast footprint and stockpiling thereof before direct replacing is initiated	Soil, Land Capability and Land use	Operational	**High**	Control through Management and Monitoring Remedy through Rehabilitation	**High**
	Expansion of topsoil, soft and hard overburden stockpiles during the operational phase as open pit expands	Soil, Land Capability and Land use	Operational	**High**	Control through Management and Monitoring	**Medium (+)**
	Progressive stripping of topsoil at opencast footprint and direct replacing thereof	Soil, Land Capability and Land use	Operational	**High**	Control through Management and Monitoring Remedy through Rehabilitation	**Medium**
	Use of haul roads	Soil, Land Capability and Land use	Operational	**High**	Control through Management and Monitoring	**Medium (+)**
	Use of pollution control dams	Soil, Land Capability and Land use	Operational	**High**	Control through Management and Monitoring	**Medium (+)**
	Use of diesel, petroleum and oil storage on site	Soil, Land Capability and Land use	Operational	**Medium**	Control through Management and Monitoring	**Low**
	Use of coal stockpiles and ROM tip	Soil, Land Capability and Land use	Operational	**High**	Control through Management and Monitoring	**Medium (+)**
	Impacts on habitat for floral	Flora	Operational	**Medium**	Control through Management	**Medium**

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
	species				and Monitoring	
	Impacts on floral diversity	Flora	Operational	**High**	Control through Management and Monitoring	**Medium**
	Impact on floral species of conservational concern	Flora	Operational	**Low**	Control through Management and Monitoring	**Low**
	Impact on faunal habitat and ecological structure	Fauna	Operational	**High**	Control through Management and Monitoring	**Medium**
	Impact on faunal diversity and ecological integrity	Fauna	Operational	**High**	Control through Management and Monitoring	**Medium**
	Impact on faunal species of conservational concern	Fauna	Operational	**Medium**	Control through Management and Monitoring	**Low**
	Loss of wetland habitat and ecological structure	Wetlands	Operational	**High**	Control through Management and Monitoring	**Medium**
	Changes to wetland ecological and sociocultural service provision	Wetlands	Operational	**High**	Control through Management and Monitoring	**Medium**
	Impact on wetland hydrological function	Wetlands	Operational	**Medium**	Control through Management and Monitoring	**Low**
	Impacts on water quality	Aquatic Ecology	Operational	**High**	Control through Management and Monitoring	**Medium**
	Impacts on loss of aquatic habitat	Aquatic Ecology	Operational	**Medium**	Control through Management and Monitoring	**Medium**
	Impacts on loss of aquatic habitat	Aquatic Ecology	Operational	**Medium**	Control through Management and Monitoring	**Medium**
	Impacts on loss of instream flow	Aquatic Ecology	Operational	**High**	Control through Management and Monitoring	**Medium**
	Impact as a result of the increase in fugitive dust emissions	Air Quality	Operational	**Medium**	Control through Management and Monitoring	**Low**
	Transport of Coal from the	Noise	Operational	**Low**	Control through Management	**Low**

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
	mine to the treatment plant				and Monitoring	
	Operational phase of the Opencast Pit	Noise	Operational	**Low**	Control through Management and Monitoring	**Low**
	Blasting for the operation of the Opencast Mine	Noise	Operational	**Medium**	Control through design	**Low**
	Vibration on Surrounding Structures	Noise	Operational	**Low**	Control through design	**Low**
	Operational Noise and its effect on Livestock	Noise	Operational	**Low**	Control through Management and Monitoring	**Low**
	Blast Noise and its effect on Livestock	Noise	Operational	**Medium**	Control through Management and Monitoring	**Low**
	Effect of the areas in close proximity to the Operating Mine	Visual	Operational	**Medium**	Control through Management and Monitoring	**Medium**
	Effect of the mine on landscape characteristics	Visual	Operational	**Low**	Control through Management and Monitoring	**Low**
	Impact on Settlement and homesteads in close proximity to the proposed mine	Visual	Operational	**Medium**	Control through Management and Monitoring	**Medium**
	Mine's impact on the residents of settlements and homesteads within the region	Visual	Operational	**Low**	Control through Management and Monitoring	**Low**
	Visual impacts on users of major and secondary roads in close proximity to the proposed mine	Visual	Operational	**Medium**	Control through Management and Monitoring	**Medium**
	Visual impacts on users of major and secondary roads within the region.	Visual	Operational	**Low**	Control through Management and Monitoring	**Low**
	Visual impacts on recreational users, tourists and sightseers in close proximity to the proposed mine	Visual	Operational	**Low**	Control through Management and Monitoring	**Low**

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
	Visual impacts on users of major and secondary roads within the region.	Visual	Operational	**Low**	Control through Management and Monitoring	**Low**
	Visual impact of lighting at night on visual receptors in close proximity to the proposed mine.	Visual	Operational	**Medium**	Control through Management and Monitoring	**Medium**
	The development of the mine will have a positive impact on the economic development	Socio-Economic	Operational	**Medium (+)**	Control through Management and Monitoring	**High (+)**
	Employment opportunities for local labour resulting from the operational phase.	Socio-Economic	Operational	**Medium (+)**	Control through Management and Monitoring	**High (+)**
	Increased health and safety issues resulting from noise emissions, dust emissions and trucks using the roads during the operational phase.	Socio-Economic	Operational	**High**	Control through Management and Monitoring	**Medium**
	Unmanaged contractors might cause an increase in influx of job seekers and the establishment of informal settlements	Socio-Economic	Operational	**Medium**	Control through Management and Monitoring	**Low**
	Construction, operational and closure activities could contribute to social ills, such as HIV/ AIDS, petty crime, stock theft, etc.	Socio-Economic	Operational	**High**	Control through Management and Monitoring	**Medium**
	The presence of non-residents, perceived "outsiders" and contractors within the local environment could cause localised social tension	Socio-Economic	Operational	**Medium**	Control through Management and Monitoring	**Low**
	Growth in skills development resulting from the employment	Socio-Economic	Operational	**Medium (+)**	Control through Management	**Medium (+)**

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
	of unskilled labour from nearby communities				and Monitoring	
	Opportunities for entrepreneurial development as a result of the operational activities.	Socio-Economic	Operational	**Medium (+)**	Control through Management and Monitoring	**High (+)**
	Ground vibration impact on houses	Blasting and Vibration	Operational	**Medium**	Control through Management and Monitoring	**Low**
	Ground vibration impact on boreholes	Blasting and Vibration	Operational	**Medium**	Control through Management and Monitoring	**Low**
	Ground vibration impact on roads	Blasting and Vibration	Operational	**Low**	Control through Management and Monitoring	**Low**
	Ground vibration impact on railways	Blasting and Vibration	Operational	**Medium**	Control through Management and Monitoring	**Low**
	Air Blast impact on houses	Blasting and Vibration	Operational	**Medium**	Control through Management and Monitoring	**Low**
	Air Blast impact on boreholes	Blasting and Vibration	Operational	**Low**	Control through Management and Monitoring	**Low**
	Air Blast impact on roads	Blasting and Vibration	Operational	**Low**	Control through Management and Monitoring	**Low**
	Fly Rock impact on houses	Blasting and Vibration	Operational	**Low**	Control through Management and Monitoring	**Low**
	Fly Rock impact on boreholes	Blasting and Vibration	Operational	**Low**	Control through Management and Monitoring	**Low**
	Fly Rock impact on roads	Blasting and Vibration	Operational	**Medium**	Control through Management and Monitoring	**Low**
	Fly Rock impact on railways	Blasting and Vibration	Operational	**Medium**	Control through Management and Monitoring	**Low**
	Impact of Fumes Houses	Blasting and Vibration	Operational	**Low**	Control through Management and Monitoring	**Low**

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
	Impact of Fumes - Boreholes	Blasting and Vibration	Operational	**Low**	Control through Management and Monitoring	**Low**
	Impact of Fumes - Roads	Blasting and Vibration	Operational	**Low**	Control through Management and Monitoring	**Low**
	Impact of Fumes - Railways	Blasting and Vibration	Operational	**Low**	Control through Management and Monitoring	**Low**
	Traffic generation around the site from transportation and operational vehicles	Traffic	Operational	**Medium**	Control through Management and Monitoring	**Medium**
	Creation of dust as a result of the movement of operational vehicles	Traffic	Operational	**High**	Control through Management and Monitoring	**Low**
	Heavy vehicles may result in an increase in road accidents	Traffic	Operational	**Medium**	Control through Management and Monitoring	**Low**
	Increase in traffic could result in the deterioration of paved and haul routes	Traffic	Operational	**Medium**	Control through Management and Monitoring	**Low**
	Shoulder Sight Distance	Traffic	Operational	**Medium**	Control through Management and Monitoring	**Low**
	Operation of vehicles may impact pedestrian safety	Traffic	Operational	**Medium**	Control through Management and Monitoring	**Low**
The decommissioning and closure phase includes the activities associated with the removal/dismantling of machinery/equipment/infra structure no long necessary to the operation. This phase also includes the implementation and completion of	Decommissioning and Closure of the pit	Topography	Decommissioning and Closure	**High**	Control through Management and Monitoring Remedy through Rehabilitation	**Medium**
	Decommissioning of surface infrastructure	Topography	Decommissioning and Closure	**High**	Control through Management and Monitoring Remedy through Rehabilitation	**Medium**
	Erosion due to increase of runoff speed and velocity	Surface Water	Decommissioning and Closure	**Low**	Control through Management and Monitoring	**Low**

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
rehabilitation goals as well as the implementation of agreed monitoring and maintenance prescribed for the cessation of operations. The activities most relevant to this phase include: • Dismantling surface infrastructure; • Rehabilitation of haul and access roads; • Rehabilitation of final void(s); • Monitoring and maintenance of ground and surface water; and • Monitoring and maintenance of rehabilitation areas, specifically in terms of land use and capability.	Siltation related to erosion	Surface Water	Decommissioning and Closure	**Low**	Control through Management and Monitoring	**Low**
	Deterioration of water quality due to spill and/or leaking from hydrocarbon storage area	Surface Water	Decommissioning and Closure	**Medium**	Control through Management and Monitoring	**Low**
	Deterioration of water quality due to seepage and/or spillage from waste site facility	Surface Water	Decommissioning and Closure	**Medium**	Control through Management and Monitoring	**Low**
	Deterioration of the surface water quality due decanting water	Surface Water	Decommissioning and Closure	**High**	Control through Management and Monitoring	**Medium**
	Flood risk due decant to surface	Surface Water	Decommissioning and Closure	**Medium**	Control through Management and Monitoring	**Low**
	Erosion due decant water runoff	Surface Water	Decommissioning and Closure	**Low**	Control through Management and Monitoring	**Low**
	During decommissioning handling of waste and transport of building material can cause various types of spills (domestic waste, sewage water, hydrocarbons) which can infiltrate and cause contamination of the groundwater system.	Groundwater	Decommissioning and Closure	**Medium**	Control through Management and Monitoring	**Medium**
	Flooding and decanting of open pit	Groundwater	Decommissioning and Closure	**High**	Control through Management and Monitoring	**Medium**
	Rehabilitation of remaining open pit and final voids	Soil, Land Capability and Land use	Decommissioning and Closure	**N/A**	Control through Management and Monitoring Remedy through Rehabilitation	**Medium (+)**
	Demolishing and rehabilitation of the office workshop complex	Soil, Land Capability and Land use	Decommissioning and Closure	**N/A**	Control through Management and Monitoring Remedy through	**Medium (+)**

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
					Rehabilitation	
	Impacts on habitat for floral species	Flora	Decommissioning and Closure	**Medium**	Control through Management and Monitoring	**Medium**
	Impacts on floral diversity	Flora	Decommissioning and Closure	**High**	Control through Management and Monitoring	**Medium**
	Impact on floral species of conservational concern	Flora	Decommissioning and Closure	**Low**	Control through Management and Monitoring	**Low**
	Impact on faunal habitat and ecological structure	Fauna	Decommissioning and Closure	**High**	Control through Management and Monitoring	**Medium**
	Impact on faunal diversity and ecological integrity	Fauna	Decommissioning and Closure	**High**	Control through Management and Monitoring	**Medium**
	Impact on faunal species of conservational concern	Fauna	Decommissioning and Closure	**Medium**	Control through Management and Monitoring	**Low**
	Loss of wetland habitat and ecological structure	Wetlands	Decommissioning and Closure	**High**	Control through Management and Monitoring	**Medium**
	Changes to wetland ecological and sociocultural service provision	Wetlands	Decommissioning and Closure	**High**	Control through Management and Monitoring	**Medium**
	Impact on wetland hydrological function	Wetlands	Decommissioning and Closure	**Medium**	Control through Management and Monitoring	**Low**
	Impacts on water quality	Aquatic Ecology	Decommissioning and Closure	**High**	Control through Management and Monitoring	**Medium**
	Impacts on loss of aquatic habitat	Aquatic Ecology	Decommissioning and Closure	**Medium**	Control through Management and Monitoring	**Medium**
	Impacts on loss of aquatic habitat	Aquatic Ecology	Decommissioning and Closure	**Medium**	Control through Management and Monitoring	**Medium**
	Impacts on loss of instream flow	Aquatic Ecology	Decommissioning and Closure	**High**	Control through Management and Monitoring	**Medium**
	Impacts created as a result of the generation of TSP and	Air Quality	Decommissioning and Closure	**Medium**	Control through Management and Monitoring	**Low**

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
	PM10					
	Impact due to the generation of gases	Air Quality	Decommissioning and Closure	**Low**	Control through Management and Monitoring	**Low**
	Decommissioning of the Opencast Pit	Noise	Decommissioning and Closure	**Low**	Control through Management and Monitoring	**Low**
	Employment opportunities for local labour resulting from the decommissioning phase.	Socio-Economic	Decommissioning and Closure	**Low (+)**	Control through Management and Monitoring	**Medium (+)**
	Increased health and safety issues resulting from noise emissions, dust emissions and trucks using the roads during the decommissioning phase.	Socio-Economic	Decommissioning and Closure	**Medium**	Control through Management and Monitoring	**Low**
	Construction and closure activities could contribute to social ills, such as HIV/ AIDS, petty crime, stock theft, etc.	Socio-Economic	Decommissioning and Closure	**Medium**	Control through Management and Monitoring	**Medium**
	Growth in skills development resulting from the employment of unskilled labour from nearby communities	Socio-Economic	Decommissioning and Closure	**Low (+)**	Control through Management and Monitoring	**Low (+)**
	Opportunities for entrepreneurial development as a result of the decommissioning activities.	Socio-Economic	Decommissioning and Closure	**Medium (+)**	Control through Management and Monitoring	**High (+)**
	Creation of dust as a result of the movement of decommissioning vehicles	Traffic	Decommissioning and Closure	**Medium**	Control through Management and Monitoring	**Low**

The supporting impact assessment conducted by the EAP must be attached as an appendix, marked **Appendix 31**.

Details regarding the supporting impact assessment are included in Section 3(g)(v) above.

j) Summary of specialist reports.

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

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
Air Quality: Air Quality Impact Assessment for the proposed Rietvlei Mine, Mpumalanga *Airshed Planning Professionals* June 2014	Due to the generally high existing background particulate air concentrations in the region, it is recommended to control major contributing sources. Wind erosion of exposed areas should be kept to a minimum through watering programs and avoiding unnecessary disturbance of stabilised areas. **Monitoring** A dust fallout network comprising of eight single dust fallout buckets following the American Society for Testing and Materials standard method for collection and analysis of dust fall (ASTM D1739-98) should be installed. The bucket locations are indicated on a map and located either up or down wind from the wind dependent sources (stockpiles), at the proposed open pit site and close to the unpaved road, the paved road and sensitive receptors. In addition, it is recommended that a PM10 sampler be installed at the nearest sensitive receptor (farmhouse) to provide daily average data especially before the mine commences and continuing afterwards. The main objective of the dust fallout network is to ensure the following: ▪ Dust fallout in the immediate vicinity of the road perimeter to be less than 1 200 mg/m2/day and less than 600 mg/m2/day at the mine boundary. ▪ Dust fallout in the immediate vicinity of the open pit should be below 1 200 mg/m2/day. ▪ Dust fallout levels should not exceed 600 mg/m2/day outside the mine boundary or at any sensitive receptor. ▪ PM10 GLCs should not exceed the NAAQS at the nearest sensitive receptor (less than 40 µg/m³ over an annual average and not exceeding the daily limit	**X**	**See Appendix 18**

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	of 75 µg/m³ more than four times per calendar year).		
Blasting: Ground Vibration and Air Blast Study Butsanani Energy Investment Holdings Proposed Rietvlei Open Cast Coal Mining Project *Blast Management & Consulting* April 2014	The following recommendations are proposed. ▪ Safe blasting distance from communities A minimum safe distance 150m is required but recommended is that a minimum of 500m must be maintained from any blast done. This may be greater but not less. The blaster has a legal obligation concerning the safe distance and he needs to determine this distance. ▪ Evacuation All persons and animals within 500m from a blast must be cleared and where necessary evacuation must be conducted with all the required pre-blast negotiations. ▪ Road Closure There are public and farm roads closer than 500m to the project area. Proper road closure procedures in conjunction with the necessary authorities will be required. All blasting closer than 500m to roads will require road closure procedures. Farm roads that are used daily may exist and should be considered for closure just when blasting is done in vicinity of these roads. ▪ Railway The railway is located close to the pit area on the southern side. The frequency of trains passing through is unknown at this stage. Specific care and attention will have to be given to the following. Blasting should considered train schedules, distance from the railway, contingency plans if fly rock has occurred, fly rock control for railway electrical lines are some of the actions to be considered. ▪ Photographic Inspections It will be imperative to conduct a photographic survey (crack survey) of all structures around the pit areas. All structures within 1500m from the pit boundary are to be surveyed prior to any blasting done. A 1500m equates to 2.1mm/s of expected ground vibration for the charge used. This level of ground vibration is already perceptible and people in structures could	**X**	**See Appendix 29**

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	experience ground vibration negatively. ▪ Recommended ground vibration and air blast levels Specific ground vibration and air blast levels are recommended for blasting operations in this area. These levels are included in the Blasting Specilaist Report. ▪ Stemming length The current proposed stemming lengths at least must be maintained to ensure control on fly rock. Specific designs where distances and blast is known should be considered with this. ▪ Blasting times A further consideration of blasting times is when weather conditions could influence the effects yielded by blasting operations. Recommended is not to blast too early in the morning when it is still cool or the possibility of inversion is present or too late in the afternoon in winter as well. Do not blast in fog. Do not blast in the dark. Refrain from blasting when wind is blowing strongly in the direction of an outside receptor. Do not blast with low overcast clouds. These ‘do not’s stem from the influence that weather has on air blast. The energy of air blast cannot be increased but it is distributed differently to unexpected levels where it was not expected. It is recommended that a standard blasting time is fixed and blasting notice boards setup at various routes around the project area that will inform the community blasting dates and times. ▪ Third party monitoring Third party consultation and monitoring should be considered for all ground vibration and air blast monitoring work. Additionally assistance may be sought when blasting is done close to the highways. This will bring about unbiased evaluation of levels and influence from an independent group. Monitoring could be done using permanent installed stations. Audit functions may also be conducted to assist the mine in maintaining a high level of performance with regards to blast results and the effects related to blasting operations.		
GeoChemistry:	The following recommendations are indicated from the work described in this	**X**	**See Appendix 30**

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Preliminary Geochemistry Assessment of the Proposed Rietvlei Coal Mine *Solution H+* May 2014	report: ■ Further sampling of Rietvlei lithologies should be conducted during the operational phase of mining when the overburden is exposed in the opencast pit. ■ The additional samples should be submitted for ABA testing to confirm the low acid generation potential indicated by the results presented in this report. ■ Selected samples should be subjected to extraction tests to confirm the results presented in this report. ■ A surface water, groundwater and mine water monitoring programme should be established for the proposed Rietvlei mine. Monitoring should commence prior to mining to extend the current baseline water quality data. Monitoring should continue throughout the operational phase of mining. ■ The monitoring data and additional sample testing should be evaluated by an environmental geochemist. The model predictions in this report should be revised based on the data evaluation. ■ Field kinetic tests should be established on site. These will provide advance indication of potential post-closure drainage qualities under site environmental conditions. These can be used to inform mine closure planning		
Groundwater: Rietvlei Colliery Detailed Geohydrological Investigation *Aqua Earth Consulting* July 2014	A detailed groundwater impact assessment was undertaken and the following conclusions are reached: ■ Field investigations have been conducted according to WSP gap analysis recommendation; ■ The conceptual model of the site has been updated base on field investigations results; ■ The potential impacts (quality, quantity) have been identified and assessed accordingly; ■ The overall project impacts (construction, operation, closure) significance is expected to be from Low to Very High without any appropriate mitigation; ■ Thorough planning, design, suitable investment, management measures,	**X**	**See Appendix 19**

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	workplace procedures and good housekeeping will generally mitigate the potential impacts rising from proposed Rietvlei Mine development will de reduced to Low, Except the for impacts at post closure phase; ▪ Specific measures have been proposed for certain infrastructure units to address particular potential impacts; ▪ Monitoring will be necessary to ensure that any impacts on water quality and quantity that do arise are dealt with rapidly; ▪ An initial monitoring network has been proposed for the management of groundwater resources.		
Heritage: A Revised Phase I Heritage Impact Assessment (HIA) Study for the Proposed Rietvlei Open Cast Coal Mining Operation between Middelburg, Belfast and Stofberg in the Mpumalanga Province of South Africa *Dr JCC Postorius* June 2014	The graveyards must be mitigated by means of exhumation and relocation. The exhumation of human remains and the relocation of graveyards are regulated by various laws, regulations and administrative procedures. This task is undertaken by forensic archaeologists or by reputed undertakers who are acquainted with all the administrative procedures and relevant legislation that have to be adhered to whenever human remains are exhumed and relocated. This process also includes social consultation with a 60 days statutory notice period for graves older than sixty years. Permission for the exhumation and relocation of human remains have to be obtained from the descendants of the deceased (if known), the National Department of Health, the Provincial Department of Health, the Premier of the Province and the local police. The relocation (mitigation) of the graveyards has high potential for better conservation as these cemeteries will be managed whilst the current graveyards are abandoned, neglected and are falling into disrepair. A Conservation Management Plan for graveyards which may be left unaffected must be included in the mine's EMP to ensure their continued existence during the construction, operation and decommissioning phase of the Rietvlei Coal Mine. This plan must provide for the following: ▪ Demarcation of graveyards with fences or walls and fitted entrance gates to provide access to family and friends.	**X**	**See Appendix 28**

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	▪ Regulated visitor hours compatible with mine safety rules. ▪ Maintaining corridors of at least 30m between graveyard borders and developmental activities.		
Noise: Environmental Noise Report – Rietvlei Opencast Mine *JH Consulting* July 2014	▪ Maintenance of equipment and operational procedures: Proper design and maintenance of silencers on diesel-powered equipment, systematic maintenance of all forms of equipment, training of personnel to adhere to operational procedures that reduce the occurrence and magnitude of individual noisy events. ▪ Placement of material stockpiles: Where possible earthworks and material stockpiles should be placed so as to protect the boundaries from noise from individual operations and especially from haul roads, which for greatest effect should be placed directly behind them. If a levee is constructed, it should be of such a height as to effectively act as a noise barrier, if line of sight calculations show this to be practicable. ▪ Equipment noise audits: Standardised noise measurements should be carried out on individual equipment at the delivery to site to construct a reference data base and regular checks carried out to ensure that equipment is not deteriorating and to detect increases which could lead to increase in the noise impact over time and increased complaints. ▪ Environmental noise monitoring: This should be carried out by an independent agency regularly at six-monthly intervals close to MP2 at the nearest mine boundary to Rietvlei Farm to detect deviations from predicted noise levels and enable corrective measures to be taken where warranted. In addition it is recommended to carry out continuous blast monitoring to check on the levels of air blast and groundborne vibration generated by individual blasts at the same position.	**X**	**See Appendix 27**
Ecology: Faunal, Floral, Wetland and Aquatic	After conclusion of this ecological assessment, it is the opinion of the ecologists that the proposed activity be considered favourably provided that the following essential mitigation measures as listed below are adhered to:	**X**	**See Appendix 22, 23, 24 and 26**

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
Assessment as Part of the Environmental Assessment and Authorisation Process for the Proposed Rietvlei Colliery Outside Middelburg, Mpumalanga Province *Scientific Aquatic Services* April 2014	**<u>Aquatic features</u>** ▪ Measures to contain and reuse as much water as possible within the mine process water system and water from underground dewatering activities should be sought. ▪ A return water structure should be developed where mine process water is stored in a lined dam in order to prevent impacts on the receiving aquatic environment. ▪ As far as possible all mining infrastructures should remain out of the riparian zone and associated buffer in line with the requirements of Regulation GN704 of the National Water Act. ▪ No dirty water runoff must be permitted to reach the wetland and riverine resources during the entire life of mine, and clean and dirty water management systems must be put in place to prevent the contaminated runoff (suspended solids and salts and water with low pH) from entering the receiving aquatic environment. All dirty water containment structures should be designed to contain a minimum storm event of a 24 hour 1 in 50 year flood event. ▪ Any dirty water runoff containment facilities must remain outside of the defined wetland areas and their buffers as a measure to minimise the footprint areas of mining within sensitive wetland areas. ▪ Adequate stomr water management must be incorporated into the design of the proposed development in order to prevent erosion and the associated sedimentation of the riparian and instream areas, as these systems have aquatic communities which rely on stream substrates clear of sediment and on clear, fast flowing water. In this regard special mention is made of: ▪ Sheet runoff from cleared areas, paved surfaces and access roads needs to be curtailed. ▪ Runoff from paved surfaces should be slowed down by the strategic placement of berms.		

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	▪ During any construction phase or exploration drilling activities no vehicles should be allowed to indiscriminately drive through the wetland areas and vehicles must remain on designated roadways. ▪ All areas of increased ecological sensitivity near to mining operations should be clearly marked as "out of bounds" areas for all mining staff. ▪ During the construction and operational phases of the proposed mining development erosion berms should be installed to prevent gully formation and siltation of the wetland resources. The following points should serve to guide the placement of erosion berms: ▪ Where the track has slope of less than 2%, berms every 50m should be installed. ▪ Where the track slopes between 2% and 10%, berms every 25m should be installed. ▪ Where the track slopes between 10%-15%, berms every 20m should be installed. ▪ Where the track has slope greater than 15%, berms every 10m should be installed. ▪ No dumping of waste should take place within the riparian zone. If any spills occur, they should be immediately cleaned up. ▪ Upon closure it is deemed essential that all MRD"s be rehabilitated and stabilised using a suitable grass mix to prevent sedimentation of the aquatic resources in the area. ▪ Throughout the life of mine measures to control alien vegetation must be implemented and specific attention to riverine features should be paid. ▪ Upon closure all haul and access roads as well as all unnecessary mining infrastructures should be removed in order to minimise the impacts on the aquatic resources of the area beyond the life of mine. ▪ Close monitoring of water quality must take place. Monitoring of water quality should take place at a minimum frequency of once a month during which time major salts and basic metals, are monitored along with basic parameters such as pH, TSS and TDS, dissolved oxygen and EC.		

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	■ Ongoing biomonitoring of the aquatic resources in the vicinity of the mine must take place. Biomonitoring should take place at points located upstream and downstream of the mining activities on the Selons Rivers as long as there is sufficient habitat to do so. Biomonitoring should take place on 6 monthly basis as a minimum in the summer and winter of each year. Biomonitoring should take place using the SASS5 and IHAS indices. Biomonitoring should take place throughout the life of the mine, including the closure and aftercare phases. The results of the biomonitoring program should be compared to the results of this study to allow any temporal trends to be observed. Should any problems be indicated measures to minimise or prevent the impact should be implemented. ■ Toxicity testing of the proposed mines underground and open pit discharge should take place concurrently with the biomonitoring program in order to monitor the toxicological risk of the process water system to the receiving environment. Tests should include the following test organisms as a minimum: • Vibrio fischeri • Daphnia pulex • Algal Growth Potential ■ Definitive toxicological testing according to the DEEEP protocol should take place should it become evident that process water discharge or decant of underground water will occur. **<u>Mining footprint</u>** ■ A sensitivity map has been developed for the subject property, indicating the various wetland features, which are considered to be of increased ecological importance. It is recommended that this sensitivity map be considered during the planning/ pre-construction and construction phases of the proposed development activities to aid in the conservation of ecology within the subject property.		

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	▪ All demarcated sensitive zones outside of the construction area must be kept off limits during any development and closure phases of the mine. ▪ It must be ensured that planning of mining infrastructure includes consideration of adjacent wetland areas to ensure that these areas are avoided as far as possible. ▪ Edge effects of activities including erosion and alien / weed control need to be strictly managed in these areas. ▪ Planning of temporary roads and access routes should take the site sensitivity plan into consideration. Such roads should be constructed a distance from the more sensitive wetland areas and not directly adjacent thereto ▪ Ensure that seepage from dirty water systems is prevented as far as possible. ▪ It must be ensured that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. All vehicles must be regularly inspected for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil. ▪ All spills should be immediately cleaned up and treated accordingly. ▪ Appropriate sanitary facilities must be provided for the life of the mine and all waste removed to an appropriate waste facility. ▪ Effective waste management must be implemented in order to prevent construction related waste from entering the wetland environment. ▪ Restrict construction to the drier winter months if possible to avoid sedimentation of wetland features in the vicinity of the proposed mine development areas. **Vegetation** ▪ Proliferation of alien and invasive species is expected within any disturbed areas. These species should be eradicated and controlled to prevent their spread beyond the development footprint areas. ▪ Species specific and area specific eradication recommendations:		

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	• Care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used. • Footprint areas should be kept as small as possible when removing alien plant species. • No vehicles should be allowed to drive through designated sensitive wetland areas during the eradication of alien and weed species. ■ Informal fires in the vicinity of development area should be prohibited during all development phases. ■ Should any other RDL or protected plant species be encountered within the proposed development footprint areas, the following should be ensured: • If any threatened species, or nationally or provincially protected floral will be disturbed, ensure that permit application are obtained where necessary from the relevant authorities. All rescue and relocation plans should be overseen by a suitably qualified specialist **<u>Wetland features</u>** ■ Development / mining impacts on the affected wetland features should be managed to minimise impacts on adjacent wetland features. ■ Run-off from dirty water areas entering wetland habitats must be prevented and clear separation of clean and dirty water in the vicinity of the proposed infrastructure must take place. Oil must be prevented from entering the clean water system. ■ Pollution control dams should be off stream structures and not within the natural drainage system of the area, thereby minimising impacts loss of instream flow and downstream recharge. ■ All adjacent wetland systems must be monitored for erosion and incision.		

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	■ Desilt all adjacent wetland areas affected by mining and runoff from dirty water areas ■ It must be ensured that all activities potentially impacting on geohydrological resources are managed according to the relevant DWA Licensing regulations and groundwater monitoring requirements. ■ Post closure groundwater management will need to be very carefully managed to ensure that no impact on the wetland areas takes place after mine closure has taken place. ■ Future mine planning should ensure that mining activities does not lead to a reduction of stream flow or dewatering of any wetland areas. **<u>Vehicle access</u>** ■ Access into adjacent wetland / pan areas, particularly by vehicles, is to be strictly controlled. ■ All vehicles should remain on designated roads with no indiscriminate driving through adjacent wetland / pan areas. ■ In the event of a vehicle breakdown, maintenance of vehicles must take place with care and the recollection of spillage should be practiced near the surface to prevent ingress of hydrocarbons into topsoil and subsequent habitat loss. ■ It must be ensured that all roads and construction areas are regularly sprayed with water in order to curb dust generation. This is particularly necessary during the dry season when increased levels of dust generation can be expected. These areas should not be over-sprayed causing water run-off and subsequent sediment loss in the vicinity of the subject property. **<u>Soils</u>** ■ Ensure that all stockpiles are well managed and have measures such as berms and hessian curtains implemented to prevent erosion and		

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	sedimentation. ■ It must be ensured that the mine process water system is managed in such a way as to prevent discharge to the receiving environment. ■ In the event of a vehicle breakdown, maintenance of vehicles must take place with care and the recollection of spillage should be practiced near the surface area to prevent ingress of hydrocarbons into topsoil and subsequent habitat loss. ■ To prevent the erosion of topsoil, management measures may include berms, soil traps, hessian curtains and stomr water diversion away from areas susceptible to erosion. ■ All soils compacted as a result of construction activities falling outside of development footprint areas should be ripped and profiled. Special attention should be paid to alien and invasive control within these areas. Alien and invasive vegetation control should take place throughout all development phases to prevent loss of floral habitat in surrounding areas ■ Erosion berms may be installed in any areas where soil disturbances within the vicinity of the wetland features have occurred to prevent gully formation and siltation of the aquatic resources. The following points should serve to guide the placement of erosion berms: • Where the track has slope of less than 2%, berms every 50m should be installed. • Where the track slopes between 2% and 10%, berms every 25m should be installed. • Where the track slopes between 10% and 15%, berms every 20m should be installed. • Where the track has slope greater than 15%, berms every 10m should be installed		

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	Rehabilitation ▪ As much vegetation growth as possible should be promoted within the proposed mine development area in order to protect soils. In this regard, special mention is made of the need to use indigenous vegetation species where hydro-seeding, wetland and rehabilitation planting (where applicable) are to be implemented. ▪ All wetland areas must be rehabilitated upon decommissioning to ensure that wetland functions are re-instated during decommissioning and all disturbed wetland areas adjacent to the mining development must be re-vegetated with indigenous wetland species. **RDL and Protected floral species** ▪ Sensitive floral species, if discovered, are to be handled with care and the relocation of sensitive plant species is to be overseen by a botanist. ▪ Should any RDL or protected plant species be encountered within the proposed development footprint areas, the following should be ensured: • If any threatened species, or nationally or provincially protected floral will be disturbed, ensure permit applications are required from the relevant authorities before construction activities commence. ▪ All rescue and relocation plans should be overseen by a suitably qualified specialist. **RDL and protected faunal species** ▪ It is recommended that a speed limit of 40km/h is implemented on all roads running through the subject property area in order to minimise risk to RDL and other fauna from vehicles. ▪ Educate construction and personnel about the importance of the natural		

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	faunal species and biodiversity of the natural surroundings. ■ Education and awareness campaign on identification for any RDL faunal species that may be found within the subject property. ■ Signs must be erected along all roads on the property cautioning people driving through the property that fauna are present, thereby creating a heightened awareness regarding faunal conservation. ■ All informal fires on the subject property should be prohibited. Where a burning regime is implemented, it should be overseen by a qualified and experienced professional. ■ No trapping or hunting of fauna is to take place. Access control must be implemented to ensure that no illegal trapping or poaching takes place.		
Soils: Soil, land capability and land use assessment of the proposed Greenfields Rietvlei Opencast Coal Mine footprint, situated on portion 1 and the remaining extent of the farm Rietvlei 397 JS, near Middelburg, Mpumalanga Province *Rehab Green Monitoring Consultants CC* July 2014	In order to guarantee successful rehabilitation, the procedures in section 7 of the Soil report need to be executed as far as possible and the following needs to be monitored. ■ Stripping of soil types at stripping depths as specified in the Soil Report. ■ Progressive evaluation of a free draining spoil surface, similar to the pre-mining topography, before topsoil is replaced during rehabilitation. Slopes should not exceed 4% anywhere on the post-mining foot print. ■ Replacing of topsoil evenly over spoils during rehabilitation at depths as specified in the Soil Report. ■ A fertilizer program based on soil analysis in order to ameliorate soils before seeding and re-vegetation take place. ■ Re-vegetation of rehabilitated areas as soon as possible with a grass mixture until soils are stabilized before crop farming can be introduced. ■ Monitoring of soil erosion on the rehabilitated areas and remediation if necessary until the area can be declared as stabilized and self sustaining. ■ A post-mining soil depth and land capability evaluation by a soil specialist registered at the Council for Natural Scientific Professions (SACNASP) in order to map the final post-mining land capability which will be used for final	**X**	**See Appendix 21**

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	post-mining land uses and closure purposes.		
Surface Water: Rietvlei Colliery Surface Water Study *Aqua Earth Consulting* July 2014	Based on the results from this assessment the following recommendations are put forward for consideration: ▪ Once the final decision has been made on mining, the monitoring network in terms of surface water monitoring should be revisited and the monitoring points confirmed. ▪ When more detailed digital elevation data becomes available the model could be re-run to confirm flood lines and confirm surface water management infrastructures. In this regard topographical surveys like for example a Lidar survey, providing higher density DEM data are strongly recommended. ▪ The water management plan developed during this study should be considered a baseline and further development thereof should take place in conjunction with the infrastructure development, keeping the water management plan relevant and updated in real time. ▪ The water balance developed should be considered a baseline water balance and special effort should be made to have sufficient measuring points to collect real data for updating the water balance on a regular basis. ▪ A water treatment facility has been recommended for consideration, but further investigation into the feasibility and costs benefits is recommended	**X**	**See Appendix 20**
Traffic: Traffic Impact Study Report – Proposed Rietvlei Opencast Coal Mine *WSP Group Africa (Pty) Ltd* July 2015	Taking the above conclusions into account, with respect to roads and traffic, the impacts associated with the proposed mine can be managed and accommodated within normal, acceptable limits, subject to the following recommendations: ▪ The intersection of the R555 and D1433 should be upgraded as shown in the report. ▪ The D1433 between the R555 and Pan rail siding should be paved and constructed according to an approved payment design. ▪ The speed limit on the R555 past the site should be reduced to 60km/h and advance warning signs should be placed to warn road users along the R555 of heavy vehicles from the D1433. Speed reductions and signage should	**X**	**See Appendix 32**

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	comply with the requirements of the South African Road Traffic Signs Manual. ■ The identified road pavement maintenance measures along the R555 should be taken.		
Visual: Visual Impact Assessment for the Proposed Rietvlei Opencast Mine *Outline Landscape Architects CC* September 2011	The proposed Rietvlei Mine is expected to visually impact on the landscape character and on various sensitive visual receptors who would consider visual exposure to this type of infrastructure to be intrusive. Furthermore, in light of the existing mining operations within the study area and in fact adjacent to the proposed site, these visual receptors would be subject to a cumulative visual impact in terms of the mine, its ancillary infrastructure, and lighting at night. There also are not many options as to the mitigation of visual impacts. Notwithstanding, the anticipated visual impacts are not considered to be a fatal flaw for this project. Factors contributing to this conclusion include the following: ■ The relatively low incidence of visual receptors in the study area; ■ The relatively contained area of potential visual exposure, even within the 5km radius; ■ The accepted context of mining activities already present in the region, and specifically the Vuna Colliery located on the adjacent farm to the east of the site; ■ The relatively short anticipated lifespan of the proposed mine; ■ The unlikelihood of recreational users, tourists and sightseers likely to enter the area within 5km of the proposed mine. It is therefore recommended that the development of the mine as proposed be supported, subject to the implementation of the recommended mitigation measures	**X**	**See Appendix 25**

Attach copies of Specialist Reports as appendices

k) Environmental impact statement

(i) Summary of the key findings of the environmental impact assessment;

Construction Phase Impacts

In the event that the appropriate mitigation measures are implemented, the majority of the construction phase impacts identified were considered to be of low to medium significance. The following impacts were assessed to be of High significance in the event that mitigation measures are not implemented as required:

- Soil, Land Capability and Land use
  - Stripping of topsoil at the initial box cut footprint;
  - Construction of topsoil, soft and hard overburden stockpiles during initial box cuts;
  - Construction of haul roads;
  - Construction of access roads and diversion of existing access road;
  - Construction of Pollution control dam; and
  - Construction of office workshop complex including offices, heavy vehicle workshop, stores, vehicle parking areas.
- Flora
  - Impacts on flora diversity.
- Fauna
  - Impact on faunal habitat and ecological structure; and
  - Impact on faunal diversity and ecological integrity.
- Wetlands
  - Loss of wetland habitat and ecological structure; and
  - Changes to wetland ecological and sociocultural service provision.
- Aquatic Ecology
  - Impacts on water quality; and
  - Impacts on loss of instream flow.
- Heritage
  - Destruction of Graveyard.

After the implementation of mitigation measures the intensity levels of these impacts reduced significantly. However, the six impacts identified under Soils, Land Capability and Land Use remained high as no mitigation measures are applicable to these impacts during the construction phase.

The following positive impacts are applicable to the construction phase:

- Socio-Economic
  - Employment opportunities for local labour resulting from the construction phase;
  - Growth in skills development resulting from the employment of unskilled labour from nearby communities; and
  - Opportunities for entrepreneurial development as a result of the construction activities.

Operational Phase Impacts

In the event that the appropriate mitigation measures are implemented, the majority of the operational phase impacts identified were considered to be of low to medium significance. The following impacts were assessed to be of High significance in the event that mitigation measures are not implemented as required:

- Topography
  - The development of the pit will result in the altering of the topography in this area;
  - The development of the pit will impact on the surface water flow dynamics; and
  - Infrastructure that is utilised on the site will alter the topography and surface water flow of the area.
- Surface Water
  - Deterioration of clean storm water runoff quality.
- Groundwater
  - Drop of groundwater levels due to open pit dewatering;
  - Deterioration of groundwater quality due to open pit mining;
  - Deterioration of groundwater quality due to coal processing; and
  - Deterioration of groundwater quality due to tailings disposal.
- Soil, Land Capability and Land use
  - Progressive stripping of topsoil at opencast footprint and stockpiling thereof before direct replacing is initiated;
  - Expansion of topsoil, soft and hard overburden stockpiles during the operational phase as open pit expands;
  - Progressive stripping of topsoil at opencast footprint and direct replacing thereof;
  - Use of haul roads;
  - Use of pollution control dams; and
  - Use of coal stockpiles and ROM tip.
- Flora
  - Impacts on flora diversity.
- Fauna
  - Impact on faunal habitat and ecological structure; and
  - Impact on faunal diversity and ecological integrity.
- Wetlands
  - Loss of wetland habitat and ecological structure; and
  - Changes to wetland ecological and sociocultural service provision.
- Aquatic Ecology
  - Impacts on water quality; and
  - Impacts on loss of instream flow.
- Socio-Economic
  - Increased health and safety issues resulting from noise emissions, dust emissions and trucks using the roads during the operational phase; and
  - Construction, operational and closure activities could contribute to social ills, such as HIV/ AIDS, petty crime, stock theft, etc.

