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DMR REFERENCE NO.: NC 30/5/1/2/2/102 MR

SHANGONI
Management Services (Pty) Ltd

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).

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IMPORTANT NOTICE

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

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

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

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

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

OBJECTIVE OF THE 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.

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Introduction

Finsch Diamond Mine is a diamond mine and is a source of large, high-quality Type II industrial and gem diamonds. The mine is located on the Remaining Extent of Portion 26 (Brits) and Portion 24 of farm Carter Block 458 in Kgatelopele Local Municipality in the ZF Mgcawu District Municipality of Northern Cape Province, 3km south west of Lime Acres. The approximate co-ordinates of the mine are 28°23'5.82"S and 23°26'35.59"E.

On 14 September 2011 Petra Diamonds (Pty) Ltd. purchased the mine as a fully-staffed, operating mine from De Beers Consolidated Mines. Finsch Diamond Mine has an approved EMPr, dated 2012, however since the approval of the EMPr, it has been identified that certain activities, commitments, mitigation measures and rehabilitation objectives are no longer aligned with activities undertaken at Finsch Diamond Mine. Therefore, this EMPr amendment is undertaken, in consultation with the DMR, to amend the following:

- *Description of the mining method*

  The approved EMPr refers to a proposed selection of mining methods as to be implemented at Finsch Diamond Mine. The selection of methods is as a result of the purchase of the mine from De Beers and the uncertainty on the best way forward. Therefore, all proposed methods were described within the EMPr and the risks and mitigation for the proposed selection were assessed within the approved EMPr. However, since the approval of the EMPr, Finsch Diamond Mine has pursued and implemented sub-level caving as the most economical and suitable method.
- *Changes in terms of procedures and practices based on legislative changes*

  The approved EMPr is outdated with regards to the reference to procedures, practices and management as implemented at the mine. Such changes include but are not limited to:
  - Waste management practices.
  - The need for an Atmospheric Emissions Licence for the operation of an incinerator at the sewage treatment facility is no longer required.
  - Dust sampling practices.
  - The expansion of Dams 1, 2 and 3 and the Brits Dam. The expansion of the facilities was described in the approved EMPr and the associated risks and mitigations measure thereto were assessed. However, the approved EMPr refers to a selection of alternative methods with regards to the expansion of the facilities. Since the approval of the EMPr, Finsch Diamond Mine has selected and implemented the most economical and suitable expansions to the facilities. It is important to note that no expansion has occurred to the approved footprint area of the facilities.
  - Waste characterisation has been undertaken and the details thereto should be included in the EMPr.
  - Changes to approved EMPr commitments based on current practices: Internal and external Environmental Legal Compliance Audits have been conducted for the mine during which it

was identified that a number of commitments within the EMPr are either not aligned with the practices as conducted at the mine or are no longer applicable.

- Changes to the rehabilitation objectives and monitoring based on the latest Rehabilitation Plan and Mine Closure Plan: In 2016, an update to the Finsch Diamond Mine's Rehabilitation Plan and Mine Closure Plan was undertaken during which it was identified that several rehabilitation monitoring objectives and commitments as per the approved EMPr are not aligned with the Rehabilitation Plan and Mine Closure Plan.

This EMPr amendment will not change the scope of the valid environmental authorisations (EMPr's) nor will it increase the level or nature of the impacts, which were initially assessed and considered when the applications were made for environmental authorisation. This EMPr consolidation includes information as contained in the approved EMPr's and where applicable, updated information has been provided.

PART A

SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1. Details and expertise of the EAP

1.1 Details of the EAP

Name of the Practitioner: Shangoni Management Services: Brian Hayes / Ashley Miller

Tel No.: (012) 807 7036

Fax No.: (012) 807 1014

E-mail address: ashley@shangoni.co.za

1.2 Expertise of the EAP.

Table 1: The qualifications of the EAP

NAME	QUALIFICATIONS
Ashley Miller	B.Sc. (Honours): Environmental Analysis and Management

Table 2: Summary of the EAP's past experience

NAME	SUMMARY OF EXPERIENCE
Ashley Miller	Ashley obtained his B.Sc. (Honours) degree in Environmental Analysis and Management through the University of Pretoria. Ashley is part of the Mining Department at Shangoni Management Services (Pty) Ltd. and has three (3) years' experience in Environmental Management Programme Reports (EMP), Environmental Impact Assessments (EIA), Scoping Reports and Basic Assessments. He also has experience in Integrated Water and Waste Management Plans (IWWMP), Integrated Water Use Licence Applications (IWULA), Water Use Licence audits as well as Environmental Management Programme Performance Assessment audits.

Detailed CV's of the EAP are attached in Annexure B.

2. Description of the property.

Table 3: Description of the property

Farm Name:	Portion 26 (Brits) and portion 34, a portion of the RE of the farm Carter Block 458
Application area (Ha)	Mining Right area: 1567.54 Ha
Magisterial district:	Finsch Diamond Mine is situated in the Kgatelopele Local Municipality, within the ZF Mgcawu District Municipality in the Northern Cape Province of South Africa.
Distance and direction to nearest town	The Finsch Diamond Mine is situated in close proximity to the following towns: Lime Acres 3 km north-east Danielskuil 30 km north-northeast Postmasburg 52 km north-west Papkuil 31 km south-east
21-digit Surveyor General Code for each farm portion	C03100000000045800026 C03100000000045800034

Figure 1 below provides the locality of the Finsch Diamond Mine in relation to the nearest towns.

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 below provides a site layout plan (including Mining Right area) of the Finsch Diamond Mine.

3. Locality map

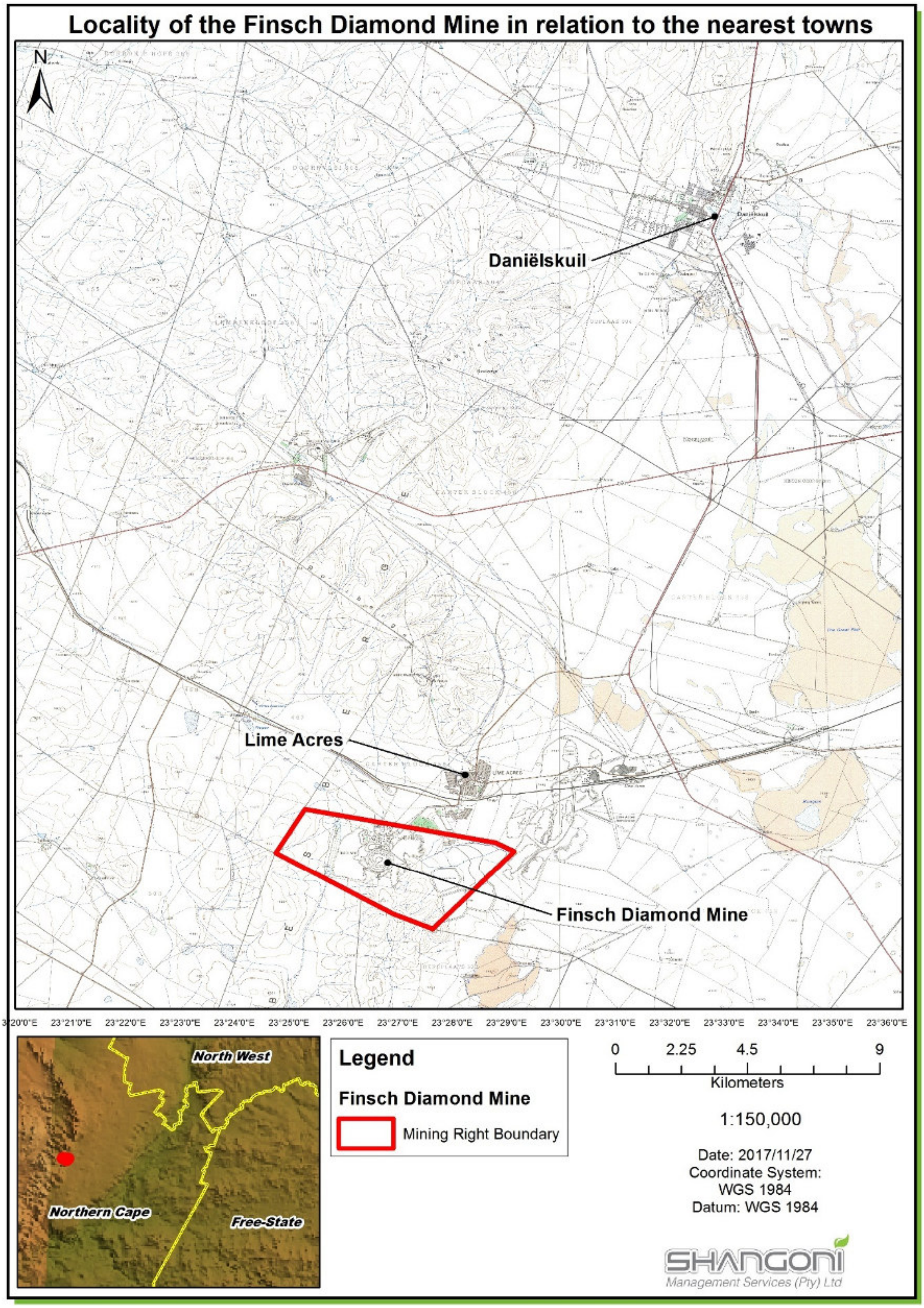


Figure 1: Locality of the Finsch Diamond Mine in relation to the nearest towns (refer also to Annexure A)

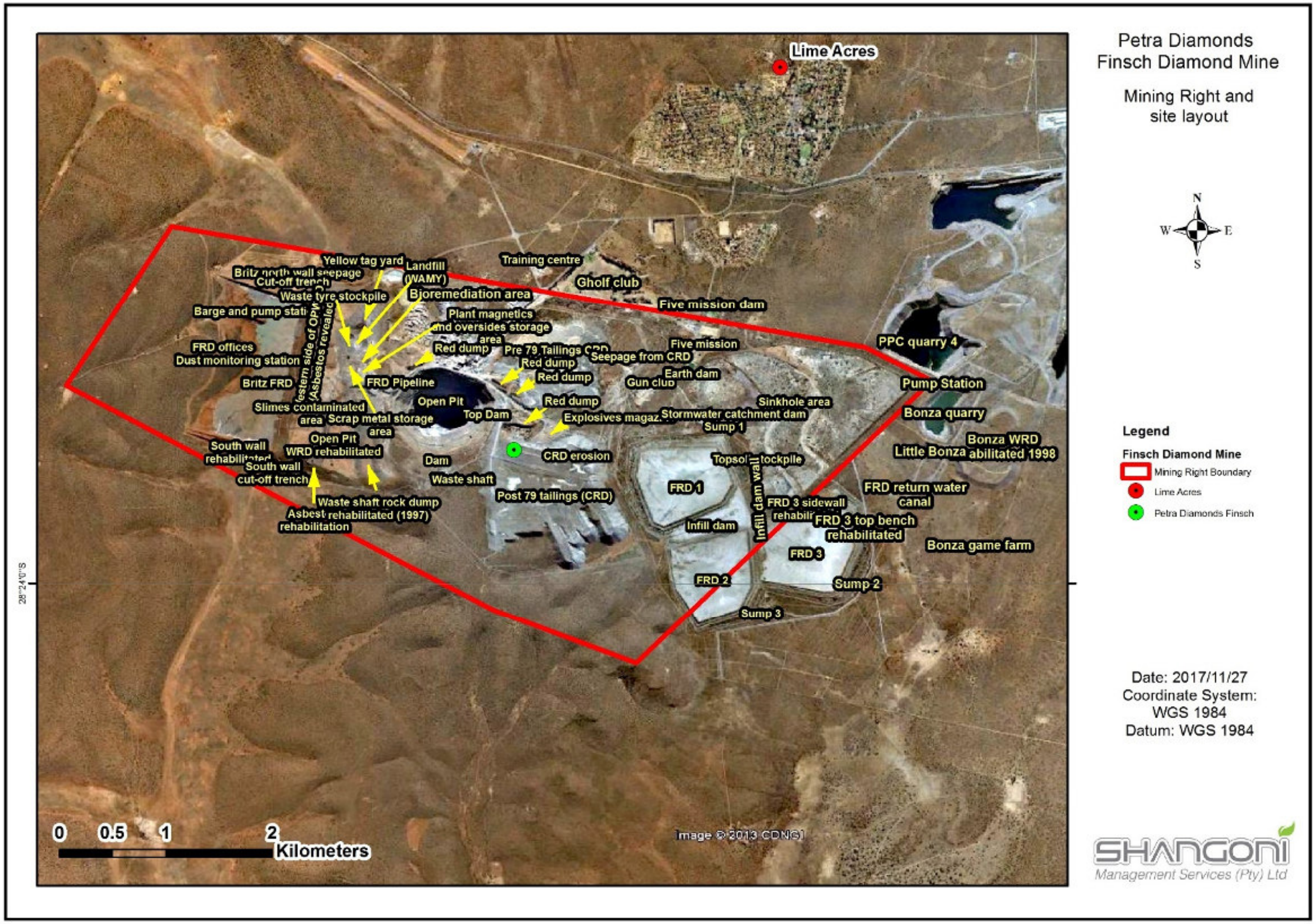


Figure 2: The Finsch Diamond Mine Mining Rights area (refer also to Annexure A)

4. Description of the scope of the proposed overall activity.

4.1 Listed and specified activities

The EIA regulations, GN R.982, GN R.983, GN R.984 and GN R.985, promulgated in terms of Sections 24(5), 24M and 44 of the NEMA and subsequent amendments, commenced on 8 December 2014. GN R.982 defines the EIA processes that must be undertaken to apply for Environmental Authorisation in respect of activities listed in GN R.983, GN R.984 and GN R.985. GN R.983 lists those activities for which a Basic Assessment is required, GN R.984 lists the activities requiring a full EIA (Scoping and Impact Assessment phases) and GN R.985 lists certain activities and competent authorities in specific identified geographical areas.

In terms of Section 39 (3)(a) and (b) of the MPRDA, read together with Regulation 50 (a) 2.5 that states the following: "*Provide a list of any listed activities (in terms of NEMA EIA regulations) which will be occurring within the proposed project*". **No listed activities have been identified as associated with this EMPr amendment (as part of the Section 102 application**), with listed activities as undertaken, and for which authorisations have already been obtained under the existing approved EMPr.

Table 4 below provides a list of activities as undertaken at Finsch Diamond Mine.

Table 4: Activities and listed activities associated with the proposed development

<table>
<tr><th>NAME OF ACTIVITY</th><th>ARIAL EXTENT OF ACTIVITY
Ha or m²</th><th>LISTED ACTIVITY
(mark with X)</th><th>APPLICABLE LISTING NOTICE
(GNR 983, GNR 984 or GNR 985)/NOT LISTED</th></tr>
<tr><td>The following activities take place during the Operational Phase at Finsch Diamond Mine:
• Mining and related activities:
  • Extraction of kimberlite ore from the Finsch underground workings.
  • The pumping out of water accumulating at various underground levels.
  • Transport of the kimberlite ore to the plant.
  • Reprocessing (Pre-79 CRD, Red Dumps and Post-79 CRD).
  • Disposal of coarse mining waste and slimes (CRD and FRD facilities).
  • Operation of the shafts (including ventilation shafts) and the plant.
  • Utilisation of waste rock dumps.
• Utilisation of infrastructure:
  • Utilisation of pollution control measures, e.g. the pollution control dams, return water dams, as well as storm water management measures, e.g. trenches.
  • Utilisation of ablution facilities, offices and workshops.
  • Utilisation of sewage treatment works.
  • Utilisation of bulk fuel and lubricant storage.
  • Utilisation of waste management facilities (including bioremediation facility).
  • Operation of landfill.
  • Utilisation of conveyors and roads.
  • Concurrent rehabilitation of areas that has been deemed as final footprint.</td><td rowspan="2">1567.54 Ha</td><td rowspan="2">No new listed activities triggered</td><td rowspan="2">Not applicable</td></tr>
<tr><td>The following activities are expected to impact on the surrounding environmental aspects, and are anticipated to take place during the Decommissioning Phase:
• Removal of infrastructure.</td></tr>
</table>

NAME OF ACTIVITY	ARIAL EXTENT OF ACTIVITY Ha or m²	LISTED ACTIVITY (mark with X)	APPLICABLE LISTING NOTICE (GNR 983, GNR 984 or GNR 985)/NOT LISTED
• Ripping and removal of haul road material, as well as removal of redundant infrastructure such as the plants, workshops, conveyors, other buildings (e.g. offices), depending on the post-closure land use. • The demolition of redundant concrete structures. • Restoration of disturbed areas. • Rehabilitation of waste dump sites (in situ rehabilitation of, as well as the rehabilitation of the remaining footprints of waste dumps that will be removed / re-treated). • Clearing of stockpile areas. • Shaping of rehabilitated areas, including the dams and remaining permanent tailings resources that are not reclaimed. • Operation and maintenance of remaining pollution management measures, depending on the long-term water management strategy. • Placement of topsoil (if required). • Planting of vegetation. • Monitoring and reporting. • Stabilising and remediation of the affected areas. • Maintenance of rehabilitated land until Closure is obtained.			

4.2 Description of the activities to be undertaken

4.2.1 History and prior ownership

Finsch Diamond Mine is a source of large, high-quality Type II industrial and gem diamonds. The mine is located on the Remaining Extent of Portion 26 (Brits) and Portion 24 of farm Carter Block 458 in Kgatelopele Local Municipality (KLM) in the ZF Mgcawu District Municipality of the Northern Cape Province, 3 km south west of Lime Acres. The approximate co-ordinates of the mine are 28°23'5.82"S and 23°26'35.59"E.

Diamonds were first discovered on Brits in 1930 by HS Richter. In 1956 Danie de Bruin obtained a licence to prospect for base minerals. His rights were transferred to Thorny Fincham, although it was only in 1959 that the claims were worked by Willie Schwabel. After a year Schwabel's option on the claims lapsed, but he and Fincham then formed the Finsch Base Minerals Company.

It was still not possible to prospect for diamonds on the property due to it being state owned land. The law was changed to allow for the prospecting for precious stones on state land. Brahm Papendorf became the third partner in the company, and the company was called Finsch Diamonds. The Finsch Kimberlite Pipe was discovered in 1960.

In 1962 De Beers obtained an option to prospect on the land. In 1964 waste stripping commenced and a treatment and recovery plant was erected adjacent to the pipe. Full production commenced in 1967. De Beers eventually bought the mine from the South African Government by Certificate of Consolidated title no. 20288/1929 in 1967 (Deed of Transfer T1033/1967), and the mine was officially opened. Additional areas, such as the Single-Quarter and Five Mission were bought in 1970 (Deed of Transfer T 24/1970). The adjoining Bonza Farm (Portion 27 of Carter Block 458) was bought by De Beers from Andries Fritz Coetzee on 5 February 1969 (Deed of Transfer T55/1969).

The original plant was built in 1964. The first upgrade was completed in 1980, whereby underground operations commenced in 1990. Sinking of the main shaft to access the mine from underground started in 1978. Two vertical shaft complexes, tunnels and ground handling infrastructure were prepared for the continuing exploitation of the pipe with the use of highly mechanised mining methods. The open pit mining ended in 1992 and was succeeded by the commencement of underground operations in 1992. The pre-1979 coarse residue deposit (CRD) retreatment was introduced in 2003. The treatment plant upgrade took place between March 2003 and August 2008.

On 14 September 2011, Petra Diamonds (Pty) Ltd purchased the mine as a fully-staffed, operating mine from De Beers.

4.2.2 Mineral to be mined

The mineral mined has been classified as follows in accordance with the Department of Mineral Resources (DMR) classification.

Table 5: Mineral classification

Code	Mineral	Type
Dia	Diamond	Diamond
Da	Diamond (alluvial)	Diamond
D	Diamond (general)	Diamond
Dk	Diamond (in kimberlite)	Diamond

4.2.3 Description of the main mining activities and processes

4.2.3.1 Mining method

Production from Block 4 on the 630 meter level (mL), has come to an end as all draw points are depleted and the entire block 4 pillar footprint mined out. Subsequent to the depletion of Block 4, underground production are derived principally from Block 5, a new ore block beneath the mined out block 4, which has probable diamond reserves of 25.3 Mcts at a grade of 58.6 cpht. In order to provide earlier access to undiluted ore in Block 5 before the main block cave is put in place, Finsch Diamond Mine will use the sub-level cave (SLC) mining method over four levels in Block 5 from 700 mL to 780 mL and is currently ramping up the underground operation to achieve steady state throughput of 3.0Mtpa from FY 2019. The new Block 5 cave will then be installed at 900 mL.

In addition to underground mining, the 'Pre-79 Tailings' dump is also treated at Finsch Diamond Mine. Tailings throughput is planned to come to an end after FY 2018 when this dump is depleted where after the additional tailings dumps at the mine, will be retreated.

4.2.3.2 Ore Processing

Treatment process

The treatment process used at the mine consists of various stages. These stages are discussed below. All stages are closely interlinked with one another, but have surge capacity in the form of silos or storage bins in order to provide steady state operations.

<u>Ore preparation by crushing, washing and screening in order to size the material for further treatment:</u>

- A variable speed apron feeder below the shaft bin feeds ore 300 mm in size onto an incline conveyor, which transports it to the crusher.
- A conveyor then feeds the 300 mm material into the gyratory crusher where it is reduced to 100 mm.

- An apron feeder, situated immediately below the crusher, discharge the sized material onto a conveyor which runs along the length of the stockpile building.
- A belt feeder feeds from the overspill bin and transfers it via conveyors and the tripper to a buffer stockpile should stacking be required.
- From an apron feeder, the ore is fed via conveyors to the scrubbers.
- The two scrubbers receive feed via a split chute to give equal feed to each scrubber.
- The water supply to the scrubber section is drawn from the Clarified water tank at C, E & D thickeners and is pumped to the scrubber clarified head tank.
- The scrubbed ore is discharged onto two double deck primary screens.
- The oversize product from the top and bottom decks is transported to the secondary crusher's feedbin by conveyors. The ore gets crushed and screened. The oversize (+22) reports to the tertiary crushers by conveyors and the undersize (-22) gets conveyed to the wet screens. The tertiary crusher section crush and screen the ore again and the oversize reports back to the tertiary crushers until the desired size are reached were it then gets conveyed to the wet screens. Screening takes place at the wet screens and the +1 material reports to the feed separation section via conveyors. The -1 material reports to the screen underpan where it gets pumped to degrit cyclones for classification. The cyclone overflow gets re-used in the wetscreen system and the underflow will report to a sump where it gets pumped to the FOS section to remove grid.
- The oversize product 22 +1mm is discharged onto conveyors feeding to the feed separation.
- The feed separation sizes the ore into coarse and fines fractions. The undersize reports to the underpan where it gets pumped to the FOS section for dewatering. The fines fractions reports to B and C silos via conveyor and the coarse fractions reports to A silo via conveyors.

<u>Concentration of the sized material and preparation by means of dense media separation (DMS):</u>

- The feed (- 22mm +12mm) from A silo reports to the Coarse DMS via conveyors.
- The 3 Feed preparation screens for the Coarse DMS receives ore from A silo. The screens wash out the -1mm fracture which gets pumped to G Thickener.
- The CDMS receives its water from the DMS Clarified and G Thickener.
- The Fines DMS feed preparation plant receives ground from the B and C silos and performs a wet screening operation to remove the –1mm material
- All the water and -1mm ore that passes through the screen deck is pumped by the degritting cyclone feed pumps to the degritting cyclones.
- The feed preparation receives its water supply from the raw water head tank at the DMS pump house and is pumped to the head tanks in the feed preparation building.
- The + 1mm report to the Fines DMS.

<u>Fines DMS:</u>

- The Fines DMS receives ore from the Feed Prep section via conveyors.

- The ore is fed out of 8 x 100 t bins with belt feeders into mixing boxes. In the mixing box, the ore gets mixed with FeSi and feeds down to the cyclones.
- The underflow/concentrate of the cyclone reports to the sink screen and the overflow to the float screen. On the screens FeSi drains from the ore and concentrate.
- The ore and concentrate also gets washed to ensure all FeSi are recovered.
- The concentrate reports from the sink screen via conveyors to the recovery for sorting.
- The float screen splits the feed into 2 size fractures. The oversize (+8mm) reports to the HPRC crushers via conveyors for recrushing. The undersize (-8mm +1mm) reports to the coarse residue section via conveyors. The fines fracture (-1mm) gets washed to the Dilute Sump from where it gets pumped to the Magsep to recover the FeSi and dispose of the fines via a launder to G Thickener.
- The Fines DMS receives water from the DMS Clarified and G Thickener.

<u>Coarse DMS:</u>

- The ore is fed from the feed prep screens into mixing boxes. In the mixing box the ore gets mixed with FeSi and gets pumped to the cyclones.
- The underflow/concentrate of the cyclone reports to the sink screen and the overflow to the float screen. On the screens, FeSi drains from the material.
- The material also gets washed to ensure FeSi are recovered.
- The concentrate reports via a sink screen to the recovery.
- The float screen oversize (-22mm + 8mm) reports to the HPRC crushers via conveyors for recrushing. The fines fracture (-1mm) gets washed to the dilute sump from where it gets pumped to the Magsep to recover the FeSi and dispose of the fines the effluent pump to the launder and G Thickener.
- The coarse DMS receives water from the DMS Clarified and G Thickener.

<u>HPRC:</u>

- The HPRC crushers receive the oversize from the fines and coarse DMS and crush the material.
- The crushed material reports the HPRC scrubbers.
- The screen sizes the ore into +12 mm, which reports to A silo via conveyors and +1 mm – 12 mm, which reports to B and C silo via conveyors.
- The fines (-1 mm) reports to the screen underpan and gets pumped to the FOS section for dewatering.

<u>FOS and Thickeners:</u>

- The FOS plant receives all undersize (-1 mm) from the plant via pumps to the FOS Header Tank.
- The header tank feeds degrit cyclones.
- The underflow, which is the coarse fracture, reports to screens for dewatering.
- The overflow of the cyclone reports to the thickener.

- The screen over size (+ 0.5 mm) reports to the coarse residue deposit via conveyors.
- The thickeners receives degrit cyclone overflow material and the screens underpan material. Flocculent is added to the slimes to improve settling rate.
- The fine residue will settle in the thickener and pumped to the Fine Residue deposit
- The clean water will overflow to the clarified and will be reused in the different plant sections.

Outside dams:

- Water from the FRDs is pumped back into the plant circuit by using the Brits Return and Top Dams.
- The Earth Dam delivers the water to the Top Dam and water from FRD1, 2, 3 and Infill discharges into Earth dam.
- The Bottom Dam receives water from Vaal – Gamagara,Bonza Quarry and excess water from underground and supply the main plant with water.
- Some storm water reports to the Five Mission Dam and gets pumped to the Earth Dam.

Mining operations of the BSP:

- A mobile screening unit is used to re-process and screen the Red Dump tailings stockpiles in order to remove the oversize material (+65mm).
- The undersize product (-65mm) from the mobile screening unit is loaded onto ADT haul trucks using Front End Loaders and transported to the Bulk Sampling Plant (BSP).
- The Mobile screening unit can be relocated to various sites on the Red Dump facility depending on the mining site, ensuring a continuous supply of Red Dump material to the BSP.

Treatment process of the BSP:

Primary ore circuit:

- The ADT haul trucks tip the undersize product into three respective head feed bins.
- Conveyors feed the material from the feed bins into the scrubbers, each fitted with a trommel screens on the discharge end, at an average feedrate of 45 tph.
- The oversize product from the trommel screens (-65 +22mm) is discharged onto conveyors feeding the scalping screen.
- The scalping screen oversize product (-60 +35mm) is stockpiled and discarded using ADT haul trucks.
- The scalping screen undersize product (-35mm) is discharged into feed bins to be fed to the downstream VSI crushing circuit.
- The undersize product from the trommel screen (-22mm), combined with slurry from the scrubber, is discharged onto dewatering screens where washing and dewatering takes place.
- The oversize material from the dewatering screens (-22 +1mm) is discharged onto conveyors feeding the sizing screens.
- The undersize material from the dewatering screens (-1mm) reports to an underpan where it is pumped to the de-grit section.

- At the sizing screens, the material is separated into three streams, the oversize material from the primary sizing screen top deck (-22 +8mm), the oversize material from the primary sizing screen bottom deck (+8 -4mm) and the oversize material from the secondary sizing screen (-4 +1mm). Each stream is deposited onto individual conveyors and transported to rotary pans for re-concentration.
- The undersize material from the secondary sizing screen (-1mm) reports to an underpan and is pumped to the de-grit section.
- At the de-grit section, the -1mm slurry is fed to de-grit cyclones. The particles in the slurry are discharged, through the spigot, onto a dewatering screen.
- On the dewatering screen the excess water is drained into the underpan. The oversize material from the dewatering screen is then deposited onto conveyors and stockpiled as tailings material.
- The fine residue fraction (effluent) from the hydrocyclones is discharged through the overlow into the underpan. The collective effluent in the underpan is then pumped to the Main Plant FOS section.
- At the rotary pans the concentrate material is removed through tappers and deposited onto conveyors before reporting to a washing screen.
- The oversize material from the washing screen (-22 +1mm) is discharged onto conveyors feeding the Dense Medium Seperation (DMS) feed bin.
- The undersize material (-1mm) from the washing screen reports to an underpan and is pumped to the secondary sizing screen.
- From the DMS feed bin, a vibrating feeder deposits the material onto a pipe conveyor which deposits the material onto the DMS prep screen for further washing. The oversize material from the DMS prep screen is discharged into a mixing box where the ore is mixed with Ferrosilicon (FeSi) and pumped to the DMS cyclone.
- The underflow/concentrate from the DMS cyclone reports to the sink screen and the overflow/tailings to the float screen.
- On the first half of both the sink- and float screens, FeSi is drained from the ore and concentrate into the correct medium sump, and recycled back to the mixing box. On the latter half of the screens, the ore and concentrate is washed to ensure all excess FeSi is recovered into the dilute medium sump.
- The dilute FeSi mixture is pumped to a pipe densifier and counter current magnetic separator to recover the FeSi and deposit in into the correct medium sump.
- The concentrate from the sink screen is pumped to the recovery via jet pump and pipeline.
- The tailings from the float screen is deposited onto conveyors and stockpiled.
- At the rotary pans the tailings material is removed through the centre overflow weir and deposited onto dewatering screens where the porrel (density medium for the rotary pans) is drained and reports to an underpan before being recycled.
- The oversize material from the dewatering screens is deposited onto conveyors and stockpiled as tailings material.

Re-crush circuit:

- As previously mentioned, the scalping screen undersize product (-35mm) is discharged into feed bins to be fed to downstream VSI crushers.
- After crushing, the ore is deposited onto a double deck sizing screen.
- The undersize material (-1mm) reports to an underpan and is pumped back to the scrubbers and used as wash water.
- The oversize material from the crusher sizing screen top deck (-16 +4mm) is conveyed to the Coarse BV feed bin. The oversize material from the crusher screen bottom deck (-4 +1mm) is conveyed to the Mids BV feed bin.
- The concentrate is separated from the BV feed material using x-ray illumination and deposited into the Flow-Sort feed bin along with the process water used in the BV machines.
- The tailings material on the other hand is deposited onto conveyors and stockpiled as tailings material.
- At the FlowSort machines, the diamonds is separated from the concentrate and stored in steel pots. The process water drains through the pots and reports to a collection sump.
- The tailings material is deposited onto a dewatering screen.
- The oversize material from the FlowSort dewatering screen is conveyed and stored in a tailings bin.
- The undersize material from the FlowSort dewatering screen also reports to the collection sump before all the process water is recycled back to the top deck of the crusher sizing screens.

Fines recovery circuit:

- The concentrate material is pumped from the DMS section and deposited onto the recovery dewatering screen.
- The transport water is drained from the concentrate and reports to an underpan before being recycled back to the DMS jet pump.
- The oversize material from the recovery dewatering screen is deposited into the recovery feed bin.
- A vibrating feeder deposits the material onto a sizing screen, which is divided into three sections.
- In the first section, the -20 +6mm concentrate is fed to the Flow sort 534 X-Ray machine. In the middle section, the -6 +4.5mm concentrate is fed to the Flow sort 179 X-Ray machine. Lastly the -4.5 +1mm concentrate is fed o the DebTech X-Ray machine.
- After separation, the final concentrate from all three X-ray machines reports to an Eriez drier.
- The dried concentrate is then deposited onto a perm roll conveyor where the magnetic material is separated and deposited onto conveyors before being stockpiled as tailings material.
- The non-magnetic concentrate and diamonds from the perm roll are deposited into pots and stored for final sorting in the Main Plant Recovery.

- The tailings material along with the process water used in all three the x-ray machines are deposited onto a final dewatering screen. The undersize material from the final dewatering screen reports to a collection sump before being recycled back to the DMS washing screen.
- The oversize material from the final dewatering screen in deposited onto a conveyor and stockpiled as tailings material.

Mining operations of WIFS:

- Material from the Pre-79 tailings stockpiles is loaded onto ADT haul trucks using Front-End loaders and Excavators.
- The ADT haul trucks tip the tailings material into a feed bin.

Treatment process of the WIFS:

- Tailings material from the feed bin in conveyed and deposited onto the primary washing screen before wash water is added from the clarified sump.
- The primary washing screen oversize product (+20 mm) is stockpiled and discarded using ADT haul trucks.
- The primary washing screen undersize product (-20mm) and wash water reports to an underpan.
- From here the undersize material is pumped to the secondary screening section using two respective pipelines, each equipped with 4 pumps operating in series.
- The material is then deposited onto two respective secondary dewatering screens before wash water is added from the clarified sump.
- The secondary dewatering screens' undersize product (-1 mm) and wash water reports to respective underpans where it is pumped to the Main Plant FOS section for further treatment.
- The secondary dewatering screens' oversize product (-20 +1 mm) from both screens is deposited onto a conveyor before being stockpiled adjacent to the Main Plant area.
- A vibrating feeder, situated in an underground tunnel below the stockpile, is used to withdraw the stockpiled material and deposit it onto a conveyor.
- From here the material is conveyed and deposited onto 220-18 conveyor, where it joins up with head feed material from the Main Plant processes.

4.2.3.3 Plant residue

All material processed in the plant is disposed of either as the coarse or the fine fraction. The fine fraction, which is the thickener underflow product, is pumped to the fines residue dams (FRDs) as slurry in pipelines and the coarse fraction is conveyed in a semi-dry state to the deposit to the coarse residue deposits (CRDs). The average proportion of the head feed treated reporting to the CRD as coarse waste is 42% (based on 2003 to present figures) and the remainder to the FRDs.

Plant residue at the mine can be categorised as follows:

- FRD: The fine residue from the process plant (-0.5 mm) produced as thickener underflow and delivered as slurry to the fine residue dams.
- CRD (coarse residue and grits): The coarse residue from the DMS section screened out as the – 6 mm fraction, and the grits from the degrit section screened out as the + 0.5 – 1.6 mm fraction, and delivered to the CRD by conveyor belt.

Fine residue dams

Finsch Diamond Mine operates the following FRDs:

- FRD paddock
    - The decommissioned FRD paddocks are located east of the mine and occupy an area of 105 ha and a volume of 5,432,907 m³.
    - These paddocks are decommissioned and in the process of being rehabilitated.
- FRD No.1
    - This FRD is located southeast of the mine.
    - Occupies a surface area of 58.8 ha.
    - This FRD is a permanent structure.
    - The residue is delivered in a slurry form to the deposit (49% moisture content).
    - Maximum elevation of 1515 metres above mean sea level (mamsl).
    - Surrounding the deposit is a ring main, with rising mains to the delivery station.
    - The slurry (fines) was deposited on the outer wall using techniques developed to suit the residue properties.
    - Return water from the slurry flows to the pool on the deposit.
    - The water is then decanted in a controlled manner.
    - Decanted water is passed into Earth dam via a sump and pumped to the plant for re-use in the process.
    - The required freeboard on the slimes dam is maintained.
    - No underdrains are in operation at the FRDs.
    - A solution trench surrounds the entire deposit and collects all bench penstock water, drains outflows and dirty storm water and leads it to the return water dam.
    - Paddocks are provided at the toe of the wall to collect and contain runoff water and eroded solids within the confines of the deposit.
    - Benches were constructed at regular intervals on the outer face of the wall to ensure a stable outer face and to control water runoff and erosion.
- FRD No.2
    - This FRD is located southeast of the mine.
    - Occupies a surface area of 56.86 ha.
    - This FRD is a permanent structure.
    - Maximum elevation of 1509 mamsl.

    - Operation the same as FRD No.1
- FRD No.3
    - This FRD is located southeast of the mine.
    - Occupies a surface area of 74.95 ha.
    - This FRD will be a permanent structure.
    - Maximum elevation of 1491 mamsl.
    - Operation the same as FRD No.1
- Infill FRD
    - This FRD is located between FRD1 and FRD2.
    - Occupies a surface area of 17.26 ha.
    - Maximum elevation of 1502 mamsl.
    - This infill FRD is a permanent structure.
- Brits FRD
    - This FRD is active.
    - The FRD is located adjacent to the current WRD that is located in a historical paleo channel, within the mining rights area.
    - The FRD will be 133 ha in size.
    - Maximum elevation of 1528 mamsl.
    - Deposition rate is 14,400,00 tons (8,000,000.00 m^3)per annum.
    - Operation is the same as other FRDs.