- Traffic
  - Creation of dust as a result of the movement of operational vehicles.

After the implementation of mitigation measures the intensity levels of these impacts reduced significantly. However, four impacts remained high as no mitigation measures are applicable to these impacts during the operational phase, the impacts include:

- Topography
  - The development of the pit will result in the altering of the topography in this area; and
  - The development of the pit will impact on the surface water flow dynamics.
- Groundwater
  - Drop of groundwater levels due to open pit dewatering.
- Soil, Land Capability and Land use
  - Progressive stripping of topsoil at opencast footprint and stockpiling thereof before direct replacing is initiated.

The following positive impacts are applicable to the operational phase:

- Soil, Land Capability and Land use
  - Rehabilitation of topsoil, soft and hard overburden stockpiles during the operational phase as open pit expands;
  - Rehabilitation of haul roads;
  - Rehabilitation of pollution control dams; and
  - Rehabilitation of coal stockpiles and ROM tip.
- Socio-Economic
  - The development of the mine will have a positive impact on the economic development;
  - Employment opportunities for local labour resulting from the operational phase;
  - Growth in skills development resulting from the employment of unskilled labour from nearby communities; and
  - Opportunities for entrepreneurial development as a result of the operational activities.

Decommissioning Phase Impacts

In the event that the appropriate mitigation measures are implemented, the majority of the operational phase impacts identified were considered to be of low to medium significance. The following impacts were assessed to be of High significance in the event that mitigation measures are not implemented as required:

- Topography
  - Decommissioning and Closure of the pit; and
  - Decommissioning of surface infrastructure.
- Surface Water
  - Deterioration of the surface water quality due decanting water.
- Groundwater
  - Flooding and decanting of open pit.
- Flora
  - Impacts on flora diversity.
- Fauna

- Impact on faunal habitat and ecological structure; and
- Impact on faunal diversity and ecological integrity.

■ Wetlands

- Loss of wetland habitat and ecological structure; and
- Changes to wetland ecological and sociocultural service provision.

■ Aquatic Ecology

- Impacts on water quality; and
- Impacts on loss of instream flow.

After the implementation of mitigation measures the intensity levels of all impacts reduced significantly.

The following positive impacts are applicable to the decommissioning phase:

■ Soil, Land Capability and Land use

- Rehabilitation of remaining open pit and final voids; and
- Demolishing and rehabilitation of the office workshop complex.

■ Socio-Economic

- Employment opportunities for local labour resulting from the decommissioning phase;
- Growth in skills development resulting from the employment of unskilled labour from nearby communities; and
- Opportunities for entrepreneurial development as a result of the decommissioning activities.

Cumulative Impacts

The following cumulative impacts were identified for the Proposed Project:

■ **Surface Water**

- Cumulating of reduction of water flow as result of water management (storage, diversion); and
- Cumulating of water quality deterioration from mine activities with existing contaminants.

■ **Groundwater**

- Cumulating of impacts due mine dewatering with existing local cone of depressions; and
- Cumulating of contaminants from mine activities with existing contaminants.

■ **Soils, Land Capability and Land Use**

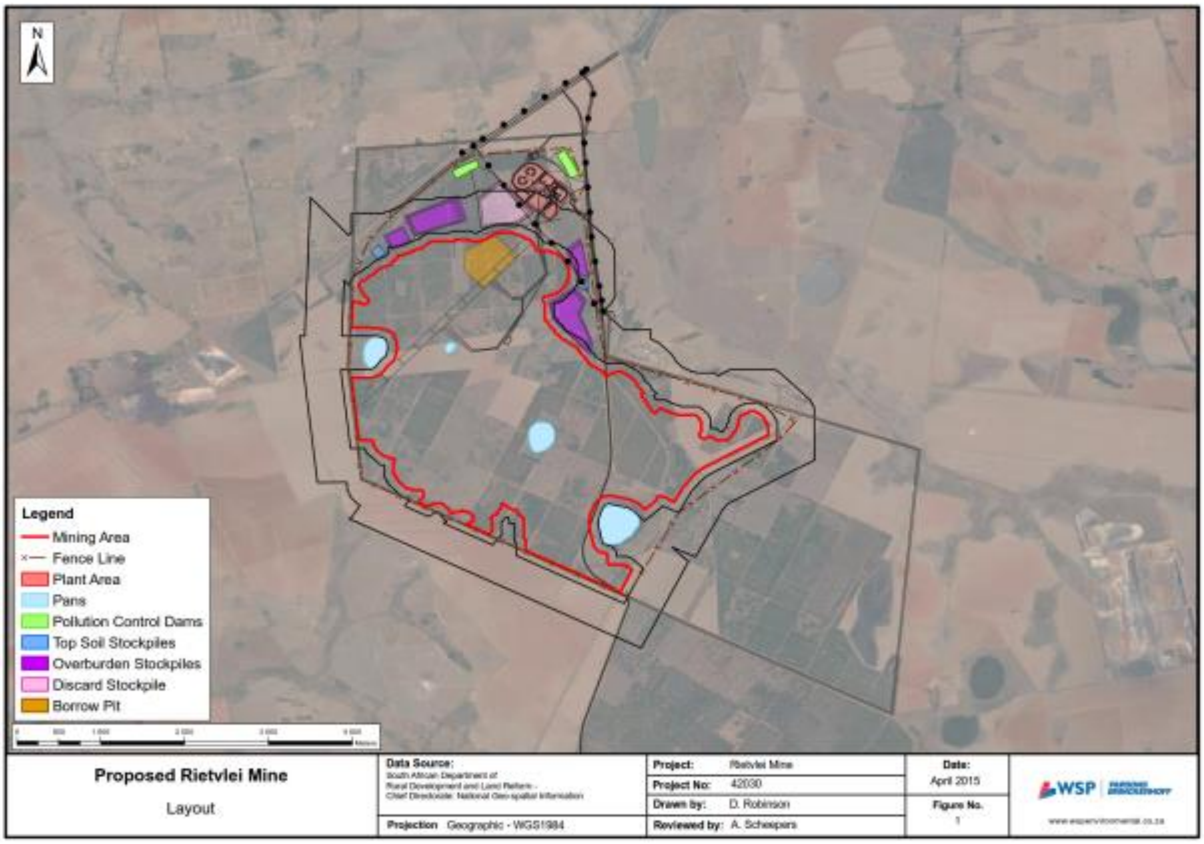
- The cumulative impact on soil can therefore probably be described as another at least 805 ha of unproductive or very low productive land that can be added to thousands of hectares of abandoned unproductive poorly rehabilitated mine property on the Eastern Highveld;
- The impact on soils causing deteriorating of soil potential and soil quality equally reflects the deterioration in land capability. Therefore the cumulative impact on land capability in reality can probably be described as another at least 805 ha of high potential arable land that will deteriorate to such an extent that it will not be possible to be phased back to viable crop farming as prior to mining; and
- The cumulative impact on land use can therefore probably be describe as at least another 805 ha with loss of private ownership and effective land management by an experienced farmer, another at least 805 ha with significant loss of land use potential and another at

least 805 ha with a significant loss of income and profit per hectare for the agricultural sector.

- **Flora**
  - The loss of the Rand Highveld Grassland, which is considered to be an endangered vegetation type with a small fraction currently statutorily conserved;
  - The spread of alien plant species within this vegetation type is considered to be significant and disturbance of natural vegetation as a result of forestry and loss of vegetation structure in the region may contribute towards lowering of the overall sensitivity of plant communities within this vegetation type; and
  - The cumulative impact from alien plant species proliferation in the region is considered to be high as these species replace indigenous vegetation and contribute to an overall loss of biodiversity.
- **Fauna**
  - The loss of habitat through future mining activities and other activities associated to mining activities. This may contribute towards lowering of the overall sensitivity of faunal communities within the region. The cumulative impact from habitat encroachment on the site may be considered to be high as the loss of habitat will contribute to an overall loss of faunal biodiversity.
- **Wetlands**
  - The loss of wetland habitat, functioning and ecoservice provision as a result of mining activities within the Middelburg region, which may in turn impact on water resources and vegetation structure; and
  - Loss of wetland connectivity and dewatering of wetlands due to mining activities will have a detrimental impact on faunal species utilising riparian zones as migratory corridors and the overall biodiversity in the area.
- **Air Quality**
  - The region is dominated by a number of coal reserves which have now started to be mine. The emissions from these multiple coal mines including the proposed mine may have a significant impact on the air quality found in the region. However the individual contribution to this degradation air in the region would be minimal compared to the combined impact of all the mines in the area.
- **Visual**
  - The development of the proposed mine will increase the cumulative visual impact of mining and related infrastructure within the region.

(ii) Final Site Map

Provide a map at an appropriate scale which superimposes the proposed overall activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers .



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

The EIA phase of this project identified and assessed the potential impacts that the Rietvlei Mine may have on the proposed site and on the surrounding areas. Through this assessment mitigation measures have been recommended in order to reduce or eliminate any impacts that were identified.

The EIA has concluded that the legislative requirement to consider alternatives during the EIA process is focussed strongly on feasible and reasonable alternatives that meet the requirements of the proposed project.

In terms of the 'no go' option, it was concluded that if the Rietvlei Mine is not established the reserves will not be mined, no income generation will be realised and the area will remain a predominantly agricultural area.

South Africa has a recent history of power outages, and as such requires coal for the generation of power. The Rietvlei project has been earmarked for such a supply and the 'no-go' scenario will result in such supply not being realised. The establishment of the mining operation will result in a cash injection into secondary industries such as contractors, manufacturers and suppliers. These secondary industries will not benefit if there is no mining. In addition to this, the SLP will not be implemented. This will result in no investment within the local community, and as a result there will be a loss in the potential for community upliftment.

The majority of impacts associated with the construction, operational and decommissioning phases are considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented. All identified impacts have been based on normal operation conditions and all impacts identified were analysed according the following criteria:

- Nature of the impact;
- Extent of the impact;

- Intensity of the impact;
- Duration of the impact;
- Probability of the impact occurring;
- Impact non-reversibility;
- Cumulative impacts;
- Impact on irreplaceable resources; and

In the view of the environmental assessment practitioner, that once final, the information contained in this report and the documentation attached thereto will be sufficient for the DMR to make a decision in respect of the activities applied for with respect to the proposed Rietvlei Mine.

This EIA provides an assessment of both the positive and negative impacts anticipated as a result of the proposed Rietvlei Mine. The findings of the assessment conclude that identified significant impacts can be addressed with relevant mitigation measures, therefore, in the view of the EAP, no environmental fatal flaws should prevent the proposed project from proceeding.

In order to achieve appropriate environmental management standards and ensure that the findings of the environmental studies are implemented through practical measures, the recommendations from this EIA have been included within an Environmental Management Programme (EMPR). The EMPR would be used to ensure compliance with environmental specifications and management measures. The implementation of this EMPR for key life cycle phases (i.e. construction, operation and decommissioning) of the proposed project is considered to be fundamental in achieving the appropriate environmental management standards as detailed for this project.

It is also recommended that the process of communication and consultation with the community representatives is maintained after the closure of this EIA process, during the construction, operational and decommissioning phases associated with the proposed project.

l) Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr;

Based on the assessment and where applicable the recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation.

A preliminary mine closure plan has been developed for the proposed mine, however, it is expected that soon after the commencement of operations, RMC will develop a conceptual closure plan, which will be periodically updated as new areas are disturbed and new information becomes available. This conceptual closure plan will form the basis of the final closure plan considered in the MPRDA which is required as the end of the Life of Mine approaches.

A preliminary closure vision has been developed to assist with the development of preliminary closure objectives, necessary to identify the closure actions required onsite. This preliminary closure vision for the Proposed Project is included below:

RMC will ensure a post closure environment that is not harmful to the safety and health of surrounding communities, where prospects to utilise infrastructure after closure are maximized and where final post land use is optimized and where natural heritage is conserved.

Objectives and Goals relating to Environmental Impacts

Objectives

RMC intends to minimise the impacts of the Proposed Project on the environment as far as possible.

Goals

The environmental related goals are as follows:

- Implement the management and mitigation measures stated in the ESMP;
- Develop and implement monitoring programmes stated in the ESMP;
- Ensure compliance with all relevant environmental legislation and legal requirements;
- Obtain the relevant licences and permits;
- Comply with relevant licence and permit conditions;
- Ensure that closure supports sustainable uses considering pre-mining conditions and is in agreement with commitments to stakeholders;
- Promote biodiversity and biological sustainability to the maximum extent practicable; and
- Utilise closure strategies that promote self-sustaining conditions with little or no need for ongoing care and maintenance.

Objectives and Goals relating to Cultural and Heritage Aspects

Objectives

RMC intends to ensure that the integrity of the heritage and cultural resources associated with the site remain intact as far as practically possible.

Goals

The cultural and heritage related goals are as follows:

- Ensure that the management measures proposed in the ESMP, which relate to heritage resources, are implemented; and
- Ensure compliance with the National Heritage Resources Act (No. 25 of 1999).

Objectives and Goals Relating to Socio-Economic Conditions

Objectives

The objectives relating to the socio-economic conditions are as per the draft SLP and are summarised below:

- Promote economic growth and mineral and petroleum resources development in the Republic;
- Promote employment and advance the social and economic welfare of all South Africans;
- Contribute to the transformation of the mining industry; and
- Ensure that holders of mining and production rights contribute towards the socio-economic development of the areas in which they are operating as well as the areas from which the majority of the workforce is sourced.

Goals

The goals to accomplish the above objectives are:

- To provide skills training opportunities to mine workers during their employment in order to improve their income earning capacity after mine closure;
- To promote employment and skills development in the local communities and major labour sending areas;
- To ensure substantially higher levels of inclusiveness and advancement of historically disadvantaged South African's, including women, in the mining industry;
- To contribute to the development of a pool of skilled South African workers in support of National Economic and Skills Development strategies;
- Physically and chemically stabilise remaining structures to minimise residual risks; and

- Ensure health and safety of all stakeholders (employees, contractors and surrounding communities) during closure and post closure and that communities using the site after closure are not exposed to unacceptable risks.

m) Final proposed alternatives.

(Provide an explanation for the final layout of the infrastructure and activities on the overall site as shown on the final site map together with the reasons why they are the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment)

Please refer to the following Sections of this report:

- 3 (d) (ii); and
- 3 (g) (i).

n) Aspects for inclusion as conditions of Authorisation.

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

None.

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

(Which relate to the assessment and mitigation measures proposed)

Geology

A specialist study was not undertaken to determine the impact on geology. As such, existing information from past studies/assessments was utilised. This is not viewed as a limitation as the geology in the area is considered regional. The geological trend of the area can be used to assume the nature of the Proposed Project site.

Topography

A specialist study was not undertaken to determine the Proposed Projects impact on topography. As such, existing information from past studies/assessments was utilised.

Surface Water

The following assumptions, uncertainties and gaps in knowledge are applicable to this section:

- Due to a lack in data available for the mines water reticulation system at the time of compilation, it is clear that the current objectives should be reviewed and assessed on a regular basis as additional data becomes available; and
- The water balance is not to be considered as a once off investigation, but rather an iterative process to be updated as the mine's activities commence. The balances should be updated regularly to reflect the dynamic process of change at the mine.

Groundwater

A numerical model solves both complex and simple problems, and serves as basis for the simulation of various scenarios. However, it should be reiterated that, a numerical groundwater model is a simplified representation (approximation) of the real system, and the level of accuracy is sensitive to the quality of the data that is available. Errors due to uncertainty in the data and the capability of numerical methods to describe natural physical processes are always associated with groundwater numerical models. The building of a numerical model requires some assumptions to make an easier representation of the real aquifer systems. Such assumptions involve mainly:

- Geological and hydrogeological features;
- Boundary conditions of the study area (based on the geology and hydrogeology);
- Initial water levels of the study area;
- The processes governing groundwater flow; and
- The selection of the most appropriate numerical code.

Based on the available field data, the following assumptions have been made behind the conceptual model:

- The top of the aquifer is represented by the generated groundwater heads;
- Averages of the distribution of the determined parameters have been used as input of the model, and a homogenous and continuous aquifer system has been assumed;
- Where specific aquifer parameters have not been determined for some reason, text book values have been used where applicable, with reasonable estimates of similar geohydrological environments;
- The system is initially in equilibrium and therefore in steady state, even though natural conditions have been disturbed;
- The boundary conditions assigned to the model are considered correct; and
- The impacts of other activities (agriculture, etc...) have not been taken into account.

The complexities associated with flow and transport in aquifer systems have not been taken into account. Any interpretation and decision from the model results should be based on these assumptions

Soil, Land Capability and Land Use

The following assumptions, uncertainties and gaps in knowledge are applicable to this section:

- The proposed infrastructure shown on all figures in the report was extracted from an electronic Mine Layout Plan (in dwg format), dated 13/08/2013, received from WSP. It was assumed that this plan is the most recent plan.

Flora

The following assumptions, uncertainties and gaps in knowledge are applicable to this section:

- The ecological assessment is confined to the subject property and does not include the neighbouring and adjacent properties; these were however considered as part of the desktop assessment; and
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most floral communities have been accurately assessed and considered as per the season of the assessment.

Fauna

The following assumptions, uncertainties and gaps in knowledge are applicable to this section

- Due to the nature and habits of most faunal taxa it is unlikely that all species would have been observed during a site assessment of limited duration. Therefore, site observations are compared with literature studies where necessary; and

- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most faunal communities have been accurately assessed and considered.

Aquatic Ecology

The following assumptions, uncertainties and gaps in knowledge are applicable to this section

- *Reference conditions are unknown:* The composition of aquatic biota in the aquatic resources associated with the subject property, prior to major disturbance, is unknown. For this reason, reference conditions are hypothetical, and are based on professional judgement and/or inferred from limited data available;
- *Temporal variability:* The data presented in this report are based on two site visits, undertaken in early spring (5th October 2011) and mid-summer (21st January 2014). The effects of natural seasonal and long term variation in the ecological conditions and aquatic biota found in the streams are, therefore, unknown; and
- *Ecological assessment timing:* Aquatic and terrestrial ecosystems are dynamic and complex. It is likely that aspects, some of which may be important, could have been overlooked. A more reliable assessment of the biota would require seasonal sampling, with sampling being undertaken under both low flow and high flow conditions.

Air Quality

The following assumptions, uncertainties and gaps in knowledge are applicable to this section:

- The impact assessment focuses primarily on particulate emissions, these having been identified as the primary pollutants associated with the proposed mining activities. Although gases will be emitted by exhausts from blasting, haul trucks and mine vehicles, such activities and hence the associated emissions would be limited and the potential for ambient air pollutant concentrations considered negligible;
- No baseline air pollution monitoring data could be sourced for the study. The predicted concentrations are limited to incremental impacts only (only the proposed Rietvlei mining activities' emissions). Given the fact that the mine is relatively close to other open cast mines in the area and since such mining activities generate air pollution, cumulative impacts are expected to be of some environmental significance;
- The scope of the study does not include other surrounding mines and since there is generally a lack of information on a lot of industries, a holistic approach is therefore required for baseline conditions;
- Particle size distributions for stockpiles (topsoil, overburden, ROM) and road surfaces were not available and therefore particle sizes from similar operations were utilised for the purposes of the study;
- For the construction phase it was assumed that there would be no modification to the existing roads which are proposed to be used during mining operations; and
- The construction was taken to be for 9 hours per a day, 260.7 days per a year and assumed to take place in 25% of each of the construction areas simultaneously.

Based on the detail of the process description, the following dust generating sources are included:

- Drilling;
- Blasting;
- Materials transfer in the pit;
- Material transfer of topsoil and mined material (ROM and overburden) at stockpiles;
- Bulldozing in the pit (removal of topsoil and overburden at the proposed pit site);
- Bulldozing at stockpiles (topsoil and overhaul stockpile management);

- Vehicle dust entrainment from unpaved and in-pit roads; and
- Wind erosion of exposed areas (proposed stockpiles).

The impact assessment is limited to airborne particulates only. No chemical speciation was available to quantify specific airborne metal concentrations and fallout rates. The following qualifications apply to the study:

- The dispersion model cannot compute real time mining processes, therefore average mining process throughputs were utilised;
- Routine emissions for the proposed mining operations were simulated. Atmospheric releases occurring as a result of upset conditions were accounted for in the form of blasting operations; and
- Since no on-site meteorological data exist for the proposed mine, measured data for a station nearby were used as input into a meteorological model.

Noise

In order to be able to assess both the quantitative and geographical extent of the potential impact, it is necessary to predict the noise levels generated by the operation of the mine and compare these with the zone noise level for the type of district backed up by confirmatory noise measurements on site. The values measured at the operating sites then formed the basis of calculations to predict the noise levels at specific locations of interest at the boundaries of the proposed mine. Using the point source and attenuation-by-distance model, the following assumptions were made:

- Acoustically hard ground conditions. This assumes that no attenuation due to absorption at the ground surface takes place. The effects of frequency-dependent atmospheric absorption were also ignored. Both assumptions represent a pessimistic evaluation of the potential noise impact;
- Meteorological conditions. Neutral weather conditions, i.e. windless and inversionless, and standard conditions of temperature and humidity (20°C and 50%RH) were assumed, representing a neutral evaluation of the noise impact;
- Noise measurements were representative of normal operation. Equivalent continuous A-weighted noise levels, LAeq,I, measured for each type of operation correctly represent the noise from that operation. Impossible-to-predict (random) single noise events louder than the continuous noise level are not taken into account, although short events which are part of the process, such as the impact noise from material transport, and beepers indicating reversing vehicles, for example, are fully represented in the measurements, representing a neutral evaluation of the noise impact;
- Ambient noise levels. Measured levels are assumed typical of the environment, representing a neutral evaluation of the noise impact;
- Barrier effect of temporary stockpiles and levees. Because of the highly mobile nature of all operations on the proposed opencast pit, the effect of these temporary structures on the noise climate has been ignored, representing a pessimistic evaluation of the potential noise impact;
- Current noise control technology is assumed. No allowance is made in the noise level predictions for improvements in noise control techniques or mitigation measures which may be incorporated into the proposed project, representing a pessimistic evaluation of the potential noise impact; and
- Worst case operational noise level assumption. The highest noise level of plant as measured at the operating site was used as the criterion value for the noise predictions at the proposed project, representing a pessimistic evaluation of the potential noise impact.

Archaeology and Cultural Heritage

The following assumptions, uncertainties and gaps in knowledge are applicable to this section:

- It must be pointed out that heritage resources can be found in the most unexpected places. It must also be borne in mind that surveys may not detect all heritage resources in a given Project Area, particularly considering the size and inaccessible nature of the Blue Gum plantations on Rietvlei. While some remains may simply be missed during surveys, others may occur below the surface of the earth and may only be exposed once mining development commences; and
- If any heritage resources of significance are exposed during the Rietvlei Open Cast Coal Mining Operation the South African Heritage Resources Authority (SAHRA) should be notified immediately, all development activities must be stopped and an archaeologist accredited with the Association for Southern African Professional Archaeologist (ASAPA) should be notified in order to determine appropriate mitigation measures for the discovered finds. This may include obtaining the necessary authorisation (permits) from SAHRA to conduct the mitigation measures.

Visual Aspects

The following assumptions, uncertainties and gaps in knowledge are applicable to this section:

- The commencement date for project is unknown. It is assumed that mining will commence after the public participation process is completed and the relevant authorities have approved the application;
- The height of a typical topsoil stockpile is estimated at 5m and a typical coal stockpile is estimated at 15m;
- Due to the scale of the proposed facility, the extent of the study area is limited to a radius of 10km;
- A site visit was undertaken to the study area on 8 August 2011, and the included photos were taken on that date; and
- This level of assessment excludes surveys to establish viewer preference and thereby their sensitivity. Viewer sensitivity is determined by means of a commonly used rating system.

Socio-Economic

The following assumptions, uncertainties and gaps in knowledge are applicable to this section:

- Engagement was conducted with potentially directly affected stakeholders and local representatives. It was not deemed necessary to broaden the scope of primary data collection as the potential social impacts identified in the scoping phase were deemed to be of low significance;
- One site visit was conducted and included the labour sending areas for the Rietvlei Mine;
- It is assumed that limited direct employment opportunities will arise as a result of the Proposed Project;
- It is assumed that the majority of construction, operation and decommissioning activities will be undertaken by contractors to be sourced from the Middelburg area; and
- Economic loss related to the mining of land proposed for cultivation has not been quantified, as information was not available at the time of the study, but is assumed to be low as it represents a small portion of land.

Blasting and Vibration

The following assumptions, uncertainties and gaps in knowledge are applicable to this section:

- There is at this stage no definite blast design for blasting operations;
- Blast designs forms the baseline for determining the possible influences from blasting operations; and

- Geological information from the project was used to derive possible drilling and blasting information.

Traffic

The following assumptions, uncertainties and gaps in knowledge are applicable to this section:

- Based on the information provided it was assumed that mining operations would commence in 2015, that there would be a ramp up period in terms of production during the first year and that the mine would have a life span of 23 years;
- Since the distribution of the coal destined for Eskom was unknown at the time of the study, the worst-case scenario in terms of road impact was assumed, i.e. all Eskom coal will be transported by means of road along the R555;
- It was assumed that haulage of coal will occur six days a week from 06:00 to 18:00;
- Due to a lack of better information the staff profile of the Rietvlei mine and related trip generation were based on information used in traffic impact studies for similar developments;
- Available historic (2011) 7-day traffic data on R33 was used to convert the 12-hour data to average daily traffic volumes for the pavement loading assessment;
- An annual traffic growth rate of 3 % was assumed for background traffic;
- Based on the type of heavy vehicles observed in the vicinity of the site, each heavy vehicle was assumed to be equivalent to 8 passenger car units for the purpose of the capacity analysis; and
- The average heavy vehicle already on the roads was assumed to be equal to 3 E80's. For the heavy vehicles from Rietvlei mine it was assumed that fully loaded trucks would be equivalent to 33.6 E80's and empty trucks would we 0.2 E80's. It was further assumed that for every loaded truck leaving the mine, one empty truck would return.

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

i) Reasons why the activity should be authorized or not.

The anticipated environmental impacts associated with the Proposed Project have been evaluated according to their significance, which is determined as a result of their extent, magnitude, probability and duration. All impacts were assessed with and without management measures in place. Where the overall environmental impact significance was determined to be low-medium and higher, these impacts were assessed in more detail with the relevant management measures recommended.

This EIR has been structured to comply with the requirements of the NEMA and MPRDA. The report provides a description of the Project and details the aspects associated with the construction, operation and decommissioning of the Rietvlei Mine. The report also includes the methodology followed to undertake the S&EIR process. A detailed description on the existing environment (bio-physical as well as socio-economic) is provided based on findings from the specialist surveys. Stakeholder engagement was undertaken from the onset of the project in a transparent and comprehensive manner. Outcomes of all meetings and comments received from the public review periods were recorded and responded to in the EIR. Based on the environmental description, specialist surveys as well as the stakeholder engagement a detailed EIA rating has been undertaken and where relevant the necessary management measures have been recommended.

In summary, the S&EIR process assessed both biophysical and socio-economic environments and identified appropriate management and mitigation measures. The biophysical impact assessment revealed that there are no environmental fatal flaws and no significant negative impacts associated with the Project should mitigation and management measures be implemented. In addition, it should be noted that the overall socio-economic impacts associated with the project are positive and include the creation of job opportunities and contributions to the local, regional and national economies.

WSP is of the opinion that should the identified mitigation and management measures be implemented, the Project ought to proceed to provide the following opportunities:

- A small number of new indirect employment opportunities (predominantly throughout the use of contractors during the construction, operation and decommissioning phase);
- Access to a previously unreachable resource that will ultimately provide coal reserves to Eskom for the ongoing generation of power; and
- Provision of a cash injection into secondary industries such as contractors, manufacturers and suppliers

Being able to extract resources from the Rietvlei Mine will provide a sustainable business opportunity for RCM to meet future product needs, as well as to prolong the contribution of the mine to the local, regional and national economy.

ii) Conditions that must be included in the authorisation

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

Refer to the recommendations stipulated in the environmental management programme.

(2) Rehabilitation requirements

Rehabilitation Activities

General Approach to Rehabilitation

The general approach to rehabilitation is given in the EMPR document and is summarised below.

- Topsoil shall be regarded as the uppermost 500 mm of the soil profile from areas not designated as wetland or wetland buffer zones. The topsoil should be stripped to stockpile from pit areas and from areas where temporary stockpiles, dumps and mine infrastructure will be established.
- Wet soil material should not be mixed with dry soil material, but should be selectively stockpiled if encountered. Soil material containing the existing seedbank of the site should be selectively stripped and used as the top dressing material for visual and pollution control temporary berms and then re-utilised as the topsoiling layer for final rehabilitation and re-vegetation.
- Topsoil material will be utilised to construct the berms where needed, or will be stockpiled in a designated area. This material will be placed back on top of the back filled voids during rehabilitation. Topsoil must be stripped to a minimum depth of 500 mm. Topsoil stockpiles should be formed as to avoid excessive heights. Where topsoil piles exceed 1.5 m in height there is excessive densification of the lower layers which can lead to anaerobic conditions. Topsoil should be either be vegetated or re-used as soon as possible after stripping to minimise propagule death.
- The coal discard material consists of reject coal from the beneficiation process that is of inferior grade for sale as thermal coal and may contain fragments of sandstone and shale. The discard material will be disposed of on a lined discard facility. When mining operations have ceased the discard facility will be capped and vegetated.

- The capping material will be placed above the discard in layers not exceeding 300 mm in thickness and compacted to a density of at least 90% Mod AASHTO where after a layer of topsoil will be added and revegetated.
- Topsoil will be lightly compacted to a field density sufficient to prevent erosion and the uppermost layer will be seeded with an appropriate mix of commercially available indigenous grass seeds to supplement the remaining seedbank and achieve an agriculturally viable pasture. Use of manually harvesting natural seed is to be encouraged and should commence on the onset of mining depending on the season. The choice of grasses will be influenced by seasonal influences depending on exact timing of re-seeding and the immediate and long term requirement of livestock farming and any specific biodiversity goals to be determined for the site.
- While the ultimate goal should be to have indigenous, hardy, palatable, perennial grass species capable of growing under conditions of low soil fertility, such species are generally commercially unavailable and less easy to establish on disturbed sites. It is thus preferable to make use of commercial species to help the site to become stable. The objective is to establish a variety of species that will produce cover at a variety of growth forms and which would occur over as much of the growing season as possible.
- Highveld grasslands are difficult to re-establish as species available for planting may be limited, this can lead to the development of monostrands and loss of biodiversity. Responsible storage and preservation of the topsoil is thus a key requirement for successful rehabilitation.
- All redundant pollution control facilities will be decommissioned and rehabilitated by the end of the operational phase. Any pollution control facilities still required to be operational will be maintained until such time as the water qualities are such that the water can be released.
- Disused roads will be rehabilitated by the amelioration of physical properties (by ripping) and chemical properties with removal of surfacing. Topsoiling with the addition of appropriate fertilisers and liming, and vegetation using appropriate indigenous seed mixes (to be defined five years prior to mine closure commencing).
- Other un-required structures, including offices, ablutions and workshops, berms, haul roads and stockpile areas will all be removed and rehabilitated.
- There will be no remaining waste storage facilities as the waste will n(general and hazardous) will not be disposed of on-site and oils and greases will be collected for recycling. Domestic waste will be disposed of on the nearest licensed municipal waste site. A septic tank and sewage plant will be utilised for sewage treatment. Sludge will be collected by an external contractor. The tank and plant will be removed and the ground re-instated at closure.
- Contaminated areas will be cleared of carbonaceous material and re-vegetated to reduce the contamination of water infiltrating the area.

Specific Revegetation Measures

The general methodology for landscaping and re-vegetation is from the ESMP Closure Plan and has been summarised below.

It will be necessary for the topsoil and subsoil to be stripped and stockpiled separately, with the dry, friable soils being kept separate from the wet, clay-rich materials. It is recommended that the soils should be stripped during the winter months, and vegetated to prevent erosion.

The pollution prevention berms should, where possible be constructed using a bulldozer to push the topsoil from the box cut area towards the toe of the berm. These topsoils will be stockpiled and utilised to top dress the berm, while the sub-soils will be used to form the bulk of the berm structure. Utilising the soil in this manner will maximise the beneficial properties of each material.

It is imperative that the topsoil that is used to cap the berm structure is well protected from erosion and compaction. These topsoils must be adequately vegetated as soon after construction as possible and maintained throughout the two year life of mining. It is recommended that the following actions be implemented:

- Strip and stockpile the topsoil from the box cut area;
- Construct the berm structure using the sub soils and overburden if required from the initial box cut. The berm should comprise a series of 1.5 m terraces if the height required is >1.5 m;
- The topsoils should then be spread evenly over the top and sides of the berm structure;
- Disc the area using a large disc harrow;
- Add the fertiliser and manure according to soil analysis and recommendation. The fertiliser and manure should be added using a standard industrial spreader;
- Harrow the area again to ensure adequate mixing has occurred; and
- The area can now be seeded with the recommended seed mix.

If the wet-based soils are stripped in their dry state it will not be necessary to cultivate the topsoil. However, if the soils are stripped when wet, then ripping and discing of the topsoil is recommended prior to seeding of the soils, in order to break up any clods that might have formed.

It is imperative, where possible, that the slopes of the berm are constructed to 1:6 or shallower gradient, as this will minimise the chances of erosion of the topsoil. However, prior to the establishment of vegetation, it is recommended that erosion control measures, such as the planting of *Vetiver* or other suitable species of grass, or the construction of benches and cut-off drains be included in the berm design. These methods of construction will limit the potential for uncontrolled run-off and the subsequent erosion of the unconsolidated soils, while the vegetation is establishing itself.

The application of fertilisers and the amelioration of the soil can be divided into two events. It is necessary to distinguish between the initial application of fertilisers or soil amendments and maintenance dressings. Initial applications of additives are required to correct disorders that might be present in the in-situ material to raise the fertility status of the soil to a suitable level prior to seeding. The initial application of fertiliser and lime to the disturbed soils is necessary to establish a healthy plant cover as soon as possible. This will prevent erosion, while the maintenance dressings are applied for the purpose of keeping up nutrient levels, and maintaining the vegetative cover in a healthy condition.

In general, the uncultivated soils mapped are deficient in nitrogen (N), phosphorus (P) and potassium (K). It is recommended that a standard 3:2:1 ratio N:P:K fertiliser be added to the soil according to soil analysis and recommendation before the re-vegetation programme.

It is recommended that, prior to soil stripping, superphosphate fertiliser should be added to the sandy loams and sandy clay loams that make up the bulk of the dry friable soils, at a rate of about 200kg/ha if they have not previously been fertilised or cultivated. Double super phosphate should be used in preference to a single superphosphate, as they contain appreciably less sulphur and are, therefore, more suitable for use in a coalmining environment. The fertiliser should be added in a slow release, granular form.

It will be necessary to re-evaluate the nutrient status of the soils at regular intervals to determine the possibility of needing additional fertiliser applications.

The following control measures and maintenance will be required:

- The area must be fenced, and all domestic animals kept off the area until the vegetation is self-sustaining;
- Newly seeded/planted areas must be protected against compaction and erosion;
- Traffic over the rehabilitated ground should be limited were possible while the vegetation is establishing itself;
- Plants should be watered and weeded regularly;
- Check for pests and diseases at least once every two weeks and treat if necessary;

- Replace unhealthy or dead plant material;
- Fertilise, seeded and grassed areas with 200kg/ha LAN 4-6 weeks after germination; and
- Repair any damage caused by erosion.

The top dressed areas will then be rolled and seeded, preferably in February/March, or as soon as the soil moisture is sufficient (monitor with tensiometers) to guarantee that the seed has a chance of germinating. A suitable seed mix (to be determined from the vegetation survey) should be used to stabilise the replaced soils. Compaction of the sub-soils should be carried out to a 85% Mod AASHTO, and monitored, so as to achieve the required permeability rate for the underlying materials.

The planting will be undertaken with water, either, by making use of natural rainfall, or, by hydro-seeding the seed mix onto the ground, or having pre-wet the soils prior to planting, with a weekly watering programme (15 to 20mm/ha/week) for one month after planting, or until germination has occurred.

The areas to be planted will need to be landscaped and engineered to a slope not greater than 1:6. The soils will then be ripped to a depth of 20mm to loosen the soil, and all weeds will be removed. A fertiliser mix, if required (of 3:2:1 at a rate of 200kg/ha), will be applied at time of planting. In addition, and if available, chicken litter should be applied to add bulk (organic matter) to the heavy, clay rich soils.

For areas that are considered too steep, and where a gradient of 1:6 cannot be achieved, the use of *Vetiver* grass (*Vetiveria zizanodies*) or other suitable species or an appropriately designed erosion control method is recommended, and in places will be essential to prevent erosion, and to stabilise the soils.

If Vetiver is used it must be planted according to the slope gradient, length of slope, and degree of erosion potential. A spacing of approximately one row every 5m of vertical drop is recommended. This might alter as the slope becomes very steep, or very shallow. It is recommended that a specialist be used for the specific areas of concern.

A horticulturist will examine the grass stands one year after planting to ensure that the grass has established itself satisfactorily. A soil sample will be taken in the June following planting, and analysed to determine the required fertiliser applications.

Surface Water Management during Rehabilitation

Ideally, unpolluted surface water from around the rehabilitated area should be kept off the rehabilitated area in order to minimise infiltration into the backfilled pit area and to reduce the risk of surface erosion caused by excess surface water flow on and over this area. The proposed reshaping will aim at ensuring that the area is free draining as far as is practical.

Water management will be such that all areas where vegetation is removed will be re-compacted. The disturbed area will be shaped to prevent water from ponding and will provide for positive drainage off the pit area. Where necessary, contour walls and drains will be constructed to limit the volume and velocity of surface runoff. Runoff will be controlled by reinstating the existing contour drains and ensuring that the outlets do not erode. Concentrated runoff, such as at access roads, will be avoided through the construction of water control structures. In addition, the area around the coal discard facilities will be made free-draining to limit ponding of water and the resultant increase in leaching.

A proper surface storm water control management design must be compiled to address a 1:100 year storm event. This design will ensure that runoff is removed from the terrain as effectively as possible, i.e. contour drains and waterways will be shaped to ensure runoff away from all areas where tree clearing has taken place. As far as possible, the runoff will be diverted to the pollution dam structures. Between the contour drains to be formed, extra care will be given to the proper design to ensure that slope lengths are short enough to minimise erosion risk; the slope angles will similarly be low enough to ensure sustainable re-vegetation and maintenance, while minimising erosion risk. The combination of compaction of cleared areas, with proper water diversion to minimise infiltration and re-vegetation on properly ameliorated growth medium will ensure that minimal water will seep into the backfilled pit, which will minimise the AMD that can generate from the area.

Summary

The overall rehabilitation of the mining area to agricultural pasture is anticipated to take over ten years post mine closure. This will result in a moderate negative impact for the short term, however, over time the site will be returned to agricultural pasture of potentially marginally lower quality thereby resulting in an overall positive impact of low significance. This is fundamentally dependent on the effort placed on the rehabilitation and the resources used, the quality of the final rehabilitation plan will ultimately influence the overall potential of the land and its economic value. In addition, the proposed mining operation will change the pre-mining landform and affect all of the existing wetlands on the site. As the mine workings are opencast and have a low potential for ground subsidence the impact on the landform is considered to be of low significance.

The rehabilitation plan will seek to emulate the pre-mining condition as well as re-vegetate with indigenous grasses and re-establish the surface drainage patterns to support the remaining wetlands thereby seeking to reduce the overall impact on the natural environment. Removal of alien vegetation will improve the biodiversity status of the site. Re-vegetation with indigenous grasses will re-establish pasture to a viable agricultural potential which will be equivalent or an improvement on the pre-mining state of land capability. Some minor loss of land capability is possible and is subject to the success of rehabilitation measures and timeframes applied to assessing the closure target.

There are activities associated with the operational phase of mining that will result in inevitable long term impacts on surface water and groundwater flows and water quality that will impact on the Rietvlei property that cannot be entirely mitigated by physical rehabilitation measures. It is predicted that there is likely to be decant from the mining area. The impacts are predicted to be localised in extent and are considered to be moderate after the implementation of recommended mitigation measures.

The mining project creates locally significant opportunities for direct long term employment and ensures the livelihoods of the broader mining-skilled working community. Closure impacts on employment patterns are accordingly considered minor/low.

q) Period for which the Environmental Authorisation is required.

The estimated operational life of mine is between 20 - 24 years, and as such the authorisation for the operational phase will be required for a minimum of 24 years.

r) Undertaking

Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the Basic assessment report and the Environmental Management Programme report.

It can be confirmed that the undertaking required to meet the requirements of the section has been completed. The undertaking provided at the end of the EMPr and is applicable to the Environmental Management Programme Report.

s) Financial Provision

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

A financial guarantee provision of **R 16 029 495.00 (including VAT)**, based on modelling completed with the Bankable feasibility study, will be provided should the right be granted as detailed in **Table 79.** This will be supplemented every year of mining with additional provisions for mine closure and water treatment.

i) Explain how the aforesaid amount was derived.

According to the regulations set out in the MPRDA, it is necessary for RMC to compile a cost estimate for the proposed mine and to update this on a regular specified basis. The financial provision for the environmental rehabilitation and closure of any mine and its associated operations and infrastructure form an integral part of the MPRDA and is addressed in Section 41 and 45 of the Act.