Coarse residue deposits

Finsch Diamond Mine operates the following CRDs:

- Old pre-1979 CRD
    - The CRD has a total footprint of 55.0 ha.
    - The CRD is inactive and being reprocessed.
- Post-1979 CRD
    - Portions of the CRD are active.
    - Situated to the south east of the main pit area.
    - The CRD has a current footprint of 118 ha and will have a final footprint area of 170 ha.
    - Average deposition rate is 3,300,00.00 tons (1,833,333 m^3) per annum.
    - Max elevation of 1,598 mamsl.
    - Coarse residue is delivered with average moisture content of approximately 18% using conveyers to the coarse residue resource.
    - The residue is deposited at its natural angle of repose.

Refer also to Figure 3 and Figure 4 for the plans presenting the Finsch Diamond Mine residue deposits and stockpiles.

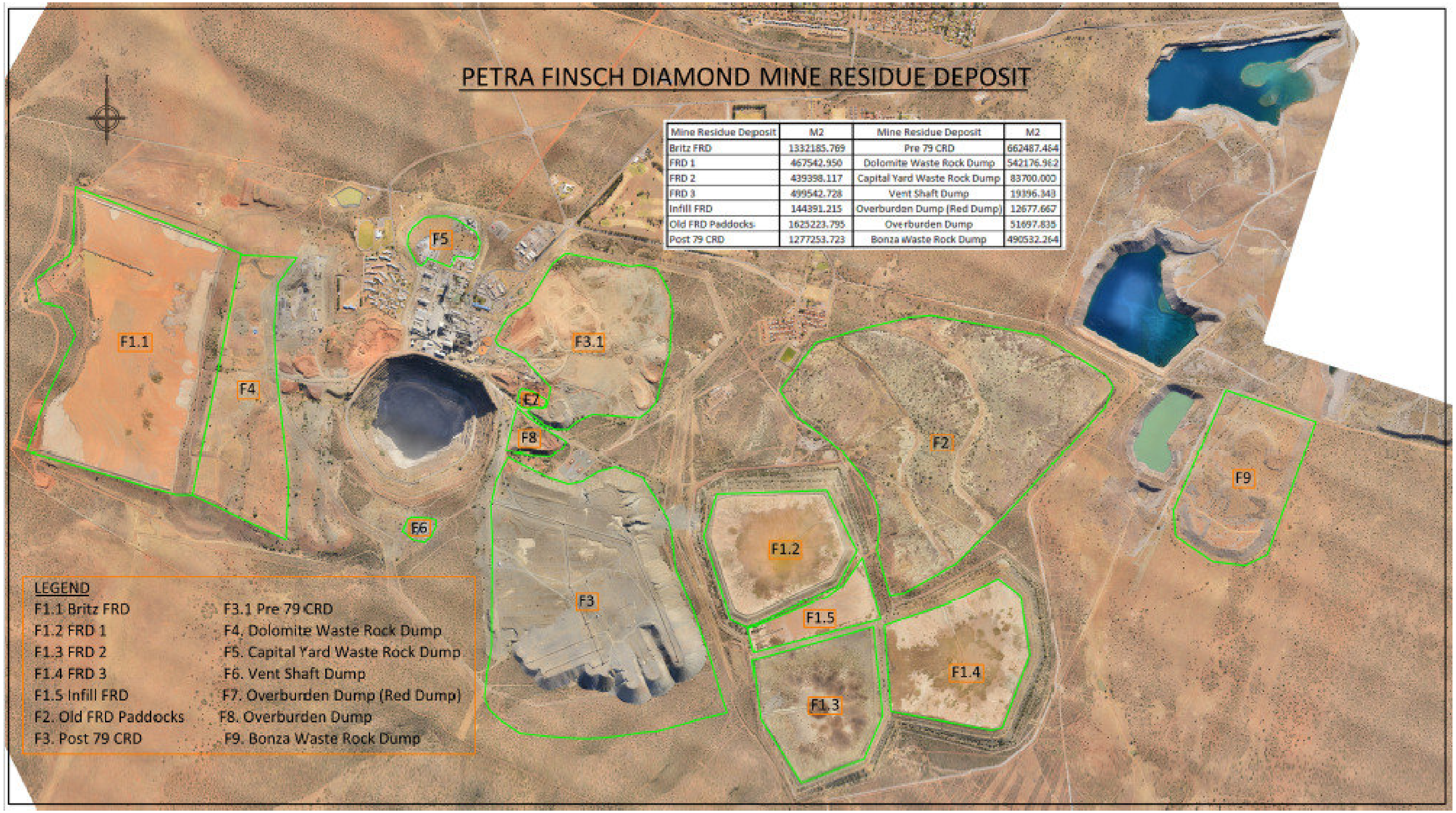
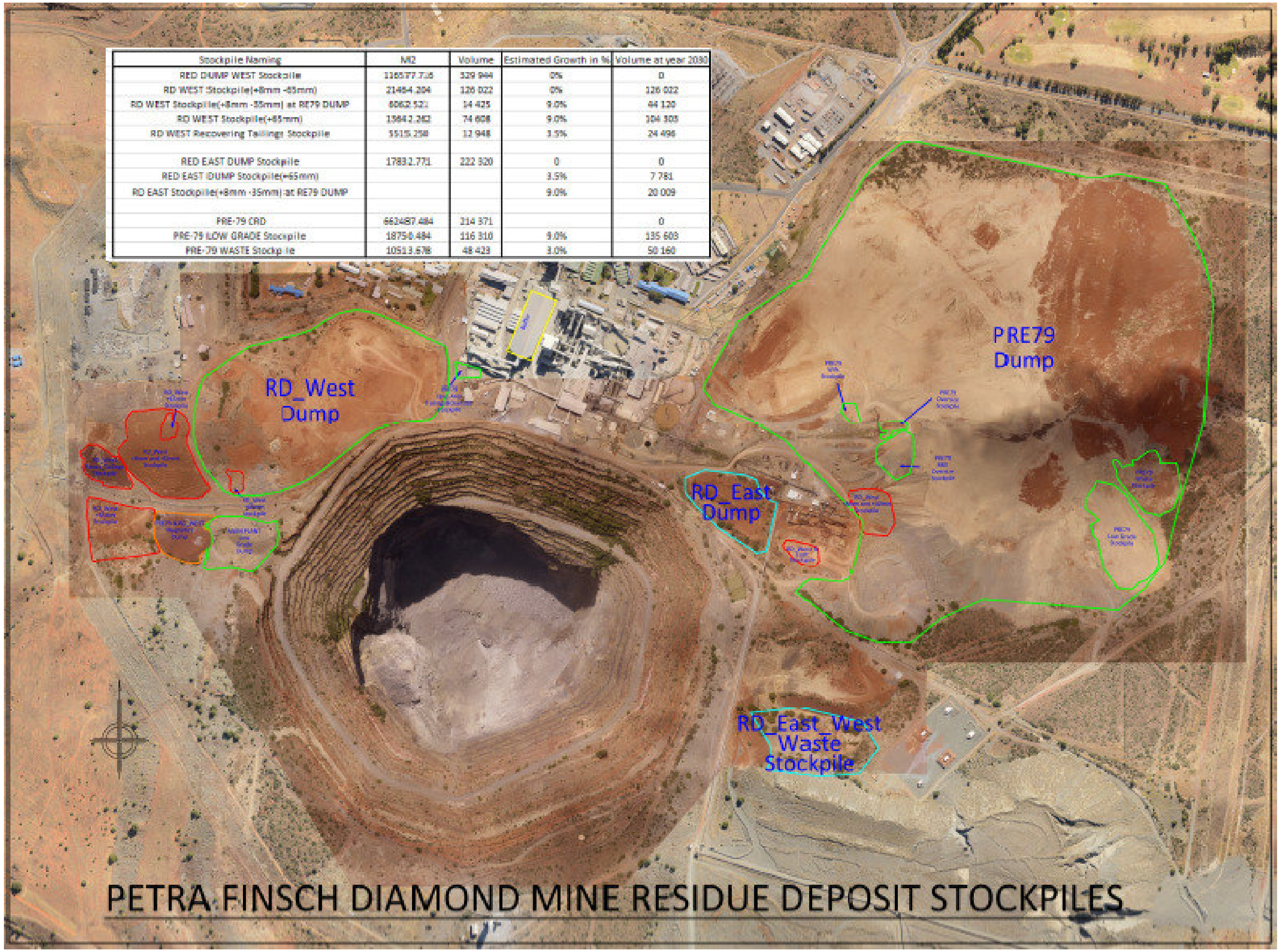


Figure 3: Plan presenting the Finsch Diamond Mine residue deposits



Stockpile Naming	M2	Volume	Estimated Growth in %	Volume at year 2030
RED DUMP WEST Stockpile	116577.716	329 944	0%	0
RD WEST Stockpile(+8mm -65mm)	21464.204	126 022	0%	126 022
RD WEST Stockpile(+8mm -35mm) at RE79 DUMP	6062.521	14 425	9.0%	44 120
RD WEST Stockpile(+65mm)	15842.262	74 608	9.0%	104 305
RD WEST Recovering Tailings Stockpile	5515.258	12 948	3.5%	24 496
RED EAST DUMP Stockpile	17832.771	222 320	0	0
RED EAST DUMP Stockpile(+65mm)			3.5%	7 781
RD EAST Stockpile(+8mm -35mm) at RE79 DUMP			9.0%	20 009
PRE-79 CRD	662487.484	214 371		0
PRE-79 LOW GRADE Stockpile	18750.484	116 310	9.0%	135 603
PRE-79 WASTE Stockpile	10513.678	48 423	3.0%	50 160

Figure 4: Plan presenting the Finsch Diamond Mine residue deposit stockpiles

4.2.3.4 Run of Mine

Run of Mine ore at Finsch Diamond Mine is transported to and stockpiled on the Buffer Stockpile, which is the main ore stockpile.

4.2.3.5 Dust plants

Finsch Diamond Mine operates ten dust plants. These plants are located at the following areas:

- Near tailings reception bin;
- Shaft bin area;
- Gyratory crusher area;
- Cemented area on south side of building;
- Behind overspill bin transfer house;
- 103/112/11318 transfer house;
- West side of SCS;
- At SCS transfer house area;
- Outside recovery building; and
- Outside recovery building.

4.2.3.6 Linear activities: Ore transport

Ore produced underground is transported by the rock hoist to surface and is tipped directly into a surge bin at the shaft.

The mine is traversed with cement, gravel and dirt roads. The majority of the roads on the site are cement surfaced. Unpaved, dirt roads include the section of road from the main shaft to the shaft electrical workshop up to the jaw crusher, and the Pre-1979 CRD roads. The roads used to reach the Pre-1979 CRD are gravel roads.

4.2.3.7 Ore Transport off-site

The mine is served by a private airstrip, shared by Finsch Diamond Mine and PPC Lime Acres, located 1 km to the northwest of the mine. The facility is managed by Finsch Diamond Mine, while the land belongs to PPC. There is also a helipad on site used for the collection of product. This is situated at the recovery section of the plant.

4.2.3.8 Water management

Groundwater

Groundwater in the underground working reports to the underground sumps (dams) 1, 2, 3 and 4 on 68-level. The mine affected water is then abstracted from these underground sumps (dams) and re-used in the process.

As the mine extends downwards, groundwater drains into the excavations. In order for mining to proceed, this water must be pumped out of the excavations. Currently this water is pumped to underground sumps on 68 level and 88 level. From here the water is either used underground or pumped to the surface Bottom Dams where it enters the closed water reticulation system of the mine as process water. The pump is situated on 70 level.

Storm water

The information contained in this section of the document is extracted from the following reports:

- "*Petra Diamonds (Finsch), Storm Water Management Plan Update*" dated January 2014 and compiled by Shangoni Management Services (Shangoni, 2014). The conceptual Storm Water Management Plan (SWMP) Update report is attached hereto as Annexure C1.
- "*Petra Diamonds Limited, Group Water Management Strategy*" dated May 2017 and compiled by Shangoni Management Services (Shangoni, 2017).

As part of the conceptual SWMP, each management area at the Finsch Diamond Mine operation is discussed by indicating the main drainage philosophy anticipated using contour data and the current / proposed runoff control strategies. The location as well as direction of clean and affected runoff is indicated in the SWMP. A detailed description of the storm water environment, and the measures to control clean runoff and retain affected runoff is also provided in the discussion tables using the maps as reference. Refer to Part 3 of the SWMP (attached hereto as Annexure C1) for a detailed description of the storm water management to be employed at the Finsch Diamond Mine.

Due to the dolomitic nature of the underlying geology and generally flat topography recharge of the aquifer/s at Finsch Mine will be high. The low rainfall received for the area and the absence of natural rivers/streams located in close proximity of the mine, implies that the impact with regards to surface water, acting as a pathway for contamination and effecting the surface water receiving environment or surface water receptors, is low to negligible.

Refer also to Chapter H of Section 7.4.1 below for a description on surface water aspects.

Process water

A volume of 3,960,000 m³ per year of water is used in the plant. The plant operates 24 hours per day for 365 days of the year. Process water supplied to the plant is used to make up that portion of water which is lost to infiltration and evaporation through fine and coarse residue and is therefore not returned to the raw water system. The water used in the process is obtained from the major sources as listed below:

- Mine affected water from the Bonza Quarry, which is pumped from the adjacent PPC Quarry 4:
  - The mine use the Bonza Quarry as a water source when available. The mine also uses potable water to make up the treatment water supply.
- Treated potable water from the Vaal–Gamagara Water Scheme:
  - The mine obtains water from the Vaal–Gamagara Water Scheme for make-up water in the process. A volume of approximately 0.45 m^3 of clean water from the Vaal–Gamagara Pipeline is required per tonne of ore processed. No.1 Incoming line [Vaal-Gamagara (VG) 1 / DB1] supplies water to Bottom Dam.
- Treated effluent water from the Domestic Wastewater Care Works:
  - Treated effluent from the Domestic Wastewater Care Works is currently pumped into the Earth Dam from where it enters the process water system.
- Contaminated storm water runoff from the residential areas as well as storm water runoff from the mining area:
  - Affected storm water from the surface of the mining area is diverted to the Five Mission Dam where it enters the process water system.
- Mine affected water from the underground workings at the mine:
  - The groundwater ingress into the underground mining operation as well as accumulated rainwater within the pit is pumped from the four underground sumps into the surface storage facilities (Bottom Dams) for re-use in the process.
- Water obtained from boreholes
  - This category of inflows has been included for the sake of completeness, as no water is currently obtained from boreholes for augmentation of the raw water supply.
- Plant effluent (recycle overflow)
  - All water used in the plant is recycled for re-use; the consumption by the plant being used to "top-up" that portion of water that is removed in either fine residue or coarse residue. The water for treatment and re-use is discharged to Streichers Dam. Overflow from this small silt control dam is discharged into a concrete channel that bypasses the Bottom Dam and discharges into Five Mission Dam. Most of the plant effluent is washed down and reports as surface runoff to either the Streichers Dam (western portion of plant area). On the eastern site of the mine, the water goes via Fyndraai channel to a storm water channel outside the mine after is passes a silt water trap. From both of these facilities, water is channelled via concrete channels to the Five Mission Dam. Spillages from the thickeners and the pipelines leading from them toward the FRDs are mostly contained on the paved or channelled surfaces of the plant area, following the storm water route via either the Streichers or Fyndraai channel to the Five Mission Dam.
- Old FRDs runoff

    - A solution trench surrounds the entire deposit and collects all bench penstock water. Decanted water from the old FRDs is pumped to Earth Dam and excessive overflow from this system is channelled to Bonza Quarry.
- Brits FRD runoff
    - Return water is salvaged through a penstock system and pumped back to the return water dam. Water is then transferred from there to Top Dam and Bottom Dam and reused in the plant. All runoff and shallow seepage from the FRD is intercepted by cut-off trenches, and an area that is sloped towards a sump. Both sides of the dam have sumps with pumps that pump the seepage back into the dam.

There are a number of process water storage facilities located in and around the mining area. Not all of these process water storage facilities supply water to the plant; however, all storage water facilities that contain process water or supply the plant with water for the process are listed below:

- Plant runoff collection Dam (Streichers Dam)
    - This dam (sediment trap) has a surface area of 424 m^2, a depth of 1.25 m, and a capacity of 530 m^3. It acts as a settling pond for spillages in the plant area. Water is received from surface water run-off out of the plant area. Water from this dam is pumped to the plant thickeners and any overflow channelled to Five Mission Dam.
- Five-Mission Dam
    - This dam has a capacity of 2,500 m^3. It is immediately north of the Five Missions Village and is concrete lined. Water is received from storm water canals, water from the Streichers Dam, Bottom Dams (overflow in canals) and storm water from Five Mission Village Dam. It supplies water to Earth Dam. The overflow goes to Five Mission Overflow/Overspill Dam.
- Five Mission Overflow/Overspill Dam
    - This dam receives water as overflow from Five Mission Dam. The dam has a surface are of 0.21 ha, and a capacity of 960 m^3.
- Earth Dam
    - This dam has a capacity of 21 000 m^3. It is located immediately south of the Five Missions residential area and is concrete lined. The dam receives water from village and mine storm water via Five Mission Dam, sewage and PPC effluent, Bonza Quarry (pumped), FRDs 1, 2 & 3 (pumped), and overflow from Top Dams. It supplies water to Top Dams and overflow goes to Bonza Quarry and Five Mission Dam.
- Bonza Quarry (dam)
    - The dam has a capacity of 3 508,000 m^3. It is partially backfilled and the area to the south and east of the existing quarry consists of backfill material. The dam receives water from PPC, Little Bonza, Earth Dam overflow, Bottom Dam overflow, rain and seepage. It supplies water to Earth Dam and Bottom Dam.

- Little Bonza quarry (dam)
  - The dam has a capacity of 206 300m3The dam/quarry receives water from FRDs No. 1, 2, 3 through canals and Infill FRD overflow, rain and seepage. It supplies water to Bonza Quarry.
- Top Dams
  - There are two top dams with a combined capacity of 4 600 m^3. The dams receive water from Earth Dam (pumped), Brits return water dam and Clarified water tank (pumped). They supply water to D – Thickener, SCS clarified water tank, and DMS clarified tank. The overflow goes to Earth Dam and Bottom Dam.
- Bottom Dam
  - There are two dams with a combined capacity of 4,600 m^3. The dams receive water from Vaal Gamagara No. 1 Incoming line, Vaal Gamagara No. 2 Overflow, Bonza Quarry (Pumped), Top Dams (Gravity flow), Main Rock Shaft (Pumped). They supply water to Raw Water tank, Transfer Tank, DMS Clarified Tank, and Ring Main – Fire Hydrants. All overflow goes to Five Mission Dam.
- Clarified Water Tank
  - This tank receives water from Top Dams, C, D, E & G thickeners overflow, and DMS Clarified Water Tank via the Transfer Tank. It supplies water to the entire plant.
- DMS Clarified Water Tank
  - This tank receives water from DMS Thickener, and Bottom Dams. It supplies water to DMS, Feed prep, and Clarified water tank.
- Transfer Water Tank
  - The tank receives water from Bottom Dam, and DMS clarified water tank. It supplies water to Clarified water tank
- DMS Thickener
  - It receives water from DMS, and dust scrubbers and supplies clear overflow water to DMS clarified water tank, underflow to wet screens in SCS, and DCD thickener feed launder
- G, C, E & D – Thickeners
  - It receives water from the degritting section (cyclone overflow) and supplies clarified overflow water to the SCS clarified tank. Underflow goes to the Excess Sump, and pumped to FRDs.
- Golf Course Dam
  - This dam receives water from Vaal Gamagara No.2 incoming line, but can also get water from the earth dam or treated effluent from the sewage farm for irrigation of the golf course.
- Potable Water Dam
  - This dam receives water from Vaal Gamagara No.2 Incoming line and supplies water to Ring Main.
- Old FRD Dam
  - This dam has a capacity of 23 500 m^3. It receives drainage water from hills south of the mine, and the old FRDs.

Potable water

Potable water is supplied from the Vaal – Gamagara (VG) Pipeline to the mine and the residential areas in Lime Acres.

Potable water is provided to four residential areas (Lime Acres, Norfin, Five Mission Village and Finville) for domestic consumption. This consumption forms the bulk of the utilisation in the potable network, accounting for approximately 53% of all consumption. The consumption in the residential networks are extensively (although not exhaustively) metered. Data from metering points on the Vaal - Gamagara bulk supply network is checked by way of check meters installed by the mine (i.e. the DB meters), thereby ensuring accuracy of the bulk supply data.

Consumption by the mine and outside services accounts for approximately 32% of potable water consumption. This includes all potable water used on the mine, but excludes water used in the plant. As is the case with the residential areas, these flows are also extensively metered. Potable water is supplied to sports and recreational areas for both consumption and irrigation purposes. This consumption accounts for approximately 3% of the total. Potable water is supplied from the Vaal - Gamagara network to numerous off – site areas. This consumption accounts for approximately 1% of the total Vaal - Gamagara potable water consumption.

The following reservoirs and structures all receive potable water from the Vaal-Gamagara pipeline:

1. Bottom potable dam

This reservoir has a wall height of 2.135 m, covers a surface area of 0.0025 ha and has a capacity to store 37.85 m³ of water and is constructed from concrete. It supplies potable water to the stores, security, plant, administration building, change house, Finville and the training centre.

2. Norfin Village reservoir

This reservoir has a wall height of 2 m, covers a surface area of 0.0025 ha and has a capacity to store 50 m³ of water. This reservoir is made from galvanised steel and it supplies Norfin Village with potable water.

3. Lime Acres Village Reservoir (concrete flask)

This concrete reservoir has a height of 4 m, covers a surface area of 0.0176 ha and has a capacity to store 600 m³ of water. The reservoir supplies the Lime Acres Village with potable water.

4. Five Mission Potable Water Reservoir

The Five Mission reservoir has a wall height of 2 m, covers a surface area of 0.002 ha and has a capacity to store 40 m³ of water. It is constructed from galvanised steel and supplies Five Mission with potable water.

Domestic waste water

Finsch Diamond Mine supplies sewage services for the villages. The Domestic Wastewater Care Works is managed by Finsch together with PPC. Conservancy tanks are utilised at various locations at Finsch

Diamond Mine (refer to discussion below). The conservancy tanks are emptied, and the sewage is then treated at the Domestic Wastewater Care Works. The sewage plant has a design capacity to treat 1,620m^3 per day. The sewage plant consists of concrete drying beds as well as four aeration ponds of varying sizes. A concrete emergency overflow dam exists at the sewage plant that serves as a contingency measure if the sewage tanks should leak. Treated sewage effluent is pumped to Earth Dam from where it enters the process water reticulation system. A composting station, wood chipping yard and an incinerator is located within the Domestic Wastewater Care Works site. Dried sewage together with wood chips and grass cuttings/leaves are turned into compost and then utilised during rehabilitation of the mine waste deposits. The rate of compost make is currently 35 m^3 per month. The composting station is not lined.

Various facilities are not linked to the sewage plant but are equipped with septic and conservancy tanks. The tanks are not located close to any groundwater supply boreholes and since the unsaturated zone is more than 20 m in depth, the movement of the effluent through the unsaturated zone will remove any contaminants by natural processes. These tanks operate under an existing lawful use.

Table 6: Location and volumes of septic tanks

Septic tank location	Size(m^3)	Number of times emptied per year	Annual disposal (m^3)
Diggers	13000	4	52000
Pony club	6500	1	6500
Gun club	6500	1	6500
Bonza	13000	1	13000
Golf Club	9000	1	9000
LA Gym	6500	1	6500
Training Centre	1300	2	2600
Caravan Park	9000	2	18000
Air Strip	9000	2	18000
Norfin Contractors	9000	2	18000
Taxi rank	1000	2	2000
TOTAL	83800		152100

French drain systems are located at the following places:

- Brits Farm;
- Bonza Farm;
- ECMP Office;
- Post-1979 CRD;
- Gun Club; and
- The SPCA.

Water balance

Finsch Diamond Mine has compiled a water balance for the mine and is updated on an annual basis, using actual data obtained over the previous years. The mine's water balance is presented in Figure 5 below.

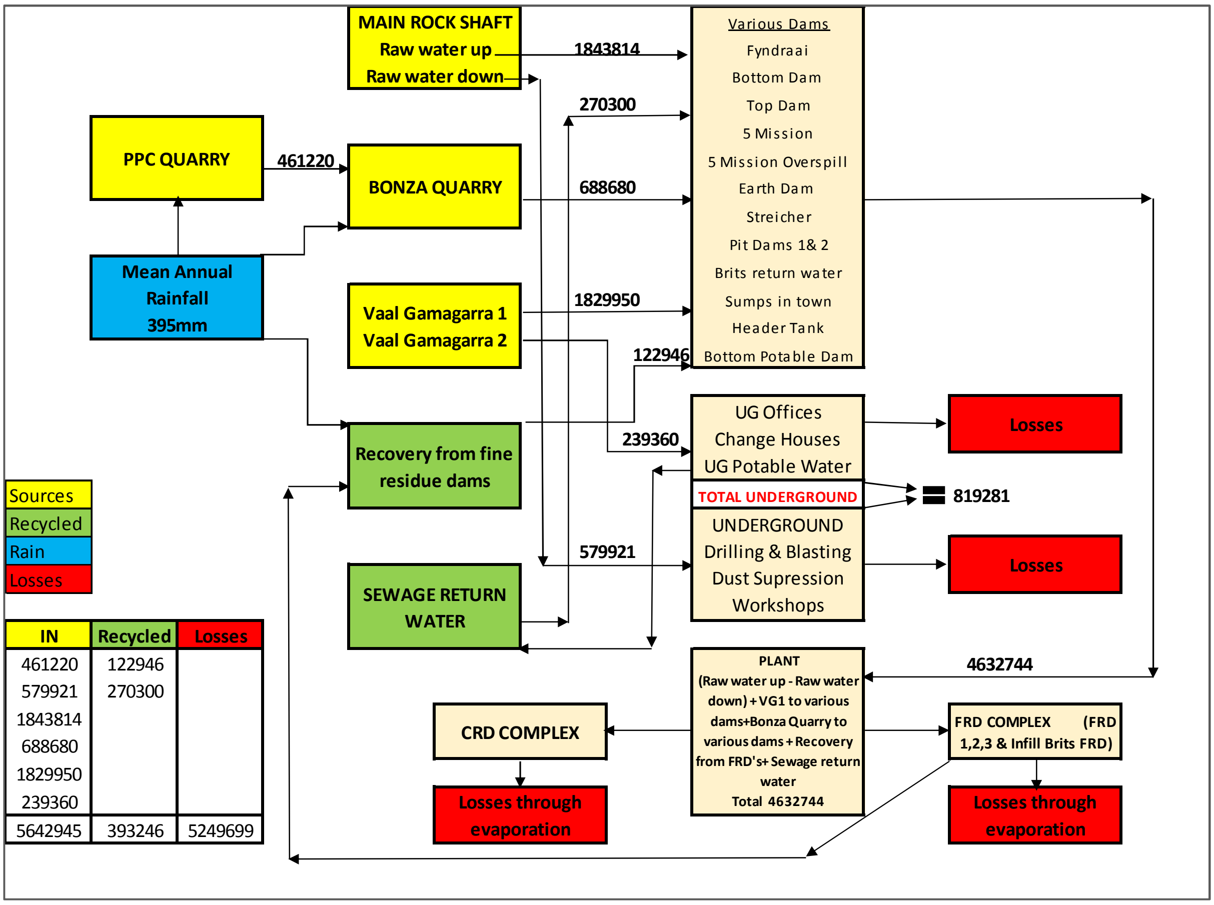


Figure 5: Finsch Diamond Mine water balance

4.2.3.9 Non-mineral waste management

Finsch Diamond Mine generates general and hazardous waste streams from the underground mining operations, workshops and washbays and on surface from the ore treatment processes and related maintenance activities. Hydrocarbon contaminated soil is treated at the Waste Management Yard (WAMY) at an established bioremediation facility. Domestic waste is produced from the office environments, change houses, material stores and contractor sites within the mine. The main waste streams generated at Finsch Diamond Mine are presented in the table below.

Table 7: Main waste streams

Waste Stream	Waste Type	Point of Generation	Method of Disposal
Hazardous Waste	Oil rags	Workshops	Collected by contractor
	Oil filters, oil drums		
	Old paint and paint tins		
	Old grease and empty containers		
	Redundant chemicals and their containers.	Mine wide	
	Insecticide/herbicide containers		
	Heavy metals, i.e. components of electronic devices	Workshops and offices	Recycled
	Electrical waste	Offices	
	Medical and sanitary waste	Offices and workshops	Collected by contractor
	Old paint brushes	Workshops	Collected by contractor
	Printer and copy machine cartridges	Offices	Recycled
	Asbestos (brake pads, gaskets, off cuts, pipes, flanges)	Workshops	To be handled according to asbestos regulations
	Explosives (emulsion)	Emulsion silo	Collected by contractor
General Waste	Rubber - tyres, pipes, conveyor belts	Mine wide	Recycled
	Plastic polyurethane panels		
	Cement bags		
	Air filters	Workshops	
	• Wooden pallets • Plastic pallets • Cement pallets	Mine wide	Recycled or donated
	Timber - poles, boxes		Recycled
	Glass bottles		
	Black bags containing tissues, milk bottles, tea bags, food waste.	Offices	Recycled where possible or disposed at Finsch general waste disposal site

Waste Stream	Waste Type	Point of Generation	Method of Disposal
	Plastic pipes	Mine wide	Recycled
	Used PPE		
	Ferrosilicon bags		
	Paper and cardboard		
Recyclable waste	Steel plates	Mine wide	Taken by contractor for recycling.
	Old bolts		
	Wire mesh		
	Strappings		
	Metal screens		
	Clean tins, drums		
	Roof bolts		
	Pipes		
	Metal shavings		
	Empty open fire extinguishers		
	Wire cages		
	Aluminium, copper, brass		
	Drill bits		
	Electrical cable (off-cuts)		
Mineral Waste	Fine residue (slimes)	Plant	Brits Fine Residue Dump (FRD)
	Coarse tailings	Plant	Coarse Residue Dump (CRD)

Conveyor belts and scrap metal

Conveyor belts are auctioned or taken by the recycling company. Scrap metal is taken by a recycling company.

Waste tyre stockpile

Waste tyres are currently stockpiled and will be recycled.

Garden waste

Green telecons may be requested from the WAMY supervisor for the disposal and removal of garden waste. This waste is disposed of as mulch or topdressing in the landfill. Outside the mining area, garden waste is taken to the Water Care Works. Tree branches are put through a wood chipper and along with grass cuttings are used as a bulking agent for the composting of sewage sludge.

Sewage sludge

Dried sewage sludge is mixed with wood chips and grass cuttings and composted. Once the sewage sludge has been denatured by the composting process, the final material is used for the surface rehabilitation of residue deposits. The use of this compost is authorised.

Medical waste

Medical waste is collected from the hospital and clinic by a licensed disposal company.

Waste management facilities

The WAMY is a designated managed site that exists for the receipt, collection and control of waste generated at Finsch Mine. The WAMY includes a hazardous waste storage area, a general waste disposal landfill site as well as a bioremediation site. The landfill at the mine consists of a space in the overburden WRD where the WAMY is situated. Surface waste is transported by tractor and telecon (from plant area) or cassette carriers (from the mining logistics area) to the WAMY. This facility was authorised under the Environmental Conservation Act, 1989 (ECA) and has been re-registered in terms of the National Environmental Management Waste Act, 59 of 2008, under permit number: 16/2/7/F400/C12/Z5/P448. It is classified as a General disposal site (G:S:B + and G:S:B -). The contractor is responsible to manage all the waste streams in accordance with the Minimum Requirements for recycling, landfill and safe disposal standards.

The wood chipping yard is located on the same plot of land as the sewage plant and the incinerator. The wood is sourced from garden refuse and off-cuts () from trees that were cut down when trees are being pruned in town or where trees are removed due to their structural damaged caused to infrastructure. The chips and grass cuttings are used together with the dry sewage originating from the sewage plant, for the production of compost, to be used during rehabilitation.

The hazardous waste storage area (HWSA) is a designated site used for the temporary storage of hazardous waste. All hazardous waste is labelled in containers and stored in the HWSA area. Most of the hazardous waste is placed in 210 litre drums, the hydrocarbon waste are placed in a $30m^3$ container. The full drums are removed from source and transported to the WAMY for temporary storage. At the HWSA, the waste is verified and labelled prior to collection by a contractor for disposal to an H:H landfill site.

The bioremediation site consists of an elevated concrete slab surrounded by a bund wall. There is a ramp leading up to the side to assist the off-loading of the material. The site receives all oil and fuel contaminated soil, sand and sawdust. It also receives the absorbing material (for e.g. Drizit or Supazorb) used to clean up spills on the mine. The contaminated material is to be spread out on the concrete and wetted. Hydrocarbon consuming bacteria is added to the material. During a process that can last up to 12 weeks the material is kept wet and occasionally nutrients will be added for the bacteria. Afterwards the material is all retreated in the plant. In the instance that the material is 100% just absorbent or sand it will be used as cover material in the landfill once treated to the suitable standard.

4.2.3.10 Other support services

Energy supply

The mine is served by the Eskom power grid.

Maintenance facilities

The following maintenance facilities occur underground:

- Large earthmoving workshop;
- Wash bays;
- Tyre bay;
- Auto electrical workshops;
- Contractors' workshops; and
- Batching plant: Raw materials for cement production transfer and storage for underground mixing is stored at the batch plant. The batch plant services x2 shafts. Deliveries generally arrive by 30 t trucks with approximately 3 truckloads per day expected during peak periods. This area is only in use when underground construction works are taking place.

The following maintenance facilities occur above ground:

- Boiler shops;
- Electrical shops;

- Earth moving workshops;
- Carpenter workshops;
- Lubrication rooms;
- Wash bays; and
- Lube bay: The lube bay at the Mechanical Surface Workshop consists of a pumping mechanism inside the lube bay that transfers used oil from drums into the two 2000 litre storage tanks situated in the lubricant storage yard.

Administration and other buildings

Buildings at the mine include:

- Administration buildings;
- Training centre;
- Production offices;
- Human resources offices;
- Projects offices;
- Geology offices;
- Control room – CCR; and
- Change houses.
- Capital yard stores
- Training centre with associated buildings

4.2.4 Estimated reserves and production rate

The Life Of Mine profile for tonnes mined is presented in Table 8 below.

Table 8: Life of Mine profile for tons mined

Description	Units	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total Tonnes Treated	t	3 855 236	3 715 318	3 567 155	3 214 092	3 138 360	3 173 583	3 200 000	3 200 000	3 200 000	3 200 000	3 200 000	3 200 000	
ROM tonnes treated	t	2 931 486	3 315 318	3 367 155	3 214 092	3 138 360	3 173 583	3 200 000	3 200 000	3 200 000	3 200 000	3 200 000	3 200 000	
BSP tonnes treated	t	623 750	400 000	200 000										
Pre-79 TMR tonnes treated	t	300 000												
Total Carats Recovered	cts	2 011 519	2 234 181	1 990 805	1 773 091	1 853 800	1 950 720	1 942 979	1 949 757	2 080 449	2 137 957	2 088 576	2 038 848	
ROM carats recovered	cts	1 615 160	2 039 811	1 901 504	1 773 091	1 853 800	1 950 720	1 942 979	1 949 757	2 080 449	2 137 957	2 088 576	2 038 848	
BSP carats recovered	cts	345 059	194 370	89 301										
Pre-79 TMR carats recovered	cts	51 300												
Recovered Grade	cpht	52.18	60.13	55.81	55.17	59.07	61.47	60.72	60.93	65.01	66.81	65.27	63.71	
ROM grade	cpht	55.10	61.53	56.47	55.17	59.07	61.47	60.72	60.93	65.01	66.81	65.27	63.71	
BSP grade	cpht	55.32	48.60	44.70										
Pre-79 TMR grade	cpht	17.10												

5. Policy and Legislative Context

Figure 6: Policy and legislative context

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)	**REFERENCE WHERE APPLIED** (i.e. Where in this document has it been explained how the development complies with and responds to the legislation and policy context)	**HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT** (E.g In terms of the National Water Act: Water Use Licence has/has not been applied for).
The Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)	Throughout this document.	Finsch Diamond Mine is in possession of a Mining Right. Refer to Annexure D for a copy of the Mining Right.
The Mineral and Petroleum Resources Development Regulations, 2004, Regulations R.562 dated April 2004).		
The National Environmental Management Act, 1998 (Act No. 107 of 1998).		
The National Environmental Management Amendment Act, 2008 (Act No. 62 of 2008).		
The Environmental Impact Assessment Regulations, R. 982 dated December 2014.		

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)	**REFERENCE WHERE APPLIED** (i.e. Where in this document has it been explained how the development complies with and responds to the legislation and policy context)	**HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT** (E.g In terms of the National Water Act: Water Use Licence has/has not been applied for).
The Environmental Impact Assessment Regulations, R. 983 dated December 2014.	Refer to Section 4.1 above.	The Section 102 application for changes to be made to the EMPr does not trigger any listed activities. It is also important to note that Finsch Diamond Mine is currently in the possession of a Mining Right. Refer to Annexure D for a copy of the Mining Right.
The Environmental Impact Assessment Regulations, R. 984 dated December 2014.		
The Environmental Impact Assessment Regulations, R. 985 dated December 2014.		
The National Water Act, 1998 (Act No. 36 of 1998).	Refer to Section 4.1, Chapter G and Chapter H of Section 7.4.1 and Section 1.4.8 of Part B (Environmental Management Programme) of this EIA and EMPr.	Finsch Diamond Mine is in possession of a Water Use Licence (WUL) (Licence number: 10/C92C/ABCEGIJ/414).
The National Heritage Act (Act No. 25 of 1999).	Refer to Chapter N of Section 7.4.1.	Several features adjacent to Finsch Diamond Mine have been identified and would require demolition permit / relocation should activities need to take place in this area.

6. Need and desirability of the proposed activities

6.1 Need and Desirability in terms of the Guideline on Need and Desirability, dated 20 October 2014.

On the 20th of October 2014, the Department of Environmental Affairs published a Guideline on Need and Desirability in terms of the Environmental Impact Assessment (EIA) Regulations, 2010, in Government Notice 891 of 2014. The following table indicates on how the guideline requirement were considered in this EIAR.

Figure 7: Need and Desirability of the Proposed Project

Requirement		Part where requirement is addressed/response
1.	**How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?**[1]	Refer to the background description of the baseline environment provided in Chapter E, Chapter F and Chapter G of Section 7.4.1. Refer also to the Risk Assessment of the potential impacts which may occur.
1.1	How were the following ecological integrity considerations taken into account?	
1.1.1	*Threatened Ecosystems.*[2]	
1.1.2	*Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.*[3]	
1.1.3	*Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs").*	Refer to Chapter E, Chapter F and Chapter G of Section 7.4.1 for the ecological description of the study area.
1.1.4	*Conservation targets.*	
1.1.5	*Ecological drivers of the ecosystem.*	
1.1.6	*Environmental Management Framework.*	Refer also to Chapter P of Section 7.4.1 for information relating to the Spatial Development Framework.
1.1.7	*Spatial Development Framework.*	

[1] Section 24 of the Constitution and section 2(4)(a)(vi) of NEMA refer.

[2] Must consider the latest information including the notice published on 9 December 2011 (Government Notice No. 1002 in Government Gazette No. 34809 of 9 December 2011 refers) listing threatened ecosystems in terms of Section 52 of National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).

[3] Section 2(4)(r) of NEMA refers.

Requirement	Part where requirement is addressed/response
1.1.8 Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).[4]	Mining equipment, machinery and mine vehicles burn fossil fuels and release a number of emissions such as hydrocarbons, carbon dioxide, carbon monoxide, mono-nitrogen oxides and possibly methane. These emissions, with specific reference to methane and carbon dioxide, are greenhouse gasses that are key drivers in climate change. All vehicle, machinery and equipment will be inspected and maintained on a regular basis to ensure efficiency, working condition and to minimise the release of emissions. Refer also to Chapter K of Part 7.4.1
1.2 How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?[5]	Refer impact assessment table, Part 7.3.8. Finsch Diamond Mine is an existing mine and no mining or mining related activities will occur outside of the surface rights and mining rights area. No positive impacts to the ecological integrity of the area can result from the proposed mining activities.
1.3 How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?[6]	Refer to Section 7.4 and Section 7.5 for the Risk Assessment.
1.4 What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been	Types of non-mineral wastes, as typically expected to be generated, as well as the management thereof are discussed in Section 4.2.3.7.

[4] Section 2(4)(n) of NEMA refers.

[5] Section 24 of the Constitution and Sections 2(4)(a)(i) and 2(4)(b) of NEMA refer.

[6] Section 24 of the Constitution and Sections 2(4)(a)(ii) and 2(4)(b) of NEMA refer.

Requirement		Part where requirement is addressed/response
	explored to safely treat and/or dispose of unavoidable waste?[7]	
1.5	How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?[8]	The description of the cultural heritage associated with the Finsch Diamond Mine is discussed in Chapter N of Section 7.4.1. As discussed in the cultural heritage background description, several features / infrastructures adjacent to the Finsch Diamond Mine can be considered to be of cultural heritage importance.
1.6	How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?[9]	Non-renewable resources (finite resources) to be used/exploited by the Finsch Diamond Mine include diamond bearing ore (alluvial and kimberlite) and, to a lesser extent, fossil fuels (vehicle transport, grease and oil and electricity). The nature of the operation is to mine diamond bearing ore (alluvial and kimberlite). Mining and extraction costs are key drivers to minimise wastage and ensure optimal resource usage.
1.7	How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?[10]	Renewable resources that will be used, primarily will constitute water use (groundwater abstraction). Other renewable resources that will be affected by the project include the vegetation and fauna within the project boundary area. Refer background discussions as per Chapter F (Vegetation), Chapter G (Fauna), Chapter H (surface water) and Chapter J (Groundwater), with potential impacts assessed in the Risk Assessment.

[7] Section 24 of the Constitution and Sections 2(4)(a)(iv) and 2(4)(b) of NEMA refer.
[8] Section 24 of the Constitution and Sections 2(4)(a)(iii) and 2(4)(b) of NEMA refer.
[9] Section 24 of the Constitution and Sections 2(4)(a)(v) and 2(4)(b) of NEMA refer.
[10] Section 24 of the Constitution and Sections 2(4)(a)(vi) and 2(4)(b) of NEMA refer.

Requirement		Part where requirement is addressed/response
1.7.1	*Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)*	Mining is by definition an activity that is dependent on depleting resources. The community that may become dependent on the mine may thus also become dependent on the depleting resource. Given that the life of mine, the community will have a reasonably long-term benefit and the community members may benefit from the Finsch Diamond Mine, be it directly (by employment) or indirectly (trickle-down effect and subcontracting by the mine).
1.7.2	*Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?)*	
1.7.3	*Do the proposed location, type and scale of development promote a reduced dependency on resources?*	As previously described, the Finsch Diamond Mine is an existing mine. Therefore, there was no possibility of selecting the location for the proposed project. The mining of diamond resources (full production) in this area commenced in 1967. The continued mining will allow for the continued provision of jobs for many members of the local community, thereby contributing to the economy of the area and possibly leading to the reduced dependency, of the local community, on natural resources of the area.
1.8	How were a risk-averse and cautious approach applied in terms of ecological impacts?[11]	Refer to the Risk assessment table in Annexure E.
1.8.1	*What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?*	All limits of the current knowledge, associated with the project and Finsch Diamond Mine, is provided in Section 15.
1.8.2	*What is the level of risk associated with the limits of current knowledge?*	

[11] Section 24 of the Constitution and Section 2(4)(a)(vii) of NEMA refer.

<table>
<tr><th colspan="2">Requirement</th><th>Part where requirement is addressed/response</th></tr>
<tr><td>1.8.3</td><td>Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?</td><td>The activities conducted at the Finsch Diamond Mine include the Sub-Level Caving mining of diamond bearing ore, the retreatment of existing dumps (i.e. Pre-79 Tailings dump) and the transportation of the ore to the plant for processing.</td></tr>
<tr><td>1.9</td><td>How will the ecological impacts resulting from this development impact on people's environmental right in terms following:[12]</td><td></td></tr>
<tr><td>1.9.1</td><td>Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?</td><td rowspan="4">All potential negative and positive impacts associated with the proposed activity have been identified, discussed and assessed in Section 8.5 below.</td></tr>
<tr><td>1.9.2</td><td>Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?</td></tr>
<tr><td>1.10</td><td>Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?</td></tr>
<tr><td>1.11</td><td>Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?</td></tr>
<tr><td>1.12</td><td>Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of</td><td>As described above, the Finsch Diamond Mine is an existing diamond mine. Therefore, the impacts that the mine have on the biophysical environment are existing impacts. Further impacts on the biophysical environment may occur (refer to Part 4 of Appendix F).</td></tr>
</table>

[12] Section 24 of the Constitution and Sections 2(4)(a)(viii) and 2(4)(b) of NEMA refer.

Requirement		Part where requirement is addressed/response
	the "best practicable environmental option" in terms of ecological considerations?[13]	
1.13	Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?[14]	Refer Part 11 of the Risk Assessment Report for the cumulative impacts, which may occur as a result of the proposed project.
2.1	What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?	
2.1.1	*The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,*	Refer to Chapter P of Section 7.4.1 of this document.
2.1.2	*Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),*	
2.1.3	*Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and*	
2.1.4	*Municipal Economic Development Strategy ("LED Strategy").*	
2.2	Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?	
2.2.1	*Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?*	
2.3	How will this development address the specific physical, psychological, developmental, cultural and	

[13] Section 2(4)(b) of NEMA refer.

[14] Regulations 22(2)(i)(i), 28(1)(g) and 31(2)(1) in Government Notice No. R. 543 refer.

	Requirement	Part where requirement is addressed/response
	social needs and interests of the relevant communities?[15]	
2.4	Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term?[16] Will the impact be socially and economically sustainable in the short- and long-term?	The potential negative and positive impacts that have been identified and presented in Section 9 below. Refer to the risk assessment tables (attached hereto as Annexure E for a detailed description and assessment. Impacts in terms of groundwater may result in the intergenerational impact distribution (refer to Chapter J of Section 7.4.1 as well as the risk assessment tables attached hereto as Annexure E.
2.5	In terms of location, describe how the placement of the proposed development will:[17]	
2.5.1	*result in the creation of residential and employment opportunities in close proximity to or integrated with each other,*	The Finsch Diamond Mine is an existing diamond mine. The Finsch Diamond Mine will continue to provide jobs with the majority of the work force sourced from the local communities.
2.5.2	*reduce the need for transport of people and goods,*	The Finsch Diamond Mine is an existing diamond mine. Therefore, the existing infrastructure will continue to be utilised.
2.5.3	*result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),*	
2.5.4	*compliment other uses in the area,*	The Finsch Diamond Mine is an existing diamond mine. Finsch Diamond Mine is located adjacent to the PPC Lime Acres operation and is surrounded by the Lime Acres Village and the Norfin Village.
2.5.5	*be in line with the planning for the area,*	As previously described, Finsch Diamond Mine is an existing diamond mine. The IDP of the Kgatelopele Local Municipality States the following: "*Government adopted the New Growth Path (NGP) as the framework for economic policy and the driver of the country's Jobs Strategy. In*

[15] Section 2(2) of NEMA refers.

[16] Sections 2(2) and 2(4)(c) of NEMA refers.

[17] Section 3 of the Development Facilitation Act, 1995 (Act No. 67 of 1995) ("DFA") and the National Development Plan refer.

Requirement	Part where requirement is addressed/response
	response to the core challenges facing the Nation economically namely joblessness, poverty and inequality combined within the global and national context. The by components of the strategy is to (a) identify areas where employment is possible on large scale and (b) to develop a policy to facilitate employment created through: *1. A comprehensive drive to enhance both social equity and competitiveness;* *2. Systematic changes to mobilise domestic investment around activities that can create sustainable employment; and* *3. Strong social dialogue to focus all stakeholders on encouraging growth in Employment-creating activities.* *The focus is to realize the above mentioned and is key job drivers and sectors which include the following:* • *Infrastructure;* • *The agricultural value chain;* • *The mining value chain;* • *The green economy;* • *Manufacturing sectors, which are included in IPAP; and* o *Tourism and certain high-level services."* Finsch Diamond Mine is therefore in line with the planning of the area for the provision of jobs.
2.5.6 for urban related development, make use of underutilised land available with the urban edge,	Not applicable.
2.5.7 optimise the use of existing resources and infrastructure,	The existing infrastructure, currently on site, will be utilised and the existing road network will be utilised for the transportation where required. Where necessary, the current infrastructure will be upgraded for safety purposes and where unnecessary infrastructure has been identified, these will be decommissioned.
2.5.8 opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	
2.5.9 discourage "urban sprawl" and contribute to compaction/densification,	The Finsch Diamond Mine is an existing diamond mine. Continued operations at the Finsch

Requirement	Part where requirement is addressed/response
2.5.10 contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,	Diamond Mine will allow for the continued provision of jobs to its current employees with the majority of the work force sourced from the local communities.
2.5.11 encourage environmentally sustainable land development practices and processes,	Refer to Section 9 as well the risk assessment table attached hereto as Annexure E.
2.5.12 take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),	As previously described, the Finsch Diamond Mine is an existing diamond mine that was purchased by Petra Diamonds (Pty) Ltd. Therefore, the location of the mine, and all applicable infrastructure, could not be selected.
2.5.13 the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),	Refer to Section 9 as well the risk assessment tables attached hereto as Annexure E.
2.5.14 impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and	
2.5.15 in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	The Finsch Diamond Mine is an existing mine utilising existing infrastructure. Employees were also sourced from the local communities thus acting as a catalyst to create a more integrated settlement.
2.6 How were a risk-averse and cautious approach applied in terms of socio-economic impacts?[18]	Refer also to the SLP attached hereto as Annexure F as well as the risk assessment table attached hereto as Annexure E.
2.6.1 What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?[19]	All limits of the current knowledge are provided in Section 15 below.
2.6.2 What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	As described above, a positive impact will be experienced, in terms of socio-economic aspects, as the Finsch Diamond Mine (as stipulated in the SLP attached hereto as Annexure E) sources employees from the local community.

[18] Section 2(4)(a)(vii) of NEMA refers.

[19] Section 24(4) of NEMA refers.

<table>
<tr><th>Requirement</th><th>Part where requirement is addressed/response</th></tr>
<tr><td>2.6.3 Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?</td><td></td></tr>
<tr><td>2.7 How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:</td><td>-</td></tr>
<tr><td>2.7.1 Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?</td><td rowspan="3">Refer to Section 9 below as well Part 4 of the risk assessment table, attached hereto as Annexure E.</td></tr>
<tr><td>2.7.2 Positive impacts. What measures were taken to enhance positive impacts?</td></tr>
<tr><td>2.8 Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?</td></tr>
<tr><td>2.9 What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?[20]</td><td rowspan="2">As the Finsch Diamond Mine is an existing diamond mine that was purchased by Petra Diamonds (Pty) Ltd. Therefore, no alternative assessment was undertaken. However, environmental and social impacts were identified as part of the risk assessment with respective mitigation measures provided to limit, prevent, minimise the impacts and enhance any positive impacts (refer to Annexure E).</td></tr>
<tr><td>2.10 What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)?[21] Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?</td></tr>
</table>

[20] Section 2(4)(b) of NEMA refers.

[21] Section 2(4)(c) of NEMA refers.

Requirement		Part where requirement is addressed/response
2.11	What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?[22]	Refer to the Finsch Diamond Mine SLP attached hereto as Annexure G.
2.12	What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?[23]	The initial EIA process focussed on quantification of environmental impacts associated with the operation. Assessments included specialist recommendations for mitigating identified risks, that have been incorporated into this EIAR.
2.13	What measures were taken to:	
2.13.1	*ensure the participation of all interested and affected parties,*	Refer to Section 7.2, for detail on the Public Participation Process followed.
2.13.2	*provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,[24]*	
2.13.3	*ensure participation by vulnerable and disadvantaged persons,[25]*	
2.13.4	*promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,[26]*	
2.13.5	*ensure openness and transparency, and access to information in terms of the process,[27]*	
2.13.6	*ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to*	

[22] Section 2(4)(d) of NEMA refers.
[23] Section 2(4)(e) of NEMA refers.
[24] Section 2(4)(f) of NEMA refers.
[25] Section 2(4)(f) of NEMA refers.
[26] Section 2(4)(h) of NEMA refers.
[27] Section 2(4)(k) of NEMA refers.

Requirement		Part where requirement is addressed/response
	all forms of knowledge, including traditional and ordinary knowledge[28]*, and*	
2.13.7	*ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were be promoted?*[29]	Refer to the Finsch Diamond Mine SLP attached hereto as Annexure G.
2.14	Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?[30]	As previously described the Finsch Diamond Mine is an existing and is also situated adjacent to PPC Limited Lime Acres operation as well as residential areas including Norfin and Lime Acres. The Finsch Diamond Mine also sources its employees from the local community.
2.15	What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?[31]	The Finsch Diamond Mine has several procedures and Code of Practices (COP's) in place that intend to inform all employees of work that may be potentially harmful to their health and well-being as well as the environment.
2.16	Describe how the development will impact on job creation in terms of, amongst other aspects:	
2.16.1	*the number of temporary versus permanent jobs that will be created,*	The Finsch Diamond Mine, as described above, sources the majority of the workforce from the local community. Refer to the Finsch Diamond Mine SLP attached hereto as Annexure G.
2.16.2	*whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),*	
2.16.3	*the distance from where labourers will have to travel,*	
2.16.4	*the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and*	

[28] Section 2(4)(g) of NEMA refers.

[29] Section 2(4)(q) of NEMA refers.

[30] Section 2(4)(g) of NEMA refers.

[31] Section 2(4)(j) of NEMA refers.

Requirement	Part where requirement is addressed/response
2.16.5 the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	
2.17 What measures were taken to ensure:	
2.17.1 that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and	Refer to Section 7.2 for a description of the Public Participation Process that has been conducted for the Finsch Diamond Mine.
2.17.2 that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	All issues and concerns raised by all I&APs, stakeholders and organs of state will be addressed in the manner as described in Section 7.2.
2.18 What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?[32]	During the initial Public Participation Process, all issues and concerns raised by the I&APs, stakeholders and the Organs of State will be taken into account, responses provided and should it be required, the appropriate changes will be made to the mines operations.
2.19 Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?[33]	The mitigation measures are based on the environmental and socio-economic baseline descriptions, as per Section 7.4.1, and the potential impacts as identified based on the current and planned operations. The mitigation measures are believed to be realistic although potentially onerous in execution. Not all mitigation measures will necessarily result in reversible impacts or in a low significance impact. Rehabilitation strategies aimed at mine closure have been proposed but the effectiveness of implementation will determine long term environmental legacy or are ineffective on certain localised areas based on ecological complexity.
2.20 What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of	The Finsch Diamond Mine appointed a qualified external contractor to determine the financial provisioning and calculation of the Quantum as

[32] Section 2(4)(o) of NEMA refers.

[33] Section 240(1)(b)(iii) of NEMA and the National Development Plan refer.

Requirement		Part where requirement is addressed/response
	preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?[34]	required in terms of the MPRDA (2002) and the NEMA (1998). The Financial Provisioning Report for the proposed operation is attached hereto as Annexure G and is discussed in detail in Section 1.7 of Part B (EMP).
2.21	Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?[35]	As previously described, the Finsch Diamond Mine is an existing mine, no alternative assessments are applicable to this EMPr amendment.
2.22	Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?[36]	The cumulative impacts have been presented in Part 11 of the risk assessment table attached hereto as Annexure E

[34] Section 2(4)(p) of NEMA refers.

[35] Section 2(4)(b) of NEMA refers.

[36] Regulations 22(2)(i)(i), 28(1)(g) and 31(2)(1) in Government Notice No. R. 543 refer.

7. 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.

7.1 Details of the development footprint alternatives considered

As described under Section 4.2.1 above, De Beers commenced full production in the 1967. Underground operations at Finsch Diamond Mine commenced in 1990. Sinking of the main shaft to access the mine from underground started in 1978. Two vertical shaft complexes, tunnels and ground handling infrastructure were prepared for the continuing exploitation of the pipe with the use of highly mechanised mining methods. The open pit mining ended in 1992 and was succeeded by the commencement of underground operations in 1992.The pre-1979 coarse residue deposit (CRD) retreatment was introduced in 2003. The treatment plant upgrade took place between March 2003 and August 2008.

Petra Diamonds (Pty) Ltd. purchased the mine as a fully-staffed, operating mine from De Beers on 14 September 2011. Therefore, the Finsch Diamond Mine is an existing mine and no alternatives (in terms of activity, process and scheduling) have been considered as part of this EMPr amendment.

7.1.1 No-go option

The no-go option is not assessed as part of this EMPr amendment process as Finsch Diamond Mine is an existing operational mine.

Refer also to the Introduction of this document for a description of the amendments made.

7.2 Details of the Public Participation Process Followed

7.2.1 Previous Public Participation Processes

7.2.1.1 New fine residue deposit facility

Engagement process

The opportunity for stakeholders to participate in the environmental assessment process, with specific regard to the Next Best Option, was announced as follows:

- Several copies of a background letter describing the use of the NBO FRD site were distributed to stakeholders in the area during July 2006 as a first step to announce the opportunity for comment;
- Site notices were placed at the mine during October 2006, providing background information to the proposed project;
- More than 50 telephone calls to key stakeholders in the area were made;
- A newspaper advertisement;
- An Authorities Meeting was held at the mine on Thursday, 7 September 2006;
- A Public Meeting was held in the afternoon of Thursday, 7 September 2006 in Lime Acres, to discuss any comments and issues raised by the Public, with regard to the Draft Scoping Report; and
- An Authorities Meeting and Public Meeting/Focus Group were held on Thursday, 30 November 2006 to discuss issues surrounding the Draft EIA/EMP Report which was in the Public domain for review.

During the initial consultation period, stakeholders had the opportunity to raise issues either in writing, by e-mail or during telephonic consultation with key groups.

A period of three weeks was made available for public comment on the Revised Draft Scoping Report. The availability of the Revised Draft Scoping Report was announced by way of a letter announcing the availability of the Revised Draft Scoping Report. The report was distributed by mail to those who requested a copy and leaving it in the following public places:

- Beaconsfield Library;
- Lime Acres Library;
- Galeshewe Library;
- Kimberley City Library;
- Finsch Diamond Mine; and
- Golder Associates Africa, Midrand.

Public review of the Revised Draft Scoping Report was by the following methods:

- Written comment, including e-mail. A comment sheet asking stakeholders to respond to particular questions accompanied the report; further written submissions were encouraged;
- Verbal comment during telephonic consultation; and
- At a Public Meeting, held in Lime Acres on Thursday, 7 September 2006.

A Public Meeting was held on Thursday, 07 September 2006 in Lime Acres, to discuss comments and issues raised by the Public, regarding the Revised Draft Scoping Report. In addition, another Public Meeting was held on Thursday, 30 November 2006 (also in Lime Acres) to discuss possible concerns raised regarding the Draft EIA/EMP Report Amendment. The content of the Revised Draft Scoping Report together with other relevant information was displayed at the September meeting, and the content of the Draft EIA/EMP Report was also displayed during the November meeting. Copies of relevant documents and reference material are also made available for stakeholders that attended the meetings to take away.

A Draft EIA/EMP Report Amendment was prepared after the public review period of the Revised Draft Scoping Report (end of October 2006). The availability of the Draft EIA/EMP Report was advertised in the Diamond fields Advertiser on 29 November 2006 and a Public Meeting was held on 30 November 2006. Stakeholders were invited to the meeting telephonically and in writing. Stakeholders were also invited to comment on the Draft EIA/EMP Report in writing and a comment sheet was included in the letter to ensure that all stakeholders had the opportunity to comment on the report. The public meeting was held and stakeholders indicated that they were satisfied with the process. A copy of the groundwater study, which elicited the most issues during the process, was handed to stakeholders to study at their leisure. The Draft EIA/EMP Report was updated with comments by the stakeholders. The final EIA/EMP Report (this report) will be submitted to the lead authority, the DME, on Monday, 11 December 2006, for a decision.

Issues raised

All the comments provided at the September meeting were captured in the format of a Draft Issues and Responses Report and distributed to people who requested copies. The comments were added to the Issues and Responses Report which accompanies this EIA/EMP Report Amendment.

7.2.1.2 New explosives magazine

Engagement process

A block advert of (150mm x 95mm), according to the EIA Regulations, 2006, was placed in the local newspaper, Kuruman Bulletin 14 June 2007. The Department requested to re-advertise the project as the previous advert was done in the old Regulations. The advert appeared in the Kuruman Bulletin on the 31 January 2008.The Kuruman Bulletin distributes approximately 12,000 copies per week to Kuruman, Kathu, Danielskuil, Lime Acres, Postmasburg, Olifantshoek, Beeshoek, mines and municipalities in distribution area.

Notices according to the NEMA, were displayed at the mine. Notices were placed at the following locations:

1. At the exit 1 and 2;
2. At the entrance 1 to the mine;
3. At the entrance 2 to the mine; and
4. At the entrance 3 to the mine.

These notices were displayed from 1 June 2007 for a period of 30 days. The site notices were re-displayed in the new EIA Regulations and displayed at the Mine.

Issues raised

No persons registered as I&APs in terms of the advertising of the project.

7.2.1.3 Closure plan

Engagement process

Consultation with I&APs did not form part of the scope of work for this Preliminary Closure Plan (2009). Its aim was to identify all relevant stakeholders that would facilitate the planning of a stakeholder engagement strategy for closure.

Issues raised

No issues were raised during this process.

7.2.1.4 Social and Labour Plan (SLP)

Engagement process

The Local Economic Development Plan (LEDP) for the mine was put together in conjunction with the relevant officials from the local and district municipalities. Since the approval of the mine's mining right and the associated SLP, the management of the mine has actively sought to engage with the key stakeholders in the region.

Stakeholder engagement forums / meetings were convened in the period under review, and were specifically aimed at informing stakeholders regarding the implementation of the LEDP. Important milestones were:

- January 2011 – Three learner ship candidates continue on the job training at the mine;
- April 2011 - Handover of the sanitation project as well as the electrification project of Idwala and PPC Lime;
- June 2011 - Draft MOU between municipality and the mines; and
- September 2011 – Draft Local Economic Development (LED) strategy between the mines and the municipality.

The implementation of LED is managed by the local municipality LED Steering Committee with the municipality chairing the meetings. The Chairperson is the Mayor or an appointed representative from the Local Council. The working groups deal with day to day activities of execution and include municipality officials, the mine technical experts and where applicable, community representatives.

The collaborative nature of the SLP necessitates that external and internal stakeholders are kept abreast and consulted at all times. External forums and steering committees include:

- KLM LED Steering Committee with the mine, Idwala Lime and PPC Lime (Mayor, councillors and MM);
- Work Group Meetings (LM and DM Officials and FM employees);
- SDM LED Forum;
- Quarterly meetings with DMR Provincial office representatives;
- The Internal structures include the following:
  - SLP Committee (Management, representative bodies and responsible employees, projects) are represented in this committee that meets on a quarterly basis.
  - Future Forum is constituted by members of Management and the representative bodies (NUM and Solidarity).
  - Ad hoc meetings with relevant other stakeholders

Additional meetings are convened when needed and the input from a wide range of relevant persons is used.

Issues raised

All issues raised were included in the Social and Labour Plan.

7.2.1.5 EMP update of 2012

Engagement process

The advertisement was published in the Diamond Fields Advertiser on 30 January 2012. Public notices referring to the proposed activities and the public meeting were put up in Lime Acres. A public meeting was held on the 13th of February 2012 at the Recreation Club Lime Acres at 17h30.

A stakeholders meeting was held on the 14 February 2012, whereby officials from DENC and DRDLR attended the meeting.

A third stakeholders meeting was held on the 19 June 2012 at the DWA offices in Kimberley. Officials from DWA attended the meeting.

Issues raised

The following issued were raised at the meetings:

Table 9: Issue at the public meeting on 13 of February 2012

Name	Comment	Response
S. Sparks	S. Sparks enquired what the proposal was with regards to the accommodation provided to the proposed contractors.	L. Rode indicated that at this stage no final decision had been made with regards to the accommodation. He did indicate that a large number of houses were available for use from the previous expansion projects done at the mine. He did indicate that this will receive careful thought.

Table 10: Comments at the stakeholder meeting on 14 February 2012

Name	Comment	Response
M Motete (MM)	MM enquired whether there is any additional prospecting on the surrounding farms.	J Nel (JN) indicated that as far as he is aware there has been prospecting done by De Beers in the past in and around the mining area. Currently no prospecting is taking place. He did however say that he cannot say whether any future prospecting is planned around the current mining area.
MM	Enquired whether the mine is the only place where the mentioned activities are planned.	JN indicated that the four additional activities namely, road upgrade, pipeline upgrade, air field/ runway upgrade and proclamation of the town fall outside the mining area. The other activities are all in the mining area.
T Molefe (TM)	TM indicated that water for agricultural purposes is very important. He enquired whether additional water will be required and whether dumping happens inside the mining area.	JN indicated that the mine has an existing water license. He mentioned that the changes would not require additional water. This is based on the current information. He also stated that dumping of coarse residue and fines is planned to take place inside the current mining area.
TM	TM enquired whether the mine may be moving towards the town and demolish the town in future.	JN indicated that according to him this is definitely not part of future developments.
JN	JN indicated that the current identified activities on the mine do not trigger any BA or EIA requirements at this stage. This is based on the current information received from the mine.	Those present agreed on the comment. It was however mentioned that the additional activities outside the mine need to be assessed against the listed activities and conformation must be obtained of the technical information to determine whether a BA or EIA may be required.
S Mbanjwe (SM)	SM enquired whether there is any proposal to extend the mine towards the town or in the direction of the mine.	JN indicated that the resource is currently mined in the pipe and the mine direction cannot change. At this stage there is no indication of any movement towards the town. Deposition of waste is limited to the current mining area and the extension of the CRD towards the south and the FRD (Brits dam) to extend to the north onto PPC property.

Table 11: Comments at the stakeholder meeting on 19 June 2012

Name	Comment	Response
Lorraine Nobela (LN)	The water use licences you have, for what is it?	GS responded that the mine operated under a registration and not authorisation. The water use licence was issued last year. He mentioned what water activities have been licensed.
Glen Stenekamp (GS)	How does Sedibeng water forms part of the mine's water activities?	The mine buys water form Sedibeng. The mine uses only a small amount of water, much less than per license. The mine does not use Bonza water at present.
GS	He saw an e-mail regarding above-mentioned matter.	SS replied that the new license forms included the old information from 2006.
GS	DWA does not bill Sedibeng water; however Sedibeng water billed De Beers in the past and now Petra.	LN stated that the mine must submit the arrangement between Sedibeng water and the mine to DWA.
GS	Will Sara Sparks (SS) take this matter up?	SS responded she will.
SS	Must the IWULA then be amended?	GS stated that the IWULA must be amended.
Sonkhile Mudaweni (SM)	The EMP states that no water is taken form Bonza quarry.	SS stated this is not entirely true. In the past the mine used water from PPC that was pumped into Bonza quarry. Sedibeng said this may not be done. Then the mine started using water allocated from the VG pipeline.
LN	The IWULA must be amended	SS confirmed this. She also said that the mine only got authorisation of their WULA last year.
SS	Should the WULA include the water from the VG pipeline?	LN confirmed this. This will enable DWA to relook in the DWA register.
SS	The use of VG water is a registered use.	GS confirmed and stated this registration was under De Beers.
SM	The mine will be billed for taking water from Bonza quarry.	SS stated that the mine is already being billed for this water.
SM	DWA will also bill the mine for seepage and the S21A water use.	SS stated the mine is at presently not billed for this.
SM	License conditions should be part of Tshiping Water User Association. It must clarify water use changes and include agreement. The mine will get 2 invoices, one from DWA and one form the water association.	SS stated the mine has only paid from Sep 2011 when the mine changed from De Beers to Petra.
SM	For the payment of the water resource management, is the name change through?	GS stated that depending on the state of title deeds only need to change name.

Name	Comment	Response
SM	Does the mine have an IWWMP?	SS confirmed that in 2010 the IWWMP was submitted to DWA. This document may be reviewed. Nothing has changed except water use volumes. Brits Dam is part of current licence.
SM	The IWWMP may need an update?	SS confirmed that this must be done to update names, sizes of dams etc. The WULA must also be updated.
SM	With the amendment of the IWULA the IWWMP must also be amended.	GS stated that the name change must be done before the amendment.
GS	A meter must be put in at Bonza quarry to measure amount of water used.	SS stated that there is such a meter.
GS	Then the actual readings must be submitted to DWA.	SS asked where these meter reading results must be submitted.
GS	The meter readings results must be submitted at Sidney Lindhorst. This will also help with the billing.	
SS	If the mine wants to take water from PPC how do the mine go about to get this legal?	
GS	Does PPC have enough water to give to the mine?	SS confirmed this and asked how to approach this.
GS	Does PPC also fall under Sedibeng?	SS said no.
GS	Have not seen PPC license yet.	SS stated they have applied. PPC does not put water in or take water out of quarry 4. The water has slightly high nitrates.
SM	The quantities of the water uses must be cleared. The license differs from the draft EMP. Need to amend the license accordingly.	SS stated this will be done.
SS	What must be done to make the taking of water form quarry 4 legal? What steps must be taken to start the process? Must the WULA be amended?	GS stated that if PPC gives consent they must amend their WULA as well.
SS	Must this water use be put on the mine WULA and be paid by the mine?	SM stated that it must be cleared on how much will be use and when. It is up for discussion on steps to be followed.
SM	Has any new specialist study been done for the update of the EMP?	SS stated the mine is busy with a groundwater study. This study is basically finished and must be commented on by the mine.

Name	Comment	Response
SM	In terms of monitoring volumes of dewatering, are you monitoring?	SS confirmed this.
SM	Do you use all the water taken from dewatering?	SS confirmed this.
SM	The reason why asking, needs to look at model regarding volumes pumped out especially when going deeper.	SS confirmed that the mine is busy with these assessments.
SM	According to the EMP the dewatering cone does not fall outside the property.	SS stated that the mine owns quite a lot of land. The groundwater is also in compartments. Some are dewatered and some are not. There are boreholes everywhere. The mine has a groundwater model for dewatering.
SM	The EMP states that the dewatering influences and area of 5-10km. Has there been any complaints from neighbours?	The only complaints are form a farmer and this is on water quality. The mine addresses this issue.
SM	You are looking at recommissioning the FRDs?	SS confirmed this. The mine is busy with a study on this.
SM	Parts of the mine is located on dolomite, what about sinkholes?	SS stated there is a sinkhole on the paddocks. This sinkhole was filled up previously but has stared collapsing again.
SM	Most of the comments will come after receiving the complete draft EMP.	
LN	Does the mine send its monitor reports to DWA?	SS asked which monitoring reports.
SM	Need the S21J effluent monitoring reports.	LN included that the first year monitoring reports on boreholes must be submitted to DWA.
SS	Groundwater reports are done every 6 months.	
SM	The mine must submit groundwater reports within 3 months of licensing.	SS confirmed this was done and included in the IWWMP.
SS	What does DWA do with the monitoring results?	LN stated that DWA also checks it as well as the IWWMP each year. This is to see if there is an impact on the groundwater.
SM	More communication is needed between the mine and DWA.	

7.2.2 Public Participation Process as part of this 2017/2018 EMPr update

A detailed public participation process is undertaken. The Public Participation Process as followed includes:

- Stakeholder identification;
- Registration of Interested and Affected Parties (I&AP's) and key stakeholders;
- Methods of notification:
  - Newspaper advertisement.
  - Site notices.
  - Notification letter including BID.
  - Electronic (E-Mail) notifications including BID.
- Access and opportunity to comment by I&APs; and
- Consultation with the relevant authorities.

Refer to Annexure H for the Public Participation Report. The Public Participation Report presents a full description of the public participation process, as undertaken, and the results and findings thereof.

7.3 Summary of issues raised by I&APs

Table 12 below provides a summary of the comments and issues raised and reaction to those responses.

Table 12: Issues and concerns raised by I&APs (refer also to Annexure H for the Public Participation Report)

Interested and Affected Parties	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			
To be completed upon completion of the public participation process.			

7.4 The Environmental attributes associated with the development footprint alternatives. A baseline environment.

7.4.1 Type of environment affected by the proposed activity

Chapter A: Geology

Regional setting

The main point of interest is the 17.9ha kimberlite pipe. The kimberlite pipe is impacted by and located in two distinct geological features. Firstly, the Lime Acres Dolomite Member of the Gaap Plateau Dolomite Formation of the Campbell Group and secondly, the Kuruman Member of the Asbestos Hills Banded Ironstone Formation of the Griekwatown group.

The Lime Acres Dolomite Member consists of dolomite limestone and is characterised by stromatolites and stylolites with occasional lenses of carbonaceous shales.

A transitional sedimentary sequence known as the “Passage beds” occurs between the Dolomite formation and the Banded Ironstone formation. This sequence is made up of interbedded shales, mudstones, chert, magnetic bands and shaly dolomite. The passage beds are underlayed by dolomite limestone of the Lime Acres Dolomite Member estimated to be between 900m to 1800m thick.

The Asbestos Hills Banded Ironstone Member consist of stilpnomelane and hematite with occasional bands of amphibolite and crocidolite asbestos (Preece 1998).

Peerce (1998) also commented that to describe the correlation between the major geological types around the kimberlite pipe is not feasible because of the complexity of the dolomitic sequence. The complexity is due to “localised discontinuities, lensoid-shaped bodies, stromatilitic algal domes, styolites and the occurrence of secondary and “drusy” dolomites controlled by water bearing, mainly vertically orientated joints”.

Local geology associated with the shaft areas

Mine pit and immediate surroundings

The pipe was covered by ironstone rubble, red sand and extremely altered clayey kimberlite (so called yellow ground). The zone of yellow ground extended down to a maximum of 30m below surface. Below the yellow ground extends a zone of partially to heavily altered kimberlite down to about 100m below surface. Unaltered kimberlite is encountered from some 70m below surface. The kimberlite is contaminated with minor amounts of dolomite, mudstones, Clarence formation sandstone, Karoo shales and a block of Drakensberg Lava present as internal waste bodies.

The Finsch Kimberlite Pipe is an 118Ma old Group 2 kimberlite with a surface area of 17.9 ha. It consists of eight main kimberlite types, some but not all, representing individual eruptive events. These have been designated F1 to F8 in the order in which they were recognised. The volumetrically significant units are labelled F1, F5/F6 and F8, and are distinguished from the minor types F2, F3, F4 and F7.

These distinctions are based on megascopic contact relationships, percentage dilution, density, petrology and diamond grade.