According to Regulation 56 (Principles for Mine Closure) of the MPRDA in the Government Gazette 466 No 26275, the holder of a prospecting right, mining right, retention permit or mining permit must ensure that prospecting or mining operations are closed efficiently and cost effectively. According to regulations published in terms of the Mineral Act (Act 50 of 1991) the holder of a mining authorisation has to:

- Compile Environmental Management Programmes that indicate adequate financial means in terms of both sufficient and acceptable pecuniary provision to the satisfaction of the DMR; and
- Annually, to the satisfaction of the DMR, and in consultation with an expert, determine the quantum of pecuniary provision.

The 'Guideline Document for the Evaluation for the Quantum of Closure Related to Financial Provision Provided by a Mine' (2004) was developed by the DMR in order to empower the personnel at regional DMR offices to review the quantum determination and closure of mining sites. This approach has been used to determine the financial provision for the closure cost of Rietvlei Mine together with information from the mine works programme (MWP) (January, 2013) and project specific data compiled by RMC and Mindset.

The following closure components are suggested by the DMR for determining the quantum for financial provisions for mine closure:

- Dismantling of process plant and related structures;
- Demolition of steel structures;
- Demolition of reinforced concrete buildings and structures;
- Rehabilitation of access roads;
- Demolition of housing facilities;
- Opencast rehabilitation including final voids and ramps
- Rehabilitation of overburden and spoil stockpiles;
- Rehabilitation of process waste deposits and evaporation ponds;
- Rehabilitation of subsided areas;
- General surface rehabilitation, including grassing of all denuded areas;
- Fencing;
- Water management (separating clean and dirty water, management of polluted water, managing the impacts on groundwater); and
- Maintenance and aftercare.

A Master Rate for each component in the DMR Guidelines and weighting factor can be applied depending on the risk class of the activity and the sensitivity of the area. The financial rates were determined in 2005 so it is therefore necessary to calculate an escalation in the rates according to an appropriate CPIX.

Location and Aerial Extent of Main Mining Activities

Refer to **Figure 84** and **Figure 85** for the mine plan illustrating the annual progress of the mining operation relative to the overall plan as well as an indication of where structures and infrastructure may be located.

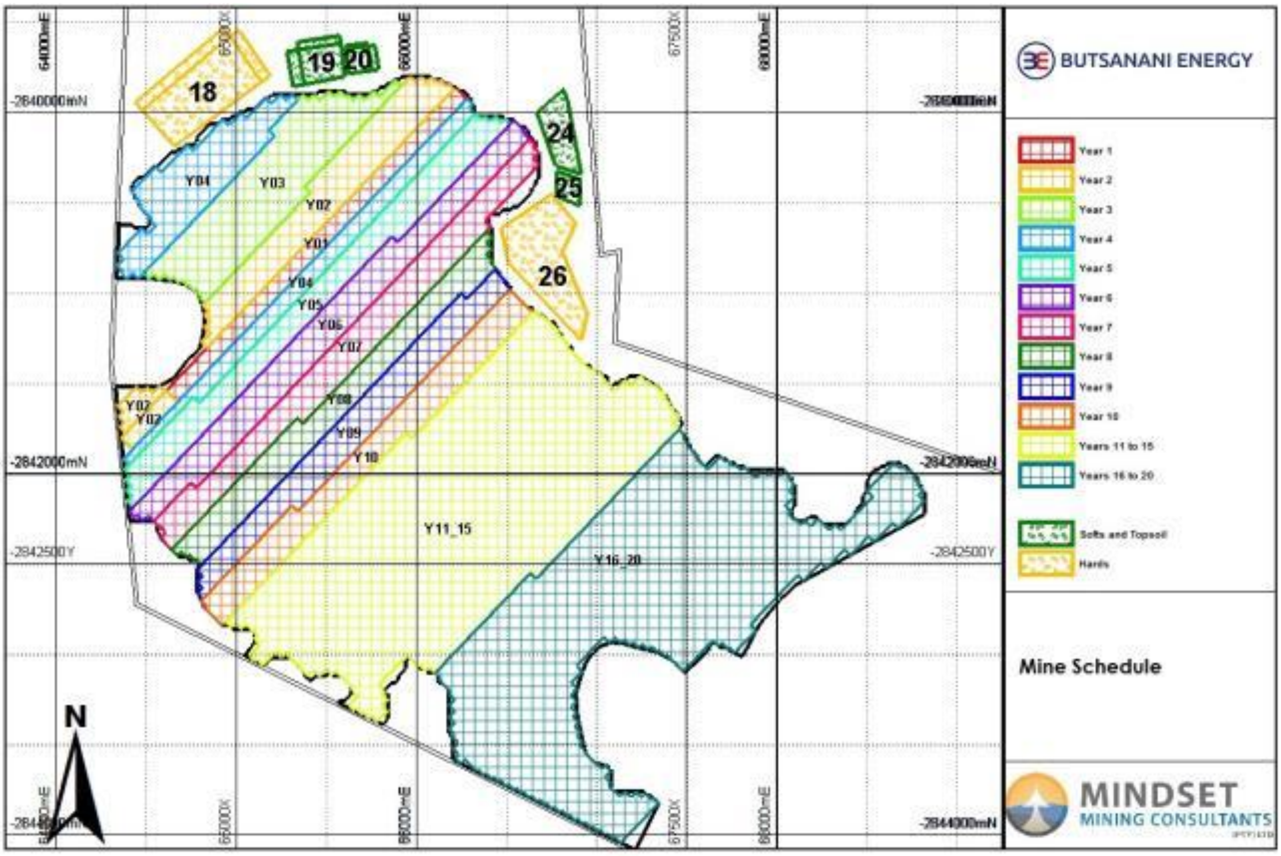


Figure 84: Mining Schedule Illustrating Annual Mining Progress (Source: Mindset, 2013)

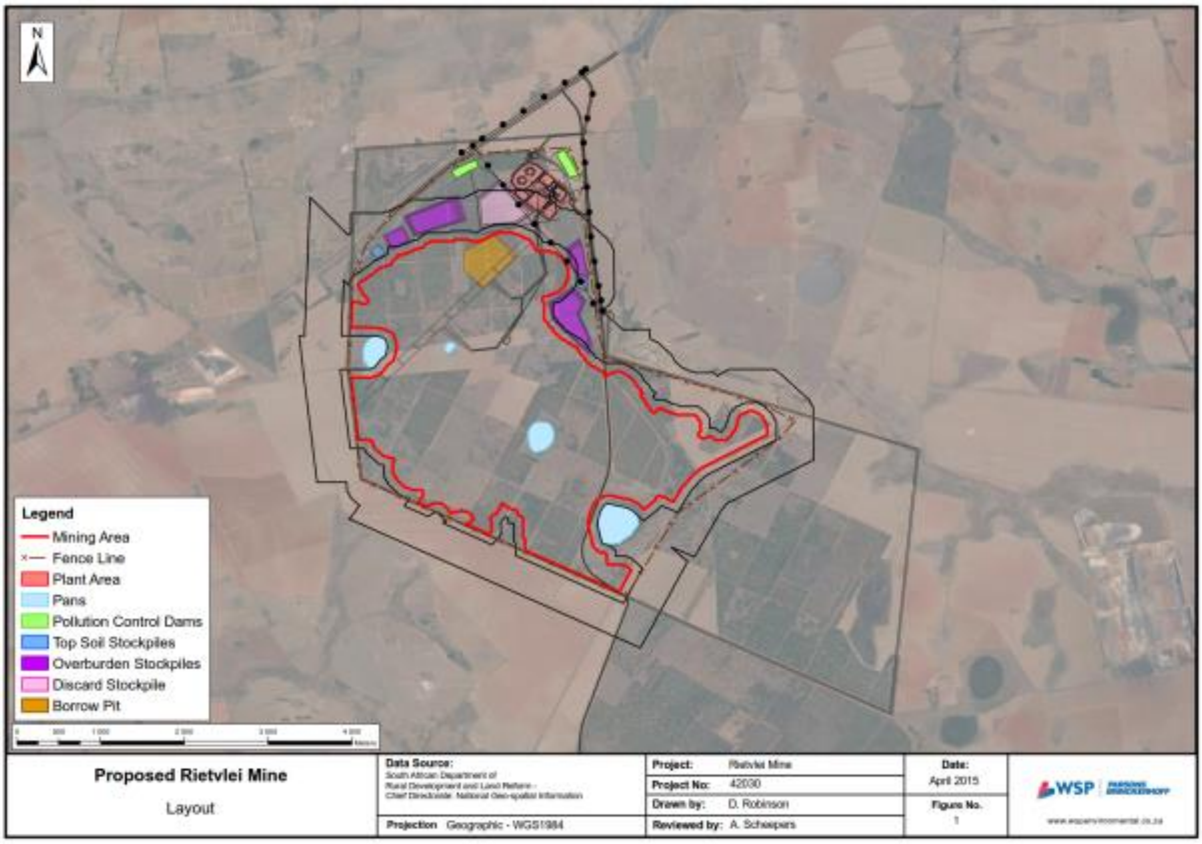


Figure 85: Schematic Illustration of the Infrastructure Associated with the Rietvlei Mine (Mindset, 2013)

Method of Providing Financial Provisions

The applicable project components are discussed below together with closure related comments and any items that influence applicable financial rates and Weighting Factors.

- Component 1: Processing Plant
  - Costs for dismantling of processing plant and related structures. Conveyors and power lines are included as part of the processing plant closure costs
  - Plant includes feeders, vibrating screens and crushers.
  - Crushed coal is washed using cyclones and discard is transported to the discard facility.
- Component 2(A): Steel Buildings and Structures and Component 2 (B): Demolition of Reinforced Concrete Buildings and Structures
  - Cost for demolition of steel buildings and structures are based on the assumption that all structures to be demolished include foundations to a depth of 1m below ground level.
  - The rubble is to be buried onsite.
  - Cleared areas will be shaped and topsoil with 300 mm of topsoil cover and re-vegetated or as stated in the relevant ESMP document.
  - Costs include allowance for monitoring and maintenance.
- Component 3 Rehabilitation of Access Road
  - Approximately 4,500 m^2 of internal access roads will be rehabilitated.
- Component 4 Rehabilitation of Railway Lines
  - Not applicable. There will be no railway links for the mine.
- Component 5 Demolition of Housing and Administration Buildings

- There will be no housing on site.
- It is proposed to use portable structures on concrete plinths for offices, workshops and change houses.
- The building structures will be re-usable and demolition will be limited to the concrete foundation slab.

- Component 6 Opencast Rehabilitation including Final Voids and Ramps
  - Rehabilitation of the voids associated with the opencast mine are estimated approximately 21ha.
- Component 7 Sealing of Shafts, Adits and Inclines
  - Rietvlei Mine is an opencast operation and therefore this component is not applicable.
- Component 8 (A) Rehabilitation of Overburden and Spoils
  - Large volumes of overburden and spoils will be generated and stockpiled as a result of the box cut for the opencast mining method. The excavated material will be stripped and stockpiled in accordance with best practice as outlined in the ESMP. The material will be used as fill material into the opencast voids at the end of the mine's life.
  - After removal of the overburden and spoils to backfill the final voids the areas where the overburden and spoils were stockpiled needs to be re-covered with topsoil. It has been calculated that approximately 30 ha will need to be rehabilitated.
  - A small portion of the excavated material generated will be used as part of the bulk earth fill material for the construction of the pollution control dams and the facility for stockpiling the coal washing residues
- Component 8 (B) Rehabilitation of Processing Waste (Discard) Deposits and Evaporation Ponds (basic, salt-producing waste)
  - See below.
- Component 8 (C) Rehabilitation of Processing Waste Deposits and Evaporation Ponds (acidic, metal-rich waste)
  - Acidic metal enriched residue deposits are typical of coal mining activities. Accepted closure methods are aimed at the following: Limiting seepage of contaminants from the coal discard facilities, and preventing seepage from entering local surface water and groundwater resources. The standard master rates allow for slope modification, armouring and evaporative covers, lined pollution control dams and lined cut off trenches. Slope modification to achieve stabilisation of residue deposits is based on an outer slope gradient of 1:3 (18 °).
  - Benching at regular intervals should ensure that bench height does not exceed 35 m in order to curb stomr water flow velocities and reduce the risk of erosion to cover material. Benches should be at least 5 m wide, sloping inwards at a slope of 1:10. The lateral slope of benches should be based on the following stability criteria:
    - 1:2 year flow events should not result in bench flow velocities of less than 0.3 m/s. Flow velocities of less than 0.3 m/s tends cause sediment build-up on benches which can result in eventual overtopping and slope damage; and
    - 1:50 year flow events should not result in bench flow velocities exceeding 1 m/s. Flow velocities in excess of 1 m/s could cause bench scouring and hence damage to stomr water chutes.
  - Generally accepted closure methods allow for a dedicated cover to be provided on the modified outer slopes of the residue deposit. The cover should provide stability to the slope and limit the ingress of air and water into the residue material reducing leaching and the potential to generate contaminated seepage from the footprint of the residue deposit. The cover material prevents contamination of the surface run-off from the deposit and allows for suitable re-vegetation to take place improving the aesthetics of the deposit.

- Operational pollution control dams will be lined to prevent migration of contaminated water impounded in the dams to surface water and shallow groundwater. The life of mine is estimated to be 20 years and therefore it is unlikely that the liner systems will degrade over this time period and therefore residual impacts of seepage into surrounding water resources should be negligible. The Master Rate used in the cost provision assumes a liner design based on a 1.5 mm thick HDPE liner on a selected granular bedding layer of 250 mm with a geotextile separation layer. The Master rate allows for concrete stomr water chutes at 200 m spacing along the perimeter of the rehabilitated residue deposit with benching and energy dissipation measures upslope of bench crossings and discharge points.

■ Component 9 Rehabilitation of Subsided Areas

- The geological review of the stability of the study area indicates that ground subsidence is considered unlikely and therefore the financial provision is not applicable for this component.

■ Component 10 General Surface Rehabilitation

- The final surface rehabilitation of areas disturbed by mining and related activities will be aligned to the selected final land use. General surface rehabilitation measures will ensure the following:
  - Surface topography will emulate the visual appearance of the surrounding areas and be aligned to the general character of the landscape;
  - Landscaping will facilitate surface runoff and result in free-drainage areas. Where possible natural drainage lines will be reinstated;
  - Special attention will be given to remove heaps of excess material and to remove unnecessary remnants of surface structures and infrastructure;
  - General shaping of the land surface will be made suitable for re-vegetation; and
  - The Master Rate allows for shaping of the land surface to a depth of 500mm.

■ Component 11 River Diversions

- There are no drainage courses within the area impacted by mining activities. This component is therefore considered to be non-applicable to the financial provision.

■ Component 12 Fencing

- An allowance has been made for 20,000 running metres of fencing.

■ Component 13 Water Management

- The Master Rate developed by the DMR is considered to be over-conservative and too generic to be applied in the case of the Rietvlei Mine where the predictive modelling suggests that mine decant will occur 58 years following mine closure.
- Allowance has been made in the Financial Model for a water treatment plant. This is due to all the water decanting as a result of the mining process having to be treated prior to release into a natural water course.
- The location of the water treatment plant has not been determined at this point, as it is considered that water treatment will only be required towards the end of the life of mine (LOM).
- Monitoring of surface water and groundwater for a period of three years will need to be implemented after the LOM as real data on groundwater level and water quality is obtained and the predictive decant modelling can be properly calibrated.

■ Component 14 Maintenance and Aftercare

- The Master Rate assumes a maintenance and aftercare period of 3 years after mine productive and includes the following:
  - Annual fertilising of rehabilitated re-vegetated areas;

- Monitoring of surface water and groundwater;
- Control of black wattle and other invasive alien plants; and
- General landscaping maintenance, including rehabilitation of cracks and subsidence.

– The area requiring maintenance and aftercare is assumed to be 884 ha for the mining area and 56 ha for the surface infrastructure area.

- Component 15 Specialist Studies and Environmental Management Programme
  - Specialist studies may be required to fully develop the Environmental Management Programme for closure. These studies could include additional monitoring boreholes for groundwater samples or various forms of field trials for re-vegetation and biodiversity initiatives and detailed investigations to assess the practicality of replacing a number of wetlands and pans. The requirements for further specialist studies should be evaluated during the LOM and the Financial Provisions should be updated to reflect any specific requirements as necessary.

Cost Estimate

The DMR requires 10 forecasts (one for each of the first 10 years of operation) and the progressive total in the tenth year (excluding concurrent rehabilitation). The estimated rehabilitation liability after year 1 is estimated to be R 16 029 495 and the progressive total liability after 10 years has been calculated in the MWP to be **R 28 563 199** (as at 2014). Section 13 of the Mine Works Programme (Mindset, 2013) details the cash flow forecast and valuation. The forecast also indicates how the applicable regulatory costs will be accommodated.

The costs are high-level estimates for the Rietvlei Mine. The final cost estimates will be determined as part of the Bankable Feasibility Study which is underway and will be completed concurrently with the environmental authorisation submissions.

A financial guarantee provision of **R 16 029 495.00 (including VAT)** will be provided should the right be granted as detailed in **Table 79**. This will be supplemented every year of mining with additional provisions for mine closure and water treatment.

Table 79: Detailed Outline of the Estimated Financial Provision for the Rietvlei Mine

Mine: Rietvlei Colliery		Rietvlei		Location:	Middelburg		
Evaluators:		Mindset Mining Consultants		Date:	Apr-13		
No	**Description**	**Unit**	**A**	**B**	**C**	**D**	**E=A*B*C**
			Quantity	**Master**	**Multiplication**	**Weighting**	***D**
				Rate	**Factor**	**Factor 1**	**Amount Including water Treatment Plant (ZAR)**
			Step 4.5	**Step 4.3**	**Step 4.3**	**Step 4.4**	
1	Dismantling of processing plant and related structures (Including overland conveyors and power lines)	m^3	500.00	200	1	1	100 000
2(A)	Demolition of steel buildings and structures	m^2	250	150	1	1	37 500
2(B)	Demolition of reinforced	m^2	600	140	1	1	84 000

Mine: Rietvlei Colliery		Rietvlei		Location:	Middelburg		
Evaluators:		Mindset Mining Consultants		Date:	Apr-13		
	concrete buildings and structures						
3	Rehabilitation of access roads	m^2	4500	50	1	1	225 000
4(A)	Demolition and rehabilitation of electrified railway lines	m	-	n/a	-	-	
4(B)	Demolition and rehabilitation of non-electrified railway lines	m		n/a	-	-	
5	Demolition of housing and/or administration facilities	m^2	-	190	1	1	
6	Opencast rehabilitation including final voids and ramps	ha	21	99600	1	1	2 091 600
7	Sealing of shafts, adits and inclines	m^3	-	51	1	1	
8(A)	Rehabilitation of overburden and spoils	ha	30	70150	1	1	2 104 500
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	ha	6	82700	1	1	496 200
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	ha	-	240200	0.59	1	
9	Rehabilitation of subsided areas	ha	-	n/a	-	-	
10	General surface rehabilitation	ha	56	52600	1	1	2 945 600
11	River diversions	ha	-	n/a	-	-	
12	Fencing	m	20000	50	1	1	1 000 000
13	Water management		1	1000000	1	1	1 000 000
14	2 to 3 years of maintenance and aftercare	ha	20.25	7000	1	1	141 753
15 (A)	Specialist study	Sum	0	2000000	1	1	-
15 (B)	Specialist study	Sum	0	1800000	1	1	0
Sub Total 1							**10 226 153**
(Sum of items 1 to 15 above)							
1	Preliminary and General		Weighting factor 2 (Step 4.4)				1

Mine: Rietvlei Colliery		Rietvlei	Location:	Middelburg		
Evaluators:		Mindset Mining Consultants	Date:	Apr-13		
		12% of Sub-total 1				1 227 138
2	Administration and supervision costs	6.0% of Sub-total 1				613 569
3	Engineering drawings and specifications	2% of Sub-total 1				204 523
4	Engineering and procurement of specialist work	2.5% of Sub total 1				255 654
5	Development of a closure plan	2.5% of Sub-total 1				255 654
6	Final groundwater modelling	2.5% of Sub-total 1				255 654
Sub-Total 2						**13 038 345**
(Sub-total 1 plus sum of management and administrative items, 1 to 6 above)						
7	Contingency 10.0% of Subtotal 1					1 022 615
Sub-Total 3						**14 060 960**
(Sub-total 2 plus contingency)						
VAT (14%)						1 968 534
Grand Total (Subtotal 3 plus VAT)						**16 029 495**

All activities relating to the proposed project will occur on the area demarcated and as approved in the mine plan. Ongoing dust suppression measurers, best practice environmental management and monitoring will be conducted on site to ensure that the extent of the footprint area is not increased.

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

(Confirm that the amount, is anticipated to be an operating cost and is provided for as such in the Mining work programme, Financial and Technical Competence Report or Prospecting Work Programme as the case may be).

Table 80 summarises the estimated mine cost forecast for the first 10 years together with the rehabilitation guarantee and the annual provisions for mine closure and water treatment[1]. Although this table shows only the first 10 years the life of the mine is approximately 20 years. The cumulative amount to be provided for by 2025 for mine closure is approximately **R 28 563 199.00**. This includes environmental costs associated with premature closure, should it occur, as required by legislation. The total of the rehabilitation guarantee and the mine closure provisions total **R 29 012 175.00** after 10 years which covers the estimated closure liability.

Provision will also be made annually for the establishment of a water treatment plant at the end of the mine's life. After 10 years this provision will be **R 20 676 120.00** and by the end of the mine's life it will be **R 41 352 000.00** for the construction of a water treatment plant.

Table 80: Environmental and Rehabilitation Costs

Category	Units	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Environmental Liability (Reg 11(1)(g)(iv))	**ZAR**	16 029 495	17 031 048	18 298 927	19 252 974	21 793 631	22 933 375	24 044 450	25 061 976	25 967 128	28 563 199

[1] Environmental costs were obtained from the Mine Works Programme of 2013.

Category	Units	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Quantum Rehab Guarantee	**ZAR**	16 029 495	16 029 495	16 029 495	16 029 495	16 029 495	16 029 495	16 029 495	16 029 495	16 029 495	16 029 495
Mine Closure Provision	ZAR	735 480	2 096 280	3 457 080	4 817 880	6 178 680	7 539 480	8 900 280	10 261 080	11 621 880	12 982 680
Total Rehab Funds Available	**ZAR**	16 764 975	18 125 775	19 486 575	20 847 375	22 208 175	23 568 975	24 929 775	26 290 575	27 651 375	29 012 175
Water Treatment Plant Provision	**ZAR**	1 171 320	3 338 520	5 505 720	7 672 920	9 840 120	12 007 320	14 174 520	16 341 720	18 508 920	20 676 120
Total Provision	**ZAR**	**17 936 295**	**21 464 295**	**24 992 295**	**28 520 295**	**32 048 295**	**35 576 295**	**39 104 295**	**42 632 295**	**46 160 295**	**49 688 295**

Environmental cost as required by the MRA Guideline after 10 years

To avoid double accounting for different divisions in the mining cost structure, the financial (OPEX[2] and CAPEX[3]) are budget according to activities rather than disciplines. Environmental related costs are therefore integrated in the different activities. For example: topsoil removal and replacements are budgeted as an integral part of mining activities, and not separated as "environmental costs". Similarly concurrent rehabilitation is a part of the mining cost and not separated in a separate budget.

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

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

(Provide a list of activities in respect of which the approved scoping report was deviated from, the reference in this report identifying where the deviation was made, and a brief description of the extent of the deviation).

None.

ii) Motivation for the deviation.

Not Applicable.

u) Other Information required by the competent Authority

i) Compliance with the provisions of sections 24(4)(a) and (b) read with section 24 (3) (a) and (7) of the National Environmental Management Act (Act 107 of 1998). the EIA report must include the:-

(1) Impact on the socio-economic conditions of any directly affected person.

(Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as Appendix 2.19.1 and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6.and 2.12.herein).

Table 81: Potential Impacts of Socio-economic Conditions

Operation	Environmental Aspect	Potential Impact
ruction	Visual Aspects	Movement of Construction Vehicles

[2] OPEX – Operational Expenditure

[3] CAPEX – Capital Expenditure

Operation	Environmental Aspect	Potential Impact
		Visual impacts of construction on visual receptors in close proximity to the proposed mine
	Socio-Economic	Increased Health and Risk ■ Noise ■ Air Emissions ■ Traffic ■ Communicable Diseases ■ Crime
		Social Tensions and Disruptions due to Construction Activities and Labour Force
		Creation of Employment Opportunities
		Growth of Skills and Business Development
	Traffic	Traffic generation around the site
		Creation of dust as a result of the movement of construction vehicles
		Operation of vehicles may impact pedestrian safety
		Construction vehicles may result in an increase in road accidents
		Increase in traffic could result in the deterioration of the surrounding road network.
Operational Phase	Visual Aspects	Effect of the areas in close proximity to the Operating Mine
		Effect of the mine on landscape characteristics
		Impact on Settlement and homesteads in close proximity to the proposed mine
		Mine's impact on the residents of settlements and homesteads within the region
		Visual impacts on users of major and secondary roads in close proximity to the proposed mine
		Visual impacts on users of major and secondary roads within the region
		Visual impacts on recreational users, tourists and sightseers in close proximity to the proposed mine
		Visual impacts on recreational users, tourists and sightseers within the region
		Visual impact of lighting at night on visual receptors in close proximity to the proposed mine
	Socio-Economic	Employment Opportunities
		Local Economic Development
		Increased Health and Safety Risk ■ Traffic ■ Blast/vibration ■ Noise and dust ■ Influx of population ■ Crime
		Increase in Social Conflict
	Blasting and Vibration	Ground vibration impact on houses
		Ground vibration impact on boreholes
		Ground vibration impact on roads

Operation	Environmental Aspect	Potential Impact
		Ground vibration impact on railways
		Air blast impact on houses
		Air blast impact on boreholes
		Air Blast impact on roads
		Fly Rock impact on houses
		Fly Rock impact on boreholes
		Fly Rock impact on roads
		Fly Rock impact on railways
		Impact of Fumes - Houses
		Impact of Fumes - Boreholes
		Impact of Fumes - Roads
		Impact of Fumes – Railways
	Traffic	Traffic generation around the site from transportation and operational vehicles
		Creation of dust as a result of the movement of operational vehicles
		Heavy vehicles may result in an increase in road accidents
		Increase in traffic could result in the deterioration of paved and haul routes
		Shoulder Sight Distance
		Operation of vehicles may impact pedestrian safety
Decommissioning Phase	Socio-Economic	Reduction in Employment Opportunities and Associated Decline in Economic Activities
		Improve Health and Safety
	Traffic	Creation of dust as a result of the movement of decommissioning vehicles

(2) Impact on any national estate referred to in section 3(2) of the National

Heritage Resources Act. (Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) with the exception of the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act, attach the investigation report as Appendix 2.19.2 and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6. and 2.12. herein).

Table 82: Potential Impacts of Heritage Features

Operation	Environmental Aspect	Potential Impact
Construction Phase	Archaeology and Cultural Heritage	Destruction of Graveyard.

v) Other matters required in terms of sections 24(4)(a) and (b) of the Act.

(the EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 22(2)(h), exist. The EAP must attach such motivation as Appendix 4).

Not Applicable.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1) Draft environmental management programme.

a) Details of the EAP, (Confirm that the requirement for the provision of the details and expertise of the EAP are already included in PART A, section 1(a) herein as required).

Name of The Practitioner: WSP Environmental (Pty) Ltd

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WSP Global Inc. and Parsons Brinckerhoff have combined and are now one of the world's leading engineering professional services consulting firms. We bring together our 31,500 staff, based in more than 500 offices, across 39 countries to provide engineering and multidisciplinary services in a vast array of industry sectors, with a focus on technical excellence and client service.

In Africa, WSP, Environment & Energy, is a leading environmental consultancy with a broad range of expertise and over 20 years' experience in the regional market. As part of a global business, we provide the marketplace with a dynamic blend of local knowledge and global expertise. While we form part of WSP Global Inc, we are also committed to transformation in our operational region, with 26% Broad Based Black Economic Empowerment (BBBEE) ownership and having achieved Level 3 BBBEE certification in South Africa.

We offer independent, insightful and professional advice to our clients to achieve a balance between environmental protection, social desirability and economic development.

At WSP Environment & Energy, we have a reputation for delivery and excellence and provide a diverse range of integrated and innovative solutions to both public and private sector clients across the industrial, mining, infrastructure and financial sectors

b) Description of the Aspects of the Activity

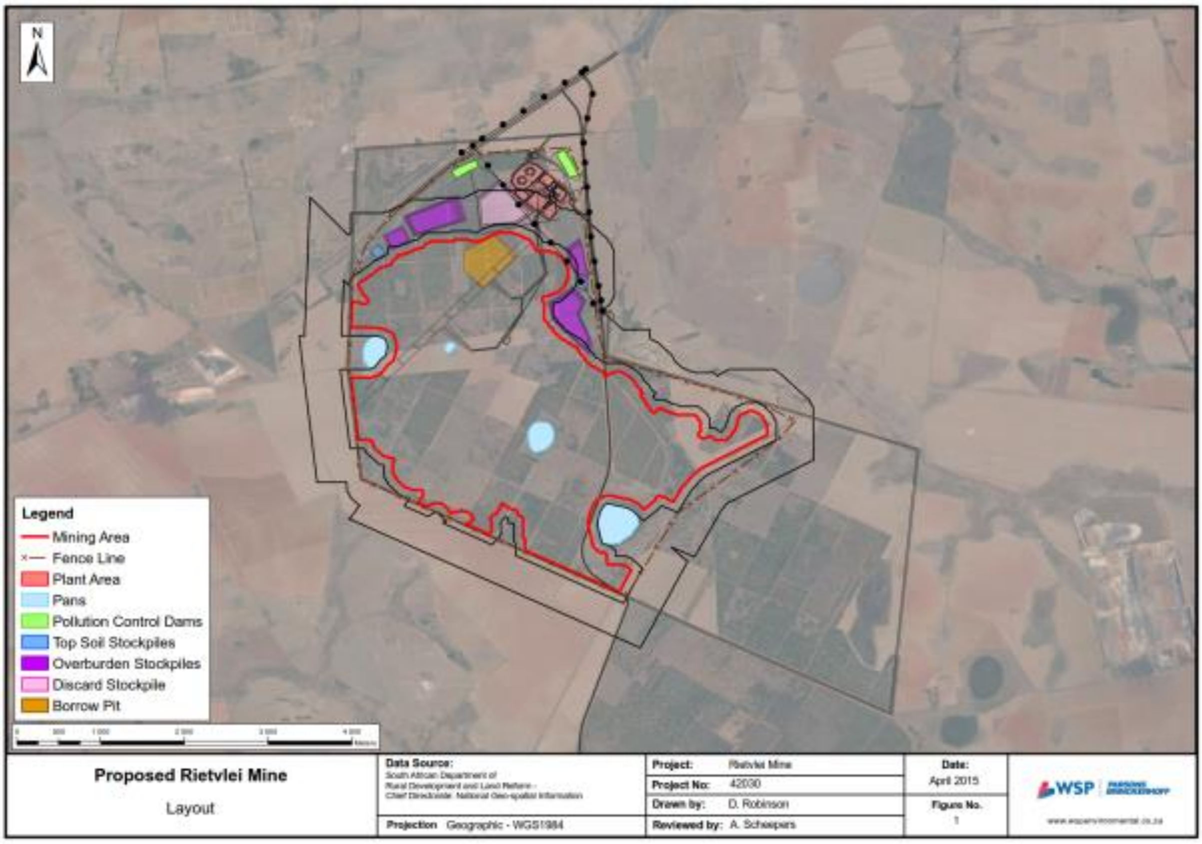
(Confirm that the requirement to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, section (1)(h) herein as required).

Refer to the following Sections of this report:

- 3 (d) (ii); and
- 3 (g) (iv).

c) Composite Map

(Provide a map (Attached as an **Appendix 4**) at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers)



d) Description of Impact management objectives including management statements

A preliminary mine closure plan has been developed for the proposed mine, however, it is expected that soon after the commencement of operations, RMC will develop a conceptual closure plan, which will be periodically updated as new areas are disturbed and new information becomes available. This conceptual closure plan will form the basis of the final closure plan considered in the MPRDA which is required as the end of the Life of Mine approaches.

A preliminary closure vision has been developed to assist with the development of preliminary closure objectives, necessary to identify the closure actions required onsite. This preliminary closure vision for the Proposed Project is included below:

RMC will ensure a post closure environment that is not harmful to the safety and health of surrounding communities, where prospects to utilise infrastructure after closure are maximized and where final post land use is optimized and where natural heritage is conserved.

Objectives and Goals relating to Environmental Impacts

Objectives

RMC intends to minimise the impacts of the Proposed Project on the environment as far as possible.

Goals

The environmental related goals are as follows:

- Implement the management and mitigation measures stated in the ESMP;
- Develop and implement monitoring programmes stated in the ESMP;
- Ensure compliance with all relevant environmental legislation and legal requirements;
- Obtain the relevant licences and permits;

- Comply with relevant licence and permit conditions;
- Ensure that closure supports sustainable uses considering pre-mining conditions and is in agreement with commitments to stakeholders;
- Promote biodiversity and biological sustainability to the maximum extent practicable; and
- Utilise closure strategies that promote self-sustaining conditions with little or no need for ongoing care and maintenance.

Objectives and Goals relating to Cultural and Heritage Aspects

Objectives

RMC intends to ensure that the integrity of the heritage and cultural resources associated with the site remain intact as far as practically possible.

Goals

The cultural and heritage related goals are as follows:

- Ensure that the management measures proposed in the ESMP, which relate to heritage resources, are implemented; and
- Ensure compliance with the National Heritage Resources Act (No. 25 of 1999).

Objectives and Goals Relating to Socio-Economic Conditions

Objectives

The objectives relating to the socio-economic conditions are as per the draft SLP and are summarised below:

- Promote economic growth and mineral and petroleum resources development in the Republic;
- Promote employment and advance the social and economic welfare of all South Africans;
- Contribute to the transformation of the mining industry; and
- Ensure that holders of mining and production rights contribute towards the socio-economic development of the areas in which they are operating as well as the areas from which the majority of the workforce is sourced.

Goals

The goals to accomplish the above objectives are:

- To provide skills training opportunities to mine workers during their employment in order to improve their income earning capacity after mine closure;
- To promote employment and skills development in the local communities and major labour sending areas;
- To ensure substantially higher levels of inclusiveness and advancement of historically disadvantaged South African's, including women, in the mining industry;
- To contribute to the development of a pool of skilled South African workers in support of National Economic and Skills Development strategies;
- Physically and chemically stabilise remaining structures to minimise residual risks; and
- Ensure health and safety of all stakeholders (employees, contractors and surrounding communities) during closure and post closure and that communities using the site after closure are not exposed to unacceptable risks.

i) Determination of closure objectives. (ensure that the closure objectives are informed by the type of environment described in 2.4 herein)

Pre-mining Environment

The majority of the study area, 95.14% (614.69ha), consists of well-drained, red and yellow brown, loamy sand to sandy clay loam soils with arable land capability and high agricultural potential. Rainfall occurs in the summer months (October to March) with a monthly rain average of 72mm recorded. 83.61% of the pre-mining land use of the surveyed area is currently utilised for forestry (*Eucalyptus* trees), 9.94% for cultivation (soybeans) and 6.45% are vacant spots where forestry or cultivation could not take place due to wetland areas.

Given this, the rehabilitation strategy will be to establish a post closure land capability of arable and grazing land uses, with post closure land use being limited by the health and safety aspects associated with mine residue dumps.

Developing a Sustainable Rehabilitation Strategy

In providing guidance on a rehabilitation strategy for the Proposed Project's facilities, we have to consider the interrelated aspects of legal, financial and technical elements in order to inform the best practical environmental option which complies with RMC's policy objectives.

Vision and Objectives for Mine Closure

The approach to mine rehabilitation master planning should be consistent with the vision, objectives and company philosophy, and should follow the same general concepts as applied in the site closure planning for other forms of company assets in the mining and industrial sector. Basic objectives for closure are:

- To develop landforms and land uses that are stable, sustainable and aesthetically acceptable on closure;
- To achieve agreed quality targets set by stakeholders as far as practical relative to impacts and reasonability to achieve; and
- A policy objective regarding mine closure is to leave self-sufficient communities after mine closure with appropriate infrastructure, skilled people and rehabilitated land.

Closure Objectives

The overall closure objective is within ten years to return the area disturbed by mining operations, as closely as is practicable, to its pre-mining state. Also of critical importance is to stabilise the affected area by landscaping and re-vegetating the disturbed area to the pre-mining landscape and cover. The surface is planned to have a post closure land capability of arable and grazing potential consistent with its present use. Management of surface and groundwater aims at ensuring that the mine does not have an unacceptably negative impact on the receiving environment or on the affected groundwater aquifer.

Closure Target Outcomes and Goals

The target outcomes and goals of the closure and rehabilitation plan are as follows:

- **Target 1: Health and Safety**
  - Rehabilitation of the opencast pit to produce a safe and stable landform;
  - Monitor coal discard facilities with respect to spontaneous combustion; and.
  - Monitor voids and stabilise areas that may give rise to ground subsidence in such a way that lives will not be endangered and environmental impacts are minimised.
- **Target 2: Impacts on Natural Environment**
  - Re-establish topography to emulate pre-existing condition, and ensure free drainage where possible;
  - Re-establish soil overburden to emulate pre-existing condition to favour development of natural drain-age condition;
  - Create topsoil layer to favour re-vegetation with grasses suitable for pre-existing land use;

- Removal of alien species to enhance natural biodiversity and reduce possibility of infestation;
- Protect and maintain remaining wetland systems;
- Restrict grazing areas to protect and enhance remaining wetland systems; and
- Reduce and monitor impacts associated with acid mine drainage and other forms of contaminated seepage from residue deposits.

- **Target 3: Social Impacts**
  - Manage the retrenchment of employees and the cessation of procurement contracts in such a way so as to avoid or minimise potential negative impacts of closure; and.
  - Minimise impacts on local community by re-establishing pre-mining condition of viable agricultural land use.
- **Target 4: Reputational Risk**
  - Achieve sustainable closure outcomes compatible with company policy on sustainable development and in compliance with all legal requirements.
- **Target 5: Legal risk**
  - Comply with all applicable legislation and the terms and conditions of all regulatory permits, licences and environmental authorisations.
- **Target 6: Financial Risk**
  - Develop and maintain accurate financial provisions for implementation of closure and rehabilitation works and for short medium and long term maintenance and monitoring.

The above list represents the overarching targets RMC wishes to achieve following the completion of the twenty year mining activities at the Proposed Project. These targets are supported by a set of Closure Goals which have been drawn out of the predicted impacts associated with the proposed mining activity. The Closure Goals represent RMC's commitment to the rehabilitation of the mining area and have been developed with a related management indicator to ensure the Goals are suitability met. **Table 83** below presents a summary of the site features which warrant protection, how this can be protected or enhanced, the related Closure Goal and the management indicator.

Table 83: Summary of Site Features which warrants Protection together with the related Closure Goals

Site Features	What must be protected	What can be enhanced	Closure Goals	Management Indicator
Land tenure	Property rights	Rehabilitation to agricultural pasture and forestry	Sale of property for agricultural use.	Successful property transfer on completion of rehabilitation.
Land use	Economic value of agricultural land	Rehabilitation to agricultural pasture and forestry	■ Total area of site that remains after areas not designated for conservation around the wetlands have been defined. ■ Support one large stock unit per ten hectares per annum.	Grazing production records.
Land Capability	Remaining Wetland systems to pre-mining status	A land capability that can sustain a controlled grazing programme.	Rehabilitation to emulate pre-existing condition. Re-vegetation with indigenous grasses and re-establishment of surface drainage patterns to	■ Adequate vegetative cover and production. ■ Audits on

Site Features	What must be protected	What can be enhanced	Closure Goals	Management Indicator
			support remaining wetlands.	remaining wetland systems
Landform	To emulate pre-mining landform	Stability of landforms.	▪ The stability of the rehabilitated area will be monitored during the decommissioning phase. ▪ Criteria will include: localised settling, subsidence and erosion. ▪ The man-made catchments landscaped for a free-draining objective during the rehabilitation of the land surface after mining, will be given optimal slopes for surface water runoff and will be monitored for erosion. If erosion, subsidence or settling occurs it will be repaired timeously. ▪ The disturbed area will be rehabilitated in order to minimise erosion and dust production. ▪ All areas will be landscaped before being top soiled.	Monitoring of physical stability
Vegetation	Grassland vegetation to be re-instated	Indigenous grassland	A vegetation cover of a minimum of five species with a 50% "ground cover" rate with no visible erosion.	The grass will be monitored during the maintenance phase to determine soil fertility, grass cover, erosion and the need for modification of the rehabilitation programme to increase species mix and bio-diversity.
Mine Infrastructure		Opportunities for re-use of structures and materials.	▪ The infrastructure not required for post-mining land use will be removed from site. That remaining will be subject to a binding, contractual obligation to take over and maintain the commitments. ▪ Disused roads will be rehabilitated by ripping, topsoiling and re-vegetation. ▪ Pollution control dams no longer required will be breached and rehabilitated when the water qualities are such that the water	

Site Features	What must be protected	What can be enhanced	Closure Goals	Management Indicator
			can be released. ▪ Other un-required structures, including berms, haul roads and stockpile areas will all be removed and rehabilitated. All the temporary facilities, including caravans, ablutions and workshops will be removed from the site.	
Transport network	Existing external arterial road links.		Maintenance and repair of any roads and bulk infrastructure impacted by mine operations.	Visual inspections of road surfaces
Hydrology	▪ Surface water inflows to support remaining wetland systems ▪ Prevention of surface water pollution from residual contamination from mining workings and spoil		▪ Prevention and remediation of impacts of acid mine drainage on surface water quality. ▪ Once rehabilitation has been completed and the topography has been landscaped to the levels envisaged in the rehabilitation programme, the rainfall run-off would then flow along the drainage patterns landscaped to ensure free drainage from the site. ▪ The re-vegetation of the area will minimise soil erosion and restore pre-mining infiltration rates.	Surface water monitoring programme
Hydrogeology	▪ Borehole yields, groundwater levels and water quality of existing domestic supply wells. ▪ The mine will ensure that private water users, if affected by mine dewatering, have a reliable alternative source of water. ▪ Groundwater baseflow volumes to wetland systems. ▪ Groundwater baseflow		▪ Monitor groundwater levels to observe predicted rebound of water table. ▪ Re-establish groundwater flow paths. Monitor groundwater flows. ▪ Monitor groundwater and surface water quality and intervene where necessary to prevent unacceptable impacts on surface water quality.	▪ Groundwater quality. ▪ Ground water rest levels.