The kimberlite types were emplaced in the following order:

- Emplacement of several kimberlite dykes along a north-east-striking lineament which already contained highly brecciated dolomite with a kimberlitic inter-clast matrix in places.
- Intrusion of the south-west and north-east precursor bulges (F3, F5 and F6 varieties) which truncated the earlier kimberlite dykes. The intrusion sequence of these precursors is unknown since contact relationships were destroyed by emplacement of the main pipe. The presence of common Karoo sedimentary clasts within these structures suggest that they extended well into the Karoo Supergroup and it could be speculated that they reached the land surface at the time of emplacement. No evidence now remains, since the upper parts were truncated by the main pipe emplacement process.
- Emplacement of the main pipe (F1, F7 and F8) and truncation of the south-west and north-east precursor bulges. During this stage of emplacement crater blocks and large quantities of Karoo basalt and sediments were incorporated into the pipe. The gradational contact between the F1 and F8 kimberlite, and the complex geometry of F8, suggests that they might be the same kimberlite, and that the differences are the result of crustal contamination.
- The final phase of activity was the intrusion of late-stage magmatic dykes (F4 and F2) which truncated the earlier kimberlites. These dykes are contained within the pipe and do not extend into the country rock. They are characterised by irregular geometries that could be attributed to the internal heterogeneous nature of the host rock.

Table 13: General features of each kimberlite type

Unit name	General features
F1	A kimberlite breccia located along the outer periphery of the kimberlite, containing on average 30% crustal dilution. Exhibits variations in colour with associated high levels of dilution in places, due to localized sidewall failure. Visibly fragmental with a clast-supported texture and well-rounded magmaclasts. Average density 2.55t/m^3. Mineralogically classified as a phlogopite kimberlite containing extensive ash to dust-sized material in the matrix resulting in a relatively friable rock mass.
F8	The unit is characterised by a decrease in the abundance of Karoo Supergroup xenoliths, but an increased abundance in Precambrian dolomite and chert compared to F1. Visibly fragmental with a high (50 %+) volume of well-rounded, often large magmaclasts. Structure is massive to diffusely layered. Variable, gradational contact with F1. Average density equals 2.63t/m^3. Mineralogically classified as a phlogopite kimberlite, but with notably less ash to dust-sized material in the matrix.
F7	Intermediate in texture between a hypabyssal (magmatic) and magmaclastic rock. Exhibits areas that are uniformly hypabyssal as well as areas with poorly/incompletely developed magmaclasts. Crustal dilution may be as low as 5% in the hypabyssal areas and may reach 20% in more magmaclastic textures. The crustal material is largely

Unit name	General features
	comprised of dolerite and dolomite, with lesser sedimentary fragments. Average density equals 2.71t/m^3. The unit may be classified mineralogically as a melilite-rich phlogopite kimberlite with the modal abundance of melilite decreasing with increasing hypabyssal character.
F2	Occupies a central plug-like geometry in the pipe, which varies with depth and consists of hypabyssal kimberlite. Dark brown in colour and contains abundant dolomite xenoliths with lesser dolerite, representing a total crustal dilution of 30%. The crustal xenoliths are highly altered. Very competent with an average density of 2.80t/m^3. One of the last phases of magmatic activity within the kimberlite. Mineralogically classified as a clinopyroxene-phlogopite kimberlite.
F3	Hypabyssal in nature and can be subdivided into F3a breccia and F3b. F3a is brownish in colour with prominent white calcite segregations. Typically contains up to 20% crustal dilution, representing virtually the entire country rock stratigraphy. F3b is dyke-like in geometry, more uniform in texture and contains less than 5% crustal xenoliths, compared to F3a. Contacts between the two range from sharp to gradational. Average density equals 2.70t/m^3. Both can mineralogically be classified as phlogopite kimberlite, but with different textures.
F4	Occurs as a system of internal dykes and sills within the main pipe and represents the final phase of magmatic activity. Represented by several variants. Crustal dilution is low (<10%) and the xenoliths consist of variably altered dolomite and chert. Average density equals 2.81t/m^3. Mineralogically classified as clinopyroxene-phlogopite kimberlites containing coarse-grained perovskite.
F5/F6	Together forming the south-west Precursor, truncated by the main pipe along a sharp contact. Similar in appearance to F3, also with regards to the segregationary texture and contains on average 20% crustal material, i.e. a kimberlite breccia. Average density equals 2.80t/m^3. Classified as phlogopite kimberlite.

Dykes, sills and faults

An analysis of aerial photographs and satellite images showed that there are several dolomite and kimberlite dykes that cross the area. The two major dykes identified are the Danielskuil dyke to the west of the mine (1 km) and the Groot Pan dyke to the east of the mine (7.5 km). The dykes have a major impact on the groundwater regime of the area. Of lesser impact are the Botha dyke to the northwest of the Lime Acres Village, the Bowden dyke which basically runs in a straight line through the open pit of the mine in north-easterly direction to the PPC workings and the Smuts dyke which crosses the Bowden dyke just northeast of the golf course and runs in a north-north-easterly direction south of the Lime Acres village. A fourth “lesser” dyke, the Bonza dyke, traverses the Bonza farm also in a north-easterly direction.

According to the “Finsch Diamond Mine Preliminary Closure Plan” compiled by Redco in 2009, sinkholes occur on the old “Paddocks”, which overlay dolomites. Numerous cracks are also observable on the surface, lining up with the sinkholes, displaying a distinct linear zone of subsidence this zone has a SSE-NNW trend and is termed the “Slimes Paddock Fault” and has a down-throw on the western side.

There are two sub-vertical dykes traversing the area. SW – NE trending sub-vertical dyke swarm (“Golf Course dyke swarm”) which crosses the Lime Acres Golf Course and trends directly into PPC quarry No. 5. This dyke swarm is thought to be some 300 m wide and comprises numerous fractures in-filled with kimberlite and dolerite dykes and a SW – NE trending sub-vertical dyke swarm “quarry No. 4 dyke swarm”) which extends from the Old fine residue deposit (FRD) paddocks into PPC quarry No. 4.

Chapter B: Climate

The region in which the mine is located experiences a temperate Highveld climate with warm to hot summers and mild, cool winters. The climate around Kimberley is essentially a continental one - the weather provides hot wet summers (December to February) and mild dry winters (June to August). The infrequent summer rains tend to take the form of occasional severe thunderstorms rather than prolonged soft showers. It is not unusual for winter night-time temperatures to drop below freezing point.

Precipitation and evaporation

The rainfall and evaporation data for Finsch is summarised in the below.

Table 14: Climate information for Finsch Diamond Mine

Month	Rainfall (mm)			Evaporation
	Average	Maximum	Minimum	S-pan (mm)
January	64.8	238.0	0.0	319.6
February	84.2	349.5	0.0	245.6
March	70.3	238.0	6.0	212.0
April	36.5	129.5	0.0	148.1
May	17.5	139.2	0.0	106.7
June	6.1	58.5	0.0	81.1
July	3.3	42.0	0.0	93.8
August	5.9	64.0	0.0	127.8
September	12.3	64.2	0.0	177.0
October	23.8	110.0	0.0	236.6
November	30.8	64.5	0.0	279.7
December	44.7	191.0	0.0	322.2
Total	400.1	1688	6.0	2350

Mean monthly maximum and minimum temperatures

Since the mine has a very distinctive micro climate it is inappropriate to use the weather data for nearby towns as supplied by the South African Weather Bureau. The mine installed a metrological station at the Lime Acres Air Field during 1998. Refer to the table for the temperature data for the period 1998 to 2001.

Table 15: Average temperature for the period 1998 to 2001 at Lime Acres Air Field (ºC)

Month	Mean max	Mean min	Mean	High	Low
January	29.4	17.4	25.0	40.0	9.8
February	28.4	22.2	25.5	40.4	13.7
March	28.1	16.7	23.7	40.5	3.4
April	23.4	15.0	19.8	32.8	8.2
May	18.8	7.4	13.5	28.6	1.0
June	16.0	5.6	11.4	24.6	-2.8
July	15.6	4.2	11.0	24.3	-4.5
August	18.2	5.6	12.6	27.2	-1.7
September	21.7	7.8	15.4	31.1	0.2
October	26.6	14.2	20.9	35.8	5.6
November	27.9	15.7	23.4	38.3	7.9
December	28.0	19.2	24.1	38.8	10.8

Extreme weather conditions

The data basis of the Kuruman weather station is used to give a general idea of occurrence rates of thunderstorms, hail, snow and mist.

Thunderstorms happen normally on 27 days per year, with hail a rare occurrence at 1 day a year. Cloud cover is associated with the mid-afternoon convectional activity and the resultant thunderstorms. Snow has a frequency of less than 1 day per year and mist is also rare at 1 day per year.

Mean monthly wind direction and speed

The mine has a distinctive micro climate. The weather data from nearby towns as supplied by the South African Weather Bureau is used in addition to the data generated by the on-site metrological station. The mine installed a metrological station at the Lime Acres Air Field during 1998.

Table 16: Average wind speeds and direction for the period 1998 to 1999at Lime Acres Air Field (knots)

Month	Average	High	Direction
January	7.2	44.8	NNW
February	6.1	35.7	NNW
March	6.2	35.6	NNW

Month	Average	High	Direction
April	4.0	32.2	NNW
May	6.4	35.9	NW
June	6.2	31.9	NW
July	7.6	38.6	N
August	7.6	43.5	N
September	7.5	41.7	NNW
October	6.9	45.5	NNW
November	7.5	40.3	NNW
December	8.7	45.7	NNW

Chapter C: Topography

Regional Description

The topography may best be described as an undulating plateau with low hills. The Ghaap plateau is bounded to the east by the Harts River and to the west by the Kuruman hills which form part of the Asbesberge.

Site Description

The mine is located approximately 1 500 mamsl on an undulating Plateau with low hills. The kimberlite pipe is located on the eastern edge of the Kuruman Hills, which form part of the Asbesberge, stretching from Griquatown in the south to Kuruman in the north. The hills are of banded ironstone with, in most cases, a shallow covering of soil. The soils are deeper in the valleys on the Brits property. At least three pan areas occur on the Bonza property, all along the southern side.

The ridges are in some places quite steep, with bands of rock outcrops. The section of the Brits farm which skirts the southern edge of the mining area and Brits FRD is steep, with small valleys, and in some places small cliffs. Small overhangs occur in a few places.

Apart from the south-western corner of the property, the Bonza Farm area is relatively flat. Vegetation is sparser and is dominated by grass species.

Chapter D: Soil

A detailed soil survey was undertaken by Dr. T.L. Morgenthal from Viridus Technologies (Pty) Ltd. trading as EKO REHAB. Most of the soils are derived from the banded ironstone formation. The natural soils of the area are predominantly shallow and rocky. The approximate depth the soils can be excavated varies between 30-50cm.

Soil profiles

There are two types of soil profiles as well as the banded ironstone outcrops. The two types of soil profile forms are described in the table below.

Table 17: Soil forms and families identified at the mine

Soil form		Soil Family	Diagnostic horizons	Soil depth (cm)
Ms	Mispah	Myhill	Ortic A	20
			Hard rock	>20
Hu	Hutton	Hayfield	Ortic A	20
			Red Apedal B	50

Mispah

Soil of the Mispah form is the predominant soil form on the mining area and occurs on the middle slopes of terrain. The A-horizon has a sandy loam texture with a high gravel/stone content of 48.7%. The soil structure can be described as structureless and single grained. Soils of the Mispah soil form can further be classified as belonging to the Myhill soil family due to non-leached and non-calcareous A horizon. The depth of the A horizon is on average 200 mm.

Areas on which this soil type occurs are the most affected by mining activities and large areas on which this soil type has occurred is now covered by FRDs and CRDs.

Hutton

Soils of the Hutton type are mostly shallow, the A-horizon being 20 cm and the B horizon is mostly between 20 and 30 cm deep. This soil type occurs on the valley pediments and has probably developed from finer material which has accumulated on the low-lying areas. The A and B horizon has predominantly a sandy loam texture and the gravel content varies from between 10% and less in the low-lying areas to 40% and more on the lower middle slopes. The structure remained structureless and single grained throughout.

The Hutton soils found during the survey was mesotrophic and non luvic soils. According to the South African classification system the Hutton soil belong to the Hayfield soil family. The total depth of this soil on the mine property rarely exceed 500 mm with the A horizon normally being 200 mm and the B horizon depth varying between 200 mm and 300 mm.

All the soils have probably derived from banded Ironstone the predominant rock formation on the mine. Mining activities which is impacting on this soil type is the FRDs and in lesser extent the CRDs.

Banded ironstone outcrops

The hills consist of banded ironstone with, in most cases, a shallow covering of soil.

Soil erodibility

The table below presents the soil erodibility of the two types of soil form as identified above.

Table 18: Derived soil properties, land capability and pre-mining land use

Soil form	Natural fertility	Erodibility	Crop product (dry land)	Crop production (irrigation)	Land capability	Pre-mining land use
Hu	Low	Low	-	-	Grazing	Grazing
Ms	Low	Low	-	-	Grazing	Grazing

Soil chemistry and nutrient status

Soil chemical analyses were conducted on five (5) soil samples from the undisturbed veld and one sample from the compost that is being used as organic ameliorant during rehabilitation by Eko Rehab in 2001. Results of the soil chemical analyses are given below.

Coarse and fine residue

- The chemistry of the coarse and fine residue is similar regarding most characteristics.
- Both areas are alkaline according to the soil pH, which exacerbate the micro-element deficiencies.
- The low EC indicate a low nutrient status.
- The percentage sodium in relation to the saturation value is too high. This is also true for the Calcium ratio. The percentage Potassium and Magnesium are, however, to low.
- The phosphate in the samples was too low.
- The base saturation exceeds 100%; therefore, there is a need to increase the cation exchange capacity of the soil. This can be corrected by the addition of organic material.

Natural soils (Ortic A, Red Apedal B, Ortic A Glenrosa)

- The pH is slightly alkaline but the electrical conductive (EC) of the soils are within acceptable range.
- It is however preferred that the base saturation must be below 100% which is not the situation in this case. The base saturation corroborates with the alkaline pH. A further explanation for the high base saturation of the soil is the low cation exchange capacity (CEC).
- The macro element ratios do not conform to the ideal macro nutrient ratio and needs to be corrected with potassium and magnesium containing fertilisers.
- Overall Ca ratio is too high and the Mg and K ratios to low.
- A low Na ratio is preferred, which is true for the natural soil samples at Finsch. The calculated sodium adsorption ration (SAR) was also within the acceptable norm value of < 1.

The natural soil is suitable for topsoil especially with correct fertilisation and kraal manure or compost added.

Compost (sewage sludge compost)

- The pH of the compost is within acceptable norm values but the elevated electrical conductivity indicates high concentration of salts.
- The high levels of nitrate, ammonium and phosphate indicate that the compost will be a good supplement for phosphate and nitrogen.
- Of more concern is the high Na content influencing the osmotic potential of the compost solution. This is atypical of organic material and the reason for the high Na is due to the use of reeds that were grown on the FRD and were cut down and used as a bulking agent in the making of the compost.
- The high sodium concentration will also influence the physical stability of the medium through dispersion and deflocculation.
- The Boron and manganese concentrations are also over the excepted norm values.
- The compost is used in rehabilitation trials for the stabilisation of FRD sidewalls.

Chapter E: Land capability

General

Land use in the Province is predominated by stock farming, with an increasing game farming component (96%), while only 2% of the land is used for crop farming, and 1% is reserved for conservation. Mines and quarries constitute only 0.1% of the total land area. Grazing capacity of the natural veld surrounding the mine ranges between 10 and 12 ha / LSU and most of the former land use in the Lime Acres area was grazing. Except for the surrounding old asbestos mines, soil pollution is limited. Like most land in the province, there is a local potential susceptibility to desertification and management should be directed towards its prevention.

Site specific

The mine area was first occupied in the 1870's and has been used for domestic livestock production for more than 100 years. It is probable that landowners have utilised the land for hunting purposes. The pre-mining land capability is thus classified as extensive grazing land. Soil depth, however, limits most of the area's potential and when combined with the erratic and unpredictable rainfall, the land is considered most suited to conservation/wilderness land. With the acquisition of the mine and surrounding properties in 1962, De Beers initiated a wildlife conservation policy, which resulted in sections of properties being enclosed by a game fence and the areas being managed as game farms.

Extensive grazing land, with soil depth limiting most of the area's potential. The land is considered most suited to conservation/wilderness use due to limited soil depth in combination with the erratic and unpredictable rainfall. Refer to Table 19 below for the classification of the land capability.

Table 19: Soil types, land use and land capability

Soil type	Effective depth (mm)	Surface areas (ha)	Land use	Land capability
Hutton	1 800	12	Natural veld	Arable
Mispah	150	225	Natural veld	Wilderness

Chapter F: Vegetation

General

The mine is situated in the Savannah Biome. Low and Rebelo (1996) described the general vegetation type present on the site as Kalahari Mountain Bushveld which is dominated by camphor bush *Tarchonanthus camphoratus.* Kunibush *Rhus burchelii* and *Rhus tridactyla* become the principal shrubs in certain areas in the southern portions of the site. The tree layer is poorly developed and individuals of wild olive *Olea europaea* subsp. *africana* and black thorn *Acacia mellifera* subsp*. detinens* are widely scattered. The common grasses include copperwire grass *Aristida diffusa,* Lehmann's lovegrass *Eragrostis lehmanniana,* thimblegrass *Fingerhuthia africana* and *Digitaria eriantha*.

Mucina and Rutherford (2006) identify the mine as being within the Savannah Biome (9), where the following vegetation types can be expected: Ghaap Plateau Vaalbosveld (SVk 7), Southern Kalahari Salt Pans (AZi 4), Olifantshoek Plains Thornveld (SVk 13) - adjacent and to the north and west of the mine, and Kuruman Mountain Bushveld (SVk 10), which is endemic to the Griqualand West Centre of plant endemism and is therefore a priority for conservation (Anderson, 2006:2). Generally occurring trees include *Olea europaea* subsp. *africana* (Wild olive), *Acacia tortilis* subsp. *heteracantha* (Umbrella thorn), *Ziziphus mucronata* (Buffalo thorn) and *Acacia karroo* (Sweet thorn). At the mine typical Kuruman Mountain Bushveld shrubs such as *Rhus burchelii* are present, while grasses include Lehmann's love grass (*Eragrostis lehmanniana*), thimble grass (*Fingerhuthia africana*) and *Digitaria eriantha.* Regional vegetation types in the surrounding area of the mine are given below.

Table 20: Regional vegetation types in the surrounding area of Finch Diamond mine

Kalahari Plateau Bushveld (van Rooyen & Bredenkamp, 1998a)	Kalahari Mountain Bushveld (van Rooyen & Bredenkamp, 1998b)	Kalahari Thornveld: Vryburg Shrub (Mixed *Tarchonanthus* veld) (Acocks,1988)
Tarchonanthus camphoratus	*Tarchonanthus camphoratus*	*Tarchonanthus camphoratus*
Rhigozum trichotomum	Rhus undulata	Olea europaea subsp africana
Ehretia rigida	*Rhus dregeana*	*Rhus ciliata*
Grewia flava	*Olea europaea subsp. africana*	*Rhus dregeana*

Kalahari Plateau Bushveld (van Rooyen & Bredenkamp, 1998a)	Kalahari Mountain Bushveld (van Rooyen & Bredenkamp, 1998b)	Kalahari Thornveld: Vryburg Shrub (Mixed *Tarchonanthus* veld) (Acocks,1988)
Maytenus heterophylla	Acacia mellifera subsp. detinens	*Lebeckia macrantha*
Olea europaea subsp. africana	*Diheteropogon amplectens*	*Euclea crispa subsp. ovata*
Acacia tortilis subsp.	*Andropogon schirensis*	Rhigozum obovatum
Boscia albitrunca	*Brachiaria serrata*	*Maytenus heterophylla*
Themeda triandra	*Aristida diffusa*	*Putterlickia pyracantha*
Aristida diffusa	*Eragrostis lehmanniana*	*Rhus burchellii*
Stipagrostis uniplumis	*Fingerhuthia africana*	*Euclea undulata*
Rhus ciliata	*Digitaria eriantha*	*Rhigozum trichotomum*
Acacia melifera subsp. detinens		*Grewia flava*
		Schizachyrium sanguineum
		Diheteropogon amplectens
		Andropogon schirensis
		Andropogon chinensis
		Brachiaria serrata

Site specific

Rocky hilltops

The vegetation on the rocky hills consists mainly of trees/large shrubs including *Tarchonanthus camphoratus* and *Rhus* spp (*R cilliata*, *R. tridactyla* and *R. burchelii*) and common shrubs including *Lebeckia macrantha* and *Euryops* sp. c*f subcarnosus* subsp. *vulgaris*. The grasses *Heteropogon contortus*, *Eragrostis lehmanniana* and *Fingerhuthia africana* were the most common on the rocky hilltops. This plant community seemed to be in a good veld condition due to its species composition ground cover and grass biomass. The rocky hilltops also had the highest grass cover.

Lower middle slopes

The vegetation on the lower middle slopes at the toes of the CRD has been encroached by *Acacia mellifera* subsp *detinens* (Swarthaak). Other shrubs and trees, which have a common occurrence, include *Tarchonanthus camphoratus*, *Rhus tridactyla, Ehretia rigida* and *Rhus burchelii*. The herbaceous layer is sparse and mostly consists of the grasses *Enneapogon desvauxii*, *Eragrostis lehmanniana* and *Digitaria eriantha* and the forbs *Chrysocoma cilliata* and *Geigeria ornativa.*

Valley bottoms/pediments

The vegetation of the valley bottoms can be considered an open shrubland consisting of small to medium bush clumps of *Tarchonanthus camphoratus* (dominant), *Rhus cilliata* (sub-dominant), *Grewia flava, Lycium* sp. and *Cadaba aphylla*. The herbaceous layer consists predominantly of the grasses

Stipagrostis sp., *Eragrostis lehmanniana, Digitaria eriantha* and *Cymbopogon plurinodis* and the forbs *Geigeria ornativa*, *Chrysocoma cilliata* and *Felicia muricata.*

The vegetation on the plains to the east that borders the FRDs area (Bonza wildlife camp) are totally encroached by *Acacia mellifera* subsp *detinens* forming a low thicket which are impregnable, indicating past mismanagement of the veld. Other trees/large shrubs also occurring in this area include *Tarchonanthus camphoratus*, *Grewia flava* and *Rhus tridactyla*. The herbaceous layer consists predominantly of the grasses *Stipagrostis* sp, *Enneapogon desvauxii* and *Eragrostis lehmanniana* and the forbs *Eriocephalus ericoides*, *Felicia muricata*, *Asparagus* spp and *Hermannia vestita.*

A different vegetation community occurs on the pediments to the northern side of Finsch Diamond Mine near the airstrip because no encroachment of *Acacia mellifera* subsp. *detinens* was evident. The ground cover was sparse and mostly consisted of forbs. Species that were only found at this area included *Aloe grandidentata*, *Gnidia polychepala*, *Pteronia mucronata*, *Rhuscia* sp., *Osteospermum muricata*, *Aptosimum* sp., *Ursinia nana*, *Diospyros astro-africana* and *Olea europaea* subsp. *africana*.

Rehabilitated vegetation

The rehabilitated Waste Shaft Rock Dump and Red Dumps were sampled in October 2001 to determine which species were the most successful to be established. The Red dumps are the topsoil from the pit and are said to contain diamonds thus a future resource. This dump contains a magnitude of high-density residue such as dolomite. *Eragrostis lehmanniana* and *Eragrostis echinochloidea* were at both dumps the dominant grass species. Other prominent species includes *Salsola kali, Chrysocoma cilliata*, *Blumea gariepina* and *Argemone ochroleuca*. The cover at both areas was estimated at over 80%. Other grass species that was also found on the rehabilitated sites were *Cenchrus ciliaris, Chloris virgata*, *Digitaria eriantha, Enneapogon cenchroides*, *Heteropogon contortus* and *Panicum maximum* (in the contours).

Unrehabilitated coarse residue deposit

Stipagrostis namaquensis and *Stipagrostis obtusa* are the dominant grasses on the CRDs (Pre-1979 and Post-1979). Other grasses, also occurring on the unrehabilitated CRDs includes *Eragrostis echinochloidea*, *Hyparrhenia hirta* (only Pre-1979 CRD) and *Pennisetum setaceum*. The only prominent forb on the CRDs was *Sutherlandia microphylla,* which particularly occur on the top of the Post 1979 CRDs.

Unrehabilitated fine residue deposits

The vegetation on the unrehabilitated FRDs is dominated by *Salsola kali*. Other frequent occurring species are *Senecio consanguineus*, *Nidorella resedifolia* subsp. r*esedifolia, Blumea gariepina, Phragmites* sp. and *Argemone ochroleuca.* On the toe wall of the dam a number of tree species were found of which some were possibly planted. Species that were probably planted include *Rhus lancea*, *Rhus pendulina*, *Rhus pyroides* and *Ziziphus mucronata*.

Rare or endangered species

Red data species present include Devil's Claw (*Harpagophytum procumbens*), while the following protected species occur on the mine's property: Camel thorn (*Acacia erioloba*), Grey camel thorn (*Acacia haematoxylon*), Shepherd's tree (*Boscia albitrunca*), as well as *Aloe hereroensis, Ammocharis coranica, Boophane disticha, Hereroa* cf. *wilmaniae, Orbeopsis lutea, Pachypodium succulentum*, and *Ruscia* cf. *sedimentata*. The following endemic species occur on the site*: Lebeckia macrantha* and *Rhus tridactyla*, while the near-endemic *Tarchonanthus* cf. *obovatus* is also present (Anderson, 2006:3,4).

The pans in the ephemeral drainage line of the valley are considered to be sensitive habitats, with a number of protected species associated with their slopes.

Invader species

Prosopis glandulosa (Honey mesquite), *Nicotiana glauca* (Wild tobacco), *Opuntia ficus-indica* (Sweet prickly pear) as well as another eleven alien invasive plant species were found within the mining lease area of the mine in 2001 (Eko-Rehab, 2001). Another Category 1 invader found on site in 2006 is *Datura ferox* (Anderson, 2006). Species with the highest frequency of occurrence are *Schinus molle* (Pepper tree), *Nicotiana glauca* (Wild tobacco), *Pennisetum setaceum* (Fountain grass) and to a lesser extent *Prosopis glandulosa* (Honey mesquite). Other invaders include *Barleria rigida*, *Pentzia* spp, *Plinthus karooirus*, *Rosenia humilis* and *Stigpagrostis obtusa* (Eko-Rehab, 2001), while the presence of *Salsola kali* (Tumbleweed) is also likely (Anderson, 2006).

Table 21: List of all exotic species considered invaders or weeds

Scientific species	Afrikaans name	English name	Category
Argemone ochroleuca	Mexikaanse papawer	Mexican poppy	1
Cirsium vulgare	Skotse dissel	Spear thistle	1
Conyza spp	Skraalhans	Fleabane	-
Cortaderia jubata	Pampasgras	Pampas grass	1
Lepidium bonariense	Peperbossie	Pepperweed	-
Melia azedarach	Seringboom	Syringa	3
Nicotiana glauca	Tabakboom	Wild tobacco	1
Pennisetum setaceum	Pronkgras	Fountain grass	1
Salsola kali	Russiese rolbossie	Russian tumbleweed	-
Schinus molle	Pepperboom	Pepper tree	-
Sonchus oleraceus	Sydissel	Milkthistle	-
Sonchus spp	Dissel	Thristle	-
Tagetes minuta	Kakiebos	Tall khaki weed	-

Scientific species	Afrikaans name	English name	Category
Xanthium spinosum	Boetebos	Spiny cocklebur	1

Chapter G: Fauna

Site specific

Due to the three security fences that encircles the mining area and the constant movement of machinery there is very little possibility that any terrestrial game will access the area. The only animals that one can expect to see inside the fences are avifauna, rodents, small predators and baboons. On the mine property outside the security fence one can expect to see various small game species that moves through the area and these will probable move to and from the surrounding game farms. One can expect to see duiker, steenbok, jackal, scrub hare and porcupine.

Mammals

The following rare animals could possibly access the mining area outside of the security fence; Honey Badger, African wild cat, Ant bear, South African Hedgehog, Aardwolf, Brown hyena and Leopard. In most instances these animals will only be foraging for food or moving through the area.

Bird habitat assessment

Typical grassland bird species which were recorded during Tania Anderson's January 2006 botanical survey and ECOSUN's faunal assessment of November 2006 included: *Mirafra fasciolata (*Eastern Clapper Lark*)*, *Mirafra africanoides (*Fawncoloured Lark*), Cisticola juncidis* (Zitting Cisticola), *and Myrmecocichla formicivora* (Anteating Chat). Bushveld specialists observed included: *Telophorus zeylonus* (Bokmakierie), *Tricholaema leucomelas* (Acacia Pied Barbet), *Oena capensis* (Namaqua Dove), *Pycnonotus nigricans* (Red-eyed Bulbul), and *Otus leucotis* (Southern White-faced Scops- Owl). All the ephemeral pans and streams in the area were dry and therefore none of the water dependant birds were present in the study area. Although a number of Red Data species were expected in the area, none were recorded. No endemic species were recorded at the site. There is a number of vulnerable bird species listed for the area, including the Kori Bustard (*Ardeotis kori)*, the African Marsh Harrier (*Circus ranivorus*), the Lesser Ketrel (*Falco naumanni*), the African Whitebacked Vulture (*Gyps africanus*), Martial Eagle (*Polemaetus bellicosus*), Bataleur (*Terathopius ecaudatus*) and Lappetfaced Vulture (*Torgos tracheliotos*).

Amphibians

Only one common amphibian species was recorded within the study area namely *Afrana angolenis* (Common river frog), which is not listed as a Red Data species.

Red data species, endemism and biodiversity

Of the avifauna, only the raptor species have protected status and since mining has moved underground there are no disturbances impacting on the breeding birds in the pit. In terms of mammals, the Springbok (*Antidorcas marsupialis*), Klipspringer (*Oreotragus oreotragus*) and Gemsbok (*Oryx gazelle*) are all Conservation Dependent, while Sclater's golden mole (*Chlorotalpa sclateri*), Round or short-eared elephant-shrew (*Macroscelides proboscideus*) and spring hare (*Pedetes capensis*) are listed as Vulnerable.

Chapter H: Surface Water

The mine falls within the greater Lower Vaal catchment area and is located on a ridge that forms part of the catchment divide between quaternary catchments C92C and D71B. This watershed forms part of the Asbesberge. The area in the east drains towards the Vaal River whilst the area in the west drains towards the Orange River. To the east, the mine falls within the catchment area of the Klein Riet River that drains to the southeast of the mine. The Klein Riet River drains out of three seasonal pans (Great Pan, Rooi Pan and one unnamed pan) located to the northeast and the east of the mine, from where the river runs in a south easterly direction till it drains into the Vaal River some 60 km away. To the west the area drains into a pan at Taaibosch Puts, which drains towards the Orange River.

Mean annual rainfall of 320 mm and the endoreic nature of the catchment imply that no perennial rivers are present in the immediate area: the closest river is the Groenwater Spruit near Postmasburg. There is no measurable surface water, except for the altered surface hydrology caused by coarse residue depositions: this result in erosion, altered groundwater flow and groundwater quality as consequential impacts. Pans that form on the Ghaap Plateau east from the mine are saline in nature and display natural vegetation typical of this landform.

Water management area

The mine falls within the greater Lower Vaal catchment area and is located on a ridge that forms part of the catchment divide between quaternary catchments C92C and D71B. There is no perennial surface water systems located or traversing the mine property, with pre-mining surface runoff from rainfall flowing to the pan at Bergplaas in the eastern catchment area and to the pan at Taaibosch Puts in the western catchment. There are, however, two distinct topographically low-lying areas or drainage basins that will carry a concentrated amount of water through the mine property in the event of a 1 in 50 year storm.

The first low lying area (part of the D71B quaternary catchment) is located to the west of the mine and drains towards to the south on a north – south axis ending up in the Orange River system (West sub-catchment). The second low lying area (part of the C92C quaternary catchment) is located to the north of the mine, draining towards the southeast on an east – west axis that swings to a northwest –southeast axis running between the Norfin Village and the existing FRD 1,2 & 3 complex towards Bonza Dam. This water drains towards the Vaal River system (North sub-catchment).

There are a few streams indicated on the 1:50,000 map and most of these are non –persistent drainage channels which feed the groundwater in the dolomites of the Ghaap Plateau or flow into seasonal pans. The whole region is considered to be endorheic, which means that precipitation does not reach river systems, but is either evaporated or reports to groundwater.

In the past, the Vaal Gamagara State Water Scheme (now known as the Sedibeng Water Board Management Scheme) managed this area but is now managed by the Department of Water and Sanitation (DWS) and the Tshiping Water Users Association.

Surface water quantity

Drainage density

In order to calculate drainage densities of the mine the area was divided into four sub catchments by KLM Consulting Services as described in the table below (refer also to Annexure C1 for the updated storm water management plan).

Table 22: Finsch Diamond Mine sub-catchments

Sub catchment	Description
Sub-Catchment A	Constitutes the north-western and western sections of the mine, including the Waste rock dump (WRD) and Brits FRD
Sub-Catchment B	Constitutes the eastern sections of the mine, including the new CRD, FRDs and Bonza Quarry and Dump.
Sub-Catchment C	Includes the eastern section of the plant, a portion of the Old CRD and the Stores area.
Sub-Catchment D	Includes the western section of the plant, Capitol Dump and the single-quarter complex.

The drainage densities of the four sub-catchments is calculated as per the table below.

Table 23: Drainage density

Sub-catchment	Drainage density
Sub-Catchment A	$4.09 \times 10^{-4}\ m^{-1}$
Sub-Catchment B	$3.53 \times 10^{-4}\ m^{-1}$
Sub-Catchment C	$17.0 \times 10^{-4}\ m^{-1}$
Sub-Catchment D	$17.0 \times 10^{-4}\ m^{-1}$

Mean annual runoff

The mean annual runoff for the sub-catchments is presented in the table below.

Table 24: Mean annual runoff

Sub-catchment	Mean annual runoff per sub-catchment
Sub-Catchment A:	$0.077 \times 10^6\ m^3$
Sub-Catchment B:	$0.078 \times 10^6 m^3$
Sub-Catchment C:	$0.0052 \times 10^6 m^3$
Sub-Catchment D:	$0.0052 \times 10^6 m^3$

Dry weather flow

There is no flow in the drainage channels but sub-surface flow within the drainage channels is sustained by ground water.

Flood peaks and flows

The flood peak flow rates for the four sub-catchments are shown Table 25, and the flood volume rates for the four sub-catchments are shown in Table 26 below.

Table 25: Flood peak

1:X years	1:2	1:5	1:10	1:20	1:50	1:100	1:200
A m^3/s	7	11	14	18	26	36	48
B m^3/s	14	21	28	36	53	72	97
C m^3/s	5	8	9	14	17	24	27
D m^3/s	3	5	6	9	11	15	17

Table 26: Flood volume

1:X years	1:2	1:5	1:10	1:20	1:50	1:100	1:200
A x $1000m^3$	89.54	191.59	281.57	375.61	519.59	634.06	761.89
B x $1000m^3$	122.1	261.3	384.0	509.5	708.5	864.6	1038.9
C $x1000m^3$	8.14	17.42	25.60	33.96	47.24	57.64	69.26
D $x1000m^3$	8.14	17.42	25.60	33.96	47.24	57.64	69.26

Resource Class and River Health

According to the State-of-Rivers Report compiled by the National River Health Programme (RHP) during 2003, the overall ecological state or health, at that time, of the lower Vaal River was found to be in a fair state. The lower Vaal River area is situated downstream of the confluence between the Harts River and the Vaal River. Finsch Diamond Mine is situated approximately 77 km to the west of the lower Vaal River.

Receiving Water Quality Objectives and the Reserve

Water quality limits are included in the Water Use License for Finsch Diamond Mine. It is the responsibility of the mine to ensure that the water quality is within these limits specified.

Surface Water User Survey

There are no perennial streams and no permanent surface water sources in the area. During the heavy rainfall years of 1988, a nearby, large surface pan filled with water and became a recreational area for a few years. Some freshwater pans, which only fill with water during exceptionally wet years, are used to water livestock. Generally, the pan water is saline.

Chapter I: Wetlands and other surface water features

An assessment of the wetland Freshwater Ecosystem Priority Areas (NFEPA) shows that there are three pans in close proximity to the site for the Brits FRD. Two small pans are located close to the northern and southern ends of the existing rock deposit. Another pan is located towards the watershed of the catchment to the north of the Brits FRD (Rietpan). Runoff generally drains in a southerly direction to a pan about 6 km south of the mine and towards the pan located adjacent to the northern end of the existing rock deposit. All water courses and pans are non-perennial.