Site Features	What must be protected	What can be enhanced	Closure Goals	Management Indicator
	quality influencing surface water quality			
Culture and heritage	Grave sites	Improve condition, remove invasive vegetation, repair and maintain fences.	Maintain access and security of grave sites.	
Employment Rates and patterns	Mine will secure jobs and livelihoods of communities supported by the workforce of the mine.	Opportunities for training and temporary employment.	Implement Social and Labour plan. Short life of mine creates limited dependency of employees and contracted services and suppliers.	Social and Labour Plan – audits.
Biodiversity	Protection of remaining wetland systems and associated buffer zones.	Development of long term wetland management and conservation plan.	▪ Preservation and protection of diverse grassland/wetland habitat. ▪ No long term loss of biodiversity.	Annual wet season audits by expert in wetland ecology.

ii) The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity.

Refer to recommendations included in the Environmental Management Programme.

iii) Potential risk of Acid Mine Drainage. (Indicate whether or not the mining can result in acid mine drainage).

Acid drainage

The four samples tested show no short-term acid generation potential. Total sulphur concentrations are less than the concentration that would allow sustained acid generation. Sulphur speciation was not conducted on these samples. However, some of the total sulphur concentration is likely to be due to non-acid generating sulphur organically-bound within the coal. Therefore, the sulphur associated with pyrite is likely to be even lower than suggested by the ABA test results.

The NPR of the samples is not considered to indicate a significant risk of acid generation due to the low sulphur concentration and neutral paste pH measurements.

Mine water quality

The pit will decant after it has filled with groundwater and infiltrating rain water. This is expected to happen some years after closure. The modelled decant water quality also represents the estimated range of composition of drainage from spoil and runoff within the opencast pit during the operational phase.

Both pit water and decant water are modelled to be significantly more saline than natural baseline water quality. However, concentrations of metals of environmental concern will generally be at or below typical laboratory detection limits. Therefore, mining activities at Rietvlei are expected to increase TDS (total dissolved solids), major cation (Na, K, Ca, Mg) and anion (F, Cl, SO4, alkalinity) concentrations. The pH range is expected to be similar to the range of natural baseline water.

Variability

Ninety-seven geological exploration boreholes were drilled, logged and sampled to define the 55 million tonnes of coal that comprise the Rietvlei coal resource (Botes 2013). To access this coal requires the removal of approximately 225 million tonnes of overburden (Mindset 2013). However, two boreholes were sampled to characterise the geochemistry of the overburden.

The four samples tested for this report cannot be considered statistically representative of the significant mass of overburden that will be disturbed by mining. The number of samples is also not sufficient to indicate the potential variability in geochemistry that may exist in the mining-disturbed overburden. Additional sampling and testing is required to confirm the results presented in this report.

As a result of the limited sampling, the model predictions in this report should be considered indicative of potential mine water quality. Site specific monitoring of groundwater, surface water and mine water quality will indicate the validity of the sample characterisation and model results presented in this report.

iv) Steps taken to investigate, assess, and evaluate the impact of acid mine drainage.

Characterisation Programme

Sampling

Core from exploration boreholes was not available for geochemical sampling. AquaEarth Consulting (AEC) collected the drilling return from selected geological intervals during the drilling of additional groundwater exploration/monitoring boreholes at the site. The two sampled boreholes fall within the proposed pit outlines specified in Mindset (2013).

AEC collected four samples consisting of several kilogrammes of pulverised rock and submitted them to Waterlab, Pretoria for geochemical analysis (**Table 84**). **Figure 86** shows the location of the sampled boreholes.

Table 84: Summary of geochemical samples analysed

Borehole	Depth sampled	Sample ID	Lithology
T7D	12-21	T7D (12-21)	White to grey sandstone
T7D	26-50	T7D (26-50)	Coal and carbonaceous shale
T8D	11-21	T8D (11-21)	Carbonaceous shale
T8D	22-50	T8D (22-50)	Coal, carbonaceous shale, sandstone, shale

Figure 86: Locations of boreholes from which geochemical samples were collected

Analysis

Waterlab, Pretoria, conducted acid-base accounting according to the Modified Sobek method. Total sulphur and neutralisation potential were determined.

Extraction tests were conducted using distilled water as the extractant solution at a solution:solid ratio of 4:1. This is lower than the ratio of 20:1 adopted by the EPA 1312 and DWAF (1998) extraction methods. Price (2009) suggests lower solution:solid ratios to avoid excessively dilute solutions that fail to identify equilibrium mineral solubility limits.

Characterisation Results

Data validation

For the ABA results relative percent difference between duplicate samples was less than 5% for all parameters. This suggests that the data are reproducible and that systematic errors are within acceptable limits.

Charge balances of the extractions were within 10% for all parameters tested. This suggests the results are internally consistent.

In general, the results are considered suitable for this preliminary geochemistry assessment.

Analysis

- *Acid-base accounting*

  Table 85 presents the ABA data for the Rietvlei samples.

Table 85: Rietvlei ABA results

Sample Number	T7D (12-21)	T7D (26-50)	T8D (11-21)	T8D (22-50)
Paste pH	6.3	6.9	6.9	7.7
Total Sulphur (%) (LECO)	0.05	0.16	0.08	0.22
Acid Potential (AP) (kg/t)	1.56	5.00	2.50	6.88
Neutralization Potential (NP)	-0.97	3.79	0.06	24.04
Nett Neutralization Potential (NNP)	-2.53	-1.22	-2.44	17.17
Neutralising Potential Ratio (NPR) (NP : AP)	0.62	0.76	0.02	3.50

Paste pH is an indicator of short-term acidity. All four samples have neutral paste pH.

If NPR is less than two, a sample is categorised as potentially acid-generating (Price 2009). This criterion is met in three of the four samples.

In general, a sulphur content of less than 0.3% cannot sustain long-term acid generation (Usher et al 2001). All samples fall within this criterion.

- *Extractions*

Table 86 presents a summary of the Rietvlei extraction test data.

Table 86: Summary of the composition of extracts obtained from Rietvlei overburden samples

Sample ID	T7D (12-21)	T7D (26-50)	T8D (11-21)	T8D (22-50)
Lithology	White sandstone	Carbonaceous shale and coal	Carbonaceous shale	Coal, carbonaceous shale, sandstone, clay
pH	5.6	8	7.9	8.1
TDS	24	126	80	96
Alkalinity	<5	64	40	64
Cl	<5	<5	<5	<5
SO4	<5	31	27	21
F	<0.2	1.7	0.5	1
Ag	<0.025	<0.025	<0.025	<0.025
Al	1.74	<0.100	0.288	0.246
As	<0.010	<0.010	<0.010	<0.010
B	<0.025	0.058	<0.025	<0.025
Ba	0.029	0.306	0.228	0.128
Be	<0.025	<0.025	<0.025	<0.025
Bi	<0.025	<0.025	<0.025	<0.025
Ca	<2	20	12	17
Cd	<0.005	<0.005	<0.005	<0.005
Co	<0.025	<0.025	<0.025	<0.025
Cr	<0.025	<0.025	<0.025	<0.025
Cu	<0.025	<0.025	<0.025	<0.025
Fe	0.28	<0.025	0.044	0.06
K	2	7.9	5.2	7.8

Sample ID	T7D (12-21)	T7D (26-50)	T8D (11-21)	T8D (22-50)
Li	<0.025	<0.025	<0.025	<0.025
Mg	<2	6	7	4
Mn	<0.025	<0.025	0.097	<0.025
Mo	<0.025	0.049	<0.025	<0.025
Na	<2	2	<2	8
Ni	<0.025	<0.025	<0.025	<0.025
P	<0.025	<0.025	<0.025	<0.025
Pb	<0.020	<0.020	<0.020	<0.020
S	0.743	11	10	9.18
Sb	<0.010	<0.010	<0.010	<0.010
Se	<0.020	<0.020	<0.020	<0.020
Si	7.3	3.4	3.4	3.2
Sn	<0.025	<0.025	<0.025	<0.025
Sr	<0.025	0.337	0.141	0.289
Ti	0.088	<0.025	<0.025	<0.025
V	<0.025	<0.025	<0.025	<0.025
W	<0.025	<0.025	<0.025	<0.025
Zn	<0.025	<0.025	<0.025	<0.025
Zr	<0.025	<0.025	<0.025	<0.025

Concentrations of Si, Fe, and Al are higher than expected from thermodynamic considerations and suggest that fine mineral matter suspended in the sample has been included in the analysis of dissolved constituents.

The sandstone extract has the lowest dissolved solids concentration. This is consistent with the poor solubility of quartz and feldspar that dominate sandstone composition. In contrast, the extract from carbonaceous shale and coal has a higher dissolved solids concentration. The extract composition includes higher concentrations of sulphate, calcium, and alkalinity. These parameters could be derived from sulphide oxidation and the dissolution of calcite vein filling in the coal.

Drainage Quality Estimation

Modelling code

This assessment used the geochemical modelling code PHREEQC (Parkhurst and Appelo 1999). The code was developed by the United States Geological Survey (USGS) and is widely applied in environmental geochemistry studies. The USGS posts regular updates to the code.

This study coupled PHREEQC with the *minteq.v4.dat* database. The database includes the "metals of environmental concern" defined by Langmuir et al (2004). These include aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, vanadium, and zinc.

Modelling limitations

Geochemical modelling to predict water qualities of complex systems demands assumptions since it is generally impossible to determine precisely the physical and geochemical characteristics of the systems. General assumptions include:

- The water chemistries used in the modelling are representative of input sources. It is not possible to model water quality without this essential assumption. Site monitoring and sampling generally provides representative water qualities. The results of a geochemical characterisation programme may indicate other water qualities. Multiple water chemistry results are required to indicate the potential variation in modelled water quality.
- Modelled waters are in full thermodynamic equilibrium. Equilibrium is the computational basis of PHREEQC. Equilibrium is unlikely to be the case for all chemical components throughout all waters. However, geochemical research has shown that assuming equilibrium conditions may usefully describe the composition of natural and mine waters.

The PHREEQC model appropriately simulates chemical reactions and contains the appropriate thermodynamic constants.

Due to the assumptions and inherent limitations of predictive modelling, the model results presented in this report should be considered as order of magnitude estimates. Therefore, results do not indicate modelled concentrations less than 0.01 mg/L.

Conceptual model

Figure 87 presents a conceptual model of decant generation from the Rietvlei backfilled opencast pit. This represents the post-closure phase of mining. Rainfall percolating into the pit backfill is simulated by the combination of distilled water and sample material under oxidising conditions during the extraction tests.

Within the backfill the partial pressure of carbon dioxide is expected to be higher than atmospheric conditions due to the oxidation of carbonaceous material. As the water level in the pit rises after mining, the maximum moisture content of the backfill will be limited to the saturated porosity of the backfill. This has been estimated at varying between 10% and 40%. This water content is considerably less than used in the extraction tests. The increase in concentration from lower solution:solid ratios in the backfill will induce precipitation of mineral phases.

The conceptual model was used to select appropriate boundary conditions for the geochemical modelling.

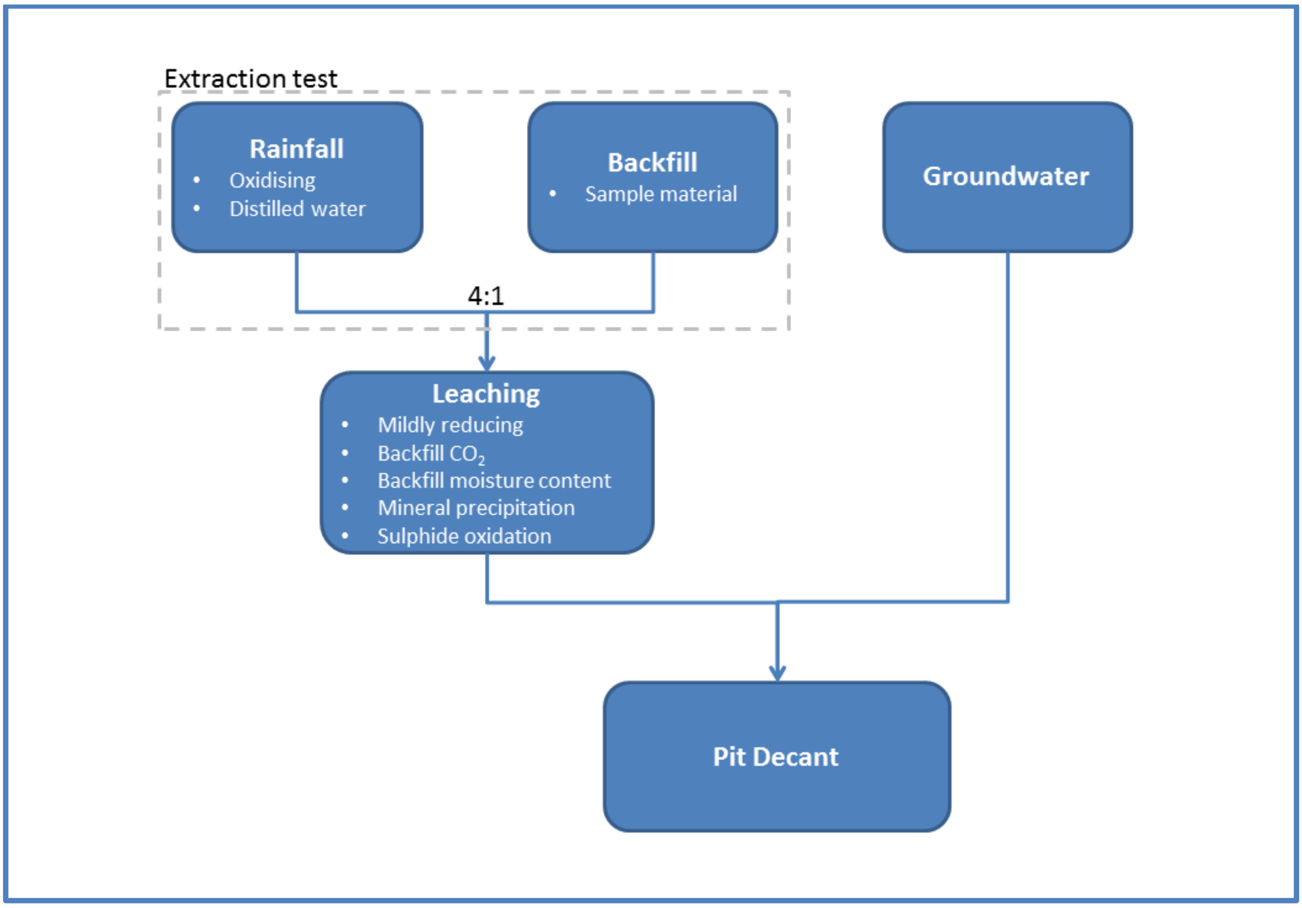


Figure 87: Conceptual model of decant generation after closure and backfilling of the Rietvlei open cast pit

Model results

Water content of 10% and 40% was modelled for each of the four samples tested. Parameter concentrations below the laboratory reporting limit were modelled at concentrations one half the reporting limit. This precautionary approach may yield higher concentrations, particularly for the metals of environmental concern.

The model allowed geochemically credible mineral phases to precipitate from solution. This yielded eight water quality estimates. Acid generation was not considered as the ABA test results indicated sulphur concentrations too low to significantly impact water quality.

- *Pit water*

  Table 87 presents the range of the modelled pit water qualities compared to baseline groundwater quality at Rietvlei. Based on the laboratory and modelling results interstitial water in the backfill is generally expected to lie within this quality range. However, site specific conditions may give rise to site water qualities that lie outside this range.

Table 87: Range of modelled pit water quality for the proposed Rietvlei coal mine

Parameter	Pit water		Groundwater baseline*	
[mg/L] except pH	Upper	Lower	Upper	Lower
pH	6.53	5.37	7.98	6.11
F	4.95	1.00	3.5	<0.1
Cl	1237	64	2.7	0.8
SO_4	425	7.40	6.6	2.3
Alkalinity (as $CaCO_3$)	1625	41	124	12
Na	316	9.97	33	2.8
K	312	20	9.3	1.5
Ca	538	9.97	73	5.5
Mg	276	9.97	12	0.6
Ag	0.49	0.12	<0.05	<0.05
Al	0.24	<0.01	27	0.09
As	0.20	0.05	<0.1	<0.1
Ba	0.29	0.04	0.93	0.22
Be	0.49	0.12	<0.05	<0.05
Cd	0.10	0.02	0.0003	<0.0001
Co	0.49	0.12	NA	NA
Cr	0.37	<0.01	0.05	<0.05
Cu	0.49	0.12	0.05	<0.001
Fe	10.89	<0.01	2.1	<0.05
Hg	<0.01	<0.01	0.0002	<0.0001
Mn	3.83	0.07	0.07	<0.05
Mo	1.93	0.12	<0.05	<0.05
Ni	0.49	0.12	<0.05	<0.05

Parameter [mg/L] except pH	Pit water Upper	Pit water Lower	Groundwater baseline* Upper	Groundwater baseline* Lower
Pb	0.39	<0.01	NA	NA
Sb	0.20	0.05	<0.1	<0.1
Se	0.39	0.10	0.13	<0.1
Sr	13.30	0.12	0.37	<0.05
Tl	<0.01	<0.01	<0.001	<0.001
V	0.49	0.12	<0.05	<0.05
Zn	0.49	0.12	0.18	<0.05
TDS	4480	164	198	18.2

** Preliminary field results provided by AquaEarth Consulting*

NA: Not analysed

Table 87 indicates that modelled pit water quality will be more saline than local groundwater by a factor of ten or more. Aluminium is an exception, although the groundwater concentrations are probably due to unfiltered colloidal matter included in the dissolved phase analysis.

The concentrations of metals of environmental concern will generally be at or below typical laboratory detection limits. However, concentrations of Mo (molybdenum) and Sr (strontium) may be elevated. Both of these metals may be adsorbed by iron and manganese oxyhydroxides which the model indicates will precipitate as the decant reaches surface. However, adsorption was not modelled. Strontium may also co-precipitate in calcium carbonate. Therefore, it is unlikely that the modelled Mo and Sr concentrations will be achieved in the field.

- *Decant water*

When the pit water decants at surface, it will be exposed to atmosphere which will induce chemical changes in the water composition. This was simulated in the numerical model, allowing geochemically credible minerals to precipitate. **Table 88** presents the simulation results compared to baseline surface water quality at Rietvlei. Based on the laboratory and modelling results decant water is generally expected to lie within this quality range. However, site specific conditions may give rise to site water qualities that lie outside this range.

Table 88: Range of modelled decant quality for the proposed Rietvlei coal mine

Parameter [mg/L] except pH	Decant water Upper	Decant water Lower	Surface water baseline* Upper	Surface water baseline* Lower
pH	8.19	7.68	7.46	7.12
F	4.84	1.00	0.53	0.52
Cl	1236	64	11	6.2
SO_4	425	7.40	8.7	7.9
Alkalinity (as $CaCO_3$)	104	27	40	19
Na	316	9.96	11	9.5
K	312	20	3.5	2.9
Ca	237	9.97	7.6	4.0
Mg	276	9.97	6.1	2.5
Ag	0.49	0.12	NA	NA
Al	0.24	<0.01	4.3	1.8

Parameter	Decant water		Surface water baseline*	
[mg/L] except pH	Upper	Lower	Upper	Lower
As	0.20	0.05	NA	NA
Ba	0.29	0.03	NA	NA
Be	0.02	0.01	NA	NA
Cd	0.10	0.02	NA	NA
Co	0.49	0.01	NA	NA
Cr	0.37	<0.01	<0.05	<0.05
Cu	0.02	0.02	NA	NA
Hg	<0.01	<0.01	NA	NA
Mn	<0.01	<0.01	<0.05	<0.05
Mo	1.93	0.12	NA	NA
Ni	0.49	0.12	NA	NA
Pb	0.13	<0.01	NA	NA
Sb	0.20	0.05	NA	NA
Se	0.39	0.10	NA	NA
Sr	13.29	0.12	NA	NA
Tl	<0.01	<0.01	NA	NA
V	0.49	0.12	NA	NA
Zn	0.49	0.12	<0.05	<0.05
Fe	<0.01	<0.01	NA	NA
TDS	2614	150	78	68

** Preliminary field results provided by AquaEarth Consulting*

NA: Not analysed

Baseline surface water quality contains Al (aluminium) concentrations that are unusually high for natural surface waters (**Table 88**). This overestimate may be caused by unfiltered colloidal material in the field samples tested in the laboratory.

Table 88 indicates that decant salinity will be about two to forty times more concentrated than baseline surface water quality. The concentrations of metals of environmental concern will generally be at or below typical laboratory detection limits. Field concentrations of Mo (molybdenum) and Sr (strontium) are unlikely to be as high as modelled concentrations due to the considerations outlined above for pit water.

v) Engineering or mine design solutions to be implemented to avoid or remedy acid mine drainage.

Coal discard and fines from the filer plant will be discarded onto a coal discard facility to be located to the southwest of the plant area (**Figure 88**). The discard facility included on **Figure 88** is a phase 1 discard facility designed to accommodate 2.1 million m^3 of compacted discard for the first 5 years of the life of mine. The resultant height of the facility will be 30m at a 1:3 slope. This facility has been designed with the potential to be expanded over the life of mine as and when required in order to reduce the upfront costs.

As part of the Bankable Feasibility Study (BFS) test work was carried out on coal samples with regards to washability and quality. No discard was generated during this process and therefore no material was available for waste profiling. However, the proponent requested that the preliminary design of the lining for this facility would be based on a Class C liner as outlined in GNR 636 (**Figure 89**). **Figure 90** shows the proposed preliminary liner design for the discard facility.

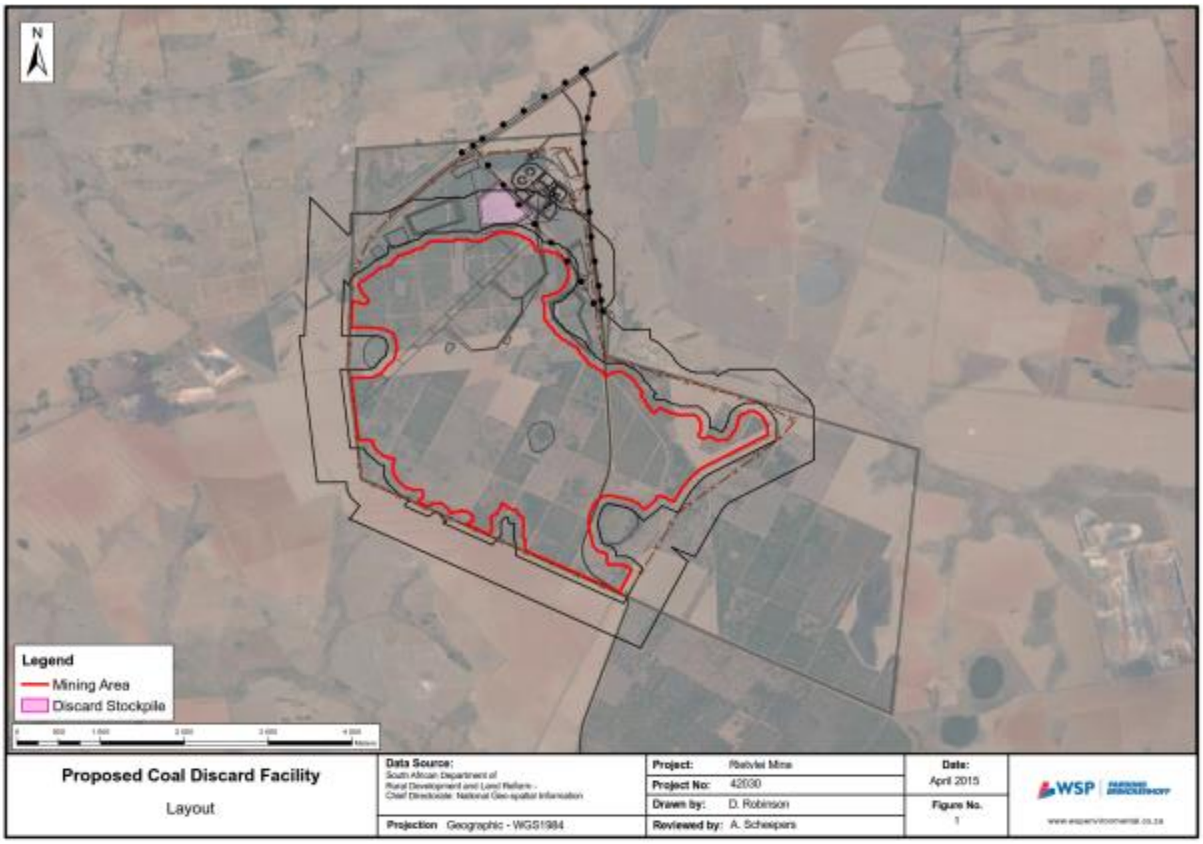


Figure 88: Proposed Coal Discard Facility (indicated in orange)

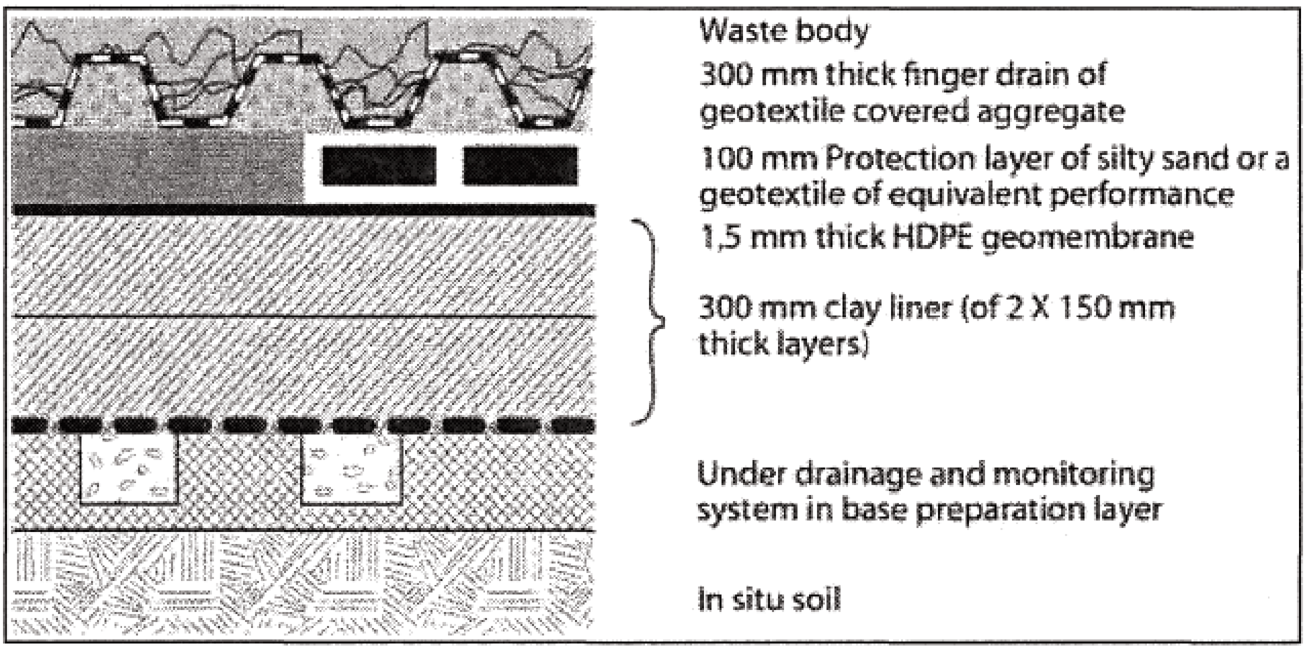


Figure 89: Class C liner required as outlined in GNR 636

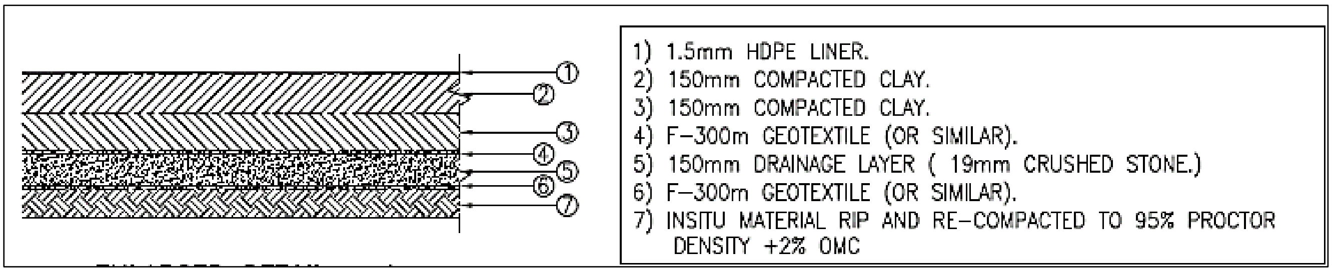


Figure 90: Proposed Preliminary Liner Design for the Rietvlei Coal Discard Facility

vi) Measures that will be put in place to remedy any residual or cumulative impact that may result from acid mine drainage.

A long-term conceptual monitoring programme was developed, based on the guideline documented in Best Practice Guideline[4] G3 - Water Monitoring Systems (2007), to ensure that any impacts on water quality and quantity that do arise are dealt with promptly.

Surface Water Monitoring Plan

A conceptual surface water monitoring plan has been developed and potential monitoring points identified (**Figure 91**). The surface water monitoring system consists of the following components:

- Surface water quality monitoring system;
- Surface water flow monitoring system; and
- Data and information management system.

[4] These guidelines are summarised and implemented in the proposed monitoring plan.

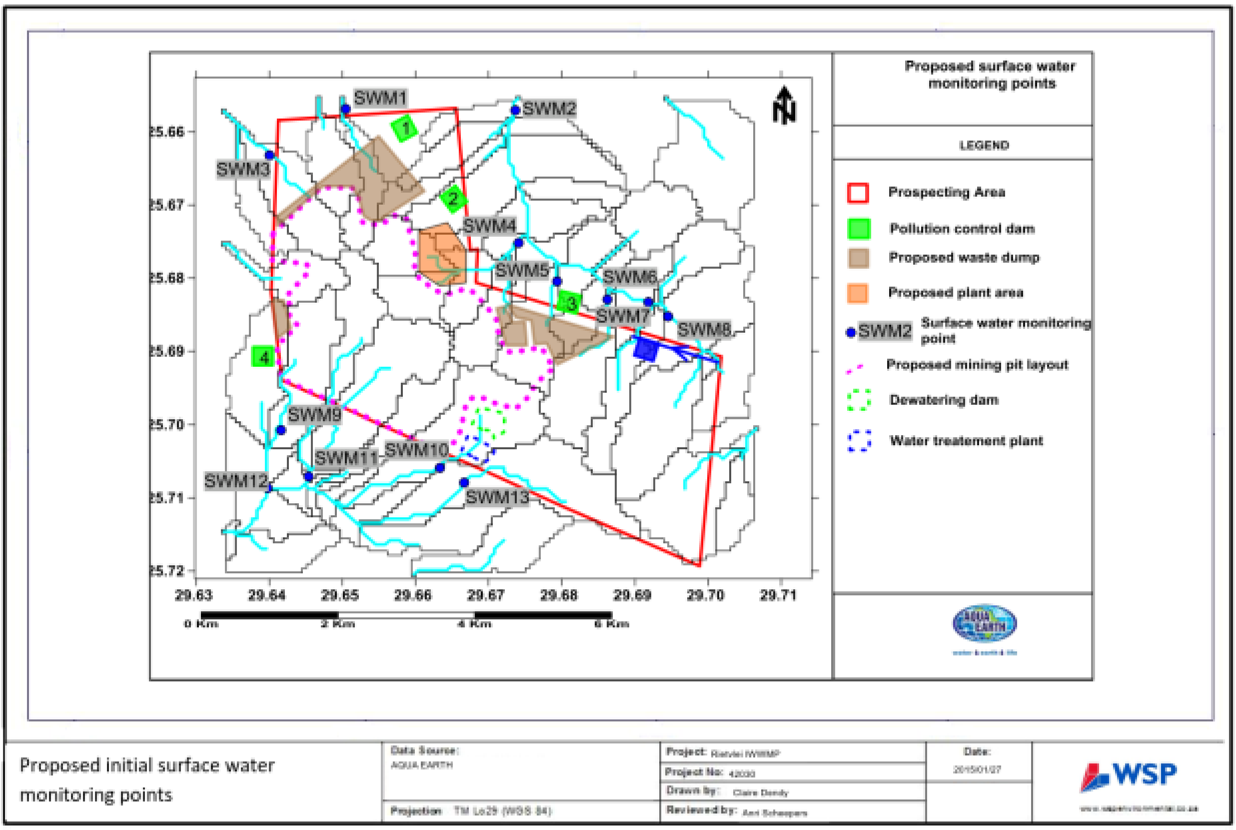


Figure 91: Proposed initial surface water monitoring points

Parameters to be measured and frequency of measurements

There are two sets of monitoring parameters. A comprehensive analysis must be conducted on surface water points within or close to the mine and a screening analysis must be conducted on surface water points further away. In addition samples must be tested for trace elements once mining commences. The parameters that must be sampled for are listed in **Table 89**. The frequency and type of sampling is summarised in **Table 90**.

Table 89: Surface Water Sampling Parameters

A (Standard set of parameters)	B (Screening parameters)	C (Trace elements)
pH	pH	Ba
EC	EC	As
Ca		Co
Mg		Cr
Na		Ni
K		Pb
Total Alk		Se
F		Sr
Cl		V
NO_2(N)		Zn
NH_4 (N)		Nb
NO_3(N)		Mn
PO_4		Cu

SO_4		Ga
Al		Ge
Fe		Rb
Mn		Y
		Zr
		Sn
		W
		Bi
		Th
		U
		Hg

Table 90: Frequency and type of sampling

Sampling point	Parameter list	Type of sampling	Type of measurement/	Frequency
Surface water points within mine boundaries	A, C*	Grab	Flow	A = Every 4 months C = Once per annum
Surface water points outside mine boundaries	B**	Grab	Flow	Once every 6 months

* If any parameters exceed SANS241-1: 2011 guidelines (or WHO guidelines if no SANS guideline available) then that parameter must become part of list A.

**If any parameters * If any parameters exceed SANS241-1: 2011 guidelines (or WHO guidelines if no SANS guideline available) then that borehole must be sampled according to the A, C list.

Groundwater Monitoring Programme

A comprehensive analysis will be conducted on groundwater samples from boreholes and dams within or close to the mine (**Figure 92**). The proposed initial monitoring boreholes consist essentially of existing boreholes (on and off site). In addition samples must be tested for trace elements once a year. The parameters that must be sampled for are listed in **Table 91**.

Table 91: Groundwater Sampling parameters

A (Standard set of parameters)	B (Trace Elements)
pH	Ba
EC	As
Ca	Co
Mg	Cr
Na	Ni
K	Pb
Total Alk	Se
F	Sr
Cl	V
NO2(N)	Zn

A (Standard set of parameters)	B (Trace Elements)
NH4 (N)	Nb
NO3(N)	Mn
PO4	Cu
SO4	Ga
Al	Ge
Fe	Rb
Mn	Y
	Zr
	Sn

Boreholes and surface water points should be sampled every 3 months for the standard list of parameters. Water levels should also be measured. In addition these boreholes must be sampled for trace elements once a year.

Every six months the farmer's boreholes within a 2km radius of the mine should be sampled for the standard list of parameters along with the groundwater levels.

A borehole must be drilled into backfilled opencast pit to monitor the rise in water level within the pit and the groundwater quality.

Biomonitoring

Aquatic biomonitoring should be undertaken on a quarterly basis upon the initiation of construction. The biomonitoring has a twofold purpose firstly, to ensure that the construction and operational related activities are not resulting in a negative impact on the aquatic ecosystems associated with the project and secondly, to act as an early warning system by identifying potential aquatic ecosystem impacts and should consist of sampling for benthic diatoms, physico-chemical water quality and aquatic macro-invertebrates

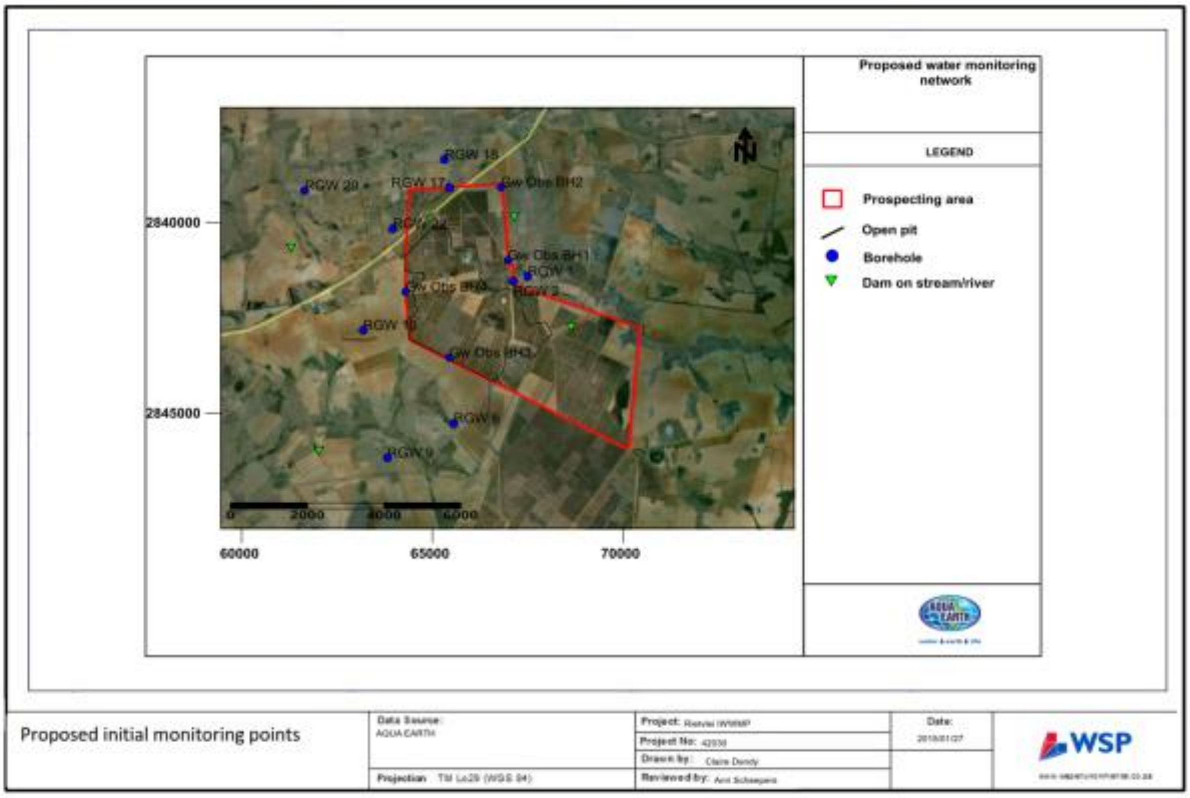


Figure 92: Proposed initial groundwater monitoring points (Aqua Earth, 2014)

vii) Volumes and rate of water use required for the mining, trenching or bulk sampling operation.

Process Water

The mine will require water for the construction, operation and decommissioning[5] phases. A source of top up water has not been identified by the proponent at this stage. A volume of 120 000 m^3/annum is required for top up. Additional water supply will be sourced from water harvesting, resulting from runoff of 'dirty' areas within the surface layout.

Plant and infrastructure locations were changed after specialist assessments were conducted. However, the general requirements of surface water management remain relevant to the new locations.

Water balance

A Water balance was developed with the available information (regional meteorological data, flow simulation from groundwater and surface water numerical model) for 20 years of operation. The water balance developed during this investigation is considered a preliminary water balance and is an iterative process and will be updated as the mine's activities commence and will be updated regularly to reflect the dynamic process of change at the mine.

The purpose of the preliminary water balance was to develop an initial water management tool to determine areas (pits, plant, water dams) to be targeted for water management and assess possible water management measures and identifying points of metering and monitoring in order to develop a realistic and site specific water balance.

[5] For the purpose of this study, water required for the decommissioning phase has not been considered, as this will need to be calculated five years prior to the commencement of decommissioning activities.

The approach to developing the balance was generally consistent with BPG G2[6]:

- Identify water management units (WMUs). These were identified from the draft water balance supplied by Turgis and subsequent revisions communicated by the engineers conducting the mine feasibility study (which was not complete at the time of developing this water and salt balance). The water balance documented selected average flows in kL/d.
- Clarify flows between WMUs from the water balance. These were summarised into a spreadsheet which represents inputs, storages and outputs from each WMU in vertical columns.
- The only flows quantified at this stage, include the dust suppression volume, the makeup water to the plant from an external source, the total plant water usage per day, and the groundwater inflow to the open cast pit. Therefore, most flows in the water balance have been estimated or calculated by difference to achieve balance. The calculated flows are highlighted in yellow on the attached spreadsheet (Tab: SBv1). They were calculated by using the following assumed values:
  - Areas of PCDs, plant and offices, and discard facility from preliminary feasibility study drawings
  - Area of open cast pit 3.5% of total pit area (800 ha)
  - Annual rainfall of 735 mm per annum
  - Annual evaporation of 1 734 mm per annum (from AEC hydrology report)
  - Moisture content of coal product and discard of 8% (from Mindset feasibility study)
  - 50% of annual rainfall reports as runoff in pit and hardstand areas
- Assign water qualities to flows:
  - Groundwater quality flowing into the open cast pit (as per results provided by AEC)
  - The quality of remaining flows were estimated based on Solution[H+] experience and published information on South African underground coal mining sites. All qualities used in the salt balance are listed in the spreadsheet.
- Include sources and sinks of salt. These are tabulated and described in **Table 92.**

Table 92: Expected sources and sinks of salt

Sources	Sinks
Open cast pit – Unused explosives, explosive residue, cement used for construction, and leaching from the walls of the mine workings all increase the salt load in mine water	Discard facility – Much of the salt load from the process plant water may be retained on the discard facility. This is especially so for Rietvlei since the facility is lined.
Process plant – the coal washing process leaches salts from the processed crushed rock and coal. Oxidation of sulphide minerals in the coal contributes to the salt load in process water	

- Balance using total dissolved solids (TDS) as a parameter and assuming conservation of salt mass across each WMU. Note that this is not necessarily valid for the TDS parameter, particularly if there are significant changes in pH in circuit. Calculated water qualities are highlighted in purple in the attached spreadsheet (Tab: SBv1). There were few constraints given the limited number of input water qualities for this preliminary salt balance. The salt balance spreadsheet includes the calculated percent difference in salt mass across each WMU. The following points are noted:
- Both water and salt are perfectly balanced since there are few flows and qualities to constrain the system. This is an unrealistic situation and emphasises that this is preliminary water and

[6] Best Practice Guidelines for Management of Water Resources in the South African Mining Industry. Department of Water Affairs and Forestry, August 2006.

salt balance that should be updated as soon as additional flow and quality information is available.

- The salt balance represents a steady state situation considering average water flows between WMUs and no change in storage within WMUs. Excess salt is assumed to be retained in the discard facility.
- The salt balance highlights points in the circuit where water quality monitoring should be conducted to assess salt sources and losses in the mine water system. Based on this preliminary balance, flow volumes and water quality should be monitored at the following key points:
  - Make up water quality at all sources
  - Open cast pit water quality at in pit dam (before pumping to PCD 1)
  - Process water to discards (at process plant)
  - Discards seepage to PCD 2 (in drains)
  - Water quality in PCD 1
  - Water quality in PCD 2

viii) Has a water use licence has been applied for?

A water use licence (WUL) is required in terms of Section 41 of the NWA for activities listed in Section 21 of the said Act. The water uses potentially applicable to the Proposed Project include:

- Section 21(a): Taking of water from a water resource;
- Section 21(c): Impeding or diverting the flow of water in a water course;
- Section 21(g): Disposing of water in a manner which may detrimentally impact on a water resource;
- Section 21(i): Altering the bed, bank, course or characteristics of a watercourse; and
- Section 21(j): Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.

GNR 704 (4 June 1999) under the NWA provides regulations on the use of water for mining and related activities aimed at the protection of water resources (requirements for clean and dirty water separation). GNR 704 requires *inter alia* the following:

- Separation of clean (unpolluted) water from dirty water;
- Collection and confinement of the water arising within any dirty area into a dirty water system;
- Design, construction, maintenance and operation of the clean water and dirty water management systems so that it is not likely for either system to spill into the other more than 1:50 years;
- Design, construction, maintenance and operation of any dam that forms part of a dirty water system to have a minimum freeboard of 0.8m above full supply level, unless otherwise specified in terms of Chapter 12 of the NWA; and
- Design, construction, and maintenance of all water systems in such a manner as to guarantee the serviceability of such conveyances for flows up to and including those arising as a result of the maximum flood with an average period of recurrence of 1:50 years.

GNR 704 also stipulates that no person in control of a mine or activity may-

- Locate or place any residue deposit, dam, reservoir, together with any associated structure or any other facility within the 1:100 year flood line or within a horizontal distance of 100m from any watercourse or estuary, borehole or well, excluding boreholes or wells drilled specifically to monitor the pollution of groundwater, or on water-logged ground, or on ground likely to become water-logged, undermined, unstable or cracked;
- Place or dispose of any residue or substance which causes or is likely to cause pollution of a water resource, in the workings of any underground or opencast mine excavation, prospecting diggings, pit or any other excavation; and

Use any area or locate any sanitary convenience, fuel depots, reservoir or depots for any substance which causes or is likely to cause pollution of a water resource within the 1:50 year flood line of any watercourse or estuary.

ix) Impacts to be mitigated in their respective phases

Measures to rehabilitate the environment affected by the undertaking of any listed activity

ACTIVITIES (as listed in 2.11.1)	**PHASE** of operation in which activity will take place. State; Planning and design, Pre-Construction' Construction, Operational, Rehabilitation, Closure, Post closure.	**SIZE AND SCALE of disturbance** (volumes, tonnages and hectares or m²)	**MITIGATION MEASURES** (describe how each of the recommendations in herein will remedy the cause of pollution or degradation and migration of pollutants)	**COMPLIANCE WITH STANDARDS** (A description of how each of the recommendations herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)	**TIME PERIOD FOR IMPLEMENTATION** Describe the time period when the measures in the environmental management programme must be implemented Measures must be implemented when required. With regard to Rehabilitation specifically this must take place at the earliest opportunity. .With regard to Rehabilitation, therefore state either:-.. Upon cessation of the individual activity or. Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.
Potential impacts have been identified and assessed according to the phases of mine development. For purposes of this report, these phases have been generically defined below. ■ **Construction Phase:** The construction phase includes the preparatory works/activities typically associated the creation of	**Geology**				
	Construction	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	Soil stripping is to be limited to the footprint of the infrastructure requirements.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Operation		Formulate and implement a blasting design that will ensure the least impact on the environment.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		The minimal amount of soils will be stripped on the sections to be blasted in order to reduce the potential for air blasts.	Not Applicable	Year 1 – 24 – after completion of construction phase

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
surface infrastructure, the pit footprint, access ramps and haul roads, the development of waste, residue and product stockpiles, handling areas, water reticulation and electrical power. The activities most relevant to this phase include: • Topsoil stripping and stockpiling; • Haul road construction; • Upgrading of the D1433; • Construction of the surface infrastructure including the coal processing plant, buildings and offices, perimeter fence and sewage plant; • Establishment of the coal discard facility; • Installation of water and power supply infrastructure including stomr water control infrastructure; and • Construction of the clean and dirty water system, including 2 pollution control dams ▪ **Operation Phase:** The operational phase includes the daily activities associated with the extraction of coal from the open cast pit. The activities most relevant to this phase	Operation		Blasting may only be undertaken by registered personnel.	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Year 1 – 24 – after completion of construction phase
	Operation		Blasting schedules must be distributed to all surrounding residents.	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Year 1 – 24 – after completion of construction phase
	Operation		Warning sirens must sound prior to the initiation of blasting to inform the surrounding employees and other stakeholders and to ensure safety of all people in the vicinity of the blast area.	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Year 1 – 24 – after completion of construction phase
	Operation		The blasting area must be cordoned off prior to each blasting activity.	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Year 1 – 24 – after completion of construction phase
	Operation		Sequential rehabilitation of opencast pits with overburden, ensuring adequate compaction and levelling, prior to topsoiling and rehabilitation.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		Undertake regular subsidence surveys. Areas identified as potential concern should be mapped and frequently inspected/monitored.	Not Applicable	Year 1 – 24 – after completion of construction phase

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
include: • Excavation and blasting, as well as overburden stockpiling; • Coal removal, transport and processing; • Coal storage; • Utilisation of vehicles, equipment and machinery; and • Concurrent rehabilitation including, initial backfilling, levelling and placement of topsoil, fertiliser, vegetation and maintenance. ■ **Decommissioning and Closure:** The decommissioning and closure phase includes the activities associated with the removal/dismantling of machinery/equipment/infrastructure no long necessary to the operation. This phase also includes the implementation and completion of rehabilitation goals as well as the implementation of agreed monitoring and maintenance prescribed for the cessation of operations. The activities most relevant to this phase include: • Dismantling surface infrastructure;	Operation		Areas of subsidence should be rehabilitated as appropriate.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Topography				
	Construction and Operation	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	The areas on which new infrastructure will be placed, constructed, installed or sunk will be clearly demarcated and communicated to contractors and staff members.	Not Applicable	Year 0 – 24 – after receipt of all relevant authorisations
	Construction and Operation		All structures and infrastructure must be designed and operated with the aim of closure in mind.	Not Applicable	Year 0 – 24 – after receipt of all relevant authorisations
	Construction		Monitoring methods (i.e. visual inspections) will be implemented from the start of construction to monitor the surface stability (baseline) prior to the commencement of mining activities.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Contractors and employees will be limited to the clearly defined access routes and areas to be constructed in order to limit site disturbance.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Design appropriate storm management measures that allows drainage of the site.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		All structures must be designed and developed in specific locations as to avoid excessive damage to topography and the free drainage of the area.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Operation		Concurrent replacement of overburden and topsoil and	Not Applicable	Year 1 – 24 – after completion of construction phase

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
• Rehabilitation of haul and access roads; • Rehabilitation of final void(s); • Monitoring and maintenance of ground and surface water; and • Monitoring and maintenance of rehabilitation areas, specifically in terms of land use and capability.			resultant re-vegetation during the operational phase may improve the natural surface flow dynamics and topography.		
	Operation		Limit the height of stockpiled materials and preferable place these outside known drainage lines.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		Align backfilling and levelling activities to the existing topography and post-mining land use. The rehabilitation and levelling activities should be frequently reviewed to ensure consistency with potential changing landscapes and land use in the area.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		Conduct regular subsidence surveys to prevent the occurrence of such. Where subsidence has occurred, it should be investigated and mitigated.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		The rehabilitated areas should be contoured to prevent pooling of surface water run-off and excessive erosion is not/does not occur i.e. promote free drainage away from mining and rehabilitated areas.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		Complete regular maintenance and management of rehabilitated areas to ensure these areas are aligned with the surrounding areas and free draining e.g. pooling or areas of	Not Applicable	Year 1 – 24 – after completion of construction phase

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			excessive erosion are not obviously/visibly present.		
	Operation		Design appropriate storm management measures that allows drainage of the site.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		All fixed infrastructure must be designed and developed in specific locations as to avoid excessive damage to topography and the free drainage of the area.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Decommissioning and Closure		The final replacement of overburden, topsoil and resultant re-vegetation will result in the improvement of natural surface flow dynamics and topography in the post-mining environment.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Surface Water				
	Construction	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	During design phase, the waste and water management infrastructures at proposed Rietvlei Mine (included dams, drains, waste area) must be designed with the appropriate water barrier system if required, and comply with the DWA minimum requirements (1998/2012/2013), with special focus on the R634, R635, R636 of the NEMWA 2008.	DWA minimum requirements (1998/2012/2013), with special focus on the R634, R635, R636 of the NEMWA 2008.	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Design of the mine facilities to be conducted by an accredited or recognised professional designer.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Construction and Operation		All dirty surface water control facilities (dam, drain) must be designed to have a minimum freeboard above full supply level, at such manner that they can always handle 1:50 year flood-event on top of its mean operational level.	Not Applicable	Year 0 – 24 – after receipt of all relevant authorisations
	Construction		Water management infrastructure (separate clean and dirty water systems) should be in place before the commencement of construction activities.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Storage area for hydrocarbons or any toxic construction material should be bounded according to DWA minimum requirement.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Compaction of the area should take place during base preparation.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Sloping of the area as to allow for free runoff, towards designated pollution control structures.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Management of speed versus velocity aspects if and when required as to prevent erosion gullies from forming.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Surface water management strategic plan must be implemented to prevent risk of water pollution.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Construction		Surface water monitoring network should be installed before the starting of any construction activities on site and monitoring network can be updated according to the DWA minimum requirements, if required.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Waste classification is required in order to influence design parameters and make recommendations with regards to design and monitoring requirements. These must be adhered to in order to prevent or minimise seepage from waste disposal areas.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Any waste and spills (especially during construction, operation and closure) need to be cleaned up immediately according to the DWA minimum requirements.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Authorities need to be notified in the event of a spill or leachate during construction, operation and closure.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Clean and dirty water is to be separated.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Regular maintenance of vehicles must be implemented.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Trucks need to be covered to minimise spillage of coal or wastes, on roads.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		The reusing dirty water from mine activities must be	Not Applicable	Year 0 – 1 – after receipt of all

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			assessed and implemented as much as possible.		relevant authorisations
	Construction		All hazardous substances must be handled according to the requirements of relevant legislation relating to the transport, storage and use of the substance.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		The area to be used for storage of any hazardous waste and items which contains hazardous substance must be lined with bounded walls to prevent pollution of surface water should a leakage/spillage occur.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Operation		Contaminated water drain (within the waste site) and dam must be properly operated and maintained.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		Keep contamination to a minimum by keeping the pit as dry as possible (dewatering) to reduce contact time of water and oxygen with exposed strata.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		Reduce the amount of water to be removed from the pit area by keeping the operating pit area as small as possible, and by continuously rehabilitating the closed pit area.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		Equip trenches and gullies with energy dissipater, and conduct frequent inspections and maintenances.	Not Applicable	Year 1 – 24 – after completion of construction phase

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Operation		Suspended solids should filter out (silt trap) before dirty water enters pollution control dams, and regular inspections and maintenances should follow.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		Routing of sewage to the municipality sewage works.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		Water and mass balance should be determined and updated regularly.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Decommissioning and Closure		Implement closure of open pit progressively.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		Effectiveness of existing surface water monitoring network should be re-evaluated.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		Rubble from waste or contaminated areas should be dismantled and disposed of accordingly.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		Backfill material to be fully compacted and covered, and the entire foot print of waste to be shaped for free-draining.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		Rehabilitation to follow backfilling compaction.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		Rehabilitation should consist of re-vegetating the site using appropriately chosen indigenous grasses. Control of vegetation cover over the rehabilitated area.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		A rehabilitation plan must be implemented and the plan should be done in the line with	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			the contents of NWA (Act No 36 of 1998), to avoid subsequent negative environmental impacts that may occur.		
	Decommissioning and Closure		Continue monitoring until it can be demonstrated that vegetation is self-sustaining and no erosion channels exist.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		Clean water system and dirty water system should be maintained on site.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		Inspection and maintenance should be implemented after removal of materials associated with mining on site.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Groundwater				
	Construction	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	During design phase, the waste and water management infrastructures at proposed Rietvlei Mine (included dams, drains, waste area) must be designed with the appropriate water barrier system if required, and comply with the DWA minimum requirements (1998/2012/2013), with special focus on the R634, R635, R636 of the NEMWA 2008.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Design of the mine facilities to be conducted by an accredited or recognised professional designer;	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction and Operation		The design of the dirty water drains, dams, as well as the waste storage areas should	Not Applicable	Year 0 – 24 – after receipt of all relevant authorisations

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			ensure their long term integrity and must be properly operated and maintained.		
	Construction and Operation		All dirty surface water control facilities (dam, drain) must be designed to have a minimum freeboard above full supply level, at such manner that they can always handle 1:50 year flood-event on top of its mean operation level.	Not Applicable	Year 0 – 24 – after receipt of all relevant authorisations
	Construction		A proper construction phase should be carried out under the supervision of an accredited or recognised professional civil engineer, as approved by the designer.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Storage area for hydrocarbons or any toxic construction material should be bunded according to DWA minimum requirement.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Groundwater management strategies must be implemented to prevent risk of water pollution.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Groundwater monitoring network should be installed before the starting of any construction activities on site.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction and Operation		The monitoring network can be updated according to the DWA minimum requirements, if required to incorporate the unsaturated zones around proposed Rietvlei Mine.	Not Applicable	Year 0 – 24 – after receipt of all relevant authorisations

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Construction		Monitoring of groundwater must be done once per Quarter.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction and Operation		Any waste and spills (especially during construction, operation and closure) need to be cleaned up immediately according to the DWA minimum requirements.	Not Applicable	Year 0 – 24 – after receipt of all relevant authorisations
	Construction		Authorities need to be notified in the event of a spill or leachate during construction, operation and closure.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Clean and dirty water is to be separated, and any containment of dirty water should be lined.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Vehicle storage and maintenance areas to be hard-surfaced.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Regular maintenance of vehicles must be implemented.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Trucks need to be capped to minimise spillage of coal or wastes, on roads.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Separate clean water from the stockpiling area to minimise water infiltrating from the site.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		The reusing dirty water from mine activities must be assessed and implemented as much as possible.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		All hazardous substances must be handled according to the requirements of relevant legislation relating to the transport, storage and use of the	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			substance.		
	Construction		The area to be used for storage of any hazardous waste and items which contains hazardous substance must be lined with bunded walls to prevent pollution of surface or groundwater should a leakage/spillage occur.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Application for WULA amendment as per DWA requirements must be made for proposed new abstraction boreholes if any required.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		The migration of leachate into the groundwater regime around any potential pollution sources as identified must be prevented at all times.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Operation and Decommissioning and Closure		Effectiveness of existing monitoring borehole position should be re-evaluated.	Not Applicable	Year 1 – 35 - concurrent rehabilitation is proposed
	Operation		Keep contamination to a minimum by keeping the pit as dry as possible (dewatering) to reduce contact time of water and oxygen with exposed strata.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Decommissioning and Closure		Implement closure of open pit progressively.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		Rubble from waste or contaminated areas should be dismantled and disposed of accordingly.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning		Backfill material to be fully	Not Applicable	Year 1 – 35 – concurrent

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	and Closure		compacted and covered, and the entire foot print of waste to be shaped for free-draining. This will minimise infiltration of oxygen rich water, and reduce geochemical reactions that should occur.		rehabilitation is proposed
	Decommissioning and Closure		Rehabilitation to follow backfilling compaction.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		Rehabilitation should consist of re-vegetating the site using appropriately chosen indigenous grasses.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		A rehabilitation plan must be implemented and the plan should be done in the line with the contents of NWA (Act No 36 of 1998), to avoid subsequent negative environmental impacts that may occur.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		Continue monitoring until it can be demonstrated that vegetation is self-sustaining and no erosion channels exist.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		Effectiveness of existing monitoring borehole position should be re-evaluated.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Soils, Land Capability and Land Use				
	Construction and Operation	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	Soils will be stripped at specified depths in order to prevent stripping of lower quality subsoil together with topsoil.	Not Applicable	Year 0 – 24 – after receipt of all relevant authorisations
	Construction and Operation		Topsoil will be stripped and stockpiled based on soil type	Not Applicable	Year 0 – 24 – after receipt of all relevant authorisations

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			groups (red soils, yellow brown soils and grey wetland soils) in order to preserve pre-mining soil potential and land capability as far as possible.		
	Construction and Operation		All accidental fuel spillages will be cleaned up immediately and contaminated soil will be removed to a suitable disposal facility.	Not Applicable	Year 0 – 24 – after receipt of all relevant authorisations
	Construction		Contaminated soil will be disposed at a suitable disposal facility.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		All mechanical equipment will be serviced at an approved facility.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		The footprint size of all stockpiles will be contained as far as possible.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		The topsoil and overburden stockpiles will probably remain through the entire construction and operational phase but it will be removed as soon as possible.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		The soil's A-horizon will be stored as a berm along the edges for later replacement.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		The soil's A-horizon will be stored as a berm along the edges for later replacement.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		The upper 300 mm of topsoil (A-horizon) will be removed and stockpiled for final rehabilitation.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Construction		The dam floor and embankments will be lined with a polyethylene membrane to prevent soil pollution by low quality mine water.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Dirty water channels will be lined with concrete or a polyethylene membrane.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Operation		Open pits will be backfilled and spoil surfaces will be levelled and shaped to a free draining topography.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		Topsoil will be dumped in sufficient quantities to render a soil depth similar to the stripping depth after levelling.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation and Decommissioning and Closure		Soil amelioration and re-vegetation will be done as described in section 7 of the Soil, Land Capability and Land Use Assessment Report included in **Appendix 21**.	Not Applicable	Year 1 – 35 - concurrent rehabilitation is proposed
	Operation		Frequent dust suppression by water trucks.	National Ambient Air Quality Standards and SANS Dust Fallout limits	Year 1 – 24 – after completion of construction phase
	Operation		Implementation of an effective storm water management system along haul roads.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		Continuous monitoring of pollution control dam levels in order to prevent overspills.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		Frequent inspections to identify leaks and immediate reparation thereof.	Not Applicable	Year 1 – 24 – after completion of construction phase

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Operation		Immediate removal of sludge after overspills.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		Implementation of an efficient storm water management system.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Decommissioning and Closure		The remaining open pit area and possibly some final voids will be backfilled and spoil surfaces will be levelled and shaped to a free draining topography.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		Topsoil will be dumped in sufficient quantities to render a soil depth after levelling which is similar to the stripping depth.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		All stockpiled overburden material will be moved to the open pit and all stockpiled topsoil will be used for rehabilitation of the open pit. The stockpile footprints will be thoroughly cleaned and then ripped to alleviate soil compaction. After ripping the rough surface will be smoothed with a disc or multiple tooth implement and then graded to a smooth surface. The topsoil will be ameliorated according to soil chemical analysis.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		The footprint will be re-vegetated with a grass seed mixture.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		The footprint will be thoroughly cleaned and all road building, coralliferous and soft overburden material will be	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			removed to a suitable disposal facility.		
	Decommissioning and Closure		The footprint will be ripped to alleviate soil compaction. After ripping the rough surface will be smoothed with a disc or multiple toothed implement and then graded to a smooth surface.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		Topsoil stored as berms on the road edges will be spread over the road footprint. The topsoil will be ameliorated according to soil chemical analysis.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		The dam floor will be thoroughly cleaned and all polluted material will be removed to a suitable disposal facility.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		Soil material used for wall embankments will be spread over the floor of the borrow pit.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		The stockpiled topsoil (A-horizon) will be replaced on the surface.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		Stored topsoil will be replaced (if any) and the footprint will be graded to a smooth surface.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		The footprint will be loosened with a multiple tooth implement to a depth of at least 300 mm to alleviate compaction.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Flora				
	Impacts on Habitat for floral species				
	Construction,	Total Area =	A sensitivity map has been	Not Applicable	Year 0 – 35 – duration of the life

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Operation and Decommissioning and Closure	1102.6ha Plant Area = 302.6ha Pit Area = 800ha	developed for the site, indicating the Wetland habitat units, which are considered to be of increased ecological importance. It is recommended that this sensitivity map be considered during all development phases to aid in the conservation of floral habitat within the site.		of mine
	Construction, Operation and Decommissioning and Closure		No activities are to infringe upon these sensitive areas or associated buffer zones.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		The boundaries of the development footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Edge effects of all construction and operational activities, such as erosion and alien plant species proliferation, which may affect floral habitat, need to be strictly managed in all areas of increased ecological sensitivity.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		All areas of increased ecological sensitivity should be designated as No-Go areas and be off limits to all unauthorised vehicles and personnel. Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed development	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			activities.		
	Construction, Operation and Decommissioning and Closure		Planning of temporary roads and access routes should take the site sensitivity plan into consideration. If possible, such roads should be constructed a distance from the more sensitive wetland areas and not directly adjacent thereto.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		It must be ensured that mining related waste or spillage and effluent do not affect the sensitive habitat boundaries and associated buffer zones.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		It must be ensured that the mine process water system is managed in such a way as to prevent discharge to the receiving environment.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		In the event of a vehicle breakdown, maintenance of vehicles must take place with care and the recollection of spillage should be practiced near the surface area to prevent ingress of hydrocarbons into topsoil and subsequent habitat loss.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Proliferation of alien and invasive species is expected within any disturbed areas. These species should be eradicated and controlled to prevent their spread beyond the mine expansion and development footprint areas.	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Alien plant seed dispersal within the top layers of the soil within footprint areas that will have an impact on future rehabilitation has to be controlled.		
	Construction, Operation and Decommissioning and Closure		All soils compacted as a result of construction activities falling outside of development footprint areas should be ripped and profiled. Special attention should be paid to alien and invasive control within these areas. Alien and invasive vegetation control should take place throughout all development including decommissioning phases to prevent loss of floral habitat.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		To prevent the erosion of top soils, management measures may include berms, soil traps, hessian curtains and stomr water diversion away from areas susceptible to erosion. It must be ensured that topsoil stockpiles are located outside of any drainage lines and areas susceptible to erosion. Stockpiles should be placed away from areas known to contain hazardous substances such as fuel and if any soils are contaminated, it should be stripped and disposed of at a registered hazardous waste dumping site.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and		All disturbed habitat areas must be rehabilitated and planted with	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Decommissioning and Closure		indigenous floral species as soon as possible to ensure that floral ecology is re-instated.		
	Construction, Operation and Decommissioning and Closure		During the construction and operational phases of the proposed mining expansion, erosion berms may be installed to prevent gully formation and siltation of the wetland resources. The following points should serve to guide the placement of erosion berms:	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		▪ Where the track has a slope of less than 2%, berms every 50m should be installed;	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		▪ Where the track slopes between 2% and 10%, berms every 25m should be installed;	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		▪ Where the track slopes between 10% and 15%, berms every 20m should be installed; and	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		▪ Where the track has a slope greater than 15%, berms every 10m should be installed.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Impacts on Floral Diversity				
	Construction, Operation and Decommissioning and Closure	Total Area = 1102.6ha Plant Area = 302.6ha	A sensitivity map has been developed for the site, indicating wetland areas which are considered to be of increased ecological importance. It is recommended that this	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
		Pit Area = 800ha	sensitivity map be considered during all development phases to aid in the conservation of floral habitat within the site.		
	Construction, Operation and Decommissioning and Closure		All development footprint areas and areas affected by the proposed mine development should remain as small as possible and should not encroach onto surrounding more sensitive wetland areas and the associated buffer zones. It must be ensured that these areas are off-limits to construction vehicles and personnel.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Removal of the alien and weed species encountered during the operational and decommissioning and closure phase must take place in order to comply with existing legislation (amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 and Section 28 of the National Environmental Management Act, 1998). Species specific and area specific eradication recommendations:	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		▪ Care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used;	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Construction, Operation and Decommissioning and Closure		▪ Footprint areas should be kept as small as possible when removing alien plant species; and	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		▪ No vehicles should be allowed to drive through designated sensitive wetland areas during the eradication of alien and weed species.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Informal fires in the vicinity of mining areas should be prohibited during all development phases.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		It must be ensured that all roads and construction areas are regularly sprayed with water in order to curb dust generation. This is particularly necessary during the dry season when increased levels of dust generation can be expected. These areas should not be over-sprayed causing water run-off and subsequent sediment loss into waterways and drainage lines in the vicinity of the site.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		The local communities residing within and in the vicinity of the site, as well as mining and construction personnel, should be informed about fire control and prevention measures to reduce the frequency of uncontrolled veld fires in areas surrounding and within the site.	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Impacts on Floral Species of Conservational Concern				
	Construction, Operation and Decommissioning and Closure	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	A sensitivity map has been developed for the site, indicating wetland areas which are considered to be of increased ecological importance. It is recommended that this sensitivity map be considered during all development phases to aid in the conservation of floral habitat within the site.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		All development footprint areas and areas affected by the proposed mine development should remain as small as possible and should not encroach onto surrounding more sensitive wetland areas and the associated buffer zones. It must be ensured that these areas are off-limits to construction vehicles and personnel.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Sensitive floral species, if discovered, are to be handled with care and the relocation of sensitive plant species is to be overseen by a botanist.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Should any RDL or protected plant species be encountered within the proposed development footprint areas, the following should be ensured:	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		▪ If any threatened species, or nationally or provincially protected floral will be disturbed, ensure permit	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			applications are required from the relevant authorities before construction activities commence; and		
	Construction, Operation and Decommissioning and Closure		▪ All rescue and relocation plans should be overseen by a suitably qualified specialist.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Fauna				
	Impact on faunal habitat and ecological structure				
	Construction, Operation and Decommissioning and Closure	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	Development should be excluded from the riparian habitat, as indicated on the sensitivity map.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		No areas falling outside of the site may be cleared for construction purposes.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Areas of increased ecological importance and sensitivity, such as the river and wetland habitat areas, should be considered during all phases of the proposed mine.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		The boundaries of the development footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		The proposed development footprint areas should remain as small as possible.	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Construction, Operation and Decommissioning and Closure		All areas of increased ecological sensitivity should be marked as such and be off limits to all unauthorised construction and maintenance vehicles and personnel.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Edge effects of all construction and operational activities, such as erosion and alien plant species proliferation, which may affect faunal habitat within surrounding areas, need to be strictly managed in all areas of increased ecological sensitivity.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Ensure that construction and maintenance related waste or spillage and effluent do not affect the sensitive habitat and impact on the associated buffer zones.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		In the event of a breakdown, maintenance of vehicles must take place with care and the recollection of spillage should be practiced to prevent the ingress of hydrocarbons into the topsoil.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		No trapping or hunting of fauna is to take place. Access control must be implemented to ensure that no illegal trapping or poaching takes place.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Alien and invasive vegetation control should take place throughout all phases of the development.	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Construction, Operation and Decommissioning and Closure		All construction and operational mining related vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed mine development activities.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Any natural areas beyond the development footprint, which have been affected by the construction activities, must be rehabilitated using indigenous grass species.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Rehabilitate all faunal habitat areas to ensure that faunal ecology is re-instated.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Fence construction footprint areas to contain all activities within designated areas.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		It is recommended that a speed limit of 40km/h is implemented on all maintenance and mining roads running through the site in order to minimise risk to RDL and other fauna from vehicles.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Education and awareness campaigns on RDL faunal species and their habitat are recommended to help increase awareness, respect and responsibility towards the environment for all staff and contractors.	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Impact on faunal diversity and ecological integrity				
	Construction, Operation and Decommissioning and Closure	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	The proposed development footprint areas should remain as small as possible and where possible be confined to already disturbed areas.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Sensitivity map needs to be taken into consideration during the construction phase.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Ensure that migratory connectivity is maintained where appropriate, especially in the sensitive faunal habitat unit areas.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Should any RDL or other common faunal species be found within the development footprint area, these species should be relocated to similar habitat within the vicinity of the site with the assistance of a suitably qualified specialist.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		No trapping or hunting of fauna is to take place.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		All informal fires in the vicinity of construction areas should be prohibited.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning		Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	and Closure		development activities.		
	Construction, Operation and Decommissioning and Closure		Education of identification for any RDL faunal species that may be found within the site.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		It is recommended that a speed limit of 40km/h is implemented on all roads running through the site during the construction as well as operational phase in order to minimise risk to RDL and other fauna from vehicles.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Speed humps should be constructed to help manage vehicle speed to mitigate collision with faunal species.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Education and awareness campaigns on faunal species and their habitat are recommended to help increase awareness, respect and responsibility towards the environment for all staff and contractors.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Impact on faunal species of conservational concern				
	Construction, Operation and Decommissioning and Closure	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	All areas of increased ecological sensitivity should be marked as such and be off limits to all unauthorised construction and operational vehicles and personnel.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning		No trapping or hunting of fauna is to take place.	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	and Closure				
	Construction, Operation and Decommissioning and Closure		Edge effects of all construction and operational activities, such as erosion and alien plant species proliferation, which may affect faunal habitat, need to be strictly managed in these areas.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Should any RDL species be noted within the site, these species should be relocated to similar habitat within or in the vicinity of the site with the assistance of a suitably qualified specialist.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		All informal fires in the vicinity of construction areas should be prohibited.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed development activities.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Education on identification for any potential RDL faunal species that may be found within the site.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Awareness campaigns are recommended to highlight the conservation of RDL faunal species, specifically for the avifaunal species highlighted in this report.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and		It is recommended that a speed limit of 40km/h is implemented	Not Applicable	Year 0 – 35 – duration of the life

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Decommissioning and Closure		on all roads running through the site during the construction phase in order to minimise risk to RDL and other fauna from vehicles.		of mine
	Construction, Operation and Decommissioning and Closure		Speed humps may be constructed to help slow vehicles and help mitigate collision with faunal species.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Wetlands				
	Loss of wetland habitat and ecological structure				
	Construction, Operation and Decommissioning and Closure	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	A sensitivity map has been developed for the site, indicating the various wetland features, which are considered to be of increased ecological importance. It is recommended that this sensitivity map be considered during the planning/ pre-construction and construction phases of the proposed development activities to aid in the conservation of ecology within the site.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		It must be ensured that planning of mining infrastructure includes consideration of adjacent wetland / pan areas to ensure that these areas are avoided as far as possible.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Development / mining impacts on the affected wetland features should be managed to minimise impacts on adjacent wetland features.	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Construction, Operation and Decommissioning and Closure		Edge effects of activities including erosion and alien / weed control need to be strictly managed in these areas.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Access into adjacent wetland / pan areas, particularly by vehicles, is to be strictly controlled.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		All vehicles should remain on designated roads with no indiscriminate driving through adjacent wetland / pan areas.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Ensure that all stockpiles are well managed and have measures such as berms and hessian curtains implemented to prevent erosion and sedimentation.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Run-off from dirty water areas entering wetland habitats must be prevented and clear separation of clean and dirty water in the vicinity of the proposed infrastructure must take place. Oil must be prevented from entering the clean water system.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Pollution control dams should be off stream structures and not within the natural drainage system of the area, thereby minimising impacts loss of instream flow and downstream recharge.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and		Ensure that seepage from dirty water systems is prevented as	Not Applicable	Year 0 – 35 – duration of the life

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Decommissioning and Closure		far as possible.		of mine
	Construction, Operation and Decommissioning and Closure		It must be ensured that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. All vehicles must be regularly inspected for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		All spills should be immediately cleaned up and treated accordingly.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Appropriate sanitary facilities must be provided for the life of the mine and all waste removed to an appropriate waste facility.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Effective waste management must be implemented in order to prevent construction related waste from entering the wetland environment.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		All adjacent wetland systems must be monitored for erosion and incision.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Erosion berms may be installed in any areas where soil disturbances within the vicinity of the wetland features have occurred to prevent gully formation and siltation of the aquatic resources. The following	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			points should serve to guide the placement of erosion berms:		
	Construction, Operation and Decommissioning and Closure		■ Where the track has slope of less than 2%, berms every 50m should be installed;	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		■ Where the track slopes between 2% and 10%, berms every 25m should be installed;	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		■ Where the track slopes between 10% and 15%, berms every 20m should be installed; and	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		■ Where the track has slope greater than 15%, berms every 10m should be installed.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Restrict construction to the drier winter months if possible to avoid sedimentation of wetland features in the vicinity of the proposed mine development areas.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Desilt all adjacent wetland areas affected by mining and runoff from dirty water areas.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Changes to wetland ecological and sociocultural service provision				
	Construction, Operation and Decommissioning and Closure	Total Area = 1102.6ha Plant Area =	It must be ensured that planning of mining infrastructure includes consideration of adjacent wetland areas to ensure that these areas are avoided as far	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
		302.6ha	as possible.		
	Construction, Operation and Decommissioning and Closure	Pit Area = 800ha	All demarcated sensitive zones outside of the construction area must be kept off limits during any development and closure phases of the mine.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		The development footprint area must be limited to what is absolutely essential in order to minimise environmental damage.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Run-off from dirty water areas entering adjacent wetland habitats must be prevented and clear separation of clean and dirty water in the vicinity of the proposed shaft must take place.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Oil must be prevented from entering the clean water system.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		It must be ensured that seepage from dirty water systems is prevented as far as possible.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		It must be ensured that the mine process water system is managed in such a way as to prevent discharge to the receiving environment.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Edge effects of activities including erosion and alien / weed control need to be strictly managed in wetland areas.	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Construction, Operation and Decommissioning and Closure		As much vegetation growth as possible should be promoted within the proposed mine development area in order to protect soils. In this regard, special mention is made of the need to use indigenous vegetation species where hydroseeding, wetland and rehabilitation planting (where applicable) are to be implemented.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Implement effective waste management in order to prevent construction related waste from entering the wetland environment.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		All wetland areas must be rehabilitated upon decommissioning to ensure that wetland functions are reinstated during decommissioning and all disturbed wetland areas adjacent to the mining development must be re-vegetated with indigenous wetland species.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Impact on wetland hydrological function				
	Construction, Operation and Decommissioning and Closure	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	It must be ensured that planning of mining infrastructure includes consideration of adjacent wetland areas to ensure that these areas are avoided as far as possible.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and		Keep all demarcated sensitive zones outside of the	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Decommissioning and Closure		construction area off limits during development phases.		
	Construction, Operation and Decommissioning and Closure		Prevent run-off from dirty water areas entering wetland habitats.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Ensure that seepage from dirty water systems is prevented as far as possible.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Ensure that the mine process water system is managed in such a way as to prevent discharge to the receiving environment.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Implement effective waste management in order to prevent construction related waste from entering the wetland environment.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		All wetland areas must be rehabilitated upon decommissioning to ensure that wetland functions are re-instated during decommissioning and all disturbed wetland areas adjacent to the mining development must be re-vegetated with indigenous wetland species.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		It must be ensured that all activities potentially impacting on geohydrological resources are managed according to the relevant DWA Licensing regulations and groundwater	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			monitoring requirements.		
	Construction, Operation and Decommissioning and Closure		Post closure groundwater management will need to be very carefully managed to ensure that no impact on the wetland areas takes place after mine closure has taken place.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Future mine planning should ensure that mining activities does not lead to a reduction of stream flow or dewatering of any wetland areas.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Aquatic Ecology				
	Impacts on water quality				
	Construction, Operation and Decommissioning and Closure	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	Ensure that as far as possible all infrastructures are placed outside of wetland, riparian, drainage and stream areas. In particular mention is made of the need to not encroach on the riparian systems on the Selons River within the proposed mine area and a minimum buffer of 100m around all wetland and riparian systems should be maintained in line with the requirements of regulation GN704 of the National Water Act.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Very clear and well managed clean and dirty water separation must take place in line with the requirements of regulation GN704 of the National Water Act.	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Construction, Operation and Decommissioning and Closure		Pollution control dams must be adequately designed to contain a 1:50 24 hour storm water event.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		All pollution control facilities must be managed in such a way as to ensure that storage and surge capacity is available if a rainfall event occurs.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Limit the footprint area of the construction activity to what is absolutely essential in order to minimise the loss of clean water runoff areas and the concomitant recharge of streams in the area.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Permit only essential construction personnel within 32m of all riparian systems.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Keep all demarcated sensitive zones outside of the construction area off limits during the construction phase of the development.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		All hazardous chemicals must be stored on specified surfaces.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Ensure that all spills are immediately cleaned up.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and		Monitor all pollution control facilities using toxicological	Not Applicable	Year 0 – 35 – duration of the life

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Decommissioning and Closure		screening methods and implement the calculation of discharge dilution factors by means of the Direct Estimation of Ecological Effect Potential (DEEEP) protocol.		of mine
	Construction, Operation and Decommissioning and Closure		Ongoing aquatic ecological monitoring must take place on a 6 monthly basis by an SA RHP Accredited assessor.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		The extent of all operations which may impact the Selons River must be kept to an absolute minimum.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		No infrastructure or open pits should encroach into any major drainage lines.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Impacts on loss of aquatic habitat				
	Construction, Operation and Decommissioning and Closure	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	Ensure that as far as possible all infrastructures are placed outside of wetland, riparian, drainage and stream areas. In particular mention is made of the need to not encroach on the riparian systems on the Selons River within the proposed mine area and a minimum buffer of 100m around all wetland and riparian systems should be maintained in line with the requirements of regulation GN704 of the national Water Act.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and		Limit the footprint area of the construction activity to what is	Not Applicable	Year 0 – 35 – duration of the life

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Decommissioning and Closure		absolutely essential in order to minimise the loss of aquatic habitat in the area.		of mine
	Construction, Operation and Decommissioning and Closure		Ensure that all stockpiles are well managed and have measures such as berms and hessian sheets implemented to prevent erosion and sedimentation which may ultimately lead to transformation of aquatic habitat areas.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Pollution control dams should be off stream structures and not within the natural drainage system of the area, thereby minimising impacts loss or transformation of aquatic habitat.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Permit only essential construction personnel within 100m of all riparian systems.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Keep all demarcated sensitive zones outside of the construction area off limits during the construction phase of the development as well as during operational phase of the mine.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Implement alien vegetation control program within wetland and riverine areas with special mention of water loving tree species.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and		Ongoing aquatic ecological monitoring must take place on a	Not Applicable	Year 0 – 35 – duration of the life