Figure 8 below presents the proximity of Finsch Diamond Mine to the identified wetlands,

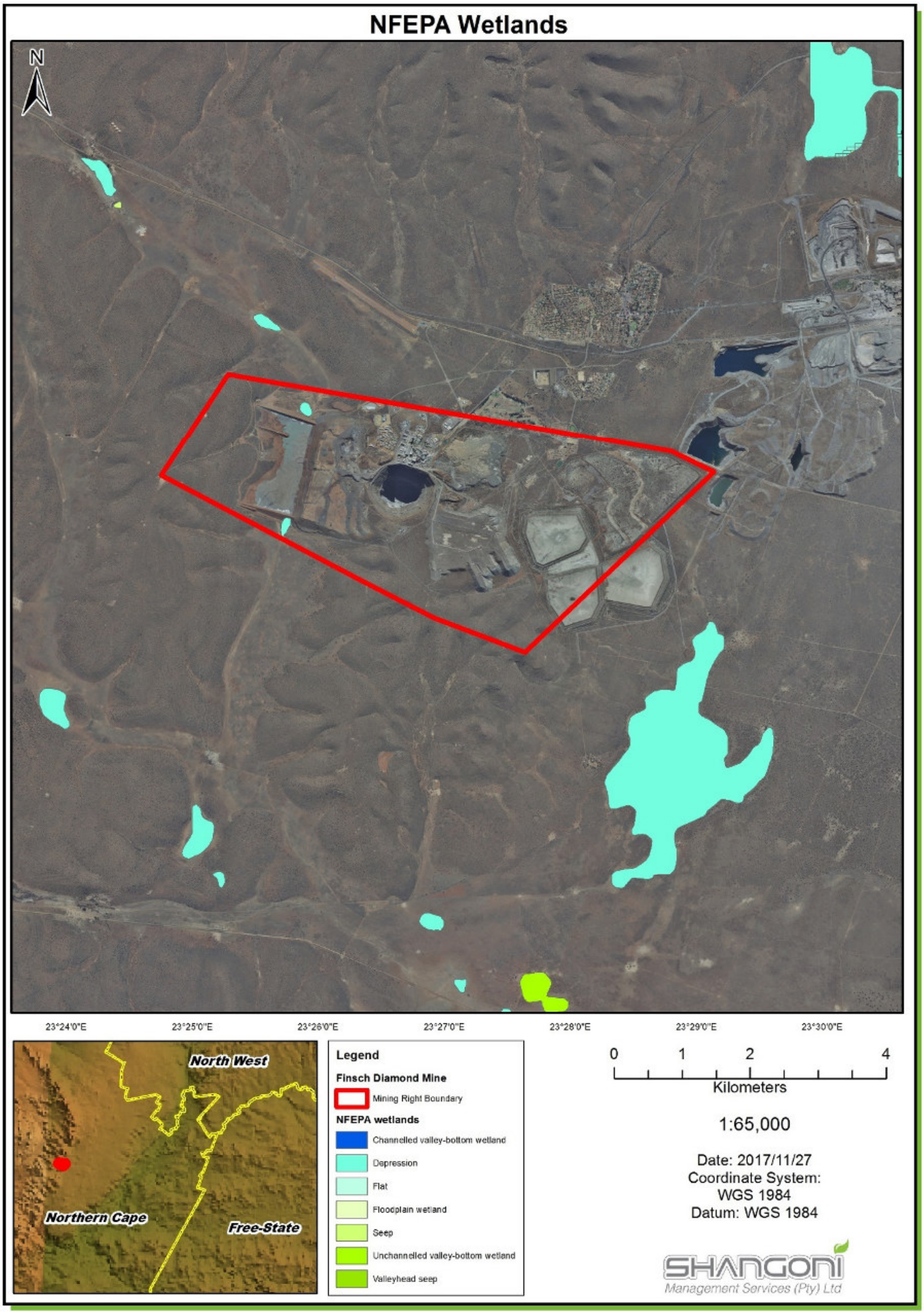


Figure 8: NFEPA wetlands in relation to the Finsch Diamond Mine (Refer also to Annexure A)

Chapter J: Groundwater

The following information was extracted from the reports titled: "Petra Finsch Mine Groundwater Impact Assessment, dated May 2012, and "Groundwater Contamination at Finsch Mine: Phase 1 Situation Assessment, dated October 2006, prepared by Golder Associates, which is attached hereto in Annexure C2 and Annexure C3, respectively.

Aquifer Characterisation

The aquifer underlying the study area is highly complex consisting of dolomite and banded ironstone. Banded Ironstone and Chert (SiO_2) is hard and fine-grained and more resistant to weathering than dolomite ($CaMgCO_3$). Dolomite is subject to solution weathering. Water percolating vertically through the unsaturated zone above the natural water table forms a weak carbonic acid that slowly dissolves the dolomite from the sides of joints or faults. Solution also takes place below the water table forming chambers and caves.

Considering the above the aquifer consists of a series of solution cavities that may or may not be interconnected. Zones of solid dolomite and chert not contributing to groundwater flow will be present between the solution cavities. This aquifer is heterogeneous, i.e., hydraulic properties may vary over short distances in all directions. However, numerical modelling assumes the aquifer is a homogeneous porous medium. Modelling a heterogeneous aquifer on a small scale may lead to an inadequate numerical representation of the modelling domain. A larger scale averages local heterogeneities within regional parameters. Therefore, for a sufficiently large modelling cell size (or representative elementary volume) a porous media approach can be applied by specifying regional representative aquifer parameters.

Groundwater quality

A review of the groundwater quality monitoring programme for 2012 (IGS, 2012) revealed that very little pollution occurs within the aquifers with most constituents recording within the acceptable range for the drinking water standard. Although seepage from the Brits FRD on the northern and southern sides of the dam has been identified, the 2011 monitoring report (IGS, 2011) revealed that the seepages have had no influence on the downgradient aquifer/s. Seepage from the Little Bonza Quarry and the possibility of affecting the downgradient groundwater regime should however be included as priority and investigated.

Based on the water quality data available, groundwater is generally within drinking water quality standards. Although all the current analyses indicate elevated concentrations of major parameters relative to the background, suggesting the influence of source(s) of contamination, the fact that the quality is generally within drinking water quality standards and localised due to compartmentalisation, the risk of pollution towards adjacent aquifers and receptors is low.

Refer to Annexure C4 for the recent groundwater qualities at Finsch Diamond Mine.

Hydro-census

Based on the results of the KLM (2002) hydrocensus, a target list of 30 potential boreholes was drawn up located in the vicinity of the slimes dams, slimes paddocks and the PPC No. 4 Quarry. Some boreholes were not accessible, were locked or destroyed. A total of 23 boreholes were visited during the hydrocensus. Surface water was sampled from PPC Quarry 4 and Quarry 5.

The elevation and co-ordinates at each site were recorded using a GPS receiver. Groundwater levels and the depth of the boreholes were measured using a 100 m dip meter. The condition and status of each borehole was noted to assist in the identification of boreholes suitable for ongoing monitoring.

Groundwater sampling

Water samples were collected at 7 sites. Of these 7 sites, 2 were surface water samples from PPC Quarries No. 4 and No. 5, and 5 were boreholes. Other boreholes could not be purged or sampled as they were dry or damaged.

Each sampled borehole was first purged to allow fresh water from the aquifer to fill the borehole. Purging and sampling was conducted using a submersible electric pump powered by a portable generator.

Two samples were collected from each borehole. One sample was passed through a 0.45 μm filter, to remove reactive colloidal material and preserved using Nitric Acid (HNO3) for cation and metal analysis. A second unfiltered sample was collected for major anion, pH, alkalinity and conductivity analysis. Samples were sent to the SANAS-accredited UIS Analytical Laboratories, in Centurion for analysis.

Quality of hydrocensus samples

The laboratory results of samples collected during the current hydrocensus are tabulated and compared to drinking water guidelines in Table 28.

Table 27: Hydrocensus results recorded at boreholes and quarries around the site

Borehole	Latitude	Longitude	Ground elevation (mamsl)	Groundwater level (mbg)	Borehole depth (mbTOC)	Groundwater elevation (mamsl)	Borehole Status
KLM2	28.40273	23.47645	1461	DRY	40.58		Good. Equipped for monitoring.
KLM3	28.39614	23.48038	1452	DRY	20.55		Good. Equipped for monitoring.
KLM4	28.38827	23.47986	1446	DRY	37.4		Good. Equipped for monitoring.
KLM5	28.40121	23.47926	1457	11.81	27.19	1445.19	Good. Equipped for monitoring.
KLM6	28.39466	23.4801	1451	35.48	40	1415.52	Good. Equipped for monitoring.
E1	28.38199	23.48341	1451	DRY	31.42		Capped but not locked. No marker pole
E2	28.38172	23.48282	1448	43.72	>100	1404.28	Capped but not locked. No marker pole. Casing flush with ground level
E3	28.38134	23.48201	1453	46.16	>100	1406.84	Capped but not locked. No marker pole
E5	28.37823	23.4643	1460	52.73	-55.5	1407.27	No cap. No marker pole
E4	28.38255	23.48481	1552	42.13	>100	1409.87	Casing bent and flush with ground level.
E12	28.38029	23.4795	1448	DRY	11.3		No cap. No marker pole
Bonza 01	28.3947	23.48229	1452	37.02	>100	1414.78	No cap. No marker pole
Bonza 02	28.40425	23.48486	1450	PUMP	>100		Bonza Game Farm water supply borehole. Pump installed - 100m
Bonza 03	28.40543	23.4852	1450	27.63		1422.37	No cap. No marker pole. Abandoned borehole. Casing flush with concrete block
PPC01	28.37235	23.4363	1452	21.95	62.5	1430.05	Capped but not locked. No marker pole
PPC03	28.38007	23.47991	1453	13.36	54.89	1439.64	Capped but not locked. No marker pole
PPC15	28.38258	23.48508	1452	39.15	44.59	1412.58	Capped but not locked. No marker pole
PPC16	28.37694	23.48139	1452	23.32	>70	1428.68	Capped but not locked. No marker pole
GC1	28.375	23.455	1472	PUMP			Pump installed - no access
GC2	28.37472	23.455	1473	PUMP			Pump installed - no access
GC-A	28.3768	23.46103	1468	54.07	60	1413.93	No cap. No marker pole
GC-B	28.37436	23.45574	1470	20.75	23.65	1449.25	No cap. No marker pole. Casing bent
PAR3	28.37389	23.45611	1410	20.85		1449.15	No cap. No marker pole. Casing bent
GG2	28.37439	23.4563	1447	25.35	33.12	1444.65	
M3	28.36667	23.47889	1458	LOCKED			Capped. No marker pole
M4							
M6	28.37392	23.4563	1470	26.08	27.87	1443.92	No cap. No marker pole
M8	28.36806	23.45778	1465				unknown
M9	28.37333	23.47167	1448	DRY	10		Filled with stones
Quarry 4	28.37721	23.48643	1408	0	SURFACE	1408	
Quarry 5	28.36872	23.49098	1405	0	SURFACE	1405	

Table 28: Analytical results of samples collected. Results exceeding the relevant SANS241 guidelines are highlighted

Analyte	Unit	E2	E3	PPC16	Bonza 01	Bonza 02	Quarry 4	Quarry 5	Class I recommended limit (SANS 241)
pH		7.5	7.6	7.7	7.5	7.6	8.1	8.1	5 to 9.5
Conductivity	mS/m	81.5	83.8	133.3	131.7	97.9	129	102.1	<105
TDS	mg/l								
Calcium	mg/l	93.5	97.2	131	89.3	127	111	113	<150
Magnesium	mg/l	42.7	40.7	60.8	71.3	30.4	55.1	34.5	<70
Sodium	mg/l	13.9	21.6	58	46.7	31.8	69.5	45.4	<200
Potassium	mg/l	2.8	2.9	7.7	6.8	2.4	9.5	4.1	<50
Fluoride	mg/l	0.5	0.5	0.3	0.1	0.3	0.3	0.1	<1.0
Chloride	mg/l	71	59	121.6	89	88	140.1	101.7	<200
Nitrate	mg/l	3.9	4.5	25.2	3.6	32.8	64.8	36	-
NO_3 as N	mg/l	0.9	1	5.7	0.8	7.4	14.6	8.1	<10
Sulphate	mg/l	51.5	71.8	421.7	4.8	112	357.4	216.3	<400
Phosphate	mg/l	<0.8	1.1	<0.8	4.6	<0.8	<0.8	<0.8	-
Iron	mg/l	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.2
Chromium	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
Manganese	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
Copper	mg/l	<0.05	<0.05	0.1	0.1	<0.05	0.1	<0.05	<1.0
Nickel	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.15
Zinc	mg/l	0.1	<0.05	<0.05	<0.05	1.8	<0.05	<0.05	<5.0
Selenium	mg/l	6.5	9,4	10.7	9.2	13.5	13	12	<20
Total alkalinity as $CaCO_3$	mg/l	409.2	410.3	577.4	516.3	442.4	504	424.3	-
p-Alkalinity	mg/l	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	-
m-Alkalinity	mg/l	264.5	279	113.5	471	260	57.5	144.5	-

Conductivity values range from 13 mS/m to 108 mS/m in the 7 borehole analyses reported.

The samples collected during the hydrocensus are generally within the limits of Class I drinking water as outlined in the SANS 241:2005 Drinking Water Specification except for Quarry 4, PPC16 and Bonza 01.

From Table 28, water in PPC Quarry No 4 exceeds the Class I acceptable limit of 10 mg/l nitrate (as N) although it is within the limit of 10 mg/l to 20 mg/l for consumption for a limited duration (Class II drinking water).

Water from the borehole designated Bonza 01 exceeds the Class I limit for Magnesium while the sample from PPC16 exceeds the Class I limit for sulphate.

Note that PPC16 is adjacent to Quarry 4 and has a higher sulphate concentration than the analysis of Quarry 4 water. This suggests that groundwater flow between the two locations may be limited or that groundwater at PPC16 is affected by another source of contamination, possibly the Old Slimes Paddocks.

Water quality in boreholes E2 and E3 is fit for drinking although the concentrations of major ions are elevated compared to the average background. These two boreholes are located directly between the Old Slimes Paddocks, a potential contamination source, and PPC Quarry No 4 and it appears likely that groundwater quality at this location is affected by some level of interaction with both sources.

The analysis of samples from the boreholes at Bonza Game Farm indicates that the water is fit for drinking purposes. In comparison to average groundwater, the Bonza samples have higher dissolved solids content.

Potential Pollution Source Identification

Potential groundwater contamination sources in the study area include:

- Five Mission Dam.
- Bonza Quarry – It is reported that the water level in Little Bonza Quarry is such that water is lost to the dolomite aquifer by seepage out of the dam into the groundwater system. The volume of the seepage is unknown, however, the poor quality of this water implies that a pollution plume may have developed from Little Bonza Quarry.
- Earth Dam – Based on the mine water circuit the composition of this water is a mixture of Bonza Quarry water, sewage effluent water, water from Five Mission Dam, FRD Sumps and overflow water from the Top Dams.
- Seepage from the Fine Residue Deposits.
- Seepage of FRD Sump 1 overflow through slimes paddock material – The presence of precipitated salts in the paddock wall material beneath the pools suggests that the FRD Sump 1 overflow may have seeped through slimes paddock material and into the groundwater through the sinkholes for an extended period of time. Sump 1 overflow is likely to be similar in quality to the slimes dams overflow although it may change significantly as it flows over the Old Slimes Paddock material and seeps through it into the underlying dolomite

Figure 9 below presents the groundwater zones of influence.

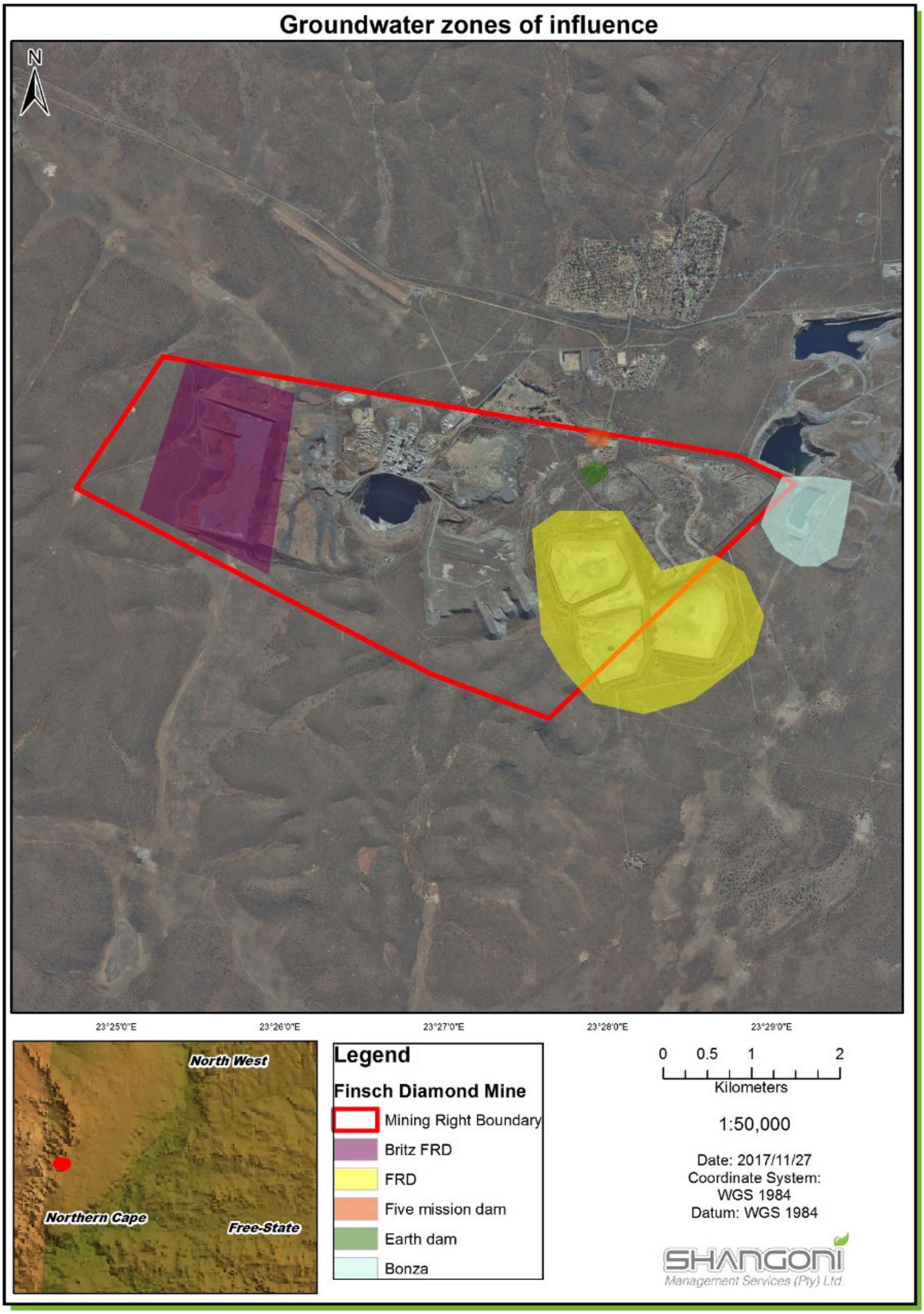


Figure 9: Groundwater zones of influence

Chapter K: Air Quality

The air quality of the area is affected by the PPC stack emissions, Idwala stack emissions, fall-out dust from the mines in the area, as well as, by the Lime Acres community.

Integrated air quality management plan

An integrated air quality management plan was developed by Bohlweki SSI environmental sector in 2009. The sources outside the mine as well as inside the mine are discussed below.

Sources outside the mine

Priority sources in the general area that have been found to be significant in terms of their contributions to ambient air pollutant concentrations and associated health risks in the vicinity of the mine include are outlined below.

- Motor vehicles - Primary air pollutants emitted by vehicles may include oxides of nitrogen (NOx), CO_2, HCs, SO_2, PM and lead. Secondary pollutants associated with vehicle emissions include NO_2, photochemical oxidants (e.g. ozone) and sulphuric or nitric acids, and sulphate and nitrate aerosols. Toxic hydrocarbons emitted include benzene, 1.2-butadiene, aldehydes and polycyclic aromatics hydrocarbons (PAH). Benzene represents an aromatic HC present in petrol, with 85% to 90% of benzene emissions emanating from the exhaust and the remainder from evaporative losses. Emissions from diesel-fuelled vehicles include PM, NO_x, SO_2, CO and HC, the majority of which occurs from the exhaust.
- Petrol stations– VOCs are released during the filling of the petrol storage tanks and petrol car tanks.
- Railway –CO_2 emissions occur in small quantities form the trains.
- Domestic fuel burn- CO2, $PM_{2.5}$ and PM_{10} emissions occur due to the burning of wood as well as different compounds depending on the type of wood burned. Inefficient combustion of the coal results in high emission rates of PM comprised mostly of condensed droplets of semi-VOCs, CO, and sulphur-containing gases (hydrogen sulphide and SO_2).
- Commercial fuel burning appliances – Boilers that are similar to domestic fuel burn.
- Industrial activities- Other industrial sources, particularly activities associated with lime and cement production as well as other mining activities in the area result in emissions released to atmosphere. The main air emissions from these processes include SO_2, PM, NO_x, various heavy metals, dioxins and furans as well as greenhouse gases (CO_2, CH_4 and N_2O) and VOCs.
- Agricultural activities -Can be considered a significant contributor to PM emissions, although tilling, harvesting and other activities associated with field preparation are seasonally based.
- Asphalt mixing and road building - Asphalt is important in road building, and it consists mainly of heavy organic compounds. Hazardous air pollutants (HAP) are volatilised from asphalt as it is heated and agitated during processing and roofing manufacturing operations.

- Biomass burning (veldt fires) - Widespread across the country and in the District, occur mostly in winter. In addition to controlled burning for fire-breaks and veldt management, many fires are set deliberately for mischievous reasons. Some are accidental, notably those started by motorists throwing cigarettes out of car windows. Emissions from veldt fires are similar to those generated by coal and wood combustion.

Sources from the mine

Air emissions sources form the mine is provided below.

- Aircraft and helicopters - The airport at the mine is associated with the emission released from aircraft, motor vehicles, and aircraft maintenance procedures. These emissions include NO_x, NO_2, CO_2, CO, VOCs and SO_2.
- Motor vehicles – Air pollutants are similar as described above.
- Batch plant– Dust from the cement production transfer, storage and delivery vehicles.
- Waste management (incineration) - Emissions from incinerators may be grouped into: criteria pollutants (SO_2, NO_x, CO, lead, PMs and benzene), acid gases (HCl, hydrogen bromide, hydrogen fluoride), metal gases (chromium, arsenic, cadmium, mercury, manganese, etc.), and dioxins and furans - (such as polychlorinated dibenzo-p-dioxins and dibenzo furans).
- Waste management (landfills) - About 99% of landfill gas is comprised of methane and CO_2 which are primarily of concern due to them being greenhouse gases. The remaining 1% is comprised of a range of odoriferous and toxic gases.
- Waste management (sewage works) – There is a potential for emissions of VOCs
- Subsurface mining operations - -Result in small quantities of PM, SO_2, NO_2 and CO, released from shaft vents primarily as a result of blasting and drilling operations, and diesel-powered vehicles working underground.
- Fuel and oil storage - There are various diesel, petrol and oil storage tanks above and below ground on site. This also adds to pollutants such as VOCs.
- Bioremediation plant – Air pollutant such as VOCs may be released
- Mine and plant residue facilities - Such sources are frequently associated with localised nuisance dust that contributes to the concentration of fine PM in the atmosphere. Wind erosion from the FRD takes place when it dries out during periods when not in use.
- Remining of pre-1979 CRD - Windblown dust at the stockpile is a result from the pre-screening activities.
- Surface mining activity - Dust fallout and inhalable PM emissions are generated due to aeolian action on exposed storage piles, material transfer activity, vehicle entrainment on both paved and unpaved road networks, drilling and blasting operations, as well as due to various process related emissions (crushing, screening and milling of ore and ore products). Dust generated during these processes at the mine are generally captured and sent to atmosphere via a dust plant.

- Topsoil recovery- In the vicinity of the mine also results in dust generations.

Dust fall-out

Dust fallout monitoring is undertaken by Finsch Diamond Mine at nine (9) sampling station, as provided in Table 29. Refer also to Table 30 and Table 31 below for the classification and the description of the sampling station, respectively.

Table 29: Sampling station locations

Sampling Station	Co-ordinates
Five Mission	S 28°22'50.671"; E 23°27'46.502"
Norfin	S 28°22'19.686"; E 23°27'52.877"
Lime Acres Village	S 28°21'52.589"; E 23°27'46.213"
Lime Acres Finville –(Hostel)	S 28°22'42.319"; E 23°26'27.369"
Bonza Quarry	S 28°25'00.289"; E 23°29'09.624"
Bonza Farm	S 28°24'19.652"; E 23°29'08.774"
South Brits	S 28°23'31.885"; E 23°25'50.205"
West Brits	S 28°24'11.919"; E 23°25'25.754"
Bergplaas	S 28°24'13.919"; E 23°28'02.917"

Table 30: Classification of sampling stations

Residential: Acceptable dust fall rate: D < 600 mg/m^2/day	Non-Residential Acceptable dust fall rate: 600 < D < 1200 mg/m^2/day
Five Mission	Bonza Quarry
Norfin	South Brits FRD
LA Finville	West Brits FRD
LA Village	Bergplaas gate
-	Bonza Farm

Table 31: Description of the sampling stations

Sampling Station	Description	Sensitive receptors
Five Mission	Single Bucket	Five Mission Village
Norfin	Single Bucket	Norfin Village
Lime Acres Village	Single Bucket	Lime Acres Village
Lime Acres Finville	Single Bucket	Lime Acres Finville - Hostel
Bonza Quarry	Single Bucket	Neighbouring property
Bonza Farm	Single Bucket	Bonza Game Farm
Bergplass	Single Bucket	Neighbouring property
South Brits	Single Bucket	Neighbouring property
West Brits	Single Bucket	N/A – Background monitoring point

Fall-out dust results for the period January 2017 to December 2017 are provided in the table below.

Table 32: Fall-out dust results for the period January 2017 to December 2017

Sample number	Level of Contamination	Sample Date	TWA Concentrations mg/m2/day	Comments
Bergplaas gate	Non- Residential	14.12 - 13.01.2017	459	Compliant
		13.01 - 10.02.2017	202	Compliant
		10.02 - 10.03.2017	14	Compliant
		10.03 - 10.04.2017	173	Compliant
		10.04-12.05.2017	338	Compliant
		12.05 – 12.06.2017	459	Compliant
		12.06 -12.07.2017	235	Compliant
		12.07 – 11.08.2017	516	Compliant
		11.08 – 13.09.2017	380	Compliant
		13.09 – 14.10.2017	710	Compliant
		14.10- 15.11.2017	813	Compliant
		15.11 – 15.12.2017	595	Compliant
Bonza Farm	Non- Residential	14.12 - 13.01.2017	599	Compliant
		13.01 - 10.02.2017	196	Compliant
		10.02 - 10.03.2017	78	Compliant
		10.03 - 10.04.2017	178	Compliant
		10.04-12.05.2017	423	Compliant
		12.05 – 12.06.2017	679	Compliant
		12.06 -12.07.2017	440	Compliant
		12.07 – 11.08.2017	660	Compliant
		11.08 – 13.09.2017	530	Compliant
		13.09 – 14.10.2017	875	Compliant
		14.10- 15.11.2017	564	Compliant
		15.11 – 15.12.2017	455	Compliant
Bonza Quarry	Non- Residential	14.12 - 13.01.2017	381	Compliant
		13.01 - 10.02.2017	200	Compliant
		10.02 - 10.03.2017	428	Compliant
		10.03 - 10.04.2017	176	Compliant
		10.04-12.05.2017	506	Compliant
		12.05 – 12.06.2017	432	Compliant
		12.06 -12.07.2017	293	Compliant
		12.07 – 11.08.2017	383	Compliant
		11.08 – 13.09.2017	852	Compliant

Sample number	Level of Contamination	Sample Date	TWA Concentrations mg/m2/day	Comments
		13.09 – 14.10.2017	887	Compliant
		14.10- 15.11.2017	563	Compliant
		15.11 – 15.12.2017	942	Compliant
Five Mission	Residential	14.12 - 13.01.2017	419	Compliant
		13.01 - 10.02.2017	166	Compliant
		10.02 - 10.03.2017	324	Compliant
		10.03 - 10.04.2017	151	Compliant
		10.04-12.05.2017	490	Compliant
		12.05 – 12.06.2017	207	Compliant
		12.06 -12.07.2017	145	Compliant
		12.07 – 11.08.2017	519	Compliant
		11.08 – 13.09.2017	880	Non - compliant
		13.09 – 14.10.2017	918	Non - compliant
		14.10- 15.11.2017	810	Non - compliant
		15.11 – 15.12.2017	614	Non - compliant
L.A Finville	Residential	14.12 - 13.01.2017	439	Compliant
		13.01 - 10.02.2017	132	Compliant
		10.02 - 10.03.2017	373	Compliant
		10.03 - 10.04.2017	151	Compliant
		10.04-12.05.2017	362	Compliant
		12.05 – 12.06.2017	546	Compliant
		12.06 -12.07.2017	202	Compliant
		12.07 – 11.08.2017	378	Compliant
		11.08 – 13.09.2017	484	Compliant
		13.09 – 14.10.2017	488	Compliant
		14.10- 15.11.2017	1207	Non - compliant
		15.11 – 15.12.2017	1033	Non - compliant
LA Village	Residential	14.12 - 13.01.2017	691	Non - compliant
		13.01 - 10.02.2017	158	Compliant
		10.02 - 10.03.2017	320	Compliant
		10.03 - 10.04.2017	337	Compliant
		10.04-12.05.2017	412	Compliant
		12.05 – 12.06.2017	795	Non - compliant
		12.06 -12.07.2017	614	Non - compliant
		12.07 – 11.08.2017	1281	Non - compliant
		11.08 – 13.09.2017	869	Non - compliant

Sample number	Level of Contamination	Sample Date	TWA Concentrations mg/m2/day	Comments
		13.09 – 14.10.2017	890	Non - Compliant
		14.10- 15.11.2017	791	Non - Compliant
		15.11 – 15.12.2017	961	Non - Compliant
Norfin	Residential	14.12 - 13.01.2017	167	Compliant
		13.01 - 10.02.2017	196	Compliant
		10.02 - 10.03.2017	310	Compliant
		10.03 - 10.04.2017	111	Compliant
		10.04-12.05.2017	380	Compliant
		12.05 – 12.06.2017	484	Compliant
		12.06 -12.07.2017	110	Compliant
		12.07 – 11.08.2017	638	Non - Compliant
		11.08 – 13.09.2017	829	Non - Compliant
		13.09 – 14.10.2017	729	Non - Compliant
		14.10- 15.11.2017	944	Non - Compliant
		15.11 – 15.12.2017	116	Compliant
South Brits FRD	Non- Residential	14.12 - 13.01.2017	321	Compliant
		13.01 - 10.02.2017	191	Compliant
		10.02 - 10.03.2017	812	Compliant
		10.03 - 10.04.2017	175	Compliant
		10.04-12.05.2017	572	Compliant
		12.05 – 12.06.2017	435	Compliant
		12.06 -12.07.2017	303	Compliant
		12.07 – 11.08.2017	515	Compliant
		11.08 – 13.09.2017	729	Compliant
		13.09 – 14.10.2017	1191	Compliant
		14.10- 15.11.2017	745	Compliant
		15.11 – 15.12.2017	536	Compliant
West Brits FRD	Non- Residential	14.12 - 13.01.2017	228	Compliant
		13.01 - 10.02.2017	201	Compliant
		10.02 - 10.03.2017	361	Compliant
		10.03 - 10.04.2017	176	Compliant
		10.04-12.05.2017	470	Compliant
		12.05 – 12.06.2017	382	Compliant
		12.06 -12.07.2017	186	Compliant
		12.07 – 11.08.2017	360	Compliant
		11.08 – 13.09.2017	449	Compliant

Sample number	Level of Contamination	Sample Date	TWA Concentrations mg/m2/day	Comments
		13.09 – 14.10.2017	629	Compliant
		14.10- 15.11.2017	733	Compliant
		15.11 – 15.12.2017	1192	Compliant

The monitoring of PM10 and PM2.5 is currently not undertaken.

Asbestos contaminated areas

Asbestos monitoring was done by SKC in 2012. Asbestos is locally present in the natural geology. Refer to the table below for the asbestos results November 2011 to January 2012. All asbestos results were within the asbestos occupational exposure limit.

Table 33: Asbestos monitoring results (SRK, 2012)

Date	Position	Flow rate	Asbestos found	Asbestos concentration
24.11.2011	Office	1.0	0	0
	South fence	1.0	0	0
	Mine fence	1.0	0	0
	Office cleaning & change house	1.0	0	0
	FRD	1.0	0	0
	FRD	1.0	2 Crocidolite	0.0029 f/ml
	FRD	1.0	0	0
	FRD	1.0	0	0
	Rehabilitation site	1.0	1 Crocidolite	0.0014 f/ml
	FRD	1.0	0	0
08.12.2011	Recovery dust plant	1.0		Filter Rejected high dust load
26.01.2012	Rehabilitation site	1.0	2 Crysotile	0.0029 f/ml
	Rehabilitation site	1.0	2 Crocidolite	0.0029 f/ml
	Rehabilitation site – low site	1.0	0	0
	Rehabilitation site – high site	1.0	1 Crocidolite	0.0014 f/ml

Asbestos Occupational Exposure Limit – 0.2f/ml

In March 2012, an analytical assessment was done at the mine. According to this report two crocidolite asbestos fibres were identified in 420 fields of three filters, and one asbestos fibre was identified in 420 fields of two filters.

Chapter L: Noise

Information contained within section of the document is obtained from the report "*Environmental Noise and Particulate Matter (PM_{10}): May 2016*" dated 30 May 2016 and compiled by Health and Occupational Hygiene Laboratory CC (refer also to Annexure C5).

Environmental noise survey

Sound pressure levels were measured at 9 test sites selected and demarcated to ensure that repeated readings were taken at the same positions around the plant and mine. These measurements were necessary to assess the sound pressure levels and to comply with Section 5 of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996).

The locations of the nine (9) testing stations is presented in Figure 10 below.

Figure 10: Sound pressure level testing stations

For the purpose of this survey the ambient noise rating level was analysed against SABS Code SABS 0103:2008 6th Edition for Environmental Noise, and SANS 10083-2004.

Table 34: Typical rating levels for ambient noise in districts as per SANS 10103:2008

Type of district	Outdoors			In-doors, with open windows.		
	Day	Evenings / weekends	Night	Day	Evenings / weekends	Night
Rural	45	40	35	35	30	25
Suburban with little road traffic	50	45	40	40	35	30

Type of district	Outdoors			In-doors, with open windows.		
	Day	Evenings / weekends	Night	Day	Evenings / weekends	Night
Urban	55	50	45	45	40	35
Urban with some workshops, business premises and main roads	60	55	50	50	45	40
Central business	65	60	55	55	50	45
Industrial	70	65	60	60	55	50

Table 35: Estimated community/group response. ΔLr1) dB as per SANS 10103:2008

1	2	3
Excess ΔLr1) dB	**Category**	**Description**
0 ≤ 5	None	No observed action
> 5 ≤ 10	Little	Sporadic complaints
> 10 ≤ 15	Medium	Widespread complaints
> 15 ≤ 20	Strong	Threats of community/group action
> 20	Very strong	Vigorous community/group action.

Sound pressure monitoring results

The result of the sound pressure level monitoring is presented in Table 36, Table 37, and Table 38 below. From the results, the following can be concluded:

- Sound Pressure Levels from the natural environment (wildlife, wind etc.) exceed the recommended levels stated in SABS Code 0103 for Rural areas;
- It is the opinion of Health and Occupational Hygiene Laboratory CC that Sound Pressure levels from activities at Finsch Diamond Mine does not exceed the prescribed SPL's for rural areas at the boundaries. *Note: Peaks recorded at the village area during this survey were from activities and traffic from public areas.*

Table 36: Morning, 26/06/2016 (06:00 – 12:00)

Remarks	Peak dB (A)	Max dB (A)	Min dB (A)	Laeq dB (A)
Test Station 1	90.1	65.0	34.1	38.5
Test Station 2	91.3	62.5	29.8	35.7
Test Station 3	89.9	63.7	28.5	39.4
Test Station 4	90.3	63.2	27.8	37.8
Test Station 5	90.6	65.3	30.2	35.7
Test Station 6	89.7	63.2	29.6	38.5
Test Station 7	90.1	63.6	28.6	39.2

Remarks	Peak dB (A)	Max dB (A)	Min dB (A)	Laeq dB (A)
Test Station 8	91.2	65.2	29.1	39.7
Test Station 9	90.3	64.8	28.4	38.9

Table 37: Afternoon, 26/06/2016 (06:00 – 18:00)

Remarks	Peak dB (A)	Max dB (A)	Min dB (A)	Laeq dB (A)
Test Station 1	89.3	61.5	28.2	35.4
Test Station 2	89.5	62.1	27.5	35.3
Test Station 3	90.4	59.5	30.1	38.2
Test Station 4	91.3	59.8	29.3	31.3
Test Station 5	91.3	60.5	28.5	32.6
Test Station 6	89.6	58.4	28.7	30.1
Test Station 7	89.7	61.3	30.5	38.1
Test Station 8	90.1	60.7	29.8	38.7
Test Station 9	90.3	60.2	29.9	39.2

Table 38: Evening, 26/06/2015 (18:00 – 00:00)

Remarks	Peak dB (A)	Max dB (A)	Min dB (A)	Laeq dB (A)
Test Station 1	93.2	55.8	27.4	28.4
Test Station 2	88.7	54.8	27.5	29.1
Test Station 3	89.7	55.4	26.7	30.5
Test Station 4	90.1	57.8	29.5	31.3
Test Station 5	89.7	58.6	26.9	31.2
Test Station 6	89.9	54.7	26.8	30.2
Test Station 7	90.8	58.2	26.5	32.1
Test Station 8	91.4	59.4	27.2	32.0
Test Station 9	90.6	58.9	28.1	31.6

Chapter M: Visual

Although the headgear and CRDs are visible from the R31 (Kimberley / Postmasburg) road, the rest of the mine has a low visual impact. Care has been taken to blend the profile of the CRDs into the surrounding hills. The mine is visible from the Lime acres village.