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Decommissioning and Closure		6 monthly basis by an SA RHP Accredited assessor.		of mine
	Construction, Operation and Decommissioning and Closure		The extent of all operations which may impact aquatic habitat must be kept to an absolute minimum.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		No infrastructure or open pits should encroach into any major drainage lines.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Re-vegetate all disturbed areas with indigenous tree species and make use of indigenous species with an affinity for riparian zones.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Impacts on loss of aquatic biodiversity and sensitive taxa				
	Construction, Operation and Decommissioning and Closure	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	Ensure that as far as possible all infrastructure is placed outside of sensitive wetland areas, streams and rivers.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Pollution control dams should be off stream structures and not within the natural drainage system of the area, thereby minimising impacts form inundation and siltation.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Permit only essential construction personnel within 100m of the wetland habitat.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Keep all demarcated sensitive zones outside of the construction area off limits during the construction phase of	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			the development.		
	Construction, Operation and Decommissioning and Closure		Use of water must be minimised as far as possible in order to minimise the loss of recharge of the Selons River system.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Limit the footprint area of the construction activity to what is absolutely essential in order to disturbance of soils leading to runoff, erosion and sedimentation and loss of instream flow and stream recharge.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Prevent run-off from dirty water areas entering stream and river systems through ensuring clear separation of clean and dirty water areas.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Ensure that the mine process water system is managed in such a way as to prevent discharge to the receiving environment and to prevent discharge of dirty water.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Implement measures to contain seepage as far as possible to prevent contamination of the groundwater regime.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Implement alien vegetation control program within wetland and riparian areas.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning		Monitor all systems for erosion and incision.	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	and Closure				
	Construction, Operation and Decommissioning and Closure		Any areas where active erosion is observed must be rehabilitated and berms utilised to slow movement of water.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Ongoing aquatic biomonitoring should take place in order to identify any emerging issues in the receiving environment.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Toxicological monitoring of the receiving and process water systems on a quarterly basis.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		The extent of all operations which may impact aquatic habitat must be kept to an absolute minimum.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		No infrastructure or open pits should encroach into any major drainage lines.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Monitoring of sediment heavy metal concentrations.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Impacts on loss of instream flow				
	Construction, Operation and Decommissioning and Closure	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	Ensure that as far as possible all infrastructures are placed outside of drainage and river areas. In particular mention is made of the need to not encroach on the riparian systems near the Selons River with a minimum buffer of 100m	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			around all wetland and riparian systems should be maintained in line with the requirements of regulation GN704 of the National Water Act.		
	Construction, Operation and Decommissioning and Closure		Limit the footprint area of the construction activity to what is absolutely essential in order to minimise the loss of clean water runoff areas.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		No use of clean surface water or any groundwater which potentially recharges the watercourses in the area should take place. In this regard specific mention is made of any water use which will affect the instream flow in the Selons River.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Very strict control of water consumption must take place and detailed monitoring must take place and where all water usage must continuously be optimised.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Upstream dewatering boreholes should be utilised to minimise the creation of dirty water and this clean water should be used to recharge the natural systems downstream of the mining rights areas.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Pollution control dams should be off stream and tributary structures and not within the natural drainage system of the	Not Applicable	Year 0 – 35 – duration of the life of mine

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			area, thereby minimising impacts loss of instream flow and downstream recharge.		
	Construction, Operation and Decommissioning and Closure		Permit only essential construction personnel within 32m of all riparian systems.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Keep all demarcated sensitive zones outside of the construction area off limits during the construction phase of the development.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Implement alien vegetation control program within wetland areas with special mention of water loving tree species.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Monitor all affected riparian systems for moisture stress.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Monitor all potentially affected riparian zones for changes in riparian vegetation structure.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		Ongoing aquatic ecological monitoring must take place on a 6 monthly basis by an SA RHP (South African River Health Program) Accredited assessor.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction, Operation and Decommissioning and Closure		The extent of the operations in the mining rights area must be kept to an absolute minimum.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction,		No infrastructure or open pits	Not Applicable	Year 0 – 35 – duration of the life

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Operation and Decommissioning and Closure		should encroach into any major drainage lines.		of mine
	Air Quality				
	Construction	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	Although incremental concentrations and deposition rates due to the construction phase of the proposed Rietvlei Mine project are estimated to be of low environmental significance, it is recommended that effective dust control measures be implemented based on good practice. The implementation of effective controls during this phase would also serve to set the precedent for mitigation during the operational phase	National Ambient Air Quality Standards and SANS Dust Fallout limits	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Control techniques for fugitive dust sources generally involve watering, chemical stabilization, and the reduction of surface wind speed though the use of windbreaks and source enclosures. Proposed dust control measures which may be implemented during the construction phase are as follows:	National Ambient Air Quality Standards and SANS Dust Fallout limits	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		▪ Debris handling - wind speed reduction through sheltering and wet suppression;	National Ambient Air Quality Standards and SANS Dust Fallout limits	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		▪ Truck transport - wet suppression or chemical	National Ambient Air Quality Standards and	Year 0 – 1 – after receipt of all relevant authorisations

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			stabilization of unpaved roads;	SANS Dust Fallout limits	
	Construction		■ Dust entrainment – reduction of unnecessary traffic and strict speed control, require haul trucks to be covered, and ensure material being hauled is wet;	National Ambient Air Quality Standards and SANS Dust Fallout limits	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		■ Materials storage, handling and transfer operations - wet suppression;	National Ambient Air Quality Standards and SANS Dust Fallout limits	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		■ Earthmoving and dozing operations - wet suppression;	National Ambient Air Quality Standards and SANS Dust Fallout limits	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		■ General construction - wind speed reduction, wet suppression and early paving of permanent roads. Phasing of earthmoving activities to reduce source size; and	National Ambient Air Quality Standards and SANS Dust Fallout limits	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		■ Open areas (wind-blown emissions) - early vegetation, compaction and stabilization of disturbed soil and reduction of the frequency of disturbance.	National Ambient Air Quality Standards and SANS Dust Fallout limits	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Mitigation measures can be implemented as an attempt to reduce the production of gases from both vehicles use and surface blasting. Catalytic converters can be fitted to construction vehicles to aid in the reduction of gases	National Ambient Air Quality Standards and SANS Dust Fallout limits	Year 0 – 1 – after receipt of all relevant authorisations

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			produced. Regular maintenance of construction vehicles can also reduce the gases produced. Well planned blasting can reduce the production of gases.		
	Operation		Due to the generally high existing background particulate air concentrations in the region, it is recommended to control major contributing sources. Wind erosion of exposed areas should be kept to a minimum through watering programs and avoiding unnecessary disturbance of stabilised areas.	National Ambient Air Quality Standards and SANS Dust Fallout limits	Year 1 – 24 – after completion of construction phase
	Operation		Dust fallout monitoring should continue to be carried out close to the sensitive receptors around the mine area. It is recommended that dust deposition sampling continue to be confined to sites within close proximity (< 2 km) to the proposed mine operations. Monitoring is undertaken using the American Society for Testing and Materials standard test method for the collection and analysis of dustfall (ASTM D-1739).	National Ambient Air Quality Standards and SANS Dust Fallout limits	Year 1 – 24 – after completion of construction phase
	Operation		Implementation of the air quality management plan as outlined in the Air Quality Impact Assessment Report included in **Appendix 18**.	National Ambient Air Quality Standards and SANS Dust Fallout limits	Year 1 – 24 – after completion of construction phase

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Noise				
	Construction	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	Regular monitoring of the exposed livestock should be undertaken in order to ascertain if there are any adverse reactions.	Noise Control Regulations in Terms of Section 25 of the Environmental Conservation Act, 1989 Relevant noise standards in terms of SANS	Year 0 – 1 – after receipt of all relevant authorisations
	Maintenance of equipment and operational procedures:				
	Construction and Operation	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	▪ Proper design and maintenance of silencers on diesel-powered equipment,	Noise Control Regulations in Terms of Section 25 of the Environmental Conservation Act, 1989 Relevant noise standards in terms of SANS	Year 0 – 24 – after receipt of all relevant authorisations
	Construction and Operation		▪ Systematic maintenance of all forms of equipment, and		Year 0 – 24 – after receipt of all relevant authorisations
	Construction and Operation		▪ Training of personnel to adhere to operational procedures that reduce the occurrence and magnitude of individual noisy events.		Year 0 – 24 – after receipt of all relevant authorisations
	Placement of material stockpiles:				
	Operation	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	▪ Where possible earthworks and material stockpiles should be placed so as to protect the boundaries from noise from individual operations and especially from haul roads, which for greatest effect should be placed directly behind them.	Noise Control Regulations in Terms of Section 25 of the Environmental Conservation Act, 1989 Relevant noise standards in terms of SANS	Year 1 – 24 – after completion of construction phase
	Operation		▪ If a levee is constructed, it should be of such a height as to effectively act as a noise barrier, if line of sight calculations show this to be		Year 1 – 24 – after completion of construction phase

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			practicable.		
	Operation		■ Equipment noise audits: • Standardised noise measurements should be carried out on individual equipment at the delivery to site to construct a reference data base and regular checks carried out to ensure that equipment is not deteriorating and to detect increases which could lead to increase in the noise impact over time and increased complaints.		Year 1 – 24 – after completion of construction phase
	Environmental noise monitoring:				
	Operation	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	This should be carried out by an independent agency regularly at six-monthly intervals close to MP2 at the nearest mine boundary to Rietvlei Farm to detect deviations from predicted noise levels and enable corrective measures to be taken where warranted.	Noise Control Regulations in Terms of Section 25 of the Environmental Conservation Act, 1989 Relevant noise standards in terms of SANS	Year 1 – 24 – after completion of construction phase
	Operation		In addition it is recommended to carry out continuous blast monitoring to check on the levels of air blast and groundborne vibration generated by individual blasts at the same position.		Year 1 – 24 – after completion of construction phase
	Mobile equipment noise:				

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Operation	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	▪ Select vehicle routes carefully by internalising the roads;	Noise Control Regulations in Terms of Section 25 of the Environmental Conservation Act, 1989 Relevant noise standards in terms of SANS	Year 1 – 24 – after completion of construction phase
	Operation		▪ Fit efficient silencers and enclose engine compartments;		Year 1 – 24 – after completion of construction phase
	Operation		▪ Damp mechanical vibrations;		Year 1 – 24 – after completion of construction phase
	Operation		▪ Maintain equipment conscientiously; and		Year 1 – 24 – after completion of construction phase
	Operation		▪ Erect berms, screens or barriers at permanent sites and haul roads.		Year 1 – 24 – after completion of construction phase
	Fixed plant noise:				
	Operation	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	▪ Carefully select permanent plant site remote from sensitive receptors;	Noise Control Regulations in Terms of Section 25 of the Environmental Conservation Act, 1989 Relevant noise standards in terms of SANS	Year 1 – 24 – after completion of construction phase
	Operation		▪ Reduce noise at source by acoustic treatment;	Noise Control Regulations in Terms of Section 25 of the Environmental Conservation Act, 1989 Relevant noise standards in terms of SANS	Year 1 – 24 – after completion of construction phase
	Operation		▪ Isolate source by acoustic enclosure, etc. Compressors and generators, if used on site, should be installed in separate acoustically treated buildings; and	Noise Control Regulations in Terms of Section 25 of the Environmental Conservation Act, 1989 Relevant noise standards in terms of SANS	Year 1 – 24 – after completion of construction phase

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Operation		▪ The crusher and front end loaders supplying the transport trucks should be centred within the coal stockpiles which should encircle the operation and maintained at a height of 4-5 meters as far as possible so they continuously act as noise berms. The essential situation is that there should be no line of sight from sensitive receptors outside the mine boundary to the operating equipment.	Noise Control Regulations in Terms of Section 25 of the Environmental Conservation Act, 1989 Relevant noise standards in terms of SANS	Year 1 – 24 – after completion of construction phase
	Operation		Correct calculation of the charge size to keep air blast and ground vibration levels below pre-determined acceptable values.	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Year 1 – 24 – after completion of construction phase
	Operation		Monitoring blast, ground vibration and human response to ensure accepted levels are in fact acceptable and are being adhered to, and to modify the blasting regime as appropriate.	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Year 1 – 24 – after completion of construction phase
	Operation		Pre-notification of affected persons of the intention to blast and the time of blast.	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Year 1 – 24 – after completion of construction phase
	Operation		Correct stemming of blastholes.	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and	Year 1 – 24 – after completion of construction phase

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				recommendations on air blast	
	Operation		Monitor sensitive structures for signs of attributable damage.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		Vibration monitoring of the structure to ascertain actual vibration levels.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		Regular monitoring of the exposed livestock should be undertaken in order to ascertain if there are any adverse reactions.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Archaeology and Cultural Heritage				
	Construction	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	The graveyards must be mitigated by means of exhumation and relocation. The exhumation of human remains and the relocation of graveyards are regulated by various laws, regulations and administrative procedures. This task is undertaken by forensic archaeologists or by reputed undertakers who are acquainted with all the administrative procedures and relevant legislation that have to be adhered to whenever human remains are exhumed and relocated. This process also includes social consultation with a 60 days statutory notice period for graves older than sixty years. Permission for the exhumation and relocation of human remains have to be obtained	National Heritage Resources Act (No 25 of 1999) Ordinance on Exhumations (No 12 of 1980) Human Tissues Act (No 65 of 1983 as amended).	Year 0 – 1 – after receipt of all relevant authorisations

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			from the descendants of the deceased (if known), the National Department of Health, the Provincial Department of Health, the Premier of the Province and the local police.		
	Construction		The relocation (mitigation) of the graveyards has high potential for better conservation as these cemeteries will be managed whilst the current graveyards are abandoned, neglected and are falling into disrepair.	National Heritage Resources Act (No 25 of 1999) Ordinance on Exhumations (No 12 of 1980) Human Tissues Act (No 65 of 1983 as amended).	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		A Conservation Management Plan for graveyards which may be left unaffected must be included in the mine's EMP to ensure their continued existence during the construction, operation and decommissioning phase of the Rietvlei Coal Mine. This plan must provide for the following:	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		▪ Demarcation of graveyards with fences or walls and fitted entrance gates to provide access to family and friends;		Year 0 – 1 – after receipt of all relevant authorisations
	Construction		▪ Regulated visitor hours compatible with mine safety rules; and		Year 0 – 1 – after receipt of all relevant authorisations
	Construction		▪ Maintaining corridors of at least 30m between graveyard borders and		Year 0 – 1 – after receipt of all relevant authorisations

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			developmental activities.		
	Visual Aspects				
	Planning	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	Make use of existing roads wherever possible, and minimise the requirement for roads around the perimeter of the mine.	Not Applicable	Year 0 – 1 – Prior to receipt of all relevant authorisations
	Planning		Where grading and earth moving is required adjacent to public roads, make use of the spoil to create berms along the road to shield visual impact. Vegetate and monitor erosion on these berms.	Not Applicable	Year 0 – 1 – Prior to receipt of all relevant authorisations
	Planning		Where new roads are required, these should be planned taking due cognisance of the topography. Construction of roads should be undertaken properly, with adequate drainage structures in place to forego potential erosion problems.	Not Applicable	Year 0 – 1 – Prior to receipt of all relevant authorisations
	Planning		Implement an environmentally responsive planning approach to roads and infrastructure to limit cut and fill requirements. Plan with due cognisance of the topography.	Not Applicable	Year 0 – 1 – Prior to receipt of all relevant authorisations
	Planning		Paint all project facilities, fences and sign boards with muted earth-toned colours that will blend with the background colour of the vegetation.	Not Applicable	Year 0 – 1 – Prior to receipt of all relevant authorisations

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Planning		Ensure that all surface treatments are non-reflective.	Not Applicable	Year 0 – 1 – Prior to receipt of all relevant authorisations
	Planning		Pro-actively plan the lighting requirements for the mine, both for construction and operations. Possible measures include the following:	Not Applicable	Year 0 – 1 – Prior to receipt of all relevant authorisations
	Planning		▪ Shielding the sources of light by physical barriers (walls, vegetation, or the structure itself);	Not Applicable	Year 0 – 1 – Prior to receipt of all relevant authorisations
	Planning		▪ Directing light sources away from residential units and roads;	Not Applicable	Year 0 – 1 – Prior to receipt of all relevant authorisations
	Planning		▪ Limiting mounting heights of lighting fixtures;	Not Applicable	Year 0 – 1 – Prior to receipt of all relevant authorisations
	Planning		▪ Making use of minimum lumen or wattage in fixtures;	Not Applicable	Year 0 – 1 – Prior to receipt of all relevant authorisations
	Planning		▪ Making use of down-lighters, or shielded fixtures;	Not Applicable	Year 0 – 1 – Prior to receipt of all relevant authorisations
	Planning		▪ Making use of Low Pressure Sodium lighting or other types of low impact lighting; and	Not Applicable	Year 0 – 1 – Prior to receipt of all relevant authorisations
	Planning		▪ Making use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.	Not Applicable	Year 0 – 1 – Prior to receipt of all relevant authorisations
	Construction		Reduce the construction period through careful planning and productive implementation of	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			resources.		
	Construction		Plan the placement of lay-down areas and temporary construction equipment camps in order to minimise vegetation clearing.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Avoid or minimise the clearing of existing vegetation wherever possible.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Screen the construction camp and lay-down yards by enclosing the entire area with a dark green or black shade cloth of no less than 2m height.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Ensure that rubble, litter and disused construction materials are managed and removed regularly.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Ensure that all infrastructure and the site and general surrounds are maintained in a neat and appealing way.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Reduce and control construction dust through the use of approved dust suppression techniques, especially on windy days.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Restrict construction activities to daylight hours in order to negate	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			or reduce the visual impacts associated with lighting.		
	Construction		Rehabilitate all disturbed areas, construction areas, road servitudes and cut and fill slopes as soon as possible to acceptable visual standards.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Operation		Maintain the general appearance of the facility in an aesthetically pleasing way.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		Reduce and control construction dust through the use of approved dust suppression techniques, especially on windy days.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		Refrain from using the coal as infill material in road works.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		Monitor rehabilitated areas, and implement remedial action as and when required.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Decommissioning and Closure		Remove infrastructure and buildings not required for the post-decommissioning use of the site.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		Backfill and rehabilitate all voids and unnatural landforms to resemble local topography.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		Rip and rehabilitate all access roads not required for the post-decommissioning use of the site.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		Monitor rehabilitated areas, and implement remedial action as and when required.	Not Applicable	Year 1 – 35 – concurrent rehabilitation is proposed

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Socio – Economic				
	Construction	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	As far as possible, labour must be sourced from the local area and Middleburg, where appropriate skills exist.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction and Operation		Contractors must make every effort to obtain services and consumables from local entrepreneurs.	Not Applicable	Year 0 – 24 – after receipt of all relevant authorisations
	Construction		Non-core activities related to the construction phase of the project will be identified and out-sourced to local service providers, where the skills exist.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction and Operation and Decommissioning and Closure		PPE must be made available to all employees and contractors, during the construction, operational and decommissioning phase.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction and Operation		Public awareness programmes must be developed by the mine with the community to identify areas of particular risk and approaches to reduce risk.	Not Applicable	Year 0 – 24 – after receipt of all relevant authorisations
	Construction		Dust suppression measures such as watering must be implemented on the access road during the construction period to reduce the amount of dust created.	National Ambient Air Quality Standards and SANS Dust Fallout limits	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Speed limits must be stipulated and enforced for vehicles using the surrounding roads.	Relevant traffic laws and regulations	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		Noisy activities must be	Noise Control Regulations	Year 0 – 1 – after receipt of all

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			undertaken during regular working hours during the construction phase. In the event that noisy activities are required to be undertaken outside of these hours the surrounding communities and residents must be informed.	in Terms of Section 25 of the Environmental Conservation Act, 1989 Relevant noise standards in terms of SANS	relevant authorisations
	Construction and Operation		No accommodation will be permitted on site.	Not Applicable	Year 0 – 24 – after receipt of all relevant authorisations
	Construction and Operation and Decommissioning and Closure		The mine will ensure that an HIV/ AIDS strategy is in place and effectively implemented at the mine.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction and Operation		Condoms will be made available to all staff and workers.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction and Operation and Decommissioning and Closure		Strict penalties will be built into tenders to deal with issues such as petty crime, stock theft, fence cutting, trespassing, the closing of farm gates etc.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction and Operation and Decommissioning and Closure		Unauthorised social activities are to be prohibited, which include, but are not limited to, consumption of or illegal selling of alcohol, drug utilisation or selling, and onsite prostitution.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction and Operation		The contractor is to ensure that all staff on site will be in possession of a South African identity document, or suitable valid work permit from the Department of Home Affairs.	Not Applicable	Year 0 – 24 – after receipt of all relevant authorisations
	Construction and		Skills development programmes will be set up so as to improve	Not Applicable	Year 0 – 24 – after receipt of all

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Operation		the skills of the labour force.		relevant authorisations
	Construction and Operation and Decommissioning and Closure		The Social Labour Plan must be followed to ensure the development of skilled labour.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction and Operation		The mine will ensure that a transportation system is implemented from the potential housing areas to the mine to reduce the potential impact on the roads and aid in the creation of entrepreneurial opportunities.	Not Applicable	Year 0 – 24 – after receipt of all relevant authorisations
	Operation		The mine should encourage local business to provide services for the mine to allow for economic development of the local area.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		As far as possible, labour will be sourced from the local area and Middleburg, where appropriate skills exist.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation and Decommissioning and Closure		The mine will routinely inspect the boundary fences around the mine.	Not Applicable	Year 1 – 35 - concurrent rehabilitation is proposed
	Blasting and Vibration				
	Operation	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	To reduce the effects of ground vibration the planning of blast operations must occur to take cognisance of different initiations and charging options.	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Year 1 – 24 – after completion of construction phase
	Operation		Attempt to increase the distance between the blast and the structure concerned to reduce	United States Bureau of Mines (USBM) criteria for safe blasting for ground	Year 1 – 24 – after completion of construction phase

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			the effects of the vibrations.	vibration and recommendations on air blast	
	Operation		No mitigation strategy can be implemented to reduce this significance however constant road maintenance and repair can help mitigate from server impacts to road users.	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Year 1 – 24 – after completion of construction phase
	Operation		Mitigation measures can be used to reduce the effect of air blasting through the control of the length and type of material used in stemming.	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Year 1 – 24 – after completion of construction phase
	Operation		It is highly recommended that a blast monitoring program be put in place. This includes monitoring ground vibration and air blast for every blast. Ground vibration and air blast is monitored using a seismograph. Monitoring can be done in permanent stations or on ad hoc basis – per blast basis monitoring. Additionally to this it is recommended that a video of each blast is done as a standard. Monitoring of ground vibration and air blast is done to ensure that the generated levels of ground vibration and air blast comply with recommendations.	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Year 1 – 24 – after completion of construction phase
	Operation		A minimum safe distance 150m is required but recommended is that a minimum of 500m must be maintained from any blast	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and	Year 1 – 24 – after completion of construction phase

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			done. This may be greater but not less. The blaster has a legal obligation concerning the safe distance and he needs to determine this distance.	recommendations on air blast	
	Operation		All persons and animals within 500m from a blast must be cleared and where necessary evacuation must be conducted with all the required pre-blast negotiations.	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Year 1 – 24 – after completion of construction phase
	Operation		There are public and farm roads closer than 500m to the project area. Proper road closure procedures in conjunction with the necessary authorities will be required. All blasting closer than 500m to roads will require road closure procedures. Farm roads that are used daily may exist and should be considered for closure just when blasting is done in vicinity of these roads.	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Year 1 – 24 – after completion of construction phase
	Operation		The railway is located close to the pit area on the southern side. The frequency of trains passing through is unknown at this stage. Specific care and attention will have to be given to the following. Blasting should considered train schedules, distance from the railway, contingency plans if fly rock has occurred, fly rock control for railway electrical lines are some of the actions to be considered.	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Year 1 – 24 – after completion of construction phase

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Operation		It will be imperative to conduct a photographic survey (crack survey) of all structures around the pit areas. All structures within 1500m from the pit boundary are to be surveyed prior to any blasting done. A 1500m equates to 2.1mm/s of expected ground vibration for the charge used. This level of ground vibration is already perceptible and people in structures could experience ground vibration negatively.	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Year 1 – 24 – after completion of construction phase
	Operation		The ground vibration and air blast levels recommended in the Blasting and Vibration Report (**Appendix 29**) for blasting operations in this area should be adhered to.	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Year 1 – 24 – after completion of construction phase
	Operation		The current proposed stemming lengths at least must be maintained to ensure control on fly rock. Specific designs where distances and blast is known should be considered with this.	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Year 1 – 24 – after completion of construction phase
	Operation		A further consideration of blasting times is when weather conditions could influence the effects yielded by blasting operations. Recommended is not to blast too early in the morning when it is still cool or the possibility of inversion is present or too late in the afternoon in winter as well. Do not blast in fog. Do not blast in	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Year 1 – 24 – after completion of construction phase

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			the dark. Refrain from blasting when wind is blowing strongly in the direction of an outside receptor. Do not blast with low overcast clouds. These 'do not's stem from the influence that weather has on air blast. The energy of air blast cannot be increased but it is distributed differently to unexpected levels where it was not expected. It is recommended that a standard blasting time is fixed and blasting notice boards setup at various routes around the project area that will inform the community blasting dates and times.		
	Operation		Third party consultation and monitoring should be considered for all ground vibration and air blast monitoring work. Additionally assistance may be sought when blasting is done close to the highways. This will bring about unbiased evaluation of levels and influence from an independent group. Monitoring could be done using permanent installed stations. Audit functions may also be conducted to assist the mine in maintaining a high level of performance with regards to blast results and the effects related to blasting operations.	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Year 1 – 24 – after completion of construction phase

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Traffic				
	Construction and Operation and Decommissioning and Closure	Total Area = 1102.6ha Plant Area = 302.6ha Pit Area = 800ha	Construction and operational vehicles using the roads will be scheduled to avoid peak-hour traffic i.e. avoid period between 07:00am and 09:00am as well as the period between 16:00pm and 18:00pm.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction and Operation and Decommissioning and Closure		Upgrade of the roads would aid in faster moving vehicles and potholes would be avoided.	Geometric Design of Rural Roads technical guidelines, document TRH17 published by the Department of Transport in 1988	Year 0 – 35 – duration of the life of mine
	Construction and Operation and Decommissioning and Closure		Construction and operational vehicles should stay to the left hand side of the road and allow faster moving vehicles to pass them if and when it is safe to do so.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction and Operation and Decommissioning and Closure		All construction, operational and maintenance vehicles travelling on public roads must adhere to the relevant traffic laws and regulations.	Not Applicable	Year 0 – 35 – duration of the life of mine
	Construction and Operation		Haul routes should be sprayed with water regularly to avoid the generation of dust.	National Ambient Air Quality Standards and SANS Dust Fallout limits	Year 0 – 24 – after receipt of all relevant authorisations
	Construction and Operation		All construction and operational vehicles should abide by speed limits to reduce excessive generation of dust.	National Ambient Air Quality Standards and SANS Dust Fallout limits	Year 0 – 24 – after receipt of all relevant authorisations
	Construction		Construction vehicles must only use the roads during daylight hours. No vehicles should be	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			operational from 6pm to 6am.		
	Construction and Operation		Construction and operational vehicles should put their headlights on when accessing the roads where pedestrians are commonly found.	Not Applicable	Year 0 – 24 – after receipt of all relevant authorisations
	Construction and Operation		All construction vehicles should comply with the general road rules as to reduce the possibility of pedestrian incidents.	Not Applicable	Year 0 – 24 – after receipt of all relevant authorisations
	Construction and Operation		All construction and operational vehicles travelling on public roads must adhere to the relevant traffic laws and regulations.	Relevant traffic laws and regulations	Year 0 – 24 – after receipt of all relevant authorisations
	Construction		In the event that the accident involves another vehicle the relevant authorities are to be notified of the incident and responsive action implemented based on legal and insurance requirements.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction		All construction and maintenance vehicles travelling on public roads must adhere to the relevant traffic laws and regulations to avoid the possibility of accidents.	Not Applicable	Year 0 – 1 – after receipt of all relevant authorisations
	Construction and Operation		All Construction and operational vehicles should adhere to the speed limits.	Relevant traffic laws and regulations	Year 0 – 24 – after receipt of all relevant authorisations
	Construction and Operation		The proposed mine must be responsible for continued maintenance on the roads used by the construction and	Not Applicable	Year 0 – 24 – after receipt of all relevant authorisations

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			operational vehicles.		
	Construction and Operation		Upgrade of the roads must occur so that potholes would be avoided and that the roads are safer to use.	Geometric Design of Rural Roads technical guidelines, document TRH17 published by the Department of Transport in 1988	Year 0 – 24 – after receipt of all relevant authorisations
	Operation and Decommissioning and Closure		All vehicles transporting coal should be covered to avoid the generation of dust created by fine coal particulates.	Not Applicable	Year 1 – 35 - concurrent rehabilitation is proposed
	Operation		In the event that the accident involves another vehicle the relevant authorities are to be notified of the incident and responsive action implemented based on legal and insurance requirements.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		The speed limit on the road surrounding the mining area should be lowered from 120km/h to 60km/h.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Operation		Clear signage should be used to clearly indicate the rules of the road.	Southern African Development Community Road Traffic Signs Manual, issued by the Department of Transport (1998)	Year 1 – 24 – after completion of construction phase
	Operation		The roads should be upgraded and lengthened to improve the shoulder sight distance for operational vehicles.	Geometric Design of Rural Roads technical guidelines, document TRH17 published by the Department of Transport in 1988	Year 1 – 24 – after completion of construction phase

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	Operation		Operational vehicles must only use the roads during daylight hours. No vehicles should be operational from 6pm to 6am.	Not Applicable	Year 1 – 24 – after completion of construction phase
	Decommissioning and Closure		Haul routes should be sprayed with water regularly to avoid the generation of dust.	National Ambient Air Quality Standards and SANS Dust Fallout limits	Year 1 – 35 – concurrent rehabilitation is proposed
	Decommissioning and Closure		All decommissioning vehicles should abide by speed limits to reduce excessive generation of dust.	Southern African Development Community Road Traffic Signs Manual, issued by the Department of Transport (1998)	Year 1 – 35 – concurrent rehabilitation is proposed

e) Impact Management Outcomes

(A description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph ();

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
whether listed or not listed. **(E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.)**	**(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc….etc…)**		In which impact is anticipated **(e.g. Construction, commissioning, operational Decommissioning, closure, post- closure)**	**(modify, remedy, control, or stop) through (e.g. noise control measures, storm- water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc)** **E.g.** • **Modify through alternative method.** • **Control through noise control** • **Control through management and** • **Monitoring**	**(Impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives)** **etc.**

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE • **Remedy through rehabilitation..**	STANDARD TO BE ACHIEVED
The activities most relevant to the construction phase include: • Topsoil stripping and stockpiling; • Haul road construction; • Upgrading of the D1433; • Construction of the surface infrastructure including the coal processing plant, buildings and offices, perimeter fence and sewage plant; • Establishment of the coal discard facility; • Installation of water and power supply infrastructure including stomr water control infrastructure; and • Construction of the clean and dirty water system, including 2 pollution control dams	The development of the construction infrastructure (building structures, access roads, fencing, etc.)	Topography	Construction	Control through design measures	Impact minimised / avoided
	Disturbance of natural lie of the land resulting from site clearing and topsoil removal	Topography	Construction	Control through design measures Remedy through Rehabilitation	Impact minimised / avoided
	Disturbance of natural/ or existing flow of topography and the free drainage of the area resulting from surface infrastructure.	Topography	Construction	Control through design measures Remedy through Rehabilitation	Impact minimised / avoided
	Stripping of topsoil at the initial box cut footprint	Soil, Land Capability and Land use	Construction	Control through Management and Monitoring Remedy through Rehabilitation	Impact minimised / avoided
	Possible contamination of soil by spillages of fuel or oil by mechanical means	Soil, Land Capability and Land use	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Construction of topsoil, soft and hard overburden stockpiles during initial box cuts	Soil, Land Capability and Land use	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Construction of haul roads	Soil, Land Capability and Land use	Construction	Control through design	Impact minimised / avoided
	Construction of access roads and diversion of existing access road	Soil, Land Capability and Land use	Construction	Control through design	Impact minimised / avoided
	Construction of Pollution control dam	Soil, Land Capability and Land use	Construction	Control through design	Impact minimised / avoided

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	Construction of office workshop complex including offices, heavy vehicle workshop, stores, vehicle parking areas	Soil, Land Capability and Land use	Construction	Control through design	Impact minimised / avoided
	Impacts on Habitat for Floral Species	Flora	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Impacts on Floral Diversity	Flora	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Impacts on Floral Species of Conservational Concern	Flora	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Impact on faunal habitat and ecological structure	Fauna	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Impact on faunal diversity and ecological integrity	Fauna	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Impact on faunal species of conservational concern	Fauna	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Impacts on water quality	Aquatic Ecology	Construction	Control through Management and Monitoring	Impact minimised / avoided Water Quality Standards
	Impacts on loss of aquatic habitat	Aquatic Ecology	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Impacts on loss of aquatic biodiversity and sensitive taxa	Aquatic Ecology	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Impacts on loss of instream flow	Aquatic Ecology	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Siltation due to soil disturbance	Surface Water	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Erosion due to rerouting of storm water runoff	Surface Water	Construction	Control through Management, monitoring and design	Impact minimised / avoided
	Water quality deterioration	Surface Water	Construction	Control through Management and	Impact minimised / avoided

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	due to Spill and /or leaking of hydrocarbon product from construction vehicles, equipment's, and storage			Monitoring	Water Quality Standards
	Water quality deterioration due to seepage from construction waste site to the surface water resource	Surface Water	Construction	Control through Management and Monitoring	Impact minimised / avoided Water Quality Standards
	Loss of wetland habitat and ecological structure	Wetlands	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Changes to wetland ecological and sociocultural service provision	Wetlands	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Impact on wetland hydrological function	Wetlands	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Decreasing of the soils buffering capacity and increasing of infiltration rates	Groundwater	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Altered Flow systems due to probable dewatering (if required)	Groundwater	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Deterioration of water quality due to construction waste (Chemical in construction material)	Groundwater	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Deterioration of water quality due to hydrocarbon spills from storage (organic contaminants)	Groundwater	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Groundwater contamination due to groundwater seeps	Groundwater	Construction	Control through Management and Monitoring	Impact minimised / avoided

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	standing in the construction's footprint area.				
	Impact due to the generation of particulate matter (dust)	Air Quality	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Impact due to the generation of gases	Air Quality	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Construction of the Opencast Pit	Noise	Construction	Control through design	Impact minimised / avoided
	Construction noise and its effect on livestock	Noise	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Movement of Construction Vehicles	Visual Aspects	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Visual impacts of construction on visual receptors in close proximity to the proposed mine	Visual Aspects	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Employment opportunities for local labour resulting from the construction phase.	Socio-Economic	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Increased health and safety issues resulting from noise emissions, dust emissions and trucks using the roads during the construction phase.	Socio-Economic	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Unmanaged contractors might cause an increase in influx of job seekers and the establishment of informal settlements	Socio-Economic	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Construction and closure activities could contribute	Socio-Economic	Construction	Control through Management and	Impact minimised / avoided

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	to social ills, such as HIV/ AIDS, petty crime, stock theft, etc.			Monitoring	
	The presence of non-residents, perceived “outsiders” and contractors within the local environment could cause localised social tension	Socio-Economic	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Growth in skills development resulting from the employment of unskilled labour from nearby communities	Socio-Economic	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Opportunities for entrepreneurial development as a result of the construction activities.	Socio-Economic	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Traffic generation around the site	Traffic	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Creation of dust as a result of the movement of construction vehicles	Traffic	Construction	Control through Management and Monitoring	Impact minimised / avoided Dust levels
	Operation of vehicles may impact pedestrian safety	Traffic	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Construction vehicles may result in an increase in road accidents	Traffic	Construction	Control through Management and Monitoring	Impact minimised / avoided
	Increase in traffic could result in the deterioration of the surrounding road network.	Traffic	Construction	Control through Management and Monitoring	Impact minimised / avoided
The operational phase includes the daily activities associated with the	Permanent loss of a natural, non-renewable resource and associated	Geology	Operational	Unable to mitigate	Impact minimised / avoided

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
extraction of coal from the open cast pit. The activities most relevant to this phase include: • Excavation and blasting, as well as overburden stockpiling; • Coal removal, transport and processing; • Coal storage; • Utilisation of vehicles, equipment and machinery; and Concurrent rehabilitation including, initial backfilling, levelling and placement of topsoil, fertiliser, vegetation and maintenance	geology				
	The development of the pit will result in the altering of the topography in this area	Topography	Operational	Control through design Remedy through Rehabilitation	Impact minimised / avoided
	The development of the pit will impact on the surface water flow dynamics	Topography	Operational	Control through design Remedy through Rehabilitation	Impact minimised / avoided
	Infrastructure that is utilised on the site will alter the topography and surface water flow of the area	Topography	Operational	Control through design Remedy through Rehabilitation	Impact minimised / avoided
	Deterioration of clean storm water runoff quality	Surface Water	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Increasing of water removal activities due to in pit dewatering	Surface Water	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Ponding due to storm water falling onto operating (mining pit, crushing and screening, stockpiling) areas	Surface Water	Operational	Control through Management, monitoring and design	Impact minimised / avoided
	Erosion due to surface water runoff rerouting	Surface Water	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Siltation due to surface water runoff rerouting	Surface Water	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Water quality deterioration due spill and/or leaking of hydrocarbon	Surface Water	Operational	Control through Management and Monitoring	Impact minimised / avoided Water Quality Standards
	Water quality deterioration due to septic tank	Surface Water	Operational	Control through Management, monitoring and design	Impact minimised / avoided Water Quality Standards
	Water quality deterioration due to seepage from waste disposal facility to the	Surface Water	Operational	Control through Management, monitoring and design	Impact minimised / avoided Water Quality Standards

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	surface water resource				
	Water quality deterioration due to spillage, seepage and/or leak from waste disposal, storage, handling facility to surface water	Surface Water	Operational	Control through Management, monitoring and design	Impact minimised / avoided Water Quality Standards
	Water quality deterioration due to Spillage of dirty water from dirty water control system (Dams, trenches, berms etc)	Surface Water	Operational	Control through Management, monitoring and design	Impact minimised / avoided Water Quality Standards
	Drop of groundwater levels due to open pit dewatering	Groundwater	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Deterioration of groundwater quality due to rock dumps.	Groundwater	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Deterioration of groundwater quality due to open pit mining.	Groundwater	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Deterioration of groundwater quality due to coal processing	Groundwater	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Deterioration of groundwater quality due to tailings disposal	Groundwater	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Deterioration of groundwater quality due to leaks/spillages from dirty water quality dams and drain	Groundwater	Operational	Control through Management, monitoring and design	Impact minimised / avoided
	Deterioration of groundwater quality due to handling and transport of waste material.	Groundwater	Operational	Control through Management and Monitoring	Impact minimised / avoided

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	Progressive stripping of topsoil at opencast footprint and stockpiling thereof before direct replacing is initiated	Soil, Land Capability and Land use	Operational	Control through Management and Monitoring Remedy through Rehabilitation	Impact minimised / avoided Closure Objectives
	Expansion of topsoil, soft and hard overburden stockpiles during the operational phase as open pit expands	Soil, Land Capability and Land use	Operational	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Progressive stripping of topsoil at opencast footprint and direct replacing thereof	Soil, Land Capability and Land use	Operational	Control through Management and Monitoring Remedy through Rehabilitation	Impact minimised / avoided Closure Objectives
	Use of haul roads	Soil, Land Capability and Land use	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Use of pollution control dams	Soil, Land Capability and Land use	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Use of diesel, petroleum and oil storage on site	Soil, Land Capability and Land use	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Use of coal stockpiles and ROM tip	Soil, Land Capability and Land use	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Impacts on habitat for floral species	Flora	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Impacts on floral diversity	Flora	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Impact on floral species of conservational concern	Flora	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Impact on faunal habitat and ecological structure	Fauna	Operational	Control through Management and Monitoring	Impact minimised / avoided

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	Impact on faunal diversity and ecological integrity	Fauna	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Impact on faunal species of conservational concern	Fauna	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Loss of wetland habitat and ecological structure	Wetlands	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Changes to wetland ecological and sociocultural service provision	Wetlands	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Impact on wetland hydrological function	Wetlands	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Impacts on water quality	Aquatic Ecology	Operational	Control through Management and Monitoring	Impact minimised / avoided Water Quality Standards
	Impacts on loss of aquatic habitat	Aquatic Ecology	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Impacts on loss of aquatic habitat	Aquatic Ecology	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Impacts on loss of instream flow	Aquatic Ecology	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Impact as a result of the increase in fugitive dust emissions	Air Quality	Operational	Control through Management and Monitoring	Impact minimised / avoided Dust levels
	Transport of Coal from the mine to the treatment plant	Noise	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Operational phase of the Opencast Pit	Noise	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Blasting for the operation of the Opencast Mine	Noise	Operational	Control through design	Impact minimised / avoided
	Vibration on Surrounding Structures	Noise	Operational	Control through design	Impact minimised / avoided

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	Operational Noise and its effect on Livestock	Noise	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Blast Noise and its effect on Livestock	Noise	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Effect of the areas in close proximity to the Operating Mine	Visual	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Effect of the mine on landscape characteristics	Visual	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Impact on Settlement and homesteads in close proximity to the proposed mine	Visual	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Mine's impact on the residents of settlements and homesteads within the region	Visual	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Visual impacts on users of major and secondary roads in close proximity to the proposed mine	Visual	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Visual impacts on users of major and secondary roads within the region.	Visual	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Visual impacts on recreational users, tourists and sightseers in close proximity to the proposed mine	Visual	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Visual impacts on users of major and secondary roads within the region.	Visual	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Visual impact of lighting at night on visual receptors in	Visual	Operational	Control through Management and Monitoring	Impact minimised / avoided

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	close proximity to the proposed mine.				
	The development of the mine will have a positive impact on the economic development	Socio-Economic	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Employment opportunities for local labour resulting from the operational phase.	Socio-Economic	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Increased health and safety issues resulting from noise emissions, dust emissions and trucks using the roads during the operational phase.	Socio-Economic	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Unmanaged contractors might cause an increase in influx of job seekers and the establishment of informal settlements	Socio-Economic	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Construction, operational and closure activities could contribute to social ills, such as HIV/ AIDS, petty crime, stock theft, etc.	Socio-Economic	Operational	Control through Management and Monitoring	Impact minimised / avoided
	The presence of non-residents, perceived “outsiders” and contractors within the local environment could cause localised social tension	Socio-Economic	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Growth in skills development resulting from the employment of unskilled labour from	Socio-Economic	Operational	Control through Management and Monitoring	Impact minimised / avoided

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	nearby communities				
	Opportunities for entrepreneurial development as a result of the operational activities.	Socio-Economic	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Ground vibration impact on houses	Blasting and Vibration	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Ground vibration impact on boreholes	Blasting and Vibration	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Ground vibration impact on roads	Blasting and Vibration	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Ground vibration impact on railways	Blasting and Vibration	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Air Blast impact on houses	Blasting and Vibration	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Air Blast impact on boreholes	Blasting and Vibration	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Air Blast impact on roads	Blasting and Vibration	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Fly Rock impact on houses	Blasting and Vibration	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Fly Rock impact on boreholes	Blasting and Vibration	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Fly Rock impact on roads	Blasting and Vibration	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Fly Rock impact on railways	Blasting and Vibration	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Impact of Fumes Houses	Blasting and Vibration	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Impact of Fumes - Boreholes	Blasting and Vibration	Operational	Control through Management and Monitoring	Impact minimised / avoided

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	Impact of Fumes - Roads	Blasting and Vibration	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Impact of Fumes - Railways	Blasting and Vibration	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Traffic generation around the site from transportation and operational vehicles	Traffic	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Creation of dust as a result of the movement of operational vehicles	Traffic	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Heavy vehicles may result in an increase in road accidents	Traffic	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Increase in traffic could result in the deterioration of paved and haul routes	Traffic	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Shoulder Sight Distance	Traffic	Operational	Control through Management and Monitoring	Impact minimised / avoided
	Operation of vehicles may impact pedestrian safety	Traffic	Operational	Control through Management and Monitoring	Impact minimised / avoided
The decommissioning and closure phase includes the activities associated with the removal/dismantling of machinery/equipment/infrastructure no long necessary to the operation. This phase also includes the implementation and completion of rehabilitation goals as well as the implementation of	Decommissioning and Closure of the pit	Topography	Decommissioning and Closure	Control through Management and Monitoring Remedy through Rehabilitation	Impact minimised / avoided Closure Objectives
	Decommissioning of surface infrastructure	Topography	Decommissioning and Closure	Control through Management and Monitoring Remedy through Rehabilitation	Impact minimised / avoided Closure Objectives
	Erosion due to increase of runoff speed and velocity	Surface Water	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Siltation related to erosion	Surface Water	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
agreed monitoring and maintenance prescribed for the cessation of operations. The activities most relevant to this phase include: • Dismantling surface infrastructure; • Rehabilitation of haul and access roads; • Rehabilitation of final void(s); • Monitoring and maintenance of ground and surface water; and • Monitoring and maintenance of rehabilitation areas, specifically in terms of land use and capability.	Deterioration of water quality due to spill and/or leaking from hydrocarbon storage area	Surface Water	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Deterioration of water quality due to seepage and/or spillage from waste site facility	Surface Water	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives Water Quality Standards
	Deterioration of the surface water quality due decanting water	Surface Water	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Flood risk due decant to surface	Surface Water	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Erosion due decant water runoff	Surface Water	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	During decommissioning handling of waste and transport of building material can cause various types of spills (domestic waste, sewage water, hydrocarbons) which can infiltrate and cause contamination of the groundwater system.	Groundwater	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Flooding and decanting of open pit	Groundwater	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Rehabilitation of remaining open pit and final voids	Soil, Land Capability and Land use	Decommissioning and Closure	Control through Management and Monitoring Remedy through Rehabilitation	Impact minimised / avoided Closure Objectives
	Demolishing and rehabilitation of the office	Soil, Land Capability and	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	workshop complex	Land use		Remedy through Rehabilitation	
	Impacts on habitat for floral species	Flora	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Impacts on floral diversity	Flora	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Impact on floral species of conservational concern	Flora	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Impact on faunal habitat and ecological structure	Fauna	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Impact on faunal diversity and ecological integrity	Fauna	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Impact on faunal species of conservational concern	Fauna	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Loss of wetland habitat and ecological structure	Wetlands	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Changes to wetland ecological and sociocultural service provision	Wetlands	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Impact on wetland hydrological function	Wetlands	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Impacts on water quality	Aquatic Ecology	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives Water Quality Standards
	Impacts on loss of aquatic habitat	Aquatic Ecology	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	Impacts on loss of aquatic habitat	Aquatic Ecology	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Impacts on loss of instream flow	Aquatic Ecology	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Impacts created as a result of the generation of TSP and PM10	Air Quality	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Impact due to the generation of gases	Air Quality	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Decommissioning of the Opencast Pit	Noise	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Employment opportunities for local labour resulting from the decommissioning phase.	Socio-Economic	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Increased health and safety issues resulting from noise emissions, dust emissions and trucks using the roads during the decommissioning phase.	Socio-Economic	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Construction and closure activities could contribute to social ills, such as HIV/ AIDS, petty crime, stock theft, etc.	Socio-Economic	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Growth in skills development resulting from the employment of unskilled labour from nearby communities	Socio-Economic	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives
	Opportunities for	Socio-Economic	Decommissioning and	Control through Management and	Impact minimised / avoided

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	entrepreneurial development as a result of the decommissioning activities.		Closure	Monitoring	Closure Objectives
	Creation of dust as a result of the movement of decommissioning vehicles	Traffic	Decommissioning and Closure	Control through Management and Monitoring	Impact minimised / avoided Closure Objectives

f) Impact Management Actions

(A description of impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (c) and (d) will be achieved).

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
whether listed or not listed. **(E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.)**	**(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc….etc…)**	**(modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc)** **E.g.** • **Modify through alternative method.** • **Control through noise control** • **Control through management and monitoring** • **Remedy through rehabilitation..**	Describe the time period when the measures in the environmental management programme must be implemented Measures must be implemented when required. With regard to Rehabilitation specifically this must take place at the earliest opportunity. .With regard to Rehabilitation, therefore state either:-.. Upon cessation of the individual activity or. Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.	(A description of how each of the recommendations in 2.11.6 read with 2.12 and 2.15.2 herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)
The activities most relevant to the construction phase include:	The development of the construction infrastructure (building structures, access roads, fencing, etc.)	Control through design measures	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
• Topsoil stripping and stockpiling; • Haul road construction; • Upgrading of the D1433; • Construction of the surface infrastructure including the coal processing plant, buildings and offices, perimeter fence and sewage plant; • Establishment of the coal discard facility; • Installation of water and power supply infrastructure including stomr water control infrastructure; and • Construction of the clean and dirty water system, including 2 pollution control dams	Disturbance of natural lie of the land resulting from site clearing and topsoil removal	Control through design measures	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Disturbance of natural/ or existing flow of topography and the free drainage of the area resulting from surface infrastructure.	Control through design measures	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Stripping of topsoil at the initial box cut footprint	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Possible contamination of soil by spillages of fuel or oil by mechanical means	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Construction of topsoil, soft and hard overburden stockpiles during initial box cuts	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Construction of haul roads	Control through design	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Construction of access roads and diversion of existing access road	Control through design	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Construction of Pollution control dam	Control through design	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Construction of office workshop complex including offices, heavy vehicle workshop, stores, vehicle parking areas	Control through design	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Impacts on Habitat for Floral Species	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Impacts on Floral Diversity	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
	Impacts on Floral Species of Conservational Concern	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Impact on faunal habitat and ecological structure	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Impact on faunal diversity and ecological integrity	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Impact on faunal species of conservational concern	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Impacts on water quality	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Impacts on loss of aquatic habitat	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Impacts on loss of aquatic biodiversity and sensitive taxa	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Impacts on loss of instream flow	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Siltation due to soil disturbance	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Erosion due to rerouting of storm water runoff	Control through Management, monitoring and design	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Water quality deterioration due to Spill and /or leaking of hydrocarbon product from construction vehicles, equipment's, and storage	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Water quality deterioration due to seepage from construction waste site to the surface water resource	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Loss of wetland habitat and ecological structure	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
	Changes to wetland ecological and sociocultural service provision	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Impact on wetland hydrological function	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Decreasing of the soils buffering capacity and increasing of infiltration rates	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Altered Flow systems due to probable dewatering (if required)	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Deterioration of water quality due to construction waste (Chemical in construction material)	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Deterioration of water quality due to hydrocarbon spills from storage (organic contaminants)	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Groundwater contamination due to groundwater seeps standing in the construction's footprint area.	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Impact due to the generation of particulate matter (dust)	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	National Ambient Air Quality Standards and SANS Dust Fallout limits
	Impact due to the generation of gases	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	National Ambient Air Quality Standards
	Construction of the Opencast Pit	Control through design	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Construction noise and its effect on livestock	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Noise Control Regulations in Terms of Section 25 of the Environmental Conservation Act, 1989

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
				Relevant noise standards in terms of SANS
	Movement of Construction Vehicles	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Visual impacts of construction on visual receptors in close proximity to the proposed mine	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Employment opportunities for local labour resulting from the construction phase.	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Increased health and safety issues resulting from noise emissions, dust emissions and trucks using the roads during the construction phase.	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	National Ambient Air Quality Standards and SANS Dust Fallout limits Noise Control Regulations in Terms of Section 25 of the Environmental Conservation Act, 1989 Relevant noise standards in terms of SANS
	Unmanaged contractors might cause an increase in influx of job seekers and the establishment of informal settlements	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Construction and closure activities could contribute to social ills, such as HIV/ AIDS, petty crime, stock theft, etc.	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	The presence of non-residents, perceived “outsiders” and contractors within the local environment could cause localised social	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
	tension			
	Growth in skills development resulting from the employment of unskilled labour from nearby communities	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Opportunities for entrepreneurial development as a result of the construction activities.	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Traffic generation around the site	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Creation of dust as a result of the movement of construction vehicles	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	National Ambient Air Quality Standards and SANS Dust Fallout limits
	Operation of vehicles may impact pedestrian safety	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Construction vehicles may result in an increase in road accidents	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
	Increase in traffic could result in the deterioration of the surrounding road network.	Control through Management and Monitoring	Year 0 – 1 – after receipt of all relevant authorisations	Not Applicable
The operational phase includes the daily activities associated with the extraction of coal from the open cast pit. The activities most relevant to this phase include: • Excavation and blasting, as well as overburden	Permanent loss of a natural, non-renewable resource and associated geology	Unable to mitigate	Year 1 – 24 – after completion of construction phase	Not Applicable
	The development of the pit will result in the altering of the topography in this area	Control through design	Year 1 – 24 – after completion of construction phase	Not Applicable
	The development of the pit will impact on the surface water flow dynamics	Control through design	Year 1 – 24 – after completion of construction phase	Not Applicable

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
stockpiling; • Coal removal, transport and processing; • Coal storage; • Utilisation of vehicles, equipment and machinery; and Concurrent rehabilitation including, initial backfilling, levelling and placement of topsoil, fertiliser, vegetation and maintenance	Infrastructure that is utilised on the site will alter the topography and surface water flow of the area	Control through design	Year 1 – 24 – after completion of construction phase	Not Applicable
	Deterioration of clean storm water runoff quality	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Increasing of water removal activities due to in pit dewatering	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Ponding due to storm water falling onto operating (mining pit, crushing and screening, stockpiling) areas	Control through Management, monitoring and design	Year 1 – 24 – after completion of construction phase	Not Applicable
	Erosion due to surface water runoff rerouting	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Siltation due to surface water runoff rerouting	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Water quality deterioration due spill and/or leaking of hydrocarbon	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Water quality deterioration due to septic tank	Control through Management, monitoring and design	Year 1 – 24 – after completion of construction phase	Not Applicable
	Water quality deterioration due to seepage from waste disposal facility to the surface water resource	Control through Management, monitoring and design	Year 1 – 24 – after completion of construction phase	Not Applicable
	Water quality deterioration due to spillage, seepage and/or leak from waste disposal, storage, handling facility to surface water	Control through Management, monitoring and design	Year 1 – 24 – after completion of construction phase	Not Applicable
	Water quality deterioration due to Spillage of dirty water	Control through Management, monitoring and design	Year 1 – 24 – after completion of construction phase	Not Applicable

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
	from dirty water control system (Dams, trenches, berms etc)			
	Drop of groundwater levels due to open pit dewatering	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Deterioration of groundwater quality due to rock dumps.	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Deterioration of groundwater quality due to open pit mining.	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Deterioration of groundwater quality due to coal processing	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Deterioration of groundwater quality due to tailings disposal	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Deterioration of groundwater quality due to leaks/spillages from dirty water quality dams and drain	Control through Management, monitoring and design	Year 1 – 24 – after completion of construction phase	Not Applicable
	Deterioration of groundwater quality due to handling and transport of waste material.	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Progressive stripping of topsoil at opencast footprint and stockpiling thereof before direct replacing is initiated	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Expansion of topsoil, soft and hard overburden stockpiles during the operational phase as open pit expands	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Progressive stripping of topsoil at opencast footprint and direct replacing thereof	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Use of haul roads	Control through Management and	Year 1 – 24 – after completion of	National Ambient Air Quality Standards and SANS Dust Fallout

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
		Monitoring	construction phase	limits
	Use of pollution control dams	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Use of diesel, petroleum and oil storage on site	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Use of coal stockpiles and ROM tip	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Impacts on habitat for floral species	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Impacts on floral diversity	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Impact on floral species of conservational concern	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Impact on faunal habitat and ecological structure	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Impact on faunal diversity and ecological integrity	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Impact on faunal species of conservational concern	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Loss of wetland habitat and ecological structure	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Changes to wetland ecological and sociocultural service provision	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Impact on wetland hydrological function	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Impacts on water quality	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Impacts on loss of aquatic habitat	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
	Impacts on loss of aquatic habitat	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Impacts on loss of instream flow	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Impact as a result of the increase in fugitive dust emissions	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	National Ambient Air Quality Standards and SANS Dust Fallout limits
	Transport of Coal from the mine to the treatment plant	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Operational phase of the Opencast Pit	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Blasting for the operation of the Opencast Mine	Control through design	Year 1 – 24 – after completion of construction phase	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast
	Vibration on Surrounding Structures	Control through design	Year 1 – 24 – after completion of construction phase	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast
	Operational Noise and its effect on Livestock	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Noise Control Regulations in Terms of Section 25 of the Environmental Conservation Act, 1989 Relevant noise standards in terms of SANS
	Blast Noise and its effect on Livestock	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast
	Effect of the areas in close proximity to the Operating Mine	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
	Effect of the mine on landscape characteristics	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Impact on Settlement and homesteads in close proximity to the proposed mine	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Noise Control Regulations in Terms of Section 25 of the Environmental Conservation Act, 1989 Relevant noise standards in terms of SANS
	Mine's impact on the residents of settlements and homesteads within the region	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Visual impacts on users of major and secondary roads in close proximity to the proposed mine	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Visual impacts on users of major and secondary roads within the region.	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Visual impacts on recreational users, tourists and sightseers in close proximity to the proposed mine	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Visual impacts on users of major and secondary roads within the region.	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Visual impact of lighting at night on visual receptors in close proximity to the proposed mine.	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	The development of the mine will have a positive impact on the economic development	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Employment opportunities for local labour resulting from the	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
	operational phase.			
	Increased health and safety issues resulting from noise emissions, dust emissions and trucks using the roads during the operational phase.	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	National Ambient Air Quality Standards and SANS Dust Fallout limits Noise Control Regulations in Terms of Section 25 of the Environmental Conservation Act, 1989 Relevant noise standards in terms of SANS
	Unmanaged contractors might cause an increase in influx of job seekers and the establishment of informal settlements	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Construction, operational and closure activities could contribute to social ills, such as HIV/ AIDS, petty crime, stock theft, etc.	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	The presence of non-residents, perceived “outsiders” and contractors within the local environment could cause localised social tension	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Growth in skills development resulting from the employment of unskilled labour from nearby communities	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Opportunities for entrepreneurial development as a result of the operational activities.	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
	Ground vibration impact on houses	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast
	Ground vibration impact on boreholes	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast
	Ground vibration impact on roads	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast
	Ground vibration impact on railways	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast
	Air Blast impact on houses	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast
	Air Blast impact on boreholes	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast
	Air Blast impact on roads	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast
	Fly Rock impact on houses	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast
	Fly Rock impact on boreholes	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
				recommendations on air blast
	Fly Rock impact on roads	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast
	Fly Rock impact on railways	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast
	Impact of Fumes Houses	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast
	Impact of Fumes - Boreholes	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast
	Impact of Fumes - Roads	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast
	Impact of Fumes - Railways	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast
	Traffic generation around the site from transportation and operational vehicles	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Creation of dust as a result of the movement of operational vehicles	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	National Ambient Air Quality Standards and SANS Dust Fallout limits
	Heavy vehicles may result in an increase in road accidents	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
	Increase in traffic could result in the deterioration of paved and haul routes	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Shoulder Sight Distance	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
	Operation of vehicles may impact pedestrian safety	Control through Management and Monitoring	Year 1 – 24 – after completion of construction phase	Not Applicable
The decommissioning and closure phase includes the activities associated with the removal/dismantling of machinery/equipment/infrastructure no long necessary to the operation. This phase also includes the implementation and completion of rehabilitation goals as well as the implementation of agreed monitoring and maintenance prescribed for the cessation of operations. The activities most relevant to this phase include: • Dismantling surface infrastructure; • Rehabilitation of haul and access roads; • Rehabilitation of final void(s); • Monitoring and maintenance of ground	Decommissioning and Closure of the pit	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Decommissioning of surface infrastructure	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Erosion due to increase of runoff speed and velocity	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Siltation related to erosion	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Deterioration of water quality due to spill and/or leaking from hydrocarbon storage area	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Deterioration of water quality due to seepage and/or spillage from waste site facility	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Deterioration of the surface water quality due decanting water	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Flood risk due decant to surface	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Erosion due decant water runoff	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	During decommissioning handling of waste and	Control through Management and	Year 1 – 35 – concurrent rehabilitation	Not Applicable

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
and surface water; and • Monitoring and maintenance of rehabilitation areas, specifically in terms of land use and capability.	transport of building material can cause various types of spills (domestic waste, sewage water, hydrocarbons) which can infiltrate and cause contamination of the groundwater system.	Monitoring	is proposed	
	Flooding and decanting of open pit	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Rehabilitation of remaining open pit and final voids	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Demolishing and rehabilitation of the office workshop complex	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Impacts on habitat for floral species	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Impacts on floral diversity	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Impact on floral species of conservational concern	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Impact on faunal habitat and ecological structure	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Impact on faunal diversity and ecological integrity	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Impact on faunal species of conservational concern	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Loss of wetland habitat and ecological structure	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Changes to wetland ecological and sociocultural service provision	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
	Impact on wetland hydrological function	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Impacts on water quality	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Impacts on loss of aquatic habitat	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Impacts on loss of aquatic habitat	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Impacts on loss of instream flow	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Impacts created as a result of the generation of TSP and PM10	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	National Ambient Air Quality Standards and SANS Dust Fallout limits
	Impact due to the generation of gases	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	National Ambient Air Quality Standards
	Decommissioning of the Opencast Pit	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Employment opportunities for local labour resulting from the decommissioning phase.	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Increased health and safety issues resulting from noise emissions, dust emissions and trucks using the roads during the decommissioning phase.	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Construction and closure activities could contribute to social ills, such as HIV/ AIDS, petty crime, stock theft, etc.	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Growth in skills development resulting from the employment of unskilled	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
	labour from nearby communities			
	Opportunities for entrepreneurial development as a result of the decommissioning activities.	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable
	Creation of dust as a result of the movement of decommissioning vehicles	Control through Management and Monitoring	Year 1 – 35 – concurrent rehabilitation is proposed	Not Applicable

i) Financial Provision

(1) Determination of the amount of Financial Provision.

(a) Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under Regulation 22 (2) (d) as described in 2.4 herein.

This closure and rehabilitation plan applies to the rehabilitation, decommissioning and closure of the mine workings, mine infrastructure and residue deposits. Recommendations and commitments relating to closure have been included based on the Project Plan based on information available at this time. It expected that the closure and rehabilitation plan will be updated to reflect the final project design and will be reviewed and revised as the mine develops and issues are identified and mitigated in the course of operations.

It is envisaged that mining activities will eventually cease when the finite coal resource is exhausted and the life of mine is estimated to be currently twenty years, depending on rates of production and future exploration drilling within the prospecting right area. However, activities may cease prematurely when costs associated with mining become unprofitable. Premature closure or temporary mothballing thus needs to be considered within the closure planning and flexibility needs to be provided for in the closure and rehabilitation plan.

Pre-mining Environment

The majority of the study area, 95.14% (614.69ha), consists of well-drained, red and yellow brown, loamy sand to sandy clay loam soils with arable land capability and high agricultural potential. Rainfall occurs in the summer months (October to March) with a monthly rain average of 72mm recorded. 83.61% of the pre-mining land use of the surveyed area is currently utilised for forestry (*Eucalyptus* trees), 9.94% for cultivation (soybeans) and 6.45% are vacant spots where forestry or cultivation could not take place due to wetland areas.

Given this, the rehabilitation strategy will be to establish a post closure land capability of arable and grazing land uses, with post closure land use being limited by the health and safety aspects associated with mine residue dumps.

Developing a Sustainable Rehabilitation Strategy

In providing guidance on a rehabilitation strategy for the Proposed Project’s facilities, we have to consider the interrelated aspects of legal, financial and technical elements in order to inform the best practical environmental option which complies with RMC’s policy objectives.

Vision and Objectives for Mine Closure

The approach to mine rehabilitation master planning should be consistent with the vision, objectives and company philosophy, and should follow the same general concepts as applied in the site closure planning for other forms of company assets in the mining and industrial sector. Basic objectives for closure are:

- To develop landforms and land uses that are stable, sustainable and aesthetically acceptable on closure;
- To achieve agreed quality targets set by stakeholders as far as practical relative to impacts and reasonability to achieve; and
- A policy objective regarding mine closure is to leave self-sufficient communities after mine closure with appropriate infrastructure, skilled people and rehabilitated land.

Closure Objectives

The overall closure objective is within ten years to return the area disturbed by mining operations, as closely as is practicable, to its pre-mining state. Also of critical importance is to stabilise the affected area by landscaping and re-vegetating the disturbed area to the pre-mining landscape and cover. The surface is planned to have a post closure land capability of arable and grazing potential consistent with its present use. Management of surface and groundwater aims at ensuring that the mine does not have an unacceptably negative impact on the receiving environment or on the affected groundwater aquifer.

Closure Target Outcomes and Goals

The target outcomes and goals of the closure and rehabilitation plan are as follows:

- **Target 1: Health and Safety**
  - Rehabilitation of the opencast pit to produce a safe and stable landform;
  - Monitor coal discard facilities with respect to spontaneous combustion; and.
  - Monitor voids and stabilise areas that may give rise to ground subsidence in such a way that lives will not be endangered and environmental impacts are minimised.
- **Target 2: Impacts on Natural Environment**
  - Re-establish topography to emulate pre-existing condition, and ensure free drainage where possible;
  - Re-establish soil overburden to emulate pre-existing condition to favour development of natural drain-age condition;
  - Create topsoil layer to favour re-vegetation with grasses suitable for pre-existing land use;
  - Removal of alien species to enhance natural biodiversity and reduce possibility of infestation;
  - Protect and maintain remaining wetland systems;
  - Restrict grazing areas to protect and enhance remaining wetland systems; and
  - Reduce and monitor impacts associated with acid mine drainage and other forms of contaminated seepage from residue deposits.
- **Target 3: Social Impacts**
  - Manage the retrenchment of employees and the cessation of procurement contracts in such a way so as to avoid or minimise potential negative impacts of closure; and.
  - Minimise impacts on local community by re-establishing pre-mining condition of viable agricultural land use.
- **Target 4: Reputational Risk**
  - Achieve sustainable closure outcomes compatible with company policy on sustainable development and in compliance with all legal requirements.
- **Target 5: Legal risk**
  - Comply with all applicable legislation and the terms and conditions of all regulatory permits, licences and environmental authorisations.
- **Target 6: Financial Risk**
  - Develop and maintain accurate financial provisions for implementation of closure and rehabilitation works and for short medium and long term maintenance and monitoring.

The above list represents the overarching targets RMC wishes to achieve following the completion of the twenty year mining activities at the Proposed Project. These targets are supported by a set of Closure Goals which have been drawn out of the predicted impacts associated with the proposed mining activity. The Closure Goals represent RMC's commitment to the rehabilitation of the mining area and have been developed with a related management indicator to ensure the Goals are suitability met. **Table 93** below presents a summary of the site features which warrant protection, how this can be protected or enhanced, the related Closure Goal and the management indicator.

Table 93: Summary of Site Features which warrants Protection together with the related Closure Goals

Site Features	What must be protected	What can be enhanced	Closure Goals	Management Indicator
Land tenure	Property rights	Rehabilitation to agricultural pasture and forestry	Sale of property for agricultural use.	Successful property transfer on completion of rehabilitation.
Land use	Economic value of agricultural land	Rehabilitation to agricultural pasture and forestry	▪ Total area of site that remains after areas not designated for conservation around the wetlands have been defined. ▪ Support one large stock unit per ten hectares per annum.	Grazing production records.
Land Capability	Remaining Wetland systems to pre-mining status	A land capability that can sustain a controlled grazing programme.	Rehabilitation to emulate pre-existing condition. Re-vegetation with indigenous grasses and re-establishment of surface drainage patterns to support remaining wetlands.	▪ Adequate vegetative cover and production. ▪ Audits on remaining wetland systems
Landform	To emulate pre-mining landform	Stability of landforms.	▪ The stability of the rehabilitated area will be monitored during the decommissioning phase. ▪ Criteria will include: localised settling, subsidence and erosion. ▪ The man-made catchments landscaped for a free-draining objective during the rehabilitation of the land surface after mining, will be given optimal slopes for surface water runoff and will be monitored for erosion. If erosion, subsidence or settling occurs it will be repaired timeously. ▪ The disturbed area will be rehabilitated in order to minimise erosion and dust production. ▪ All areas will be landscaped before being top soiled.	Monitoring of physical stability
Vegetation	Grassland vegetation to be re-instated	Indigenous grassland	A vegetation cover of a minimum of five species with a 50% "ground cover" rate with no visible erosion.	The grass will be monitored during the maintenance phase to determine soil fertility, grass cover, erosion and the need for modification of the rehabilitation

Site Features	What must be protected	What can be enhanced	Closure Goals	Management Indicator
				programme to increase species mix and bio-diversity.
Mine Infrastructure		Opportunities for re-use of structures and materials.	▪ The infrastructure not required for post-mining land use will be removed from site. That remaining will be subject to a binding, contractual obligation to take over and maintain the commitments. ▪ Disused roads will be rehabilitated by ripping, topsoiling and re-vegetation. ▪ Pollution control dams no longer required will be breached and rehabilitated when the water qualities are such that the water can be released. ▪ Other un-required structures, including berms, haul roads and stockpile areas will all be removed and rehabilitated. All the temporary facilities, including caravans, ablutions and workshops will be removed from the site.	
Transport network	Existing external arterial road links.		Maintenance and repair of any roads and bulk infrastructure impacted by mine operations.	Visual inspections of road surfaces
Hydrology	▪ Surface water inflows to support remaining wetland systems ▪ Prevention of surface water pollution from residual contamination from mining workings and spoil		▪ Prevention and remediation of impacts of acid mine drainage on surface water quality. ▪ Once rehabilitation has been completed and the topography has been landscaped to the levels envisaged in the rehabilitation programme, the rainfall run-off would then flow along the drainage patterns landscaped to ensure free drainage from the site. ▪ The re-vegetation of the area will minimise soil erosion and restore pre-mining infiltration rates.	Surface water monitoring programme
Hydrogeology	▪ Borehole yields, groundwater levels and water quality		▪ Monitor groundwater levels to observe predicted rebound of water table. ▪ Re-establish groundwater	▪ Groundwater quality. ▪ Ground water rest levels.

Site Features	What must be protected	What can be enhanced	Closure Goals	Management Indicator
	of existing domestic supply wells. ▪ The mine will ensure that private water users, if affected by mine dewatering, have a reliable alternative source of water. ▪ Groundwater baseflow volumes to wetland systems. ▪ Groundwater baseflow quality influencing surface water quality		flow paths. Monitor groundwater flows. ▪ Monitor groundwater and surface water quality and intervene where necessary to prevent unacceptable impacts on surface water quality.	
Culture and heritage	Grave sites	Improve condition, remove invasive vegetation, repair and maintain fences.	Maintain access and security of grave sites.	
Employment Rates and patterns	Mine will secure jobs and livelihoods of communities supported by the workforce of the mine.	Opportunities for training and temporary employment.	Implement Social and Labour plan. Short life of mine creates limited dependency of employees and contracted services and suppliers.	Social and Labour Plan – audits.
Biodiversity	Protection of remaining wetland systems and associated buffer zones.	Development of long term wetland management and conservation plan.	▪ Preservation and protection of diverse grassland/wetland habitat. ▪ No long term loss of biodiversity.	Annual wet season audits by expert in wetland ecology.

(b) Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties.

Refer to the public participation process outlined in Section 3(g)(ii).

(c) Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main mining activities, including the anticipated mining area at the time of closure.

General Approach to Rehabilitation

The general approach to rehabilitation is given in the EMPR document and is summarised below.

- Topsoil shall be regarded as the uppermost 500 mm of the soil profile from areas not designated as wetland or wetland buffer zones. The topsoil should be stripped to stockpile from pit areas and from areas where temporary stockpiles, dumps and mine infrastructure will be established.
- Wet soil material should not be mixed with dry soil material, but should be selectively stockpiled if encountered. Soil material containing the existing seedbank of the site should be selectively stripped and used as the top dressing material for visual and pollution control temporary berms and then re-utilised as the topsoiling layer for final rehabilitation and re-vegetation.
- Topsoil material will be utilised to construct the berms where needed, or will be stockpiled in a designated area. This material will be placed back on top of the back filled voids during rehabilitation. Topsoil must be stripped to a minimum depth of 500 mm. Topsoil stockpiles should be formed as to avoid excessive heights. Where topsoil piles exceed 1.5 m in height there is excessive densification of the lower layers which can lead to anaerobic conditions. Topsoil should be either be vegetated or re-used as soon as possible after stripping to minimise propagule death.
- The coal discard material consists of reject coal from the beneficiation process that is of inferior grade for sale as thermal coal and may contain fragments of sandstone and shale. The discard material will be disposed of on a lined discard facility. When mining operations have ceased the discard facility will be capped and vegetated.
- The capping material will be placed above the discard in layers not exceeding 300 mm in thickness and compacted to a density of at least 90% Mod AASHTO where after a layer of topsoil will be added and revegetated.
- Topsoil will be lightly compacted to a field density sufficient to prevent erosion and the uppermost layer will be seeded with an appropriate mix of commercially available indigenous grass seeds to supplement the remaining seedbank and achieve an agriculturally viable pasture. Use of manually harvesting natural seed is to be encouraged and should commence on the onset of mining depending on the season. The choice of grasses will be influenced by seasonal influences depending on exact timing of re-seeding and the immediate and long term requirement of livestock farming and any specific biodiversity goals to be determined for the site.
- While the ultimate goal should be to have indigenous, hardy, palatable, perennial grass species capable of growing under conditions of low soil fertility, such species are generally commercially unavailable and less easy to establish on disturbed sites. It is thus preferable to make use of commercial species to help the site to become stable. The objective is to establish a variety of species that will produce cover at a variety of growth forms and which would occur over as much of the growing season as possible.
- Highveld grasslands are difficult to re-establish as species available for planting may be limited, this can lead to the development of monostrands and loss of biodiversity. Responsible storage and preservation of the topsoil is thus a key requirement for successful rehabilitation.
- All redundant pollution control facilities will be decommissioned and rehabilitated by the end of the operational phase. Any pollution control facilities still required to be operational will be maintained until such time as the water qualities are such that the water can be released.
- Disused roads will be rehabilitated by the amelioration of physical properties (by ripping) and chemical properties with removal of surfacing. Topsoiling with the addition of appropriate fertilisers and liming, and vegetation using appropriate indigenous seed mixes (to be defined five years prior to mine closure commencing).
- Other un-required structures, including offices, ablutions and workshops, berms, haul roads and stockpile areas will all be removed and rehabilitated.

- There will be no remaining waste storage facilities as the waste will n(general and hazardous) will not be disposed of on-site and oils and greases will be collected for recycling. Domestic waste will be disposed of on the nearest licensed municipal waste site. A septic tank and sewage plant will be utilised for sewage treatment. Sludge will be collected by an external contractor. The tank and plant will be removed and the ground re-instated at closure.
- Contaminated areas will be cleared of carbonaceous material and re-vegetated to reduce the contamination of water infiltrating the area.

Specific Revegetation Measures

The general methodology for landscaping and re-vegetation is from the ESMP Closure Plan and has been summarised below.

It will be necessary for the topsoil and subsoil to be stripped and stockpiled separately, with the dry, friable soils being kept separate from the wet, clay-rich materials. It is recommended that the soils should be stripped during the winter months, and vegetated to prevent erosion.

The pollution prevention berms should, where possible be constructed using a bulldozer to push the topsoil from the box cut area towards the toe of the berm. These topsoils will be stockpiled and utilised to top dress the berm, while the sub-soils will be used to form the bulk of the berm structure. Utilising the soil in this manner will maximise the beneficial properties of each material.

It is imperative that the topsoil that is used to cap the berm structure is well protected from erosion and compaction. These topsoils must be adequately vegetated as soon after construction as possible and maintained throughout the two year life of mining. It is recommended that the following actions be implemented:

- Strip and stockpile the topsoil from the box cut area;
- Construct the berm structure using the sub soils and overburden if required from the initial box cut. The berm should comprise a series of 1.5 m terraces if the height required is >1.5 m;
- The topsoils should then be spread evenly over the top and sides of the berm structure;
- Disc the area using a large disc harrow;
- Add the fertiliser and manure according to soil analysis and recommendation. The fertiliser and manure should be added using a standard industrial spreader;
- Harrow the area again to ensure adequate mixing has occurred; and
- The area can now be seeded with the recommended seed mix.

If the wet-based soils are stripped in their dry state it will not be necessary to cultivate the topsoil. However, if the soils are stripped when wet, then ripping and discing of the topsoil is recommended prior to seeding of the soils, in order to break up any clods that might have formed.

It is imperative, where possible, that the slopes of the berm are constructed to 1:6 or shallower gradient, as this will minimise the chances of erosion of the topsoil. However, prior to the establishment of vegetation, it is recommended that erosion control measures, such as the planting of *Vetiver* or other suitable species of grass, or the construction of benches and cut-off drains be included in the berm design. These methods of construction will limit the potential for uncontrolled run-off and the subsequent erosion of the unconsolidated soils, while the vegetation is establishing itself.

The application of fertilisers and the amelioration of the soil can be divided into two events. It is necessary to distinguish between the initial application of fertilisers or soil amendments and maintenance dressings. Initial applications of additives are required to correct disorders that might be present in the in-situ material to raise the fertility status of the soil to a suitable level prior to seeding. The initial application of fertiliser and lime to the disturbed soils is necessary to establish a healthy plant cover as soon as possible. This will prevent erosion, while the maintenance dressings are applied for the purpose of keeping up nutrient levels, and maintaining the vegetative cover in a healthy condition.

In general, the uncultivated soils mapped are deficient in nitrogen (N), phosphorus (P) and potassium (K). It is recommended that a standard 3:2:1 ratio N:P:K fertiliser be added to the soil according to soil analysis and recommendation before the re-vegetation programme.

It is recommended that, prior to soil stripping, superphosphate fertiliser should be added to the sandy loams and sandy clay loams that make up the bulk of the dry friable soils, at a rate of about 200kg/ha if they have not previously been fertilised or cultivated. Double super phosphate should be used in preference to a single superphosphate, as they contain appreciably less sulphur and are, therefore, more suitable for use in a coalmining environment. The fertiliser should be added in a slow release, granular form.

It will be necessary to re-evaluate the nutrient status of the soils at regular intervals to determine the possibility of needing additional fertiliser applications.

The following control measures and maintenance will be required:

- The area must be fenced, and all domestic animals kept off the area until the vegetation is self-sustaining;
- Newly seeded/planted areas must be protected against compaction and erosion;
- Traffic over the rehabilitated ground should be limited were possible while the vegetation is establishing itself;
- Plants should be watered and weeded regularly;
- Check for pests and diseases at least once every two weeks and treat if necessary;
- Replace unhealthy or dead plant material;
- Fertilise, seeded and grassed areas with 200kg/ha LAN 4-6 weeks after germination; and
- Repair any damage caused by erosion.

The top dressed areas will then be rolled and seeded, preferably in February/March, or as soon as the soil moisture is sufficient (monitor with tensiometers) to guarantee that the seed has a chance of germinating. A suitable seed mix (to be determined from the vegetation survey) should be used to stabilise the replaced soils. Compaction of the sub-soils should be carried out to a 85% Mod AASHTO, and monitored, so as to achieve the required permeability rate for the underlying materials.

The planting will be undertaken with water, either, by making use of natural rainfall, or, by hydro-seeding the seed mix onto the ground, or having pre-wet the soils prior to planting, with a weekly watering programme (15 to 20mm/ha/week) for one month after planting, or until germination has occurred.

The areas to be planted will need to be landscaped and engineered to a slope not greater than 1:6. The soils will then be ripped to a depth of 20mm to loosen the soil, and all weeds will be removed. A fertiliser mix, if required (of 3:2:1 at a rate of 200kg/ha), will be applied at time of planting. In addition, and if available, chicken litter should be applied to add bulk (organic matter) to the heavy, clay rich soils.

For areas that are considered too steep, and where a gradient of 1:6 cannot be achieved, the use of *Vetiver* grass (*Vetiveria zizanodies*) or other suitable species or an appropriately designed erosion control method is recommended, and in places will be essential to prevent erosion, and to stabilise the soils.

If Vetiver is used it must be planted according to the slope gradient, length of slope, and degree of erosion potential. A spacing of approximately one row every 5m of vertical drop is recommended. This might alter as the slope becomes very steep, or very shallow. It is recommended that a specialist be used for the specific areas of concern.

A horticulturist will examine the grass stands one year after planting to ensure that the grass has established itself satisfactorily. A soil sample will be taken in the June following planting, and analysed to determine the required fertiliser applications.

Surface Water Management during Rehabilitation

Ideally, unpolluted surface water from around the rehabilitated area should be kept off the rehabilitated area in order to minimise infiltration into the backfilled pit area and to reduce the risk of surface erosion caused by excess surface water flow on and over this area. The proposed reshaping will aim at ensuring that the area is free draining as far as is practical.

Water management will be such that all areas where vegetation is removed will be re-compacted. The disturbed area will be shaped to prevent water from ponding and will provide for positive drainage off the pit area. Where necessary, contour walls and drains will be constructed to limit the volume and velocity of surface runoff. Runoff will be controlled by reinstating the existing contour drains and ensuring that the outlets do not erode. Concentrated runoff, such as at access roads, will be avoided through the construction of water control structures. In addition, the area around the coal discard facilities will be made free-draining to limit ponding of water and the resultant increase in leaching.

A proper surface storm water control management design must be compiled to address a 1:100 year storm event. This design will ensure that runoff is removed from the terrain as effectively as possible, i.e. contour drains and waterways will be shaped to ensure runoff away from all areas where tree clearing has taken place. As far as possible, the runoff will be diverted to the pollution dam structures. Between the contour drains to be formed, extra care will be given to the proper design to ensure that slope lengths are short enough to minimise erosion risk; the slope angles will similarly be low enough to ensure sustainable re-vegetation and maintenance, while minimising erosion risk. The combination of compaction of cleared areas, with proper water diversion to minimise infiltration and re-vegetation on properly ameliorated growth medium will ensure that minimal water will seep into the backfilled pit, which will minimise the AMD that can generate from the area.

(d) Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives.

The overall rehabilitation of the mining area to agricultural pasture is anticipated to take over ten years post mine closure. This will result in a moderate negative impact for the short term, however, over time the site will be returned to agricultural pasture of potentially marginally lower quality thereby resulting in an overall positive impact of low significance. This is fundamentally dependent on the effort placed on the rehabilitation and the resources used, the quality of the final rehabilitation plan will ultimately influence the overall potential of the land and its economic value. In addition, the proposed mining operation will change the pre-mining landform and affect all of the existing wetlands on the site. As the mine workings are opencast and have a low potential for ground subsidence the impact on the landform is considered to be of low significance.

The rehabilitation plan will seek to emulate the pre-mining condition as well as re-vegetate with indigenous grasses and re-establish the surface drainage patterns to support the remaining wetlands thereby seeking to reduce the overall impact on the natural environment. Removal of alien vegetation will improve the biodiversity status of the site. Re-vegetation with indigenous grasses will re-establish pasture to a viable agricultural potential which will be equivalent or an improvement on the pre-mining state of land capability. Some minor loss of land capability is possible and is subject to the success of rehabilitation measures and timeframes applied to assessing the closure target.

There are activities associated with the operational phase of mining that will result in inevitable long term impacts on surface water and groundwater flows and water quality that will impact on the Rietvlei property that cannot be entirely mitigated by physical rehabilitation measures. It is predicted that there is likely to be decant from the mining area. The impacts are predicted to be localised in extent and are considered to be moderate after the implementation of recommended mitigation measures.

The mining project creates locally significant opportunities for direct long term employment and ensures the livelihoods of the broader mining-skilled working community. Closure impacts on employment patterns are accordingly considered minor/low

(e) Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline.

According to the regulations set out in the MPRDA, it is necessary for RMC to compile a cost estimate for the proposed mine and to update this on a regular specified basis. The financial provision for the environmental rehabilitation and closure of any mine and its associated operations and infrastructure form an integral part of the MPRDA and is addressed in Section 41 and 45 of the Act.

According to Regulation 56 (Principles for Mine Closure) of the MPRDA in the Government Gazette 466 No 26275, the holder of a prospecting right, mining right, retention permit or mining permit must ensure that prospecting or mining operations are closed efficiently and cost effectively. According to regulations published in terms of the Mineral Act (Act 50 of 1991) the holder of a mining authorisation has to:

- Compile Environmental Management Programmes that indicate adequate financial means in terms of both sufficient and acceptable pecuniary provision to the satisfaction of the DMR; and
- Annually, to the satisfaction of the DMR, and in consultation with an expert, determine the quantum of pecuniary provision.