Chapter N: Protected areas and conservation planning

There are no formal or informal land-based protected areas near the mine. The closest formal protected area is situated approximately 92 km to the south west., the Witsand Nature Reserve. The closest informal protected area is approximately 355 km to the north east, Mafikeng Game Reserve. The formal and informal protected areas layer was used in the National Protected Area Expansion Strategy 2010 (NPAES). Focus areas for land-based protected area expansion are large, intact and unfragmented areas of high importance for biodiversity representation and ecological persistence, suitable for the creation or expansion of large protected areas.

Figure 11 below presents the formal protected areas in relation to Finsch Diamond Mine.

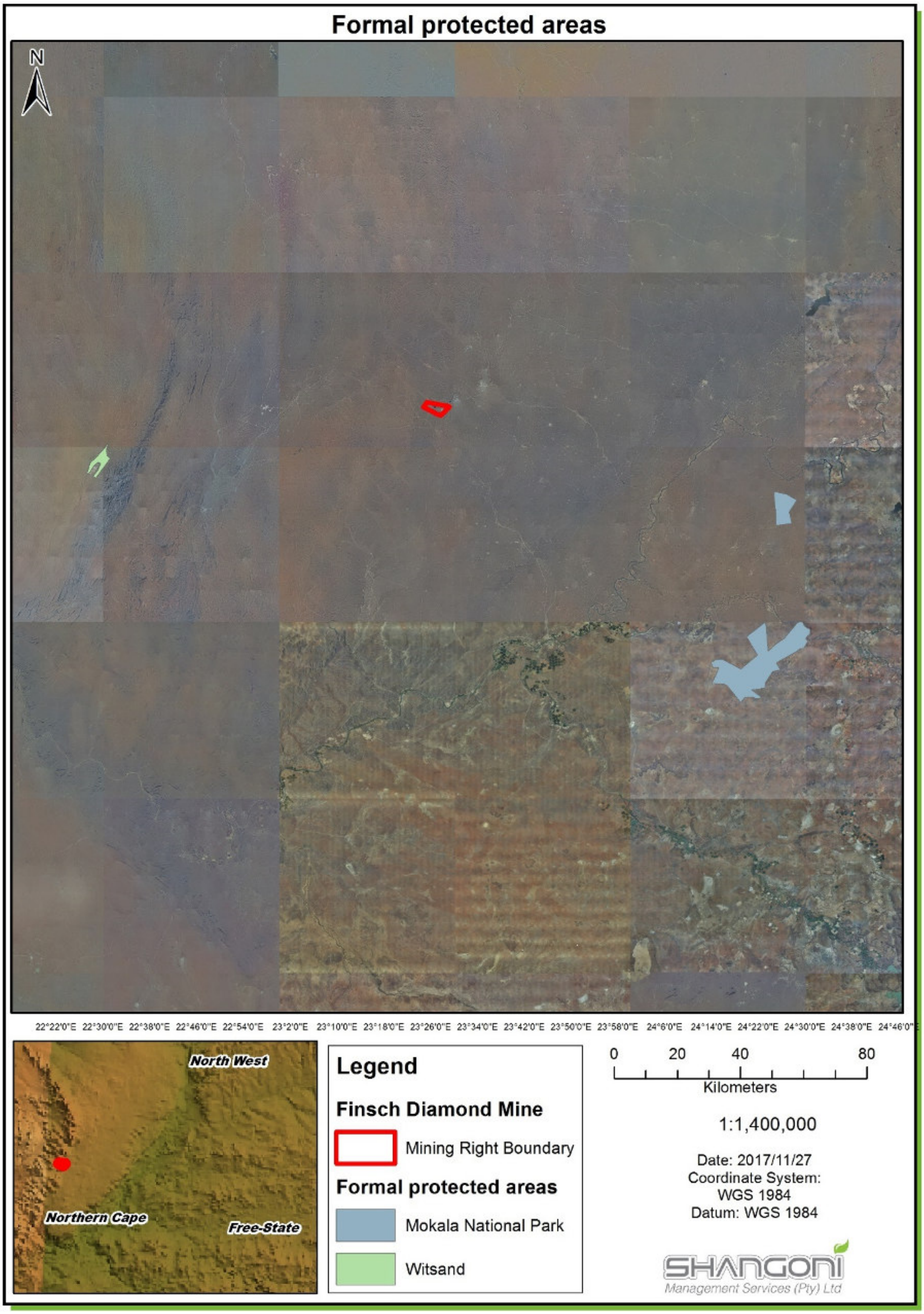


Figure 11: Formal protected areas in relation to Finsch Diamond Mine

Chapter O: Cultural Heritage

A heritage assessment was done by Zoë Henderson of the Department Archaeology of the National Museum in 2005. An update to the heritage assessment was undertaken in 2013 "*Updated report on the cultural heritage impact assessment for Petra Diamonds Finsch Mine (Case ID 3613)*" compiled by L Rossouw of the Department of Archaeology, National Museum Bloemfontein, dated January 2013. Where applicable, the findings of the updated assessment have been discussed in conjunction with the findings of the assessment undertaken in 2005.

Brits farm

Valley bottom which tapers from north to south

This was the largest area, covering the entire valley bottom from north to south of the property. It extends from the fence along the western side of the rock dump to the base of the hillside on the western side of the valley. It also includes the section north of the rock dump, through which the access road onto Brits runs.

Historic structures:

1. Foundation at 28° 23' 14.6" S by 23° 25' 70.4" E

The only structure located during the survey was the foundation of a small rectangular structure, measuring 10.30m by 4.80m. The structure foundation consisted of a wall of banded ironstone slabs, neatly packed, and held together with red clay. Some ceramic and iron fragments were scattered around the area, which seem to indicate that the structure had both a domestic as well as a work-related function. No other foundations were found in the vicinity, nor were there any traces of kraals or other stock-keeping related structures. The structure does not appear on the 1959 aerial photograph, so it could not have been roofed at that time, and was probably already a ruin. It is a reasonable distance from the pipe, and is probably not related to the mining activities at the pipe.

It is not possible to determine what the function of the structure was. It has a reasonably well-built foundation, so was not a temporary structure. The records suggest that there was no water available on Brits, so, if it was a dwelling, water would have had to have been supplied to the place. If, however, it was more work-related, but with a domestic component (i.e. people staying there for short periods of time), this would explain the cultural material noted in the vicinity.

2. Horseshoe-shaped trace at 28° 22' 38.6" S by 23° 26' 05.7" E

A second area was investigated. This was a horseshoe-shaped 'structure' identified from the aerial photographs in the area to the north of the rock dump. Although it was very clear in the aerial photographs, and appeared to be close to an old borrow-pit, almost no traces of it could be identified on the ground. It appears to have had earth walls, but these have largely disappeared in the last ten years. It is unknown what this structure could have been used for, unless it was some sort of a kraal.

Archaeological remains:

The archaeological remains consist entirely of lithic artefacts. These artefacts are mostly of Pleistocene age, but Holocene age artefacts also occur in places, most notably in the vicinity of the horseshoe-shaped earthen trace mentioned above. These artefacts appear to be flaked from a fine-grained raw material, and consisted mostly of flakes.

The soil of the valley bottom is deeper than that covering the hillsides, but is still classified as shallow (Morgenthal, 2001). The soils were probably derived from the banded ironstone and washed downslope into the valley. It is likely that artefacts abandoned on the hillside were washed downslope as well, and became incorporated into the valley fill.

The distribution of the artefacts noted in the valley area seemed to indicate a patchy distribution. Most artefacts observed in the valley area were observed in the vicinity of animal burrows. They appeared to have been thrown up as the burrows were excavated. However, not all animal burrows were surrounded by an artefact scatter, indicating that the artefacts were not generally distributed over the area.

The artefacts are both of Holocene and Pleistocene age (i.e. Later Stone Age and Middle Stone Age), which would indicate that the area was a target for settlement (although not continuous) over a considerable period of time. Most of the artefacts are flakes, but many cores also occur. These are of the single platform, radial or prepared platform type, mostly made on banded ironstone. Most of the cores are lightly abraded, but there are those which appear to be in mint condition. Scrapers were also noted.

It would appear that the distribution of the artefacts is not entirely random, but it is impossible to determine whether the distribution reflects human activities or whether it is related to natural patterns generated during the accumulation of artefacts being washed downslope.

According to the updated cultural and heritage impact assessment (2013), no artefacts were noted on the western hillside. A number of stone tools (approximately 1 artefact recorded for every 60m covered) were recorded as surface scatters on sheet wash and lag deposits along the valley bottom section. The majority of stone tools observed during the pedestrian survey were located as individual finds. Typologically, the artefacts are biased towards convergent flake blades, small flakes and scrapers comparable to late MSA and LSA stone tool industries. All the artefacts observed are surface occurrences, showing evidence of patina-formation and because of their exposed state, are most likely derived to a certain degree. The derived context for these finds appears to be largely related to the effects of lag, slope wash and topsoil erosion.

Part of the valley has been covered by the New Fine Residue Deposit area after 2005, but the section along the valley bottom at the southern wall of the New Fine Residue Deposit area indicate that lithic material are generally uncapped and exposed and most likely out of context as a result of lateral as well as vertical (lag deposits) displacement over time. This is also indicated by the co-occurrence of MSA and LSA material on the landscape. Consequently, the surface scatter of artefacts in the survey area may be derived or mixed. Even so, they remain valid archaeological elements and can still be regarded as meaningful points on a map. GPS waypoints were taken of all the artefacts recorded during the survey.

Figure 12: Examples of individual lithic artefacts recorded along the valley bottom at the southern wall of the New Fine Residue Deposit area (2013)

Eastern slope of the hillside above the valley

This area comprises the entire flank of the hill of the western edge of the valley. The hill is of banded ironstone, with shallow soil cover, and in places dense vegetation. The hillside was walked along the contours. A light scattering of artefacts was observed. These were mostly of banded ironstone, and consisted of flakes, cores and scrapers, mostly of Pleistocene age. The artefacts were in most cases lightly or more extensively abraded.

Top of the ridge

Artefacts occur in this portion of the property, but not in very high numbers. Characteristic Middle Stone Age and Early Stone Age artefacts were noted. Most of the artefacts were from banded ironstone, but other raw materials are also present. Many of the artefacts noted were in the vicinity of the small pan.

Long slope of the tongue across the southern side of the rock dump

This area is the long slope down from the portion of the hill where the pipe is located, to the valley bottom. It forms therefore the eastern side of the north-south valley on Brits. In a couple of places old diggings were noted, and some earth moving seems to have taken place at some point. Almost no artefacts were noted on the hillside.

Hilly portion of the property which forms the southern buffer zone across the southern edge of the pipe and the coarse residue deposit

This section consists of the hill-top as well as the steep-sided valleys of the mountain range. The overhangs were all too shallow, and did not contain any cultural material. An extensive survey of the area produced almost no artefacts.

Graveyard near Five Mission

A graveyard is situated near Five Mission at 28° 22' 76.5" S and 23° 28' 21.8" E (GPS reading taken on southernmost grave). The graveyard is fenced off, but is no longer in use. Only 31 graves can be distinguished in the graveyard, 24 of which have cement surrounds.

The 22 graves which have inscriptions date to 1963 (1 grave), 1965 (3), 1966 (1), 1969 (4) and 1970 (9). There are four graves which only record name or family affiliation, but have no date attached.

Of the other information recorded, the records indicate that three of the graves were of still born infants, five were younger than one year, two were aged between one and two years, one was four years old and three others are indicated as being children. This indicates that almost half of the graves in the graveyard were of infants or children. Two of the graves indisputably belong to adults, while it is fairly certain that the other five graves with inscriptions, but no ages recorded also belong to adults (graves 16 – 20) as these graves are larger than the graves of the children and infants. The other nine graves which have either head and footstones, or have cement headstones with no inscription probably also belong to adults.

Graves 1 – 22 were obviously "tidied" up at some stage, as they have all been standardised, with a cement surround, gravel across the top of the grave, and similar, commercially made name tags. The distinction between the children and infant graves and the adult graves was made at this stage, so it is evident that whoever was involved in the work was aware of who had been buried in the graveyard.

The updated cultural and heritage impact assessment (2013), found that the graveyard is properly marked and fenced off, but it is recommended that the yard is cleaned annually. The site has not been impacted by the mining process.

Figure 13: Five Mission graveyard (2013)

Bonza farmhouse and surrounding area

The farm includes FRD 3 and part of 2 on the western side, with Bonza Quarry and Dump in the north-western corner. The property includes the edge of the Asbesberge in the south-western corner. Most of the property from the FRDs/CRDs to the east is relatively flat, with a couple of pan areas on the southern section of the property. This site is divided into areas I to M. The updated cultural and heritage impact assessment (2013), found that the site is isolated and undisturbed. There is no evidence of regular vehicular traffic near or in the vicinity of the foundations. The site has not been impacted by the mining process.

Figure 14: Bonza farmhouse foundations (2013)

Pan areas

This area is along the southern side of the property. The area was searched for rock engravings, but none were found. Artefacts occurred in small quantities, scattered over areas around the pans. Acheulian hand-axes indicate Early Stone Age presence in the area. Middle Stone Age artefacts were also identified.

Marshy area

Later Stone Age artefacts were discovered in larger quantities than elsewhere on the property in the vicinity of the marshy area. The artefacts were from fine-grained raw material, and were unworn.

South-western section

Middle Stone Age artefacts made on banded ironstone were discovered in the red sands.

North-eastern area

No artefacts were discovered in the area, apart from a few flakes which could be Later Stone Age. In some cases, these flakes had become incorporated into patches of calcrete.

Farmhouse area

The foundations of the old Bonza farmhouse are still visible. This house measured about 11 m by 9.90 m, and seemed to have had seven rooms and two passages and a front veranda. There were at least three outbuildings forming the farmyard around the house. A large pepper tree still stands in what was the yard behind the house. The farm rubbish heap is nearby, and further away in an easterly direction are the, presumably, labourers cottages. Near to the possible labourers' cottages is a half circle of stones, which may be an open cooking or processing area. Domestic rubbish, such as tines and bottles, is scattered over the area, but seems to be concentrated between the rectangular structure and the half circle of stones.

Figure 15: Pepper tree - The tree has died and is left in situ. The site has not been impacted by the mining process. (2013)

Only one grave, which had been exhumed, was located. This was located on the other side of a pan near the farmhouse. The grave had obviously been fairly elaborate with cement surrounds and a headstone. However, the headstone had been removed, and there was no indication as to who might have been buried in the grave. Although the grave is fenced off, the gate is missing, and the grave is accessible from the outside. A young eland appears to have fallen into the grave at some point, and died there. The updated cultural and heritage impact assessment (2013) found that, through closer inspection during the survey, it probably was not a grave and from discussions with people at the mine it was established that the structure was an old well that had been filling up with material over the years. The site has not been impacted by the mining process.

Figure 16: Grave site or most likely an old well (2013)

GPS co-ordinates of structures and features mentioned:

Farmhouse:	28° 24' 69.8" S & 23° 30' 76.5" E
Ash Heap:	28° 24' 70.6" S & 23° 30' 74.3" E
Grave:	28° 24' 79.3" S & 23° 30' 90.1" E
Labourers cottage:	28° 24' 70.1" S & 23° 30' 69.7" E
Cooking area:	28° 24' 69.2" S & 23° 30' 69.3" E

Artefacts were also found in the vicinity of the farmhouse and outbuildings, attesting to occupation of the immediate area at various stages over a long period of time.

Chapter P: Regional socio-economic structures

The information contained within section of the document is obtained from the "*Kgatelopele Local Municipality IDP Review 2016/17, Planning 2017/2018".*

Demographic profile

Population

The Kgatelopele Local Municipality has a total population of 20691, 52.5% of the population being male, while 47.5% are female as per census Statistics for 2016. The population growth rate has been 3.49% between 2011 and 2016. The municipality has 6206 households, with 3.49% of households being female-headed (Stats SA, Census, 2011 and 2016). The average household size is 3.5. The majority of people residing in the municipal area are Black Africans, followed by Coloured people. The two least represented racial groups are Whites and Indian/Asians. The most commonly spoken language is Afrikaans at 58%, followed by Setswana at 33%.

Age group and gender distribution

The majority of people residing in the Kgatelopele Local Municipality are children of 0 – 4 years old, followed by those in the 15 – 34 years old group and from this group we have a total number of 5202 persons aged 20 years + who have completed their Grade 12 and this indicated that more programmes or projects need to be more responsive to the needs of children and young people. The population of the municipality resembles that of most developing nations, where there are high birth rates, slow growth rates and a population with a short life expectancy.

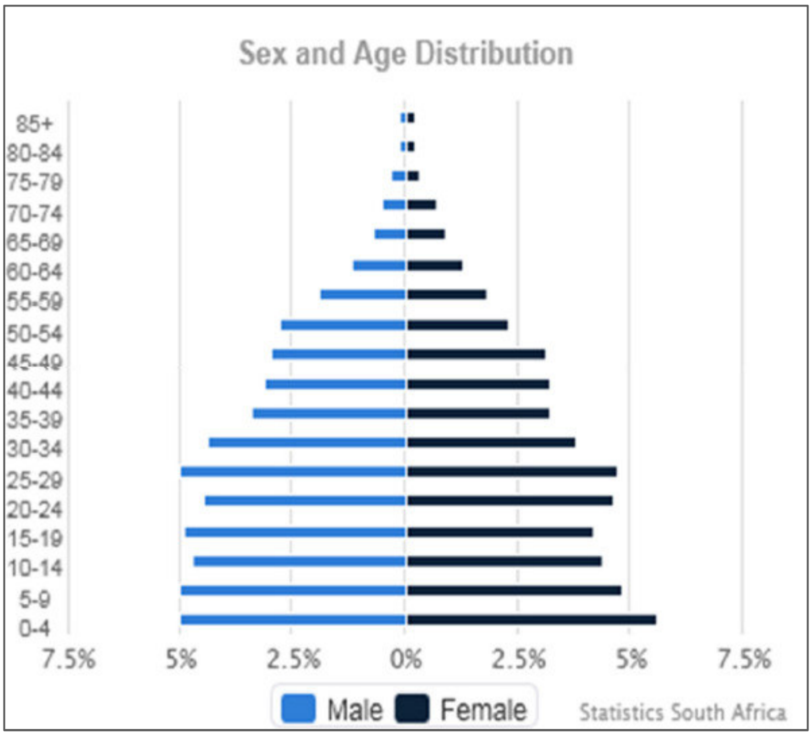


Figure 17: Population pyramid (IDP, 2017)

Socio-economic profile

Education levels

The majority of people in the municipal area have some secondary education and have completed their secondary schooling. There are those that have no schooling, some primary and others completed primary schooling and this means that these people did not receive their senior certificate, which limits their chances of getting a decent job or employment opportunities. The numbers of those who completed secondary school and got a higher education is high, so there is a large capacitated workforce to contribute to the economy of the municipality or the region.

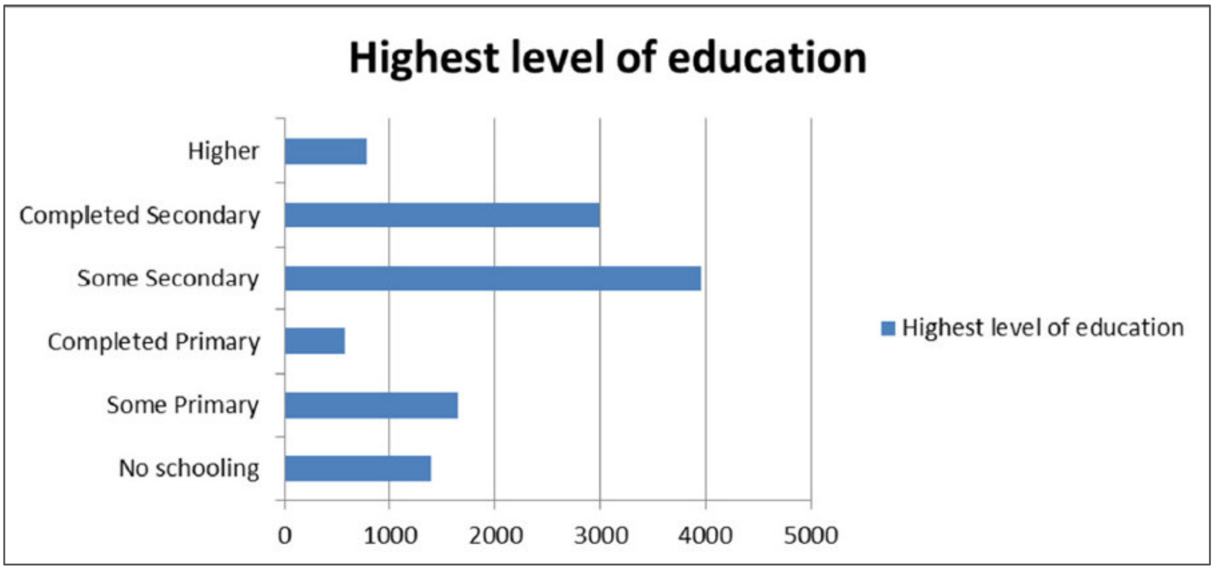


Figure 18: Highest level of education (IDP, 2017)

Employment levels

The number of those economically active is slightly greater than those not economically active, hence the dependency ratio of 50.6% which is very high. Stats SA (2011) indicates that the unemployment rate is at 22.3% while 29.1% of the total unemployed people are young people. There is need to address the challenges of those not employed particularly the youth.

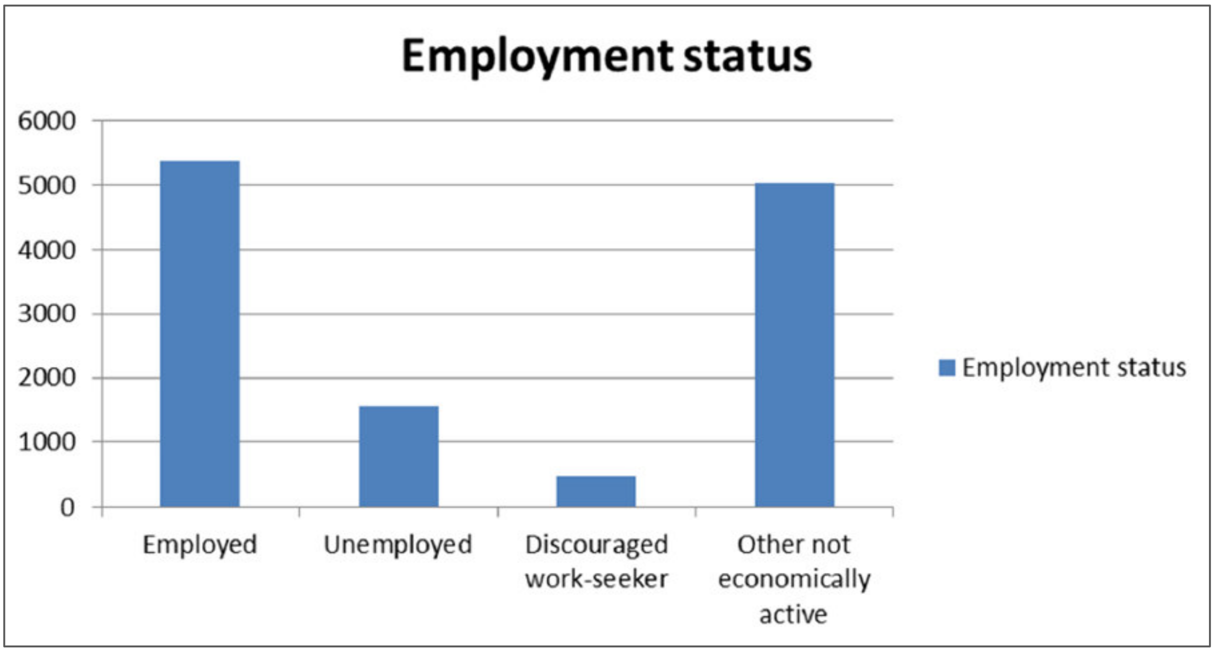


Figure 19: Employment status (IDP, 2017)

Income distribution

The income distribution of the municipality shows a very interesting pattern given the education levels in the municipality. A large number of people in the municipal area receive income above the poverty line (large capacitated workforce). It is of great concern from a municipal perspective for those who have no income at all. This income group may most likely be highly depended on government grants and are thus not able to spend money in the municipal area or pay their rates.

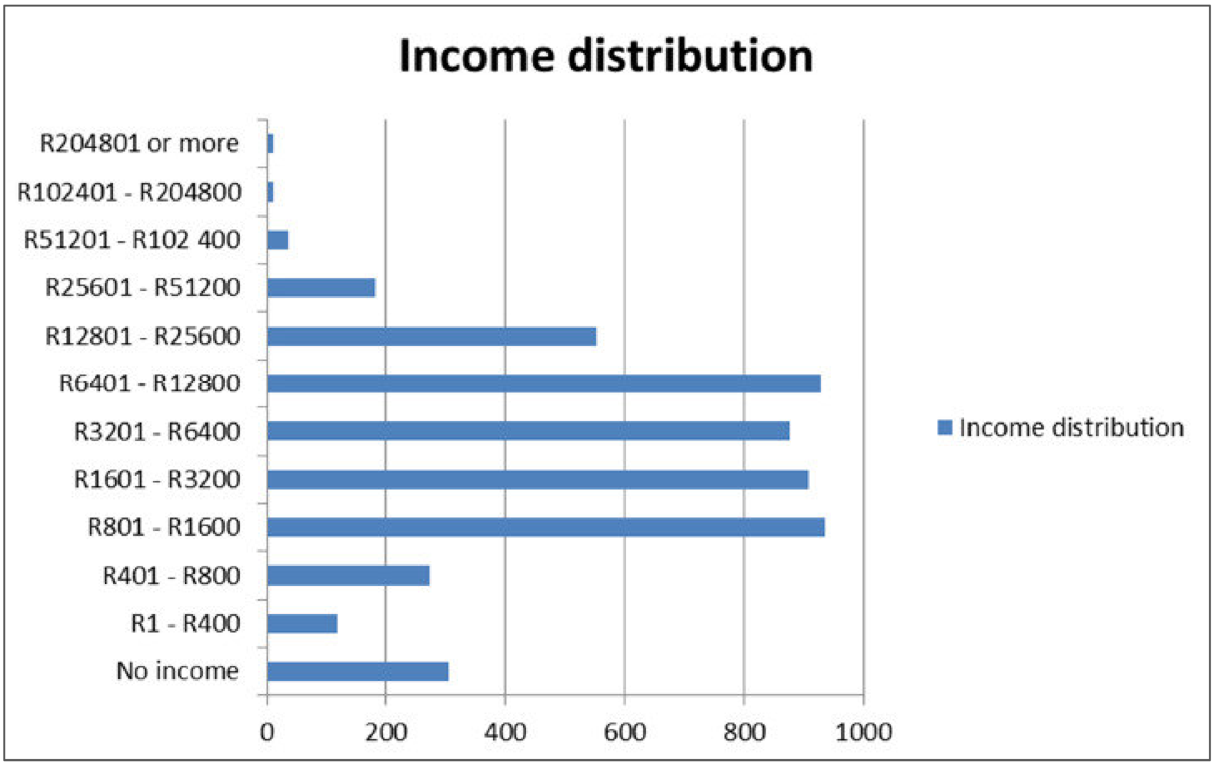


Figure 20: Income distribution (IDP, 2017)

Social infrastructure

Access to schools, government facilities/services is at the heart of settlements that perform well. These facilities give residents options and do not restrict how they live. The facilities or services offered contribute to the human development of the residents. It is clear that there are limited options for the residents, as there is not a diverse range of social services/facilities that are available to them to use.

Table 39: Facilities in the local municipality

Ward	Educational	Health service	Recreational/community facility	Safety
1	Primary school	-	-	-
2	High school	-	-	-
3	High school and primary	Clinic	Club, swimming pool	Police station

Ward	Educational	Health service	Recreational/community facility	Safety
4	3 primary school	Clinic	Recreational club, swimming pool	Police station

Service delivery and infrastructure

Water

The majority of households (4225) have access to piped water in their house, followed by those who have access to piped water in their yard (1262). 35 Households are still without piped water in their yards, however mechanisms have been put in place to deliver water twice a week to these affected households until such time that water connections can be done.

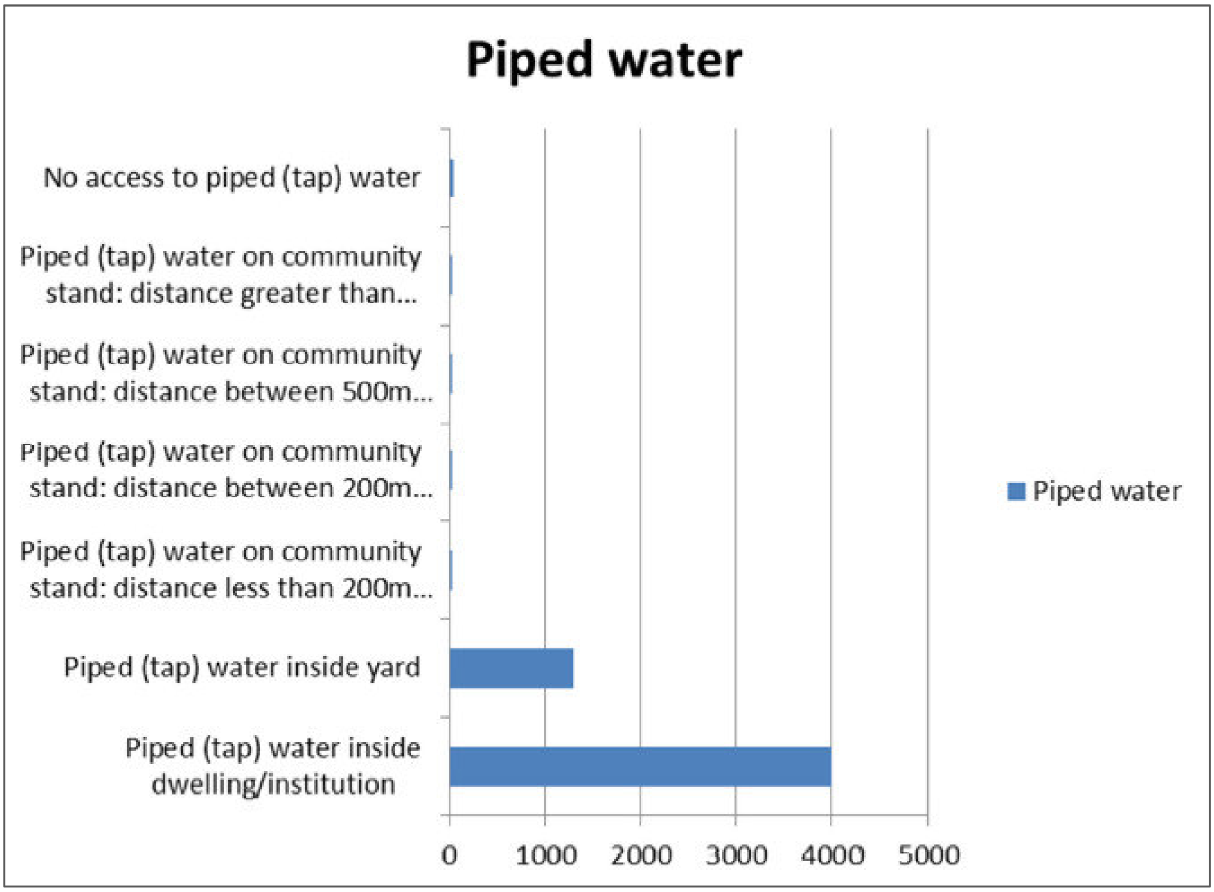


Figure 21: Piped water (IDP, 2017)

Electricity

As per Census 2016, 5960 households are connected to electricity and a total number of 100 households have been registered for prepaid meters and conventional meters for use of electricity as a source of energy for lighting this initiative was introduced in order to test its feasibility. The statistical information from Stats SA (2016), however calculations from 2011 to 2016 indicates that only 53 households are using other source for lighting purposes and thus leaving 193 households without any lighting source, which leave the question of how they actually light their households.

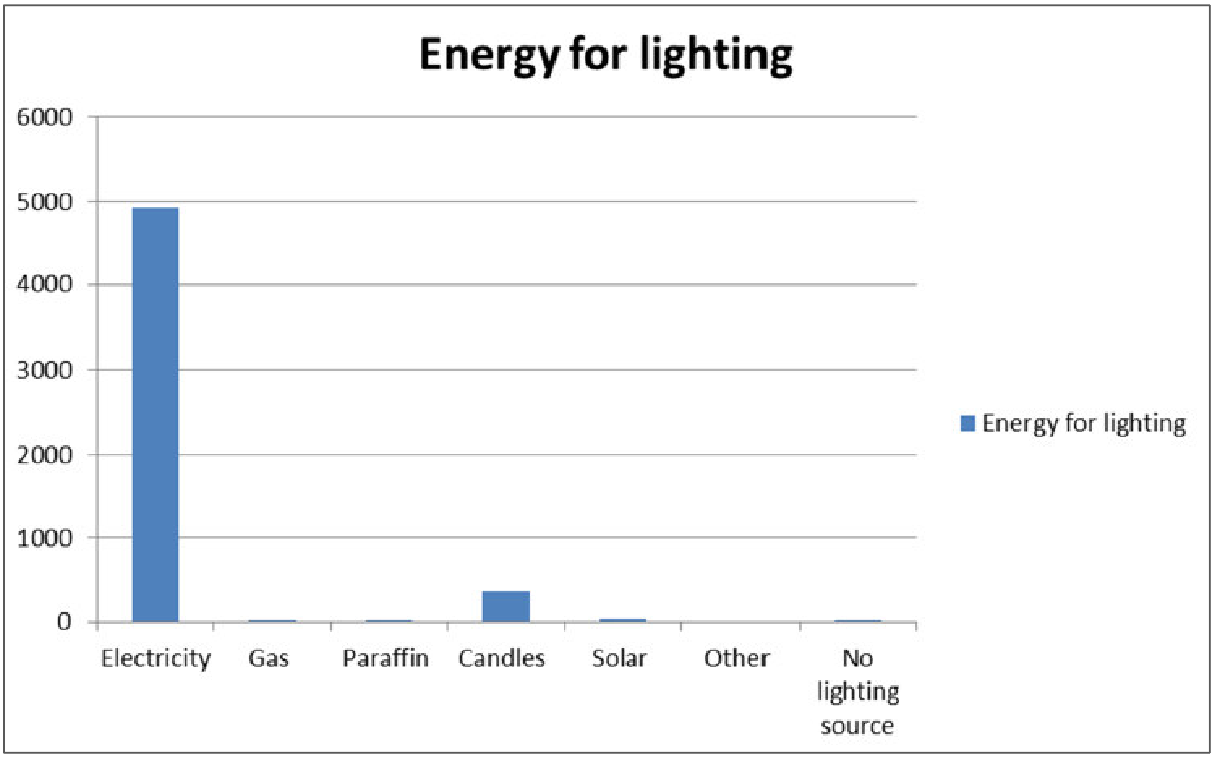


Figure 22: Energy for lighting (IDP, 2017)

Sanitation

Stats SA 2016 indicates that 5971 households have access to flush toilets (connected to sewerage system), whilst 71 households use flush toilets with septic tank. The concern is for those (161 households) that are still using bucket toilets, as that is supposed to have been eradicated. Ward 2 seems to be the ward with the greatest challenge when it comes to sanitation, as 62 households are using bucket system and 99 households have no toilet facilities.

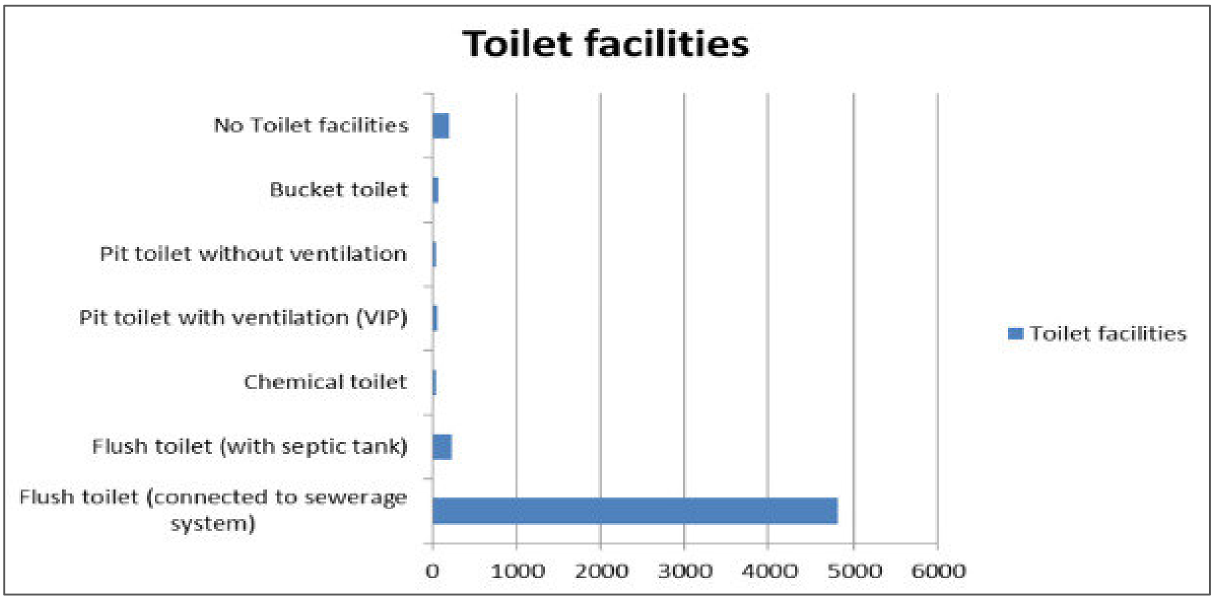


Figure 23: Toilet facilities (IDP, 2017)

Waste management

Disposing waste in an environmental friendly manner is very important for the municipality, as conservation of the environment is one of its strategic objectives. The municipality is responsible for the removal/collection of waste and its disposal. The municipality uses a landfill site for this purpose.