The ‘Guideline Document for the Evaluation for the Quantum of Closure Related to Financial Provision Provided by a Mine’ (2004) was developed by the DMR in order to empower the personnel at regional DMR offices to review the quantum determination and closure of mining sites. This approach has been used to determine the financial provision for the closure cost of Rietvlei Mine together with information from the mine works programme (MWP) (January, 2013) and project specific data compiled by RMC and Mindset.

The following closure components are suggested by the DMR for determining the quantum for financial provisions for mine closure:

- Dismantling of process plant and related structures;
- Demolition of steel structures;
- Demolition of reinforced concrete buildings and structures;
- Rehabilitation of access roads;
- Demolition of housing facilities;
- Opencast rehabilitation including final voids and ramps
- Rehabilitation of overburden and spoil stockpiles;
- Rehabilitation of process waste deposits and evaporation ponds;
- Rehabilitation of subsided areas;
- General surface rehabilitation, including grassing of all denuded areas;
- Fencing;
- Water management (separating clean and dirty water, management of polluted water, managing the impacts on groundwater); and
- Maintenance and aftercare.

A Master Rate for each component in the DMR Guidelines and weighting factor can be applied depending on the risk class of the activity and the sensitivity of the area. The financial rates were determined in 2005 so it is therefore necessary to calculate an escalation in the rates according to an appropriate CPIX.

Location and Aerial Extent of Main Mining Activities

Refer to **Figure 84** and **Figure 85** for the mine plan illustrating the annual progress of the mining operation relative to the overall plan as well as an indication of where structures and infrastructure may be located.

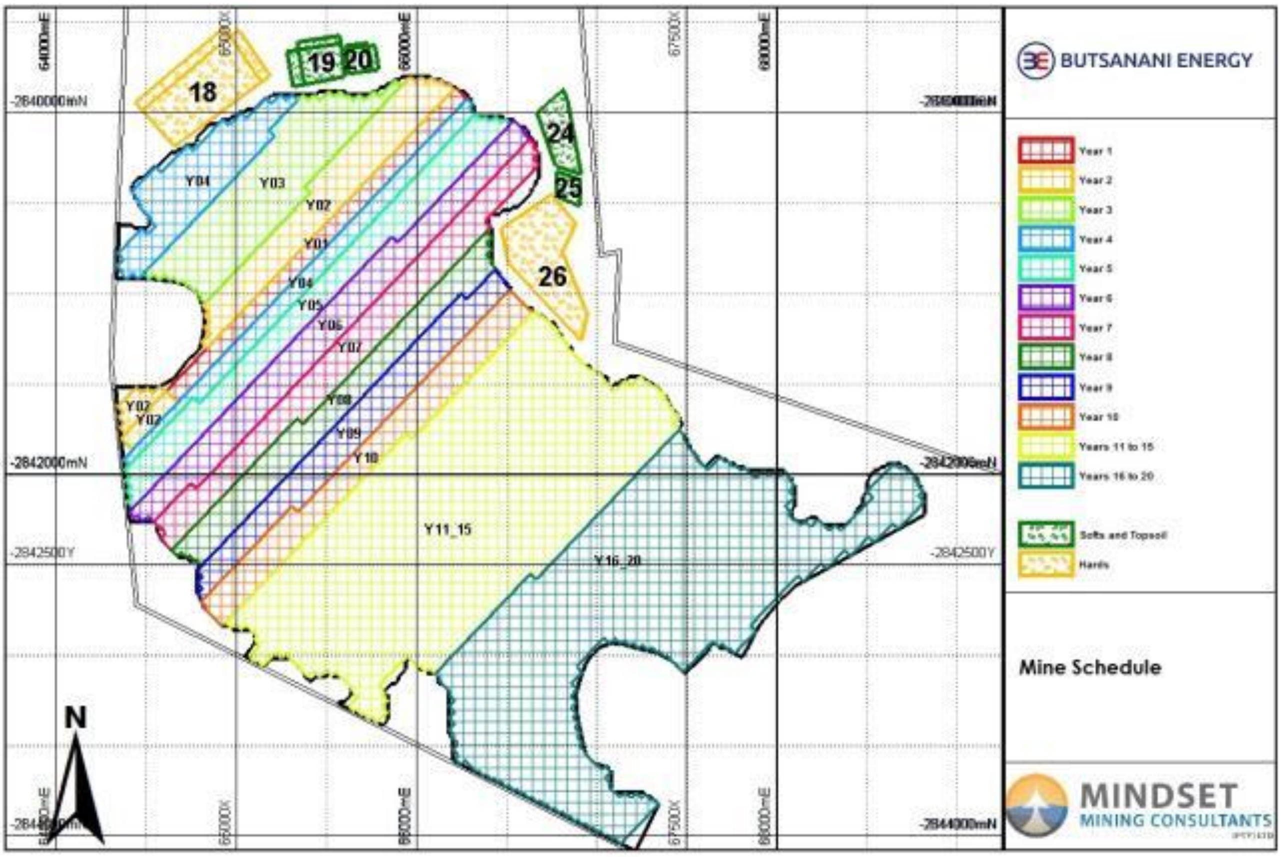


Figure 93: Mining Schedule Illustrating Annual Mining Progress (Source: Mindset, 2013)

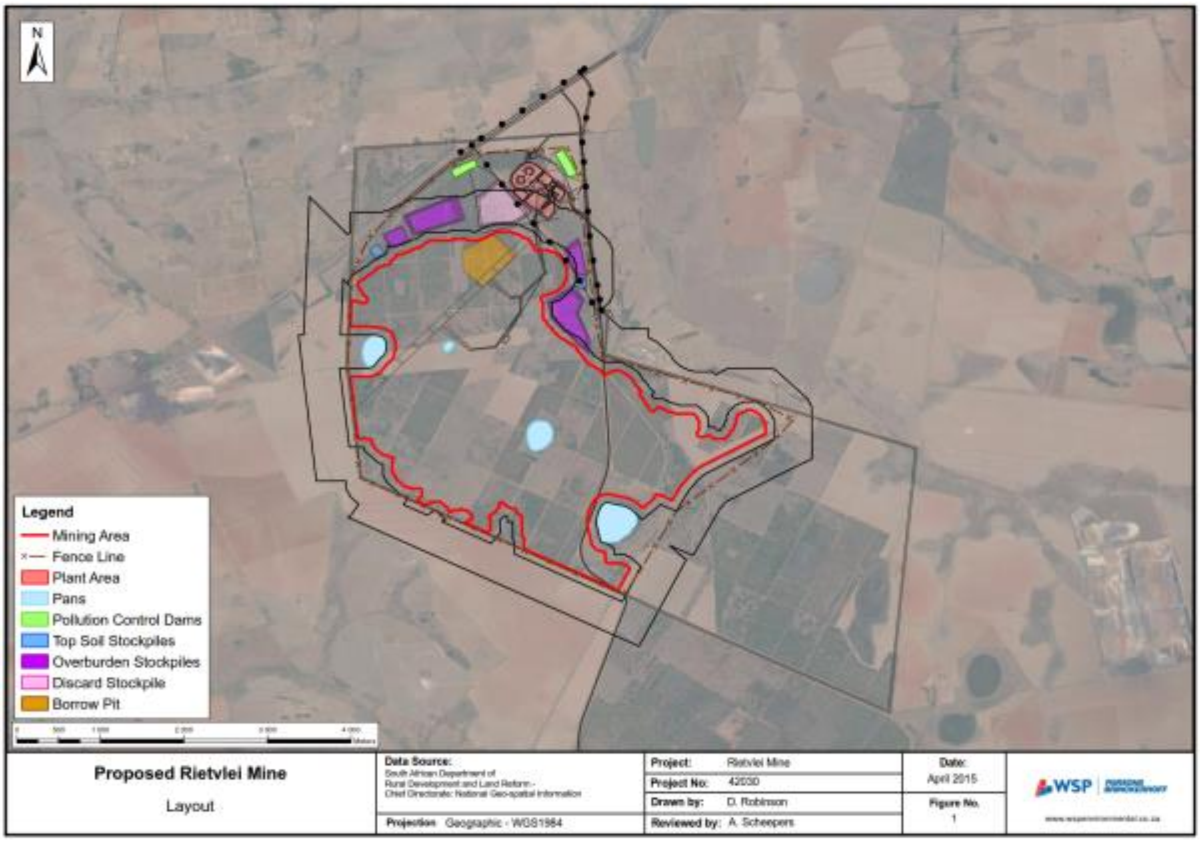


Figure 94: Schematic Illustration of the Infrastructure Associated with the Rietvlei Mine (Mindset, 2013)

Method of Providing Financial Provisions

The applicable project components are discussed below together with closure related comments and any items that influence applicable financial rates and Weighting Factors.

- Component 1: Processing Plant
  - Costs for dismantling of processing plant and related structures. Conveyors and power lines are included as part of the processing plant closure costs
  - Plant includes feeders, vibrating screens and crushers.
  - Crushed coal is washed using cyclones and discard is transported to the discard facility.
- Component 2(A): Steel Buildings and Structures and Component 2 (B): Demolition of Reinforced Concrete Buildings and Structures
  - Cost for demolition of steel buildings and structures are based on the assumption that all structures to be demolished include foundations to a depth of 1m below ground level.
  - The rubble is to be buried onsite.
  - Cleared areas will be shaped and topsoil with 300 mm of topsoil cover and re-vegetated or as stated in the relevant ESMP document.
  - Costs include allowance for monitoring and maintenance.
- Component 3 Rehabilitation of Access Road
  - Approximately 4,500 m^2 of internal access roads will be rehabilitated.
- Component 4 Rehabilitation of Railway Lines
  - Not applicable. There will be no railway links for the mine.

- Component 5 Demolition of Housing and Administration Buildings
  - There will be no housing on site.
  - It is proposed to use portable structures on concrete plinths for offices, workshops and change houses.
  - The building structures will be re-usable and demolition will be limited to the concrete foundation slab.
- Component 6 Opencast Rehabilitation including Final Voids and Ramps
  - Rehabilitation of the voids associated with the opencast mine are estimated approximately 21ha.
- Component 7 Sealing of Shafts, Adits and Inclines
  - Rietvlei Mine is an opencast operation and therefore this component is not applicable.
- Component 8 (A) Rehabilitation of Overburden and Spoils
  - Large volumes of overburden and spoils will be generated and stockpiled as a result of the box cut for the opencast mining method. The excavated material will be stripped and stockpiled in accordance with best practice as outlined in the ESMP. The material will be used as fill material into the opencast voids at the end of the mine's life.
  - After removal of the overburden and spoils to backfill the final voids the areas where the overburden and spoils were stockpiled needs to be re-covered with topsoil. It has been calculated that approximately 30 ha will need to be rehabilitated.
  - A small portion of the excavated material generated will be used as part of the bulk earth fill material for the construction of the pollution control dams and the facility for stockpiling the coal washing residues
- Component 8 (B) Rehabilitation of Processing Waste (Discard) Deposits and Evaporation Ponds (basic, salt-producing waste)
  - See below.
- Component 8 (C) Rehabilitation of Processing Waste Deposits and Evaporation Ponds (acidic, metal-rich waste)
  - Acidic metal enriched residue deposits are typical of coal mining activities. Accepted closure methods are aimed at the following: Limiting seepage of contaminants from the coal discard facilities, and preventing seepage from entering local surface water and groundwater resources. The standard master rates allow for slope modification, armouring and evaporative covers, lined pollution control dams and lined cut off trenches. Slope modification to achieve stabilisation of residue deposits is based on an outer slope gradient of 1:3 (18 °).
  - Benching at regular intervals should ensure that bench height does not exceed 35 m in order to curb stomr water flow velocities and reduce the risk of erosion to cover material. Benches should be at least 5 m wide, sloping inwards at a slope of 1:10. The lateral slope of benches should be based on the following stability criteria:
    - 1:2 year flow events should not result in bench flow velocities of less than 0.3 m/s. Flow velocities of less than 0.3 m/s tends cause sediment build-up on benches which can result in eventual overtopping and slope damage; and
    - 1:50 year flow events should not result in bench flow velocities exceeding 1 m/s. Flow velocities in excess of 1 m/s could cause bench scouring and hence damage to stomr water chutes.
  - Generally accepted closure methods allow for a dedicated cover to be provided on the modified outer slopes of the residue deposit. The cover should provide stability to the slope and limit the ingress of air and water into the residue material reducing

leaching and the potential to generate contaminated seepage from the footprint of the residue deposit. The cover material prevents contamination of the surface run-off from the deposit and allows for suitable re-vegetation to take place improving the aesthetics of the deposit.

- Operational pollution control dams will be lined to prevent migration of contaminated water impounded in the dams to surface water and shallow groundwater. The life of mine is estimated to be 20 years and therefore it is unlikely that the liner systems will degrade over this time period and therefore residual impacts of seepage into surrounding water resources should be negligible. The Master Rate used in the cost provision assumes a liner design based on a 1.5 mm thick HDPE liner on a selected granular bedding layer of 250 mm with a geotextile separation layer. The Master rate allows for concrete stomr water chutes at 200 m spacing along the perimeter of the rehabilitated residue deposit with benching and energy dissipation measures upslope of bench crossings and discharge points.

■ Component 9 Rehabilitation of Subsided Areas

- The geological review of the stability of the study area indicates that ground subsidence is considered unlikely and therefore the financial provision is not applicable for this component.

■ Component 10 General Surface Rehabilitation

- The final surface rehabilitation of areas disturbed by mining and related activities will be aligned to the selected final land use. General surface rehabilitation measures will ensure the following:
  - Surface topography will emulate the visual appearance of the surrounding areas and be aligned to the general character of the landscape;
  - Landscaping will facilitate surface runoff and result in free-drainage areas. Where possible natural drainage lines will be reinstated;
  - Special attention will be given to remove heaps of excess material and to remove unnecessary remnants of surface structures and infrastructure;
  - General shaping of the land surface will be made suitable for re-vegetation; and
  - The Master Rate allows for shaping of the land surface to a depth of 500mm.

■ Component 11 River Diversions

- There are no drainage courses within the area impacted by mining activities. This component is therefore considered to be non-applicable to the financial provision.

■ Component 12 Fencing

- An allowance has been made for 20,000 running metres of fencing.

■ Component 13 Water Management

- The Master Rate developed by the DMR is considered to be over-conservative and too generic to be applied in the case of the Rietvlei Mine where the predictive modelling suggests that mine decant will occur 58 years following mine closure.
- Allowance has been made in the Financial Model for a water treatment plant. This is due to all the water decanting as a result of the mining process having to be treated prior to release into a natural water course.
- The location of the water treatment plant has not been determined at this point, as it is considered that water treatment will only be required towards the end of the life of mine (LOM).
- Monitoring of surface water and groundwater for a period of three years will need to be implemented after the LOM as real data on groundwater level and water quality is obtained and the predictive decant modelling can be properly calibrated.

■ Component 14 Maintenance and Aftercare

- The Master Rate assumes a maintenance and aftercare period of 3 years after mine productive and includes the following:
  - Annual fertilising of rehabilitated re-vegetated areas;
  - Monitoring of surface water and groundwater;
  - Control of black wattle and other invasive alien plants; and
  - General landscaping maintenance, including rehabilitation of cracks and subsidence.
- The area requiring maintenance and aftercare is assumed to be 884 ha for the mining area and 56 ha for the surface infrastructure area.

- Component 15 Specialist Studies and Environmental Management Programme
  - Specialist studies may be required to fully develop the Environmental Management Programme for closure. These studies could include additional monitoring boreholes for groundwater samples or various forms of field trials for re-vegetation and biodiversity initiatives and detailed investigations to assess the practicality of replacing a number of wetlands and pans. The requirements for further specialist studies should be evaluated during the LOM and the Financial Provisions should be updated to reflect any specific requirements as necessary.

Cost Estimate

The DMR requires 10 forecasts (one for each of the first 10 years of operation) and the progressive total in the tenth year (excluding concurrent rehabilitation). The estimated rehabilitation liability after year 1 is estimated to be R 16 029 495 and the progressive total liability after 10 years has been calculated in the MWP to be **R 28 563 199** (as at 2014). Section 13 of the Mine Works Programme (Mindset, 2013) details the cash flow forecast and valuation. The forecast also indicates how the applicable regulatory costs will be accommodated.

The costs are high-level estimates for the Rietvlei Mine. The final cost estimates will be determined as part of the Bankable Feasibility Study which is underway and will be completed concurrently with the environmental authorisation submissions.

A financial guarantee provision of **R 16 029 495.00 (including VAT)** will be provided should the right be granted as detailed in **Table 79**. This will be supplemented every year of mining with additional provisions for mine closure and water treatment.

Table 94: Detailed Outline of the Estimated Financial Provision for the Rietvlei Mine

Mine: Rietvlei Colliery		Rietvlei		Location:	Middelburg		
Evaluators:		Mindset Mining Consultants		Date:	Apr-13		
No	**Description**	**Unit**	**A**	**B**	**C**	**D**	**E=A*B*C**
			Quantity	**Master**	**Multiplication**	**Weighting**	***D**
				Rate	**Factor**	**Factor 1**	**Amount Including water Treatment Plant (ZAR)**
			Step 4.5	**Step 4.3**	**Step 4.3**	**Step 4.4**	
1	Dismantling of processing plant and related structures	m^3	500.00	200	1	1	100 000

Mine: Rietvlei Colliery		Rietvlei		Location:	Middelburg		
Evaluators:		Mindset Mining Consultants		Date:	Apr-13		
	(Including overland conveyors and power lines)						
2(A)	Demolition of steel buildings and structures	m^2	250	150	1	1	37 500
2(B)	Demolition of reinforced concrete buildings and structures	m^2	600	140	1	1	84 000
3	Rehabilitation of access roads	m^2	4 500	50	1	1	225 000
4(A)	Demolition and rehabilitation of electrified railway lines	m	-	n/a	-	-	
4(B)	Demolition and rehabilitation of non-electrified railway lines	m		n/a	-	-	
5	Demolition of housing and/or administration facilities	m^2	-	190	1	1	
6	Opencast rehabilitation including final voids and ramps	ha	21	99 600	1	1	2 091 600
7	Sealing of shafts, adits and inclines	m^3	-	51	1	1	
8(A)	Rehabilitation of overburden and spoils	ha	30	70 150	1	1	2 104 500
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	ha	6	82 700	1	1	496 200
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	ha	-	240 200	0.59	1	
9	Rehabilitation of subsided areas	ha	-	n/a	-	-	
10	General surface rehabilitation	ha	56	52 600	1	1	2 945 600
11	River diversions	ha	-	n/a	-	-	
12	Fencing	m	20 000	50	1	1	1 000 000
13	Water management		1	1 000 000	1	1	1 000 000
14	2 to 3 years of maintenance and	ha	20.25	7 000	1	1	141 753

Mine: Rietvlei Colliery		Rietvlei		Location:	Middelburg		
Evaluators:		Mindset Mining Consultants		Date:	Apr-13		
	aftercare						
15 (A)	Specialist study	Sum	0	2 000 000	1	1	-
15 (B)	Specialist study	Sum	0	1 800 000	1	1	0
Sub Total 1							**10 226 153**
(Sum of items 1 to 15 above)							
1	Preliminary and General	Weighting factor 2 (Step 4.4)					1
		12% of Sub-total 1					1 227 138
2	Administration and supervision costs	6.0% of Sub-total 1					613 569
3	Engineering drawings and specifications	2% of Sub-total 1					204 523
4	Engineering and procurement of specialist work	2.5% of Sub total 1					255 654
5	Development of a closure plan	2.5% of Sub-total 1					255 654
6	Final groundwater modelling	2.5% of Sub-total 1					255 654
Sub-Total 2							**13 038 345**
(Sub-total 1 plus sum of management and administrative items, 1 to 6 above)							
7	Contingency 10.0% of Subtotal 1						1 022 615
Sub-Total 3							**14 060 960**
(Sub-total 2 plus contingency)							
VAT (14%)							1 968 534
Grand Total (Subtotal 3 plus VAT)							**16 029 495**

All activities relating to the proposed project will occur on the area demarcated and as approved in the mine plan. Ongoing dust suppression measurers, best practice environmental management and monitoring will be conducted on site to ensure that the extent of the footprint area is not increased.

(f) Confirm that the financial provision will be provided as determined.

Table 95 summarises the estimated mine cost forecast for the first 10 years together with the rehabilitation guarantee and the annual provisions for mine closure and water treatment[7]. Although this table shows only the first 10 years the life of the mine is approximately 20 years. The cumulative amount to be provided for by 2025 for mine closure is approximately **R 28 563 199.00**. This includes environmental costs associated with premature closure, should it occur, as required by legislation. The total of the rehabilitation guarantee and the mine closure provisions total **R 29 012 175.00** after 10 years which covers the estimated closure liability.

[7] Environmental costs were obtained from the Mine Works Programme of 2013.

Provision will also be made annually for the establishment of a water treatment plant at the end of the mine’s life. After 10 years this provision will be **R 20 676 120.00** and by the end of the mine’s life it will be **R 41 352 000.00** for the construction of a water treatment plant.

Table 95: Environmental and Rehabilitation Costs

Category	Units	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Environmental Liability (Reg 11(1)(g)(iv))	**ZAR**	16 029 495	17 031 048	18 298 927	19 252 974	21 793 631	22 933 375	24 044 450	25 061 976	25 967 128	28 563 199
Quantum Rehab Guarantee	**ZAR**	16 029 495	16 029 495	16 029 495	16 029 495	16 029 495	16 029 495	16 029 495	16 029 495	16 029 495	16 029 495
Mine Closure Provision	ZAR	735 480	2 096 280	3 457 080	4 817 880	6 178 680	7 539 480	8 900 280	10 261 080	11 621 880	12 982 680
Total Rehab Funds Available	**ZAR**	16 764 975	18 125 775	19 486 575	20 847 375	22 208 175	23 568 975	24 929 775	26 290 575	27 651 375	29 012 175
Water Treatment Plant Provision	**ZAR**	1 171 320	3 338 520	5 505 720	7 672 920	9 840 120	12 007 320	14 174 520	16 341 720	18 508 920	20 676 120
Total Provision	**ZAR**	**17 936 295**	**21 464 295**	**24 992 295**	**28 520 295**	**32 048 295**	**35 576 295**	**39 104 295**	**42 632 295**	**46 160 295**	**49 688 295**

Environmental cost as required by the MRA Guideline after 10 years

To avoid double accounting for different divisions in the mining cost structure, the financial (OPEX[8] and CAPEX[9]) are budget according to activities rather than disciplines. Environmental related costs are therefore integrated in the different activities. For example: topsoil removal and replacements are budgeted as an integral part of mining activities, and not separated as “environmental costs”. Similarly concurrent rehabilitation is a part of the mining cost and not separated in a separate budget.

[8] OPEX – Operational Expenditure

[9] CAPEX – Capital Expenditure

Mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon, including:

g) Monitoring of Impact Management Actions

h) Monitoring and reporting frequency

i) Responsible persons

j) Time period for implementing impact management actions

k) Mechanism for monitoring compliance

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
The activities most relevant to the construction phase include: • Topsoil stripping and stockpiling; • Haul road construction; • Upgrading of the D1433; • Construction of the surface infrastructure including the coal processing plant, buildings and offices, perimeter fence and sewage plant; • Establishment of the coal discard facility; • Installation of water and power supply infrastructure including stomr water control infrastructure; and	Air Quality	A dust fallout network comprising of eight single dust fallout buckets following the American Society for Testing and Materials standard method for collection and analysis of dust fall (ASTM D1739-98) should be installed. The bucket locations are indicated on a map and located either up or down wind from the wind dependent sources (stockpiles), at the proposed open pit site and close to the unpaved road, the paved road and sensitive receptors. In addition, it is recommended that a PM10 sampler be installed at the nearest sensitive receptor (farmhouse) to provide daily average data especially before the mine commences and continuing afterwards. The main objective of the dust fallout network is to ensure the following: ▪ dust fallout in the immediate vicinity of the road perimeter to be less than 1 200 mg/m2/day and less than 600 mg/m2/day at the mine boundary. ▪ dust fallout in the immediate vicinity of the open pit should be below 1 200 mg/m2/day.	RMC will establish, implement and maintain a procedure(s) to monitor and measure, on a regular basis, the key characteristics of the operations that may have a significant environmental impact. The procedure(s) shall include the documenting of information to monitor performance, applicable operational controls and conformity with the operation's environmental objectives and targets	▪ Dust fall out monitoring should be undertaken at permanent points and data collected and reported on monthly ▪ Monitoring should be continuous for the life of the mine

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
• Construction of the clean and dirty water system, including 2 pollution control dams The operational phase includes the daily activities associated with the extraction of coal from the open cast pit. The activities most relevant to this phase include: • Excavation and blasting, as well as overburden stockpiling; • Coal removal, transport and processing; • Coal storage; • Utilisation of vehicles, equipment and machinery; and • Concurrent rehabilitation including, initial backfilling, levelling and placement of topsoil, fertiliser, vegetation and maintenance The decommissioning and closure phase includes the activities associated with the removal/dismantling of machinery/equipment/infrastr		▪ dust fallout levels should not exceed 600 mg/m2/day outside the mine boundary or at any sensitive receptor. ▪ PM10 GLCs should not exceed the NAAQS at the nearest sensitive receptor (less than 40 µg/m³ over an annual average and not exceeding the daily limit of 75 µg/m³ more than four times per calendar year). Detailed monitoring requirements are included in the Air Quality Specialist Study (Section 9.2.2 and Section 10) included in **Appendix 18**.		
	Noise	▪ On-site monitoring to ensure that any agreements entered into regarding operating times are adhered to ▪ <u>Environmental noise monitoring:</u> This should be carried out by an independent agency regularly at six-monthly intervals close to MP2 at the nearest mine boundary to Rietvlei Farm to detect deviations from predicted noise levels and enable corrective measures to be taken where warranted. In addition it is recommended to carry out continuous blast monitoring to check on the levels of air blast and groundborne vibration generated by individual blasts at the same position.		▪ Monitoring and reporting should be undertaken Six Monthly ▪ Monitoring should be undertaken for the life of mine
	Surface Water	A detailed monitoring plan is outlined in Section 7 of the Surface Water Specialist Study included in **Appendix 20**.		Relevant monitoring frequencies are detailed in Section 7 of the Surface Water Specialist Study included in

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
ucture no long necessary to the operation. This phase also includes the implementation and completion of rehabilitation goals as well as the implementation of agreed monitoring and maintenance prescribed for the cessation of operations. The activities most relevant to this phase include: • Dismantling surface infrastructure; • Rehabilitation of haul and access roads; • Rehabilitation of final void(s); • Monitoring and maintenance of ground and surface water; and • Monitoring and maintenance of rehabilitation areas, specifically in terms of land use and capability.				**Appendix 20.**
	Groundwater	A detailed monitoring plan is outlined in Section 9 of the Ground Water Specialist Study included in **Appendix 19**.		Relevant monitoring frequencies are detailed in Section 9 of the Ground Water Specialist Study included in **Appendix 19**.
	Vibration	It is highly recommended that a blast monitoring program be put in place. This includes monitoring ground vibration and air blast for every blast. Ground vibration and air blast is monitored using a seismograph. Monitoring can be done in permanent stations or on ad hoc basis – per blast basis monitoring. Additionally to this it is recommended that a video of each blast is done as a standard. Monitoring of ground vibration and air blast is done to ensure that the generated levels of ground vibration and air blast comply with recommendations. Proposed positions were also selected to indicate the nearest points of interest at which levels of ground vibration and air blast should be within the accepted norms and standards as proposed in this report. The monitoring of ground vibration will also qualify the expected ground vibration and air blast levels and assist in mitigating these aspects properly. This will also contribute to proper relationships with the neighbours. Currently 10 monitoring positions were identified that will required during the life of mine at least. Not all points may be utilised at once. These points are the most critical. Monitor positions are indicated in the Blasting Specialist Study included in **Appendix 29**.		▪ Monitoring to be undertaken at permanent positions or on a per blast basis. ▪ Monitoring should coninute for the life of the mine.

l) Indicate the frequency of the submission of the performance assessment report.

RMC will establish, implement and maintain a procedure(s) to monitor and measure, on a regular basis, the key characteristics of the operations that may have a significant environmental impact. The procedure(s) shall include the documenting of information to monitor performance, applicable operational controls and conformity with the operation's environmental objectives and targets.

RMC will ensure that all instruments and devices used for the measurement or monitoring are calibrated and appropriately operated and maintained. Calibration records must be kept on site or in close proximity to the equipment for ease of availability.

RMC will establish, implement and maintain a procedure(s) for periodically evaluating compliance with applicable legal requirements at the operation. RMC will also evaluate compliance with other requirements to which it subscribes. Records of findings, observations, etc. of the evaluation shall be maintained.

RMC will establish, implement and maintain a procedure(s) for dealing with actual and potential non-conformities identified and will develop a procedure(s) for taking corrective and preventive action. The procedure(s) shall define requirements for the following:

- Identifying and correcting non-conformities and taking actions to mitigate their environmental impact;
- Investigating non-conformities, determining their causes and taking actions in order to avoid their recurrence;
- Evaluating the need for actions to prevent non-conformities and implementing appropriate actions designed to avoid their occurrence;
- Recording the results of corrective actions and preventive actions undertaken; and
- Reviewing the effectiveness of corrective actions and preventive actions undertaken.

RMC will ensure that any necessary changes are made and adequately documented and recorded. RMC will establish and maintain records as necessary to demonstrate conformity to the requirements of the ESMP and relevant procedures.

RMC will also ensure that annual internal audits of the conditions within the ESMP are conducted at planned intervals. Audit procedures will be established, implemented and maintained that address the responsibilities and requirements for planning and conducting audits, reporting results and retaining associated reports. The procedure(s) will also address the determination of the audit criteria, scope, frequency and methods. Internal auditors will ensure objectivity of the audit process.

The specific procedures and standard operating procedures will be compiled and finalised, incorporating ESMP commitments, licence conditions and Environmental Authorisation added conditions once the mine is operational.

It is thus envisaged that the following schedule be adhered to with regard to compliance monitoring and performance assessment:

- Internal monitoring of compliance with the EMP should be undertaken monthly;
- An external compliance audit should be undertaken annually;
- The revision of the rehabilitation/financial provision calculation and amount available in the Trust should be undertaken annually; and

Monitoring and performance assessment of the EMP in accordance with Regulation 55 of the MPRDA should be undertaken every two years. The revision of the financial provision will be undertaken annually.

m) Environmental Awareness Plan

(1) Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work.

The MPRDA requires that, under regulation 55 (b)(vi), an environmental awareness plan is included as part of the EMPR submission. This Chapter details a framework outlining procedures essential for effective education of employees, contractors and their sub-contractors on social and environmental matters and associated responsibilities. The plan provides an outline to ensure that systems are in place to ensure that those working for the Proposed Project are aware of their social and environmental commitments.

RMC will provide appropriate resources to facilitate social and environmental awareness training during the construction, operational and decommissioning and closure phases of the Proposed Project.

RMC will require that all managers associated with the Proposed Project adhere to the mitigation/management measures detailed in the ESMP and identify, evaluate, and minimize risks to the social, physical and biophysical environments. This will be implemented by educating employees in social and environmental matters and responsibilities relating to performance of their assigned tasks. Furthermore, employees will be entrusted to maintain the necessary level of environmental performance for their activities. Contractors, and their associated sub-contractors, will also need to demonstrate compliance to mitigation/ management measures included in the ESMP.

The following methodology will be used to implement and ensure environmental and social awareness:

- Internal Communication;
- Standard Meetings;
- Environmental and Social Talk Topics;
- External Communication;
- Complaints; and
- Training.

Internal Communication

Internal communication of environmental and social issues to ensure environmental awareness will be achieved by the following means:

- Meetings;
- Memos;
- Notice boards;
- Briefs;
- Reports;
- Monthly themes;
- Daily operational bulletins;
- Newsletters;
- E-mail;
- Telephone; and
- Induction training.

Standard Meetings

The following standard meetings will be held at specific times to ensure that environmental and social awareness; potential problems, complaints etc. are heard and addressed proactively:

- Safety, Health and Environmental Meetings will be held monthly by the Senior Management;

- Safety, Health and Environmental Meetings will be held daily, weekly and monthly by the relevant operations personnel, environmental and social issues will form part of the agenda;
- Communication between all personnel and Senior Management will be facilitated through the appropriate reporting lines, or by using complaint and incident forms.

Environmental and Social Talk Topics

Monthly environmental and social talk topics will be compiled and distributed to relevant personnel and will be displayed on appropriate notice boards.

As a minimum, the following topics must be covered:

- Water Quality;
- Water Use and Consumption;
- Air Quality;
- Power Consumption and Energy Efficiency;
- Waste Management;
- Fauna and Flora;
- Wetlands;
- Emergency Procedures;
- Incidents Reporting;
- Systems;
- Noise;
- Heritage Impacts;
- Landowner Etiquette;
- Speed Limits;
- Health Risks (such as HIV/ Aids); and
- General Awareness (e.g. World Environment Day, National Arbour Day).

External Communication

An environmental and social forum will be developed and bi-annual meetings hosted to keep stakeholders informed of significant environmental and social aspects associated with the Proposed Project. This forum will provide stakeholders with the opportunity to raise environmental and social issues and concerns. Records will be kept of all issues raised.

General Communications

Any environmental and social issues will be communicated to and from Head Office (in terms of Divisional and Group Communication) by means of the following:

- Fax or E-mail;
- News briefs from Head Office;
- Formal meetings and workshops;
- Quarterly environmental reports; and
- Annual environmental reports.

Communication to the community, government, landowners, neighbouring farmers, environmental groups, NGOs and other stakeholders will be communicated to ensure environmental and social awareness by means of the following:

- Fax or E-mail;
- Postal system;
- Telephone;
- Formal meetings; and
- Open days.

Complaints

All environmental and social related complaints and queries will be captured on a complaint form and directed to the Environmental Coordinator for attention. The Environmental Coordinator will record all complaints in the complaints register. The Environmental Coordinator will be responsible for capturing the complaints and developing appropriate action plans.

The Environmental Coordinator will ensure that the following information is recorded for all complaints:

- Nature of the complaint.
- Causes of the complaint.
- Party/ parties responsible for causing the complaint.
- Immediate actions undertaken to stop/ reduce/ contain the causes of the complaint.
- Additional corrective or remedial action taken and/ or to be taken to address and to prevent reoccurrence of the complaint.
- Timeframes and the parties responsible for the implementation of the corrective or remedial actions.
- Procedures to be undertaken and/ or penalties to be applied if corrective or remedial actions are not implemented.
- Copies of all correspondence received regarding the complaint.

Training

It is important to ensure that all personnel, contractors and their sub-contractors have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm. As a minimum environmental training must include the following:

- Employees must have a basic understanding of the key environmental features of the site and the surrounding environment;
- Employees will be thoroughly familiar with the requirements of the ESMP and the environmental specifications as they apply to the Proposed Project.
- Employees must undergo training for the operation and maintenance activities associated with Proposed Project and have a basic knowledge of the potential environmental impacts that could occur and how they can be minimised and mitigated.
- Awareness of any other environmental matters, which are deemed to be necessary by the Environmental Coordinator.
- Training must include the environment, health and safety as well as basic HIV/AIDS education.

The following facets to training form part of the Environmental and Social Awareness Plan:

- **Induction**

  Environmental and social awareness training will be given at induction when personnel join the company and/or return from leave. Induction training will also be given to visitors entering the site.

- **Job Specific Training**

  Job specific training programmes will be developed as and when required. The programs will be based on the significant environmental and social aspects/ impacts that are identified during regular audits and site inspections.

  Supervisory staff will be equipped with the necessary knowledge and information to guide their employees on environmental and social aspects applicable to performing a specific task.

- **Competency Training**

  The Environmental Coordinator will be responsible for the environmental and social competency and awareness training of Middle Management and supervisors. This training will be performed both on a one-on-one basis and through workshops and presentations.

  Competence and the effectiveness of training and development initiatives will be determined through the following methods:

  - Trend analysis of incidents reported; and
  - Analysis of work areas during visits and audits.

  The process to declare competency of personnel is documented in the ISO9001:2000 procedure.

  This plan will be amended periodically in light of operational changes, learning experienced during its implementation and other activities that can affect the risk profiles.

- **Training Records**

Training can be done either in a written or verbal format but will be in an appropriate format for the receiving audience. Persons having received training must indicate in writing that they have indeed attended a training session and have been notified in detail of the contents and requirements of the ESMP. The attendance registers must be kept on file.

(2) Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment.

This Section details a framework outlining procedures essential for effectively containing emergency situations for the Proposed Project. The plan has been developed as per the requirements the MPRDA Regulations, Section 51(b) (iii), that require the mine to implement procedures for environmental related emergencies and remediation, and provides an outline to ensure that systems are in place to react and appropriately manage unwanted outcomes. RMC will use this framework for mitigating impacts that may be unforeseen or unidentified until construction or operation is underway, and will develop a detailed operational plan based on identified hazards.

RMC will provide appropriate resources to respond to process upset, accidental, and emergency situations for operations and activities during construction, operation and decommissioning and closure phases. The procedures will include plans for addressing training, resources, responsibilities, communication and all other aspects required to effectively respond to emergencies associated with their respective hazards.

All operations/ activities associated with the Proposed Project will require site-specific emergency response plans to mitigate impacts, which meet or exceed all applicable regulations.

The objectives of this plan are as follows:

- Protect the communities and the environment through the development of emergency response strategies and capabilities;
- Set out the framework for hazard identification in order to define procedures for response to the situations including the development of contingency measures;

- Structure a process for rapid and efficient response to and manage emergency situations during the construction, operational and decommissioning and closure phases of the Proposed Project; and
- Assign responsibilities for responding to emergency situations.

Roles and Responsibilities

With respect to this plan, RMC has the responsibility to:

- Provide emergency response services and to structure and coordinate emergency response procedures for the Proposed Project;
- Ensure that specific emergency responsibilities allocated to them are organised and undertaken; and
- Ensure that employees and contractor third parties are trained and aware of all required emergency procedures.

Emergency Communications and Coordination Plan

In an emergency situation where there is an immediate threat to communities, personnel or the environment, the Mine Manager will be notified immediately. The General Manager will dispatch the Emergency Response Coordinator who will determine the appropriate plan of action depending on the severity of the emergency, the people affected, and the need to evacuate.

If there is a developing emergency or unusual situation, where an emergency is not imminent, but could occur if no action is taken, the Mine Manager (or if the Mine Manager is absent the Environmental Manager) is to be informed immediately. Once the emergency or unusual situation has been managed, the correct incident/near miss must be reported to the General Manager.

If an emergency situation poses a direct threat to communities in the area, the Environmental Coordinator and/or Community Liaison Officer will advise persons in the vicinity of the emergency to evacuate due to the potential risk. The appropriate government authorities will immediately be notified of such an emergency evacuation. The Emergency Response Coordinator will be tasked with responding to the potential risk. Should the emergency situation be such that it can be managed by RMC, equipment and personnel will be deployed to the maximum extent necessary, so as to prevent/minimise potential risks.

Response to Incidents

An incident is any occurrence that has caused, or has the potential to cause, a negative impact on people, the environment or property (or a combination thereof). It also includes any significant departure from standard operating procedures. The reporting and investigation of all potential and actual incidents that could have a detrimental impact on human health, the natural environment or property is required so that remedial and preventive steps can be taken to reduce the potential or actual impacts because of all such incidents.

The actions resulting from any formal or informal investigations will be used to update the ESMP.

Budget for Emergency Response

Costs for emergency response and management will be included in the capital expenditure budget for the construction phase and operational budget for the operational and decommissioning phases of the proposed project.

Verification

An environmental emergency response system will be developed for the execution of emergency drills that will include the following, *inter alia*:

- Fire Drills;
- Bomb Threat Drills;
- Armed Riot Drills;
- Emergency Evacuation Drills; and
- Medical and Environmental Drills.

Reporting and monitoring requirements for the plan will include:

- Monthly inspections and audits;
- Quarterly reporting of accidents/ incidents;
- Reporting at the time of the incident and monthly spill reporting developed by the Environmental and Quality, Health and Safety departments;
- Bi-annual emergency response drills; and
- Annual reporting on training.

Emergency response drills and reporting will be maintained by the Mine Manager and will provide information regarding required revisions to training or the emergency response actions. Each incident reported will be reviewed and investigated upon occurring. Actions will be identified where possible to improve the site's overall response to emergencies.

Updates/revisions that are necessary to protect worker or community health and safety will be implemented immediately after approval by the General Manager. On a bi-annual basis, Key Performance Indicators (KPIs) will be compared against past-performance and analysed for trends to determine if there are areas for improvement. Changes because of the trend analysis and identified areas for improvement will be implemented following the project's change management system as required.

This plan will be amended periodically in light of operational changes, learning experienced during its implementation and other activities that can affect the risk profiles.

n) Specific information required by the Competent Authority

(Among others, Confirm that the financial provision will be reviewed annually).

It is thus envisaged that the following schedule be adhered to with regard to compliance monitoring and performance assessment:

- Internal monitoring of compliance with the EMP should be undertaken monthly;
- An external compliance audit should be undertaken annually;
- The revision of the rehabilitation/financial provision calculation and amount available in the Trust should be undertaken annually; and

Monitoring and performance assessment of the EMP in accordance with Regulation 55 of the MPRDA should be undertaken every two years. The revision of the financial provision will be undertaken annually.

2) UNDERTAKING

The EAP herewith confirms

a) the correctness of the information provided in the reports X

b) the inclusion of comments and inputs from stakeholders and I&APs ;X

c) the inclusion of inputs and recommendations from the specialist reports where relevant; X and

d) the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed; X

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