The municipality is also doing well in this area, as weekly refuse removal is at 91.7%. The municipality needs to pay attention to those using their own refuse dump and those that have no rubbish disposal, as they might be disposing waste in a manner that is not in line with sustainable development. The current landfill site which is being utilized for Danielskuil and Lime Acres communities is near its full capacity. The Municipality has undertaken a number of activities for the cleaning campaign in trying to ensure that there is a collection of waste and the eradication of heaps that are laying around the area of Tlhakalatlou, Kuilsville, Maranteng as well as in the Landbou Erwe and this initiative transpired to be a success and the municipality will then take the responsibility in ensuring that they continue with such programmes.

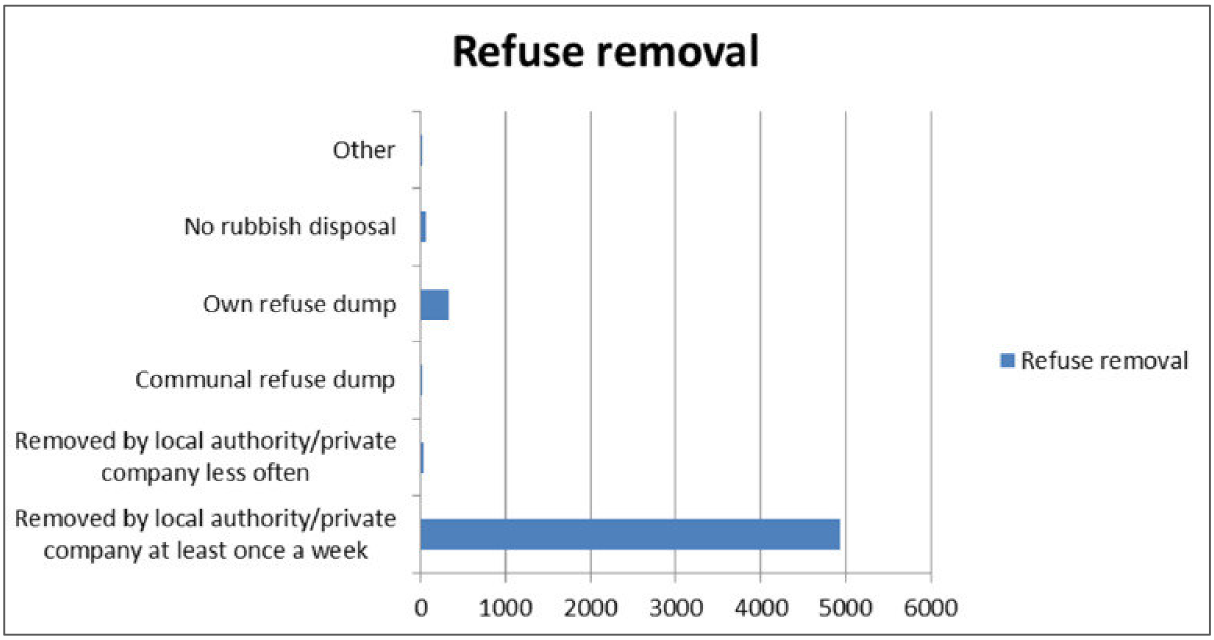


Figure 24: Refuse removal (IDP, 2017)

Spatial Development Framework

A summary of the Spatial Development Framework (SDF) for the Kgatelopele Local Municipality is contained within the document "*Kgatelopele Local Municipality IDP Review 2016/17, Planning 2017/2018".*

The SDF was developed in 2009 for the period 2010-2015, therefore, it is outdated and need to be reviewed in order to be compliant with the provisions of the Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013). The following was extracted from the IDP "*With comprehensive dolomite stability investigation reports in place, the new version of the SDF would also propose better informed spatial proposals. However, funding for this review is proving to be a challenge for the Municipality. Therefore, the Municipality is in the process of sourcing of fund for the review of the Municipality's SDF. Once the municipality has reviewed its SDF, it will also have to review its Land Use Scheme (2010) for SPLUMA compliance. This process should take place within 5 five years from the commencement of SPLUMA which was on 01 July 2015. Therefore, the Municipality has +/- 3 years to review its SDF and Land Use Scheme.*"

The following alternative development areas have however been identified by the SDF:

- Alternative 1 (Kuilsville)
  - This proposed area is situated directly to the west of Kuilsville and is approximately 23 ha in size. The land is occupied by informal structures and in private ownership. Integrated development principles would be enforced while the environmental impact would be nominal since an existing residential character has already been established. Bulk services are in close proximity to the area.

- Alternative 2 (Daniëlskuil)
  - This proposal is directly west of the existing Daniëlskuil and occupies the area of the previous caravan park and golf course. The property is approximately 60 ha. All the land does not belong to the Local Authority but is situated in close proximity to existing bonded housing. The area lends itself to an integrated housing development.
- Alternative 3 (Tlhakalatlou)
  - This alternative is situated between Tlhakalatlou and Daniëlskuil. The total land available is approximately 69.4 ha which belongs to the Local Authority. The development potential is mainly disturbed by drainage systems, existing municipal services, other land uses and a flood line. Bulk services are available and this area would be a natural extension space for Tlhakalatlou. A detailed contour and topographical analyses however would be recommended.
- Alternative 4 (Bo-Plaas)
  - Alternative 4 accommodating approximately 90 ha is situated between Bo-Plaas small holdings and Tlhakalatlou. This development area lends itself to an integrated housing development where all alternative housing typologies and ancillary land uses could be provided for. The planning for bulk and other municipal services could be done in a modern and sustainable fashion. This area would provide for not only the proposed 5- year growth but also for the time thereafter.

7.4.2 Description of the current land uses

The land tenure and land use of immediately adjacent land is given in the table below.

Table 40: Land tenure and use of immediately adjacent land

Farm	Current land use
Farms Strathmore & Wildspan	Agriculture
Farm Rocky Flats	Agriculture
Farm Bergplaas	Agriculture
PPC Lime Acres	Mining

Land use in the Province is predominated by stock farming, with an increasing game farming component (96%), while only 2% of the land is used for crop farming, and 1% is reserved for conservation. Mines and quarries constitute only 0.1% of the total land area.

There are no records kept on land use prior to 1964 when the mine started operating. However, there is an aerial photograph available that was taken in August 1959 prior to the start of mining. Interpretation of the photo clearly indicates that the land was used mainly for grazing purposes with one semi-permanent hut and accompanying kraal for the stock tender about 1.5 km north of the pipe. The area was accessed by a few roads and tracks. To the north of the kimberlite pipe, where the current air strip is located today, a small patch of land was used for the dry land cultivation of an unknown crop (possibly maize). There was also an air strip located to the north east of the pipe for use by PPC. The PPC mine village of Lime Acres was located 3.5 km north-north-east of the pipe.

The railway track (Kimberley / Sishen) with accompanying dirt road was already in place to the north of the pipe. The depression in the kimberlite pipe itself was used as a watering point for farm stock and game.

7.4.2.1 Historical Agricultural Production

The land use on this property was mainly restricted to grazing due to the climate and soil characteristics. The carrying capacity of the area is around 1 large livestock unit or 6 small livestock units per 10 ha.

7.4.2.2 Existing Structures

There were no structures on site except for the stock tender’s hut and kraal to the north of the kimberlite pipe prior to the start of mining.

7.4.2.3 Land misuse

According to a report by Conservationist Hennie Erasmus, the *Acacia mellifera* vegetation is a natural biome and it’s “encroachment” is limited by soil type (see vegetation around FRDs and in Bonza Game

Farm area. *Acacia mellifera* is also a valuable food source for various species of antelope and the giraffe.

Due to mining activities large portions of the mining area is being covered by coarse residue.

7.4.3 Description of specific environmental features and infrastructure on the site

The mine surface infrastructure is indicated on the mine layout diagram in Figure 4. Finsch Diamond Mine consists of the following components:

- On-site infrastructure:
  - Bulk sampling plant;
  - Explosives magazine;
  - Gun club;
  - Main store area;
  - Outside surfaces area;
  - Process plant area;
  - Support infrastructure;
  - Water dams;
  - Roads; and
  - Underground support structures.
- Residue sites:
  - Bonza;
  - Coarse residue deposits (CRD);
  - Fine residue deposits (FRD);
  - Old FRD paddocks;
  - Overburden dumps; and
  - Waste rock dumps.
- Open Pits:
  - Bonza quarry; and
  - Finsch pit.
- Underground:
  - Decline shaft;
  - Main rock shaft;
  - Main ventilation shaft;
  - Return airway shaft; and
  - Underground support infrastructure.
- Waste disposal:
  - WAMY;
  - Landfill site; and
  - Waste disposal support infrastructure.

There are no environmental features within or in the direct vicinity of the Finsch Diamond Mine area. The closest surface water body to the Finsch Diamond Mine is that of the Klein-Riet (drains towards the south east of the mine) and the Groenwater Spruit near Postmasburg.

As previously described, NFEPA classified wetlands (refer to Chapter I of Section 7.4.1) as well as cultural and heritage resources (refer to Chapter O of Section 7.4.1) are located in close proximity to Finsch Diamond Mine.

7.4.4 Environmental and current land use map

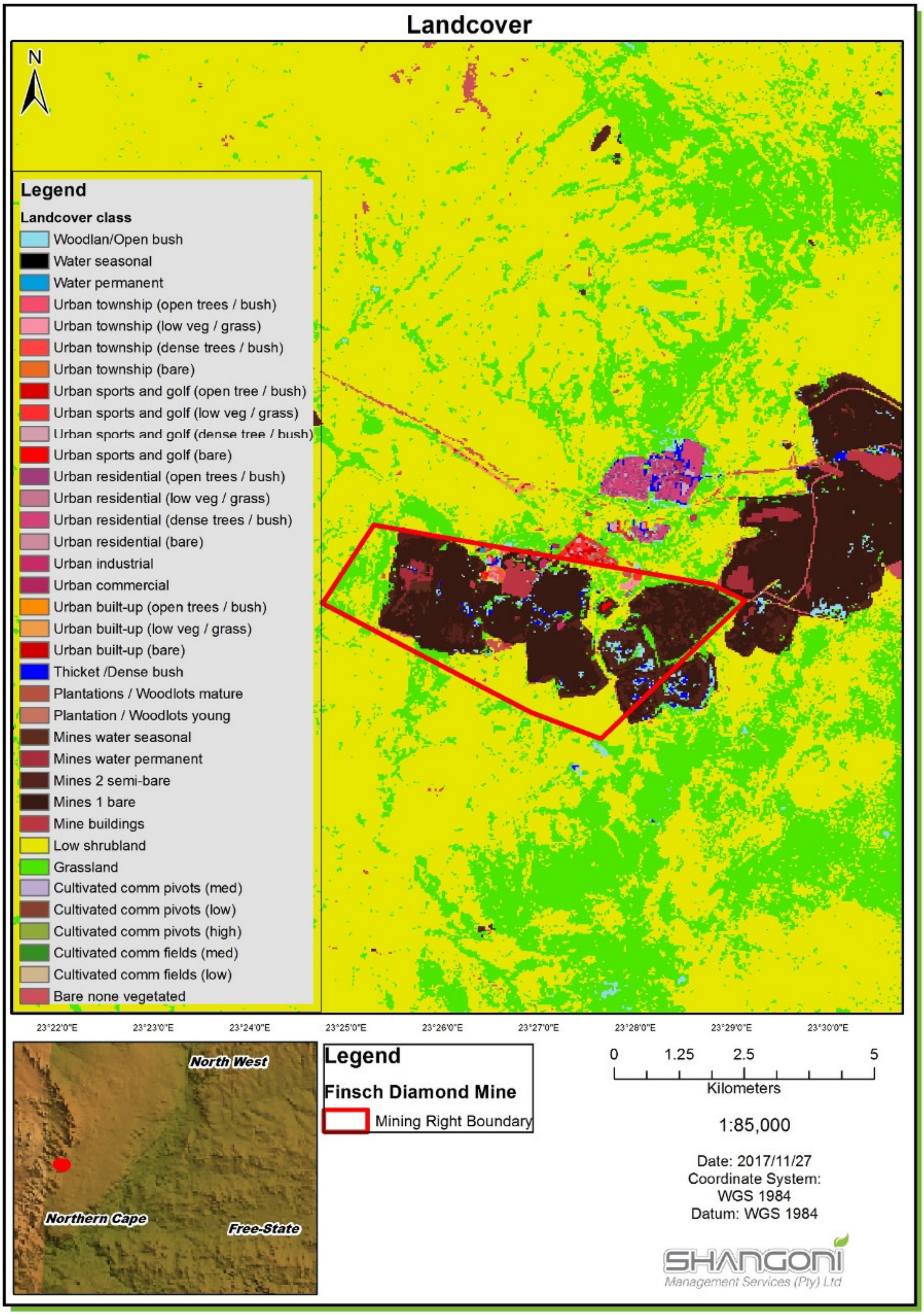


Figure 25: General land cover in relation to Finsch Diamond Mine

7.5 Impacts and risks identified

A detailed risk assessment has been undertaken, as contained in Annexure E. The following table contains all the potential impacts identified for the activities described in the initial site layout.

Table 41: Detailed Risk Assessment – Operational Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
1	Geology	Underground mining operations	Loss of geological structures Depletion of the ore body and a certain amount of country rock.	N	Y	Operational Phase	Site only Mining Right area	5	1	Low	**Control**	Disruption of geology is expected during mining operations and no mitigation is possible.	5	1	Low	To minimise the destruction of the geological strata and to prevent the unnecessary loss of geology	In compliance with the Mining Rights issued in terms of the MPRDA (2002) and the EMPr.	Operational Phase
2			Geological instability	N	Y	Operational Phase	Site only Mining Right area	5	4	High	Control	Disruption of geology is expected during mining operations and no mitigation is possible. Security and control measures shall be implemented for safety purposes. Areas of subsidence will be identified and monitored. Stability assessments of the pit are done regularly.	5	3	High			Operational / Decommissioning and Closure Phase
3	Geology and Topography	The pit bottom is lowered as the underground mining continues.	The pit perimeter will break back over time until it is stable	N	Y	Operational	Limited to site	4	4	High	Control		4	3	High			Operational / Decommissioning and Closure Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
4	Soil	Mining engineering; Headgear; Mechanical & electrical workshops operations: the use and maintenance of transformers, gearboxes & motors, winder drum, hydraulic power pack filters, fans, and winches	Spillages and leakages of hydrocarbons and hazardous chemicals (solvents, paints) may result in impacts on soil.	Y	Y	Operational	Limited to site	3	3	Medium	Control / Remedy	Spills on soil A bioremediation agent containing ''oil/diesel eating bacteria'' shall be used in the following manner: 1. The excess oil and/or diesel shall be removed as quickly as possible to prevent further penetration into the ground by scooping up excess with shovels. 2. Plastic sheeting shall be used where necessary to divert and pick up the soil. 3. Any excess oil/diesel/chemicals shall be placed into a drum marked for that purpose and sends it to the WAMY. 4. Bioremediation of oil/diesel polluted soil on site shall be done where practicable. Spills on concrete or other non tarmac surface 1. Oil, diesel, acid or other liquid chemical spills on concrete cement floors shall be mopped up with loose absorbent fibre. 2. Used fibre shall be put into a 210 litre drum marked for that purpose. 3. The drums shall be sent to the WAMY once it is full. 4. All diesel, oil and petrol contaminated fibre or soil shall be handled as hazardous waste. 5. Large oil spills shall be contained with fibre booms, bio tubes or sand filled plastic bags. 6. The spread of the substance shall be prevented. 7. Excess oil, diesel and liquid chemicals shall be pumped up and/or scooped into a holding tank/drum marked for that purpose. 8. The use of chemicals to absorb/emulsify oil shall be avoided. 9. The biological degreasers shall be used to remove traces of oil left on the concrete surface. 10. Only degreasers that are compatible with oil separators and water shall be used where there is oil separators installed. Spills on tarmac surfaces 1. Spills shall be cleaned immediately because oil and diesel softens the tar surface. 2. Excess oil and/or other chemicals shall be soaked up with a suitable absorbent (loose fibre) and sent to the WAMY. 3. The remaining spill or stain shall be cleaned with an approved biological cleaner.	2	2	Low	To limit the impact on soil.	In Compliance with the National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GNR.331 of 2014), thereunder. In compliance to the Waste Classification and Management Regulations, 2013 GN.R634 (dated August 2013), under the National Environmental Management: Waste Act, 2008 (Act No.59 of 2008). In Compliance to the Norms and Standards for the storage of waste, GN 926 (dated November 2013), under the National Environmental Management: Waste Act, 2008 (Act No.59 of 2008). In compliance with the Rehabilitation,	Operational / Decommissioning and Closure Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT: Impact description	Reversible	Irreplaceable loss	PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated: Probability	Magnitude	Significance	MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated: Probability	Magnitude	Significance	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
5		Reprocessing activities of Pre-1979 CRD – Wet Infield Screening (WIFS) Operations. Loading and hauling. The re-mining of Red Dumps and Post 80 CRD	Leakages or spillages may occur from earthmoving vehicles and machinery used for the re-mining of the residue deposits may result in soil pollution.	N	Y	Operational	Limited to site	3	3	Medium	Control / Remedy	All vehicles are inspected prior to use. Vehicles and equipment are serviced on a regular basis. Vehicles should be issued a spill mat to be used when the vehicle is parked and leaks are observed. If leakages or spills occur on soil the following will apply: 1. The excess oil and/or diesel shall be removed as quickly as possible to prevent further penetration into the ground by scooping up excess with shovels. 2. Plastic sheeting shall be used where necessary to divert and pick up the soil. 3. Any excess oil/diesel/chemicals shall be placed into a drum marked for that purpose and sent to the WAMY. 4. Affected soil shall be picked up and sent to the WAMY for bio-remediation.	2	2	Low		Decommissioning- and Closure plans and Closure Objectives. Implementation also to be in compliance with the mine's internal procedures. Procedures to be in line with the latest legislation.	
6		Concurrent rehabilitation of WRD The open pit WRD contains Asbestos fibres which occur naturally in the banded ironstone geology. This material has been disturbed with the opening of the pit. • Use of compost • Use of topsoil as a topdressing material for areas undergoing rehabilitation	The rehabilitation trials of WRDs using composted garden waste, wood chippings and sewage sludge will improve the physical properties and fertility of soil.	Y	Y	Operational	Limited to site	Positive			Enhancement of positive impact	Continued enhancement of the positive impact through the use of garden waste composting, wood chippings and sewage sludge.	Positive					Operational / Decommissioning and Closure Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
7		Constructed plant and associated infrastructure	Soil has been removed due to the footprint of the plant and has resulted in a loss of soil	N	Y	Operational	Limited to site	4	2	Medium	Control / Remedy	Prior to the commencement of any topsoil and subsoil stripping, all vegetation, in particular invasive plants shall be removed, in consultation with the Environmental Specialist. Stripping shall only occur where soils are to be disturbed and when an end-use for the stripped soil has been identified. Topsoil shall not be stripped when saturated, as this will exacerbate the damage to the soil structure. Wherever possible, stripped topsoil shall be placed directly onto an area being rehabilitated. • This avoids stockpiling and double handling of the soil. • Topsoil placed directly onto rehabilitation areas contains viable seed, nutrients and microbes that allow it to re-vegetate more rapidly than topsoil that has been stockpiled for longer periods. If immediate use is not possible the stripped topsoils and subsoils shall be transported to the designated stockpile areas. Topsoil shall be stockpiled separately from any subsoil and rock. Suitable stockpiling areas shall be identified, preferably in close proximity to the source of the topsoil. • The areas shall be calculated on the basis of the expected soil volume. Stockpiles shall be established within the bounds of stormwater management infrastructure. Soil stockpiles shall be clearly identified as such. To avoid compaction and consequent damage to the soils, equipment movement on the stockpiles shall be limited. The stockpiled topsoils and subsoils are not to exceed 1m in height, and shall not be compacted. Rapid growth of vegetation on the stockpiles shall be promoted. No waste shall be disposed of at the stockpiled areas. If deemed necessary samples of stripped soils shall be analysed to determine the nutrient status. • Fertilisers and seeding will be applied if/ as required. Erosion control measures shall be implemented to ensure that the topsoil is not washed away and erosion gullies do not develop in the arable land. Topsoil shall not be sold as a mineral nor mixed with sterile soils.	2	2	Low			Operational and Decommissioning Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
8		Plant operations	The non-availability of material safety data sheets (MSDSs) and inadequate training of personnel may further increase the risk of spillages and leakages of hazardous substances.	N	Y	Operational	Limited to site	3	3	Medium	Control / Remedy	All employees working with the storage, use or disposal of hazardous substances shall be trained and briefed on the relevant procedures and potential environmental impacts of not adhering to these. The MSDS's for all chemicals and hazardous substances will be made available to all employees working with the storage, use or disposal of hazardous substances.	2	2	Low			
9		Construction and operation of the Brits FRD; Two non-perennial pans were located within the footprint of the Brits FRD. These non perennial water bodies were lost after 2006 once the construction of the FRD commenced. The two non-perennial water bodies were located at the northern (northern pan) and southern (southern pan) ends of the FRD.	Fine residue spillages from pumping activities on the rehabilitated WRD may result in soil pollution	N	Y	Operational Phase	Limited to site	3	3	Medium	Control / Remedy	Fine residue spills shall be reported. The necessary action according to the mine's procedures/ COP's shall be taken. Fine residue spill shall be contained and picked up. Regular inspection and maintenance of pumping infrastructure (including pipelines).	3	2	Medium			Operational / Decommissioning and Closure Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
10		General operation and concurrent rehabilitation of all FRDs	Ineffective water management and rehabilitation practices on the sidewalls may occur and result in soil erosion.	N	Y	Operational / Decommissioning phase	Limited to site	3	3	Medium	Control / Remedy	Stormwater control infrastructure including diversion trenches and down chutes (where provided) shall be maintained in an acceptable condition such as that they conform to their design capacity at all times. Trenches shall be kept clear of vegetation, debris or silt that could impede flow. Any repairs to the infrastructure shall be carried out in accordance with the original design and construction specifications. Significant erosion down side slopes and particularly down re-profiled and capped slopes shall be repaired on identification using a suitable method to return the slope to at least its original status. The area shall also be upgraded to prevent re-occurrence or further deterioration.	3	2	Medium			Operational / Decommissioning and Closure Phase
11			Wind erosion of the FRD takes place when the surfaces are dry. Contamination of the surrounding environment with kimberlite FRD may further occur	N	Y	Operational / Decommissioning phase	Limited to site	3	3	Medium	Control / Remedy	The FRDs shall be monitored quarterly for erosion. Erosion gullies shall be stabilised with infill material.	3	2	Medium			

12		Construction and operation of CRDs	The CRDs cover Hutton and Mispah soil types which have not been removed prior to disposal and therefore result in a loss of soil and land capability	N	Y	Operational Phase	Limited to site	3	3	Medium	Control / Remedy	The continued re-treatment of the pre-79 and red dumps will result in the uncovering of the soils beneath. Prior to any dumping taking place on the site of the re-treated dumps, available soil will be stripped. Stripping shall only occur where soils are to be disturbed and when an end-use for the stripped soil has been identified. Topsoil shall not be stripped when saturated, as this will exacerbate the damage to the soil structure. Wherever possible, stripped topsoil shall be placed directly onto an area being rehabilitated. • This avoids stockpiling and double handling of the soil. • Topsoil placed directly onto rehabilitation areas contains viable seed, nutrients and microbes that allow it to re-vegetate more rapidly than topsoil that has been stockpiled for longer periods. The stripped topsoils and subsoils shall be transported to the designated stockpile areas. Topsoil shall be stockpiled separately from any subsoil and rock. Suitable stockpiling areas shall be identified, preferably in close proximity to the source of the topsoil. • The areas shall be calculated on the basis of the expected soil volume. Stockpiles shall be established within the bounds of stormwater management infrastructure. Soil stockpiles shall be clearly identified as such. To avoid compaction and consequent damage to the soils, equipment movement on the stockpiles shall be limited. The stockpiled topsoils and subsoils are not to exceed 1m in height, and shall not be compacted. Rapid growth of vegetation on the stockpiles shall be promoted. No waste shall be disposed of at the stockpiled areas. Samples of stripped soils shall be analysed to determine the nutrient status. • Fertilisers and seeding will be applied if/ as required. Erosion control measures shall be implemented to ensure that the topsoil is not washed away and erosion gullies do not develop in the arable land. Topsoil shall not be sold as a mineral nor mixed with sterile soils.	3	2	Medium			Operational / Decommissioning and Closure Phase
13		Waste transportation	Incorrect transportation of hazardous waste, such as the use of damaged drums, may lead to spillages onto the ground and result in soil pollution	Y	Y	Operational Phase	Limited to site	3	1	Low	Control	All telecons containing hazardous waste from the outside areas under the mine's control, shall be transported to the Freight Yard area and shall be taken to the WAMY; provided that a security escort is available. Care shall be taken to prevent any spills from the telecon while transporting the waste.	2	1	Low			Operational / Decommissioning and Closure Phase

14		Handling and storage of hazardous waste	Incorrect handling of hazardous waste while off-loading and storage at non-designated areas at the HWSA may cause spillages of hazardous substances and result in soil pollution.	N	Y	Operational Phase	Limited to site	3	1	Low	Control	All telecons containing hazardous waste in the inside areas shall be transported to the WAMY. Special transport shall be arranged for the following items: • Items heavier than 50 Kg; • Items of dimensions> 1 m³; • Electrical cable; • Hoist cable; • Conveyor belting; • Batteries; and • Fluorescent tubes. Waste shall not be spilled while the telecon or cassette is in transit or in the process of being offloaded or tipped. The transportation of waste to the WAMY shall take place during normal day shift, working hours, unless special arrangements have been made. When weekend work is carried out where waste must be disposed of to the WAMY, the project owner shall make prior arrangements with the WAMY Supervisor to arrange for access and the appropriate offloading of the waste. Waste shall be safely offloaded at the WAMY. Equipment and/or material, identified for salvage purposes shall be safely offloaded to minimise the damage thereof. Cassettes shall be collected and transported from underground to the marshalling yard. Any non-compliance with regards to waste separation in the cassettes from underground shall be reported Cassettes shall be transported from the marshalling yard to the WAMY. The cassettes shall be off loaded and tipped at a designated place after the content has been inspected. Hazardous or hydrocarbon contaminated waste shall be placed in a 210 litre drum, marked for that purpose, before being placed in a cassette or telecon or on a bakkie for transportation to the WAMY. Arrangements shall be made to transport hazardous waste from the marshalling yard separately to the WAMY where possible. If there are large quantities of polluted soil, a telecon or cassette shall be requested and transported to the WAMY. All batteries (dry cell and acid/lead batteries) shall be transported separately to the WAMY as hazardous waste. They shall not be placed in a telecon or cassette with any other waste types. Incorrect transport of batteries can lead to short circuits which may result in explosions and/or fires or the chemicals of wet cell batteries may leak out and contaminate the rest of the waste. Whenever any failed fluorescent tubes, mercury vapour, high-pressure sodium or LED Fittingsare replaced on mine the lamps shall be transported intact to the electrical workshop where they will be collected for disposal. Incinerator ash shall be sampled. When test results indicate that the ash is not hazardous it shall be sent as general waste to the	2	1	Low			Operational / Decommissioning and Closure Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
												WAMY in a closed/sealed drum. When the test results indicate that the ash is hazardous it shall be sent directly to the contractor or to the WAMY until collected by the contractor.						

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
15			Incorrect design and inadequate maintenance of the bunded area for hazardous waste may cause spillages or seepage from this waste and may impact on soil.	N	Y	Operational Phase	Limited to site	3	1	Low	Control	All new bunds shall have the following specifications • It must be able to contain 110 % of the sum of the liquid of all containers stored in that particular bund facility. • It must be constructed from an impermeable material or it must be lined with an appropriate impermeable sealant to prevent spilled liquids from leaching in the soil. • It must have a collection sump inside the bunded area or fitted with a drainage pipe leading to a collection sum on the outside of the bund. This drainage pipe shall be fitted with a lockable spindle/valve. • The floor shall be graded in such a way that liquid will collect in the sump. • Spillage sumps shall be locked, preferably with "key-like" type devices to ensure availability of keys in case of emergency. • As far as possible all pipe fittings, flanges, pipe fittings, valves and pumps shall be situated within the bund wall. • Allowance shall be made to cope with maximum storm rainwater (100mm rainfall in 1 hour) and firewater. The bund floor and walls shall be constructed of materials that are impervious to the contents of any tank or container within the bund. The bunded area shall be capable of preventing the migration of any spillage or leakage to the surrounding environment and shall therefore be either: • Built of concrete; • Built of brick and then plastered with concrete and painted with an impervious paint; • Sealed with an impermeable liner; or • Constructed with steel. The area within the bund wall shall only be used for storage of hazardous waste. High bund walls shall have steps for quick escape and/or to facilitate easy access from the outside. Bund drain valves/stopcocks shall be/have: • Leak proof; • Able to continue functioning in a fire; • Controls outside the bunded area; • Able to open manually; • Valves that must be kept locked in the closed position unless in use; and • The "open" and "closed" positions that must be indicated and obvious.	2	1	Low			

16		General operation of the WAMY	The historical incorrect disposal of hazardous and non-hazardous waste at the WAMY may result in impacts on surrounding soil.	N	Y	Operational Phase	Limited to site	3	3	Medium	Control / Remedy	The WAMY shall be locked and secured after hours and suitably manned during operated hours. Waste received at the WAMY shall be sorted, stacked and stored. Storage shall be at demarcated areas for the specific type of waste. All WAMY personnel shall be adequately trained for the WAMY operation to include identification of the various hazardous and general waste streams and explosives. Waste shall not be stored or disposed of in front of the WAMY gates. Litter shall be prevented and where it is windblown against the fence it should be removed. Record shall be kept of the general waste that is disposed of; quantities, dates and origins of hazardous and non-hazardous waste received, stored and leaving; waste materials recycled; waste material sales/or auctions; and incidents associated with the WAMY. General Waste shall not be stored for more than eighteen months from the date of generation. Scrap metal for cutting, salvage and/or auction purposes shall be identified and send to stores. Products and containers that are used shall be returned to the supplier for recycling, where practicable. Plastics, cardboard, wooden pallets, plastic pallets, polyurethane panels, scrap metals, conveyor belts and scrap metal shall be recovered for recycling. Garden waste shall be disposed of as a mulch or topdressing to the WRDs. Grass cuttings and leaves can be added to the bioremediation process of oil contaminated ground at the WAMY. The addition of organic material enhances the process. Tyres shall not be land filled as they cannot be compacted and tend to rise up through the waste. Tyres shall be stockpiled and recycled whenever possible. When handling and/or storing hazardous waste, special attention shall be given to the prevention of fires, explosions, burns, chemical fires, toxic fumes, chemical reactions, loss of life and damage to company property. Hazardous waste received in telecons, cassettes and by any other means shall be removed, sorted and stored under cover on a concrete bunded area. All hazardous wastes shall be removed and disposed of to a licensed hazardous site within 90 days. All chemicals waste shall be labelled and an MSDS shall be available on site.	2	2	Low			Operational / Decommissioning and Closure Phase

												Drums shall be stored and labelled as per legal requirements. The washbay shall be used to steam clean all chemically contaminated drums, hydraulic hoses and other containers so that they can safely be reused, recycled or disposed of. The contaminated water from the wash bay shall report to an oil water separator sump whereby the oil is removed to a separate container for safe disposal and the clean water used on the bioremediation site. Spillages shall be prevented when decanting liquids from one container to another. In the event of a spillage or contamination at the incident shall be reported immediately to ensure prompt action. Contaminated soil shall be stored at the hazardous waste storage area or taken directly to the bioremediation site. Old oil shall be disposed of to an approved oil recycle company. Asbestos waste shall be placed in containers that will prevent the likelihood of exposure during handling. All vehicles, re-usable containers or any other similar articles which have been in contact with asbestos waste shall be cleaned and decontaminated after use in such a way that it does not cause a hazard inside or outside of the workplace. All asbestos waste shall be disposed of at a registered site. All persons working with asbestos waste shall wear PPE. Electronic waste shall be recycled as far as possible The dried sewerage sludge shall be disposed of through a controlled composting program. The final compost product shall be used as a top dressing material for WRD rehabilitation purposes. Lead/Acid batteries shall be returned to supplier. Batteries that cannot be recycled shall be disposed of to Waste-tech. In the event that they are any explosives at WAMY, this shall be reported. No medical or health care waste or pharmaceutical waste, explosive waste, mining residue waste or sewerage waste may report to this site. Explosives shall be placed and locked in the relevant marked boxes. Detonators shall not be stored with other explosive components. The box containing the explosive shall be moved to a designated site away from the working area of the WAMY personnel and shall be collected by a designated person. Waste from the emulsion silos shall be stored in marked drums; one for gassing solution and the other for emulsion within the						

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
												locked Silos area. They shall be collected by AEL for safe disposal. Redundant chemicals, pesticides, incinerator ash, solvents, oily rags, oil filters, crushed fluorescent tubes and any other hazardous waste shall be dispatched to an registered landfill appropriate for the type of waste every ninety days or when necessary. Where alternatives is possible for example alternative fuels for a plant, such options will be considered rather than landfilling. Any people conducting salvage operations at the WAMY shall be suitably trained and fall under the jurisdiction of the waste permit holder and or / employer. Ad hoc inspections shall be done on the WAMY to ensure compliance with the Specifications. The WAMY shall be measured in terms of audit findings, inspection recommendations and legal compliance in terms of waste management. Ensure compliance to *Waste Classification and Management Regulations, 2013 GN.R634* (dated August 2013), under the National Environmental Management: Waste Act, 2008 (Act No.59 of 2008). Ensure compliance to the *Norms and Standards for the storage of waste, GN 926* (dated November 2013), under the National Environmental Management: Waste Act, 2008 (Act No.59 of 2008).						
17		Operation of landfill area	Any striping of topsoil and removal of vegetation, during the operation of the facility, may result in the erosion of soil.	N	Y	Operational Phase	Limited to site	3	3	Medium	Control / Remedy	Indigenous vegetation shall not be removed. Projects shall be advised to cut vegetation off at ground level rather than bulldozing and clearing everything to prevent wind erosion. Unseasonal veld fires shall be controlled. Stormwater will be controlled on the landfill in such a way that water is directed away from the landfill. Vegetation around the boundary of the landfill shall be encouraged, if it is safe for vegetation to establish there. If there are erosion gullies surrounding the landfill site and if these are creating unsafe conditions, these gullies will be filled. The landfill are shall be rehabilitated as per Mine Closure Planning.	3	2	Medium			Operational / Decommissioning and Closure Phase

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18		Storage of tyres	Potential veld fires may lead to leaching of hazardous substances if tyres catch a light.	N	Y	Operational Phase	Limited to site	3	4	High	Control / Remedy	Fire extinguishers are available at the tyre stock pile. Waste separation at the WAMY, ensures that no other flammable waste is stored with the waste tyres. Cutting of steel is not done close to the tyre stockpile. Borehole monitoring may indicate potential leachate. Tyres shall be stockpiled and recycled whenever possible. 20m fire breaks are currently established around the town and around the game farms and shall be maintained. Waste tyre should be managed and stockpiled in accordance to the waste tyre abatement plan. Soil compacted underneath tyre stockpile. Tyre stockpiles to be recycled through the appointed waste facility that is licensed	2	4	Medium			
19			Incomplete tyre combustion leading to dioxin (highly toxic compounds) and noxious gases, leaching into the soil during accidental burning of rubber due to cutting of steel or the storage or tyres during a fire. Other substances released include Volatile organic compounds (VOCs) polynuclear aromatic hydrocarbons (PAHs), furans, hydrogen chloride, benzene, PCBs arsenic, cadmium, nickel, mercury, zinc, chromium and vanadium.	N	Y	Operational Phase	Limited to site	3	4	High	Control / Prevent / Remedy		2	4	Medium			
20		Operation of incinerator	Incorrect disposal of incinerator ash	N	Y	Operational Phase	Limited to site	3	3	Medium	Control / Prevent	Incinerator ash has been classified as per Waste Classification and Management regulations. Incinerator ash will be handled, stored and disposed of as per the SDS. Ensure compliance to Waste Classification and Management Regulations, 2013 GN.R634 (dated August 2013), under the National Environmental Management: Waste Act, 2008 (Act No.59 of 2008). Ensure compliance to the Norms and Standards for the storage of waste, GN 926 (dated November 2013), under the National Environmental Management: Waste Act, 2008 (Act No.59 of 2008).	2	2	Low			Operational / Decommissioning and Closure Phase
21			Potential spillages on soil from diesel tank held on site for the operation of the incinerator.	N	Y	Operational phase	Limited to site	3	3	Medium	Control/ prevent	Diesel tank stored in bund wall. Bund wall checked during staff inspections and HSE official inspections. Low levels of diesel in tank due to small amounts of screenings removed and incinerated.	2	1	Low			

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22		Bioremediation activities.	Seepage or incorrect water drainage of materials e.g. heavy metals during bioremediation processes at the bioremediation site due to incorrect bunding or maintenance of the bunded area.	N	Y	Operational Phase	Limited to site	3	3	Medium	Control / Prevent	All polluted material shall be stored and remediated within the concreted area. The bundwall shall be inspected by staff and HSE Officials and deviations shall be reported. Maintenance shall be requested if there is damage to the wall. Untreated material shall be separated from treated material and piled in windrows approximately 1m in height. The untreated material can be mixed with the Bobcat (or manually with shovels) to introduce air into the soil. The mixing of the material shall be done as described in Procedure FDM-HSE-108E. Treated kimberlite sludge or residue shall be disposed of in the process via Boyo's Bin. Treated soil or absorbent fibre that does not contain kimberlite shall be disposed of to the landfill or onto the WRD as top dressing if deemed clean enough.	2	2	Medium			
23			Incorrect or inadequate bioremediation practices on site	N	Y	Operational Phase	Limited to site	3	3	Medium	Control / Prevent		2	2	Low			
24		Storage of process water	The potential failure of the process water dams may cause spillages of process water and impact on soil.	N	Y	Operational Phase	Limited to site but may extend to adjacent areas	3	5	High	Control / Prevent	All process water dams shall be inspected on an ongoing basis for compromises and maintained where required All impoundments or dams containing any hazardous substance shall be effectively fenced-off so as to restrict access thereto, and warning notice boards shall be erected at prominent locations so as to warn persons of the hazardous contents thereof and to prevent unauthorised access which may lead to vandalism. There shall be no discharges of dirty water from the mine site unless there is an extreme storm event, with a recurrence interval exceeding 1:50 years. The water balance for the mine shall be refined on an ongoing basis during the LoM. The water balance shall be used to check on an ongoing basis that the capacity of the dirty water holding facilities is adequate, taking the operational distribution and use of water into account. Major spillage incidents shall be reported to the relevant stakeholders or authorities. . Appropriate remedial measures will be implemented in consultation with these regulatory authorities. In the event of a spillage the affected soil will be taken to the bioremediation facility for treatment. Pumping to the failed process water facility shall cease until the facility is repaired.	2	4	Medium			

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
25		Transportation of water	Spillages may occur due to burst pipes, overflows, seepage from dirty water drains and pump failures and result in impacts on soil.	N	Y	Operational Phase	Limited to site	3	3	Medium	Control / Prevent	All water systems shall be kept free from any matter or obstruction which may affect the efficiency thereof. All pipes shall be kept in a good condition to prevent leaks. All leaks shall be reported and repaired as soon as possible. Maintenance of water taps shall take place on an ongoing basis. Re-instalment of stolen / broken meters stolen shall be ongoing. Volumes of water used for mining as well as the amount of water re-used shall be monitored to ensure that all facilities are operated within its holding capacity. All water systems and MRDs shall be designed, located and maintained to restrict the possibility of damage to the riparian or in-stream habitat through erosion or sedimentation, or the disturbance of vegetation, or the alteration of flow characteristics. Security measures shall be put into place to prevent theft and/ or vandalism. Maintenance of access control and warning signage shall take place. Pipes, drains, dams shall be inspected as per section specific arrangements or procedures.	2	2	Low			
26		Sewage Operations	Leakages or spillages from the honeysucker and sewage containers during the removal of sewage from the underground toilets and all other toilets on surface not connected to wastewater care works may occur. This spillage may result in impacts on soil.	Y	N	Operational Phase	Limited to site	3	3	Medium	Control / Prevent	In the event of minor contamination of the ground with sewage the following shall apply: • The sewage spill shall be contained and picked-up, using a long handled shovel and placed in one of the portable toilets that contains a disinfectant. • PPE shall be worn, i.e. long rubber gloves, gum boots, facemasks and safety goggles. • The contaminated area shall be disinfected with a suitable environmentally friendly chemical e.g. lime and the area shall be washed well with water. • The spill shall be reported. • The Honeysucker shall be maintained and the operator shall check the machine and container for leaks prior to collecting sewage.	2	2	Low			

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27			Incomplete or incorrect treatment of sewage sludge used as compost for rehabilitation. This will result in an impact on soil fertility and structure.	N	Y	Operational Phase	Limited to site	3	3	Medium	Control / Prevent	The Waste Water Treatment works shall be operated as per FDM-HSE-99E. The Treatment works is inspected by an external service provider who gives recommendations to the responsible foreman if there are any parts of the plant that is not running efficiently. The sewage sludge is used for rehabilitation purposes only. Rehabilitation test areas where the compost has been used showed good vegetation cover. Monitoring of boreholes around the sewage plant and composting site are done regularly.	2	2	Low			
28		Stormwater control measures	Inadequate stormwater management may result in erosion where vegetation has been removed and / or the topsoil has been compacted.	Y	Y	Operational Phase	Limited to site	3	3	Medium	Control / Prevent	Stormwater drainage shall be established on all waste rock dumps and rehabilitated areas to prevent erosion which includes the constructions of berms, contours and/or water channels. In the event of erosion occurring: • The extent and rate of change of soil erosion shall be monitored on all rehabilitation areas during site visits to these areas. • The FRDs shall be monitored quarterly for erosion during the quarterly visits form the responsible engineer, and to be reported in minutes of meetings. • Erosion gullies shall be stabilised with infill material.	2	2	Low			Operational / Decommissioning and Closure Phase
29		Transportation activities via road; The transportation of hazardous materials such as hazardous waste, hydrocarbons, explosives from the magazine the shaft bank on surface as well as the transportation of hazardous materials from the shaft to underground working.	Hydrocarbon leakages or spillages from vehicles transporting material as well as parked vehicles may contaminate soil.	Y	N	Operational Phase	Limited to site	3	3	Medium	Prevent / Remedy	All mine vehicles are inspected prior to use. Vehicles and equipment are serviced on a regular basis. In the event of leakages or spillages occurring the soil will be removed as per the Spill Management Procedure (FDM-HSE-93E) and taken to the WAMY for Bioremediation.	2	2	Low			

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30		Construction and maintenance of roads	Increased run-off from rain water flowing off roads which are not connected to a drainage system may result in soil erosion.	Y	Y	Operational Phase	Limited to site	3	3	Medium	Prevent / Remedy	Majority of the cemented roads on mine are linked to a drainage system that is continuously inspected.	2	2	Low			
31			Soil compaction due to dirt roads and gravel roads, leading to changes of all other physical characteristics. Compacted soil may lead to the decrease of water infiltration therefore leading to soil erosion.	Y	Y	Operational Phase	Limited to site	3	3	Medium	Control / Remedy	Vehicles shall only drive on designated roads. All access roads will be inspected and maintained on a regular basis. Roads will be ripped during the decommissioning and rehabilitation phase.	3	1	Low			
32			Leakages or spillages from machinery during maintenance of roads may result in contamination of soil.	Y	Y	Operational Phase	Limited to site	3	3	Medium	Control / Remedy	Vehicles shall only drive on designated roads. All vehicles are inspected prior to use. Vehicles and equipment are serviced on a regular basis. In the event of leakages or spillages occurring the soil will be removed as per the Spill Management Procedure (FDM-HSE-93E) and taken to the WAMY for Bioremediation.	2	2	Low			

33		Operation and storage above ground; There are various diesel, and oil storage tanks above ground on site	Inadequate bunding above ground that does not meet specifications, damaged bunding, inadequate or damaged equipment such as storage tanks and underground tanks leaking may cause hazardous substances to spill or seep out of the bunded areas / tanks. Such leakages and spillages may result in the contamination of soil.	Y	N	Operational Phase	Limited to site	3	3	Medium	Control / Remedy	All new bunds shall have the following specifications: • It must be able to contain 110 % of the sum of the liquid of all containers stored in that particular bund facility. • It must be constructed from an impermeable material or it must be lined with an appropriate impermeable sealant to prevent spilled liquids from leaching in the soil. • It must have a collection sump inside the bunded area or fitted with a drainage pipe leading to a collection sump on the outside of the bund. This drainage pipe shall be fitted with a lockable spindle/valve. • The floor shall be graded in such a way that liquid will collect in the sump. • Spillage sumps shall be locked, preferably with "key-like" type devices to ensure availability of keys in case of emergency. • As far as possible all pipe fittings, flanges, pipe fittings, valves and pumps shall be situated within the bund wall. • Allowance shall be made to cope with maximum storm rainwater (100mm rainfall in 1 hour) and firewater. The bund floor and walls shall be constructed of materials that are impervious to the contents of any tank or container within the bund. The bunded area shall be capable of preventing the migration of any spillage or leakage to the surrounding environment and shall therefore be either: • Built of concrete; • Built of brick and then plastered with concrete and painted with an impervious paint; • Sealed with an impermeable liner; or • Constructed with steel. The area within the bund wall surrounding the tank or drums shall be kept entirely free and unoccupied and shall only be used for storage of hazardous chemicals. High bund walls shall have steps for quick escape and/or to facilitate easy access from the outside. A collection sump shall be provided in the bund floor to make it easier to remove liquids. The floor shall be graded in such a way that liquid will collect in the sump. Spillage sumps shall be locked, preferably with "key-like" type devices to ensure availability of keys in case of emergency. Bund drain valves/stopcocks shall be/have: • Leak proof; • Able to continue functioning in a fire; • Controls outside the bunded area; • Able to open manually; • Valves that must be kept locked in the closed position unless in use; and • The "open" and "closed" positions that must be indicated and obvious. If there are coupling in the bund, they shall be placed where leaks or spillage will be contained within the bund.	2	2	Low			

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												Areas where fuel/oil is dispensed/refuelled (surface and underground) shall have bund type facilities to collect leaks or spills, and a means of collecting and disposing of these wastes in a way that will not cause soil or water pollution. If any new surface underground tanks must be constructed, the latest techniques in the way of jacketed tanks shall be investigated. The necessary certificate of registration for such a facility shall be obtained prior to it being used. The construction of the surface and underground tanks shall be according to the regulations relating to inflammable liquids and substances. Every surface or underground tank shall have a ventilating pipe. If an underground storage tank is to be abandoned, it shall either be removed or filled with sand or liquid concrete and will be confirmed by the environmental personnel. All underground storage facilities shall be tested on an annual basis to check for leakages and record kept. The capacity of tanks shall be indicated in letters 150mm high in an easily readable position.						

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
34			Ineffective oil/water separators may cause hydrocarbon spillages/ leakages. This could lead to soil pollution.	Y	N	Operational Phase	Limited to site	3	3	Medium	Control	Oil/ water separators shall be maintained and serviced as per Procedure (FDM-HSE-103E). Daily, monthly and ad hoc inspections will be done on the units by the section responsible for it as well as by HSE officials. These units will be housed in a bunded area to prevent accidental release of oil or oil contaminated water. The oil separator shall automatically pump the oil with a small amount of water into a separate container which shall be monitored and emptied when necessary and the old oil disposed of as per the storage, use and disposal of fuel and oil procedure. Sludge shall be removed and treated at the bioremediation site at the WAMY. Contaminated water from the surface wash bay shall be directed to the oil separator. It shall be ensured that no water contaminated with oil is allowed to flow into the stormwater drainage system. Oil/ water separators are linked to closed drainage systems and no oil water separator may discharge directly into the natural environment (i.e run off onto soil, discharge will be into drainage channels/ furrows, sumps, process water dams)	2	2	Low			

35			Leakages or spillages from the incorrect transport, loading, storage, use and removal of hazardous substances above ground, such as fuel, oil, paint, batteries, chemicals, acid & corrosive salt, reagents, paint and solvents. Spillages from off-loading may take place during refuelling of vehicles, or due to spillages from damaged delivery lines, or overfill at bulk storage tanks. Such leakages and spillages may result in the contamination of soil.	Y	N	Operational Phase	Limited to site	3	3	Medium	Prevent / Remedy	Pollution shall be prevented when transporting and offloading hazardous substances. Preventative measures shall include securing the closed containers on the vehicles as well as the use of drip trays and other spill corrective measures when transporting hazardous substances. All applicable procedures shall be followed when hazardous substances products are off-loaded in bulk or in small quantities. The necessary PPE shall be used when handling the product. Unloading of fuels shall be done according to the instructions available at stores and bulk refuelling points. Any material or substances which can present a threat to the safety and health of a person and which can be detrimental to the environment shall be handled with care and as per the relevant procedure. Hazardous substances shall be stored as indicated on MSDS. Hazardous substances shall be stored in bunded areas and these areas shall be labelled as required. All floors shall be sloped and bunded to contain any spills or leaks. Where items are stacked, adequate drip trays shall be made available to contain and confine any potential leaks. Store rooms containing hazardous substances shall be locked at all times. Only designated personnel shall have access to these areas. All employees working with the storage, use or disposal of hazardous substances shall be trained and briefed on the relevant procedures and potential environmental impacts of not adhering to these. No smoking shall be allowed within 10m of the hazardous storage area. All areas using fuel or oil, as far as practicably possible shall keep reconciliation records of fuel/oil used and disposed of on a monthly/quarterly basis. As a standard, no insulating oil containing PCB shall be used in transformers on mine. PCB levels will be tested and records kept. An phase out plan will be in place for PCB containing oils above 10ppm. Spills or leaks encountered anywhere (including at refuelling points) shall be reported to the responsible supervisor of the area in which the spill occurs immediately. Arrangements shall be made for the clean up by the person/section that caused the spill and the supervisor of the area shall monitor the situation where necessary. The section that caused the spill shall be responsible for the clean-up costs. The spill management procedure shall be followed and appropriate disposal of contaminated material shall be ensured.	2	2	Low			Operational Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
												Spillage of solid or liquid material within bunded areas shall be cleaned up as soon as possible. After rainfall, all bunds shall be emptied as soon as possible to maintain full capacity.						
36			Redundant or mothballed equipment or material containing hydrocarbons above ground may leak and contaminate soil.	Y	N	Operational Phase	Limited to site	3	2	Medium	Prevent / Remedy	All fuels and oils (hydrocarbons) will be removed from redundant and mothballed equipment prior to scrapping/ storing Drip trays and spill mats will be used under stored equipment. Redundant or mothballed equipment will be stored in the WAMY, if possible, and removed off-site (sold or removed as scrap metal) as soon as possible. All spills shall be reported and cleaned as per procedure The method used to clean up an oil spill depends on the type of surface that has been contaminated but shall be done in such a way to prevent the spreading of oil, recover oil where possible, clean up and if necessary rehabilitate the area. Personnel shall have training in spill management. Appropriate records shall be kept. Large spills on a concrete surface shall be contained using absorbent booms or with appropriate method Excess oil shall be pumped or scooped up into old oil containers. Small spills on a concrete surface shall be contained using loose fibre. The used fibre and fibre booms, together with oily rags shall be disposed of in a drum marked for this purpose and sent to the WAMYOil-contained fibre or other oil contaminated materials shall not be mixed with any other wastes. Spills on land shall be contained as quickly as possible with earth walls or absorbent booms. Excess oil shall be deflected onto plastic sheeting to minimise infiltration into the ground. Contaminated soil shall be removed and placed in 210 litre drums and removed to the designated bioremediation site at the WAMY.	2	2	Low			

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37			The incorrect storage or use of foam, Water with Additive and Wet Chemical (F Class) extinguisher contents containing chemicals may cause leakages or spillages and result in the contamination of soil.	Y	N	Operational Phase	Limited to site	3	3	Medium	Prevent / Remedy	Pollution shall be prevented when transporting and offloading hazardous substances. Preventative measures shall include securing the closed containers on the vehicles as well as the use of drip trays and other spill corrective measures when transporting hazardous substances. Contractors responsible for re-filling and maintenance of fire extinguishers may be audited by mine officials.	2	2	Low			
38		Maintenance activities above ground	The incorrect use of any hazardous materials during maintenance activities above ground may cause hydrocarbon and other hazardous chemical spillages (includes oil, paint, grease, etc) and may contaminate soil.	Y	N	Operational Phase	Limited to site	3	3	Medium	Prevent / Remedy	All applicable procedures shall be followed when hazardous substances products are off-loaded in bulk or in small quantities. The necessary PPE shall be used when handling the product. Unloading of fuels shall be done according to the network instructions available at stores and bulk refuelling points. Any material or substances which can present a threat to the safety and health of a person and which can be detrimental to the environment shall be handled with care and as per relevant procedure. Store rooms containing hazardous substances shall be locked at all times. Only designated personnel shall have access to these areas. All employees working with the storage, use or disposal of hazardous substances shall be trained and briefed on the relevant procedures and potential environmental impacts of not adhering to these. Spills or leaks encountered anywhere (including at refuelling points) shall be reported to the responsible supervisor of the area in which the spill occurs immediately. Arrangements shall be made for the clean up by the person/section that cause the spill and the supervisor of the area shall monitor the situation where necessary. The section that caused the spill shall be responsible for the clean-up costs. The spill management procedure shall be followed and appropriate disposal of contaminated material shall be ensured. Spillage of solid or liquid material within bunded areas shall be cleaned up as soon as possible. After rainfall, all bunds shall be emptied as soon as possible to maintain full capacity.	2	2	Low			Operational Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT: Impact description	Reversible	Irreplaceable loss	PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated: Probability	Magnitude	Significance	MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated: Probability	Magnitude	Significance	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
39			The washing of contaminated parts, lack of maintenance of the sumps, inadequate or damaged bunding, ineffective operation, and uncontrolled water drainage at the wash bay above ground may cause hydrocarbon and other hazardous chemical spillage that may contaminate soil.	Y	N	Operational Phase	Limited to site	3	3	Medium	Prevent	Contaminated parts and equipment will be washed in designated areas. Waste water from cleaning shall be diverted to the oil/ water separator. All dirty/process water shall be contained within the dirty water system. The infrastructure such as drains, sumps, trenches and berms shall be assessed to examine whether it has adequate capacity for water flow. The section responsible for the wash-bay shall do routine inspections to ensure that the water is contained in the designated channels.	2	2	Low			
40			Inadequate maintenance of the pumping system, the 2 000l storage tanks, and the bunding of the storage tank from the lube bay above ground may result in leakages or spillages of oil and may contaminate soil.	Y	N	Operational Phase	Limited to site	3	3	Medium	Prevent / Remedy	All employees working with the storage, use or disposal of hazardous substances shall be trained and briefed on the relevant procedures and potential environmental impacts of not adhering to these. Spills or leaks encountered anywhere (including at refuelling points) shall be reported to the responsible supervisor of the area in which the spill occurs immediately. Arrangements shall be made for the clean up by the person/section that cause the spill and the supervisor of the area shall monitor the situation where necessary. The section that caused the spill shall be responsible for the clean-up costs. The spill management procedure shall be followed and appropriate disposal of contaminated material shall be ensured. Spillage of solid or liquid material within bunded areas shall be cleaned up as soon as possible. After rainfall, all bunds shall be emptied as soon as possible to maintain full capacity. Inspections are done at the tanks and lube bays to check for leaks, spills or cracks in bunding.	2	2	Low			

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41		Use of water	Overdosing of wash water with soaps and detergents for cleaning purposes and the use of acid based cleaning reagents in the change houses. Should spillage of the wash water occur, it may result in the contamination soil	Y	N	Operational Phase	Limited to site	3	1	Low	Prevent	All pipes shall be kept in a good condition to prevent leaks. All leaks shall be reported and remediated as soon as possible. Contaminated parts and equipment will be washed in designated areas. Waste water from cleaning shall be diverted to the waste water system or an oil/water separator if applicable All dirty/process water shall be contained within the dirty water system. The infrastructure such as drains, sumps, trenches and berms shall be assessed to examine whether it has adequate capacity for water flow.	2	1	Low			

42	Land Capability	Constructed plant and associated infrastructure	Soil has been removed due to the footprint of the plant and has resulted in a loss of land capability	Y	N	Operational	Limited to site	3	3	Medium	Control / Remedy	Rehabilitation of the plant area should be undertaken to restore the land capability, as close as possible, to pre-mining conditions.	2	2	Low	To restore the land use and land capability to the agreed upon end land use, taking the recommendations of the DMR and municipalities into account.	In terms of Government Gazette 41236. Government Notice R.1228 dated 2017 (Financial Provision Regulations) and any amendments thereto In compliance with the Rehabilitation, Decommissioning- and Closure plans and Closure Objectives. In compliance with principles contained in the MPRDA, 2002, Mine Health and Safety Act, 1996, NEMA, 1998, NEM:WA, 2008, Regulations there under and amendments thereto. Implementation also to be in compliance with the mine's internal procedures. Procedures to be in line with the latest legislation. The continued implementation of requirements contained in the NEM:BA (2004) and the regulations thereunder.	Operational Phase
43	Ecology	Operation of ventilation shafts and passes	Particulate matter, SO_2, NO_2 and CO, released from shaft vents primarily as a result of blasting and drilling operations, and diesel-powered vehicles working underground, may impact of vegetation. Particulate matter can clog stomatal openings of plants and interfere with photosynthesis functions and may lead to growth stunting or mortality in some plant species.	N	N	Operational	Local in extent	3	3	Medium	Prevent / Control	Removal of vegetation cover shall be kept to a minimum. In the case of project-related areas, such areas shall be re-vegetated as soon as reasonably practicable to reduce the amount of open areas exposed to wind erosion. Dust shall be managed by means of a watering down non-tar surface roads and the implementation of lower speed limits on the mine's roads.	2	3	Medium	Prevent the destruction of vegetation and subsequent impacts species of conservation concern and protected species. Prevent the destruction of	Biodiversity management: The continued implementation of requirements contained in: The NEM:BA (2004) and the regulations	Operational / Decommissioning and Closure Phase

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												Continue to monitor for PM10 and PM2.5 as monitored as part of the monitoring programme by the Environmental Department. If there are any complaints with regards to dust pollution, dust samples shall be taken to assess the intensity of such an impact on the applicable complainants' land or residences. All machinery and equipment shall be kept in a good working order and serviced regularly to reduce emissions.				habitats and subsequent impacts on faunal species	thereunder, the Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector, Environmental Conservation Act, 1989 (Act No 73 of 1989).	
44		Concurrent rehabilitation of WRD • Use of compost • Use of topsoil as a topdressing material for areas undergoing rehabilitation	Use of topsoil taken from undisturbed areas containing a seed bank of indigenous flora provides a growth medium for indigenous plant species. This allows for an increase in biodiversity with the establishment of indigenous vegetation.	Y	Y	Operational	Limited to site	Positive			Enhance positive impact	Prior to the commencement of any topsoil and subsoil stripping, all vegetation, in particular invasive plants shall be removed, in consultation with the Environmental Specialist. Stripping shall only occur where soils are to be disturbed and when an end-use for the stripped soil has been identified. Topsoil shall not be stripped when saturated, as this will exacerbate the damage to the soil structure. Wherever possible, stripped topsoil shall be placed directly onto an area being rehabilitated. • This avoids stockpiling and double handling of the soil. • Topsoil placed directly onto rehabilitation areas contains viable seed, nutrients and microbes that allow it to re-vegetate more rapidly than topsoil that has been stockpiled for longer periods. Topsoil and young/small vegetation shall be stripped together on all areas earmarked for new development to ensure the seedbed is maintained to facilitate with rehabilitation. An approved seed-mix of indigenous plants shall be used in all new rehabilitation programmes on the mine. Consecutive rehabilitation shall be undertaken on areas impacted where rehabilitation has taken place.	Positive					

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
45		Deposition of Coarse Residues using conveyors and spreaders	Invasive plants may establish. This may lead to: • Displacement of indigenous vegetation. • Change in plant species composition. • Change in vegetation composition and structure. • Competition for sunlight, nutrients, water and 'living space' will increase between indigenous and alien species. • Change in plant-pollinator composition. • Loss of habitat • Change in flammability of existing vegetation structure – pending the introduction of the alien species. • The spread of alien vegetation in areas previously free from such species causing a change in biodiversity.	Y	N	Operational	Limited to site	4	2	Medium	Control	General control Alien invasive vegetation shall be removed according to area and not species. Details of invasive species eradication can be found in the Invasive Species Management Plan. Methods of control shall include: • Uprooting, felling, cutting or burning. These methods shall coincide with the life cycle of invaders to prevent the plants from forming seeds or re-establishment in any manner. • Treatment with herbicide that is registered for use in connection with such plants in accordance with the directions for the use of such herbicide. • Biological control carried out in accordance with the stipulations of the Agricultural Pests Act, 1983 (Act No. 36 of 1983), the NEMBA and any other applicable legislation. • A combination of the above methods shall be employed to control weeds or invaders. • Regular follow-up operations shall become mandatory to allow achieving the appropriate combating levels. This shall also give an indication of the success of the control method employed. • The services of a biological expert shall be called upon to assess the success of a biological control agent. • Actions taken in the combating of weeds and invaders shall be done in such a fashion that it will cause the least harm to the environment. Bush encroachment shall be combated. Information and actions taken on combating of weeds and invader plants shall be recorded and reported as necessary	3	1	Low			Operational / decommissioning and Closure Phase
46		Constructed plant and associated infrastructure	Soil has been removed due to the footprint of the plant and has resulted in a loss of biodiversity.	Y	Y	Operational	Limited to site	3	3	Medium	Prevent / Control	If further structures are added to the footprint topsoil and young/small vegetation shall be stripped together on all areas earmarked for new development to ensure the seedbed is maintained to facilitate with rehabilitation. Rehabilitation of the plant area will take place as per Closure Plan.	3	2	Medium	Prevent the destruction of vegetation and subsequent impacts on species of conservation concern and protected species. Prevent the destruction of habitats and subsequent impacts on faunal species	Biodiversity management: The continued implementation of requirements contained in: The NEM:BA (2004) and the regulations thereunder, the Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector,	Operational / Decommissioning and Closure Phase
47		Construction and operation of the Brits FRD; Two non-perennial pans were located within the footprint of the Brits FRD.	Seepage water accumulation behind the north and southern dam walls may result in the loss of biodiversity.	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent / Control	Seepage water shall be pumped back into the dam or to the return water dam. Water on the dam shall be utilised as much as possible to prevent the dam being too wet and causing more seepage. Sumps shall be constructed to manage water. An assessment on the pans has been conducted and is titled "Surface Water Management Assessment for the Pans at the	2	2	Low			Operational / Decommissioning and Closure Phase

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48		These non perennial water bodies were lost after 2006 once the construction of the FRD commenced. The two non-perennial water bodies were located at the northern (northern pan) and southern (southern pan) ends of the FRD.	The destruction of the pans has lead to a loss of aquatic habitats.	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent / Control	Britz Fine Residue Deposit (FRD) Extension Report No: JW020/18/G566-Rev 2. February 2018. The impacts of the loss of the pans will be minimal. The pans are perennial and therefore may not support aquatic life	3	3	Medium		Environmental Conservation Act, 1989 (Act No 73 of 1989).	Operational and Decommissioning Phase
49		Storage of tyres	Accidental burning of tyres due to veld fires or other accidental spark/ fire may lead to toxic leachate forming that may be taken up by the vegetation through soil.	N	Y	Operational Phase	Local in extent	3	4	High	Prevent / Control	Fire breaks are in place around the mining area. There is minimal vegetation around the tyre stockpile. No activities using open flames are conducted close to the tyre stock pile. Firefighting equipment is available at the tyre stock pile.	2	4	Medium			Operational and Decommissioning Phase
50		Use of garden waste	Using of garden waste or wood chippings contaminated by invasive vegetation seeds or other vegetative parts, for composting.	Y	N	Operational Phase	Limited to site	3	3	Medium	Prevent / Control	During composting, the higher range of temperatures in the windrows can kill invasive species seed. If invasive species grow on rehabilitated areas it will be dealt with as per the Eradication plan.	2	2	Low			Operational and Decommissioning Phase
51		Transportation of water	Installation or replacing of pipelines may disturb vegetation as well as animal habitats.	Y	N	Operational Phase	Limited to site	3	3	Medium	Control	Human and TMM activity shall be restricted to the access roads and operational areas. Topsoil and young/small vegetation shall be stripped together on all areas earmarked for new development to ensure the seedbed is maintained to facilitate with rehabilitation. If new pipes are to be installed the management of change process shall be followed.	2	2	Low			Operational and Decommissioning Phase

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52		Transportation of water	Installation or replacing of pipelines may disturb animal habitat.	Y	N	Operational Phase	Limited to site	3	3	Medium	Control	Stripping shall only occur where soils are to be disturbed and when an end-use for the stripped soil has been identified.	2	2	Low			Operational and Decommissioning Phase
53		Construction and maintenance of roads	Soil compaction due to dirt roads and gravel roads, leading to changes of all other physical characteristics. Potential decrease in vegetation growth. The effect of compaction on plant growth and yield depends on the type of vegetation and the environmental conditions that is encountered. In general, under dry conditions some compaction is beneficial, but under wet conditions compaction decreases vegetation.	Y	Y	Operational Phase	Limited to site	3	3	Medium	Control	Refer to mitigation measures as presented under Reference Number 31 above.	2	2	Low			Operational / Decommissioning and Closure Phase
54			Disturbed areas along roads may cause alien invasive plants to establish.	Y	Y	Operational Phase	Limited to site	3	3	Medium	Prevent / Control	Refer to mitigation measures as presented under Reference Number 45 above.	2	2	Low			Operational and Decommissioning Phase
55			Veld disturbance may take place during road maintenance and may result in a loss of vegetation and subsequent fragmentation or destruction of habitats.	Y	Y	Operational Phase	Limited to site	3	3	Medium	Prevent / Control	Vehicles shall only drive on designated roads. Surface disturbance shall be kept to a minimum by concentrating activities at the already disturbed mining infrastructure area. Human and vehicular activity shall be restricted to operational sites. Human and vehicular activity shall be restricted to the access roads and operational areas. Topsoil and young/small vegetation shall be stripped together on all areas earmarked for new development to ensure the seedbed is maintained to facilitate with rehabilitation. An approved seed-mix of indigenous plants shall be used in all new rehabilitation programmes on the mine.	2	2	Low			Operational and Decommissioning Phase

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56	Surface Water	Use and storage of explosives	Incorrect maintenance and operations of explosive storage areas may result in pollution of surface and groundwater	N	Y	Operational Phase	Site only May extend beyond site should control measures not be implemented	3	3	Medium	Control	Explosive waste such as cut off from ignition cords, detonators as well as old, excess or damaged stock shall be transported by a responsible person within the mine where it is destroyed by exploding the waste in an underground area during normal blasting processes. All explosives shall be stored in identifiable red, locked explosive boxes. Empty cardboard boxes that contained explosive packaging wastes can be destroyed during blasting, the remaining boxes will be burned at the burning grounds situated in the WAMY. Old explosive shall not be delivered to the WAMY with the exception of blasting wire and empty boxes In the event that they are, the appropriate person shall be notified. Explosives shall be placed and locked in relevant marked boxes. Detonators shall not be stored with other explosive components. The boxes containing the explosives shall be moved to a designated site away from the working area of the WAMY personnel.	2	2	Low	To prevent quality deterioration of surface water quality and prevent impact on catchment yield	Surface water management: In line with the DWS Best Practice Guidelines, to prevent and minimise impacts and to ensure the separation of clean and dirty water management areas; GN704, dated 1999; the NWA (1998) and Regulations there under and amendments thereto; the storm water management plan and / or amendments thereto; specialist recommendations; and the IWUL conditions. Implementation also to be in compliance with the mine's internal procedures. Procedures to be in line with the latest legislation.	Operational Phase
57		Construction and operation of CRDs	The CRDs lead to a change in the surface water yield of the area. The CRDs are located within sub-catchment B and sub-catchment C. Bonza farm and Bergplaas farm are either situated within or adjacent to this sub-catchment.	N	Y	Operational Phase	Local in extent	3	3	Medium	Control	The affected water management system shall be maintained to be as small as operationally possible. All unpolluted water shall be confined to a clean water system, away from any dirty area using infrastructure such as drains, trenches and berms.	2	3	Medium			Operational / Decommissioning and Closure Phase
58		Underground dewatering. Groundwater users are neighbouring farmers and PPC Lime Quarry operations. The PPC Quarries and Finsch mining operations are likely to be hydraulically connected	The inflow of surface water during rainfall events into the Open Pit may result in a loss of surface water resource. No adjacent community is likely to be adversely influenced by this loss of surface water	Y	Y	Operational	Limited to site and local catchment	3	3	Medium	Control	An annual report on water balance shall be submitted to DWA. This will provide information on the status of the water balance in the wet season and the dry season and under conditions of extreme rainfall. All unpolluted water shall be confined to a clean water system, away from any dirty area using infrastructure such as drains, trenches and berms.	2	2	Low			Operational and Decommissioning Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
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59		Bulk fuel & lubricant storage, dispensing & reticulation; Pollution prevention controls (bund walls, fuel dispensing shut off valves at refuelling Bays 62 /63 L; Diesel delivery shut off controls on surface; Oily water separator maintenance; Old oil reticulation system operations; Oily water separator operations	Failure of pollution control systems due to inadequate maintenance may result in pollution of surface water resources.	N	Y	Operational	Local to regional in extent	4	4	High	Prevent / Remedy	Surface and underground tanks shall be integrity tested on a regular basis (at least every two years) to ensure their integrity is not compromised. This will be done by the supplier of the tanks. Maintenance of bunded areas shall include checking the following: • That the drain valve is kept closed and locked; • Availability of the key to open or close when necessary; • That the bund wall is intact and is impervious to the liquids it must contain; and • That the pipe work, valves and other equipment in the bund are routinely maintained. Maintenance of concrete areas shall be done by using OT8 (or other biological degreaser) to wash down after mop-up operations. A qualified person shall examine all electrical earth connections every 2 months. Documented records of these inspections shall be kept according to the record keeping procedure.	3	3	Medium			Operational Phase
60		Underground Water Reticulation; Water treatment & flocculation 68 L (Chlorine); Water Recovery; Water & Mud pumping to Surface 70 L	Inadequate treatment of water may result in the pollution of water with E coli	Y	N	Operational Phase	Limited to site and surrounding areas	3	4	High	Prevent / Control	Refer to mitigation measures as presented under Reference Number 28.	3	3	Medium			Operational Phase
61			Use of chlorine mixes with hydrocarbons in the water to form organo chlorine which is a toxic substance with the potential to pollute water at the Settlers.	Y	Y	Operational	Local in extent	3	4	High	Prevent		3	3	Medium			Operational Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
62		Reprocessing activities of Pre-1979 CRD – Wet Infield Screening (WIFS) Operations. Loading and hauling. The re-mining of Red Dumps and Post 80 CRD	Surface water run-off from the new face of the re-mined residue, may lead to siltation of drainage channels down slope from the residue as well as pollution of surface water	N	Y	Operational	Local in extent	3	3	Medium	Control / Remedy	All unpolluted water shall be confined to a clean water system, away from any dirty area using infrastructure such as drains, trenches and berms. All dirty/process water shall be contained within the dirty water system. The infrastructure such as drains, trenches and berms shall be assessed to examine whether it has adequate capacity for water flow. The infrastructure such as drains, trenches and berms shall be maintained to keep out all vegetation and blockage that may prevent water flow. They will be maintained to ensure the system can handle the 1:100 year storm event.	2	2	Low			Operational Phase
63			Siltation of drainage channels resulting in siltation of the storage dams limiting the storage capacity, causing overflow and pollution of soil and surface water resources.	N	Y	Operational Phase	Local in extent	3	3	Medium	Control		2	2	Low			Operational and Decommissioning Phase
64			Leakages or spillages may occur from earthmoving vehicles and machinery used for the re-mining of the residue deposits may result in contamination of surface water runoff.	N	Y	Operational	Limited to site and surrounding areas	3	3	Medium	Prevent / Remedy	Refer to mitigation measures as presented under Reference Number 5.	2	2	Low			Operational Phase
65		Storage and transport of explosives. Explosives are stored in the various bunkers at the magazines. Maintenance of the area is carried out according to the Explosives and Hazardous Materials Regulations	Inadequate maintenance of magazines and possible spillage of Anfex may occur. Anfex can lead to eutrophication (nutrient enrichment) of water bodies.	Y	Y	Operational	Local in extent	2	5	High	Prevent / Remedy	The explosives magazine and emulsion silo shall be inspected on a regular basis and maintained where required. Strict access control to these areas is implemented. Emulsion spillages shall be reported and cleaned immediately in accordance to the Explosives Handling Procedure.	2	2	Low			Operational and Decommissioning Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
66		The Open pit has an area of approximately 55ha. The pit bottom is lowered as the underground mining continues. Water is diverted away from the perimeter of the pit by cut off trenches and water on the benches is diverted to dams which are pumped out to surface	The inflow of surface water during rainfall events into the open pit occurs and results in a loss of surface water resource.	N	N	Operational	Local in extent	3	3	Medium		Refer to mitigation measures as presented under Reference Number 58.	2	2	Low			Operational and Decommissioning Phase
67		Constructed WRDs. The WRDs are mainly made up of coarse dolomite, dolerite and some banded ironstone which reflects the geology of the surrounding area. The stormwater is channelled into the natural environment. All the WRDs are rehabilitated and top-dressed with a finer banded ironstone material and over seeded.	Stormwater will only flow off the dumps in severe rainstorm events, which happen infrequently due the arid climate. Infiltration rates are high due to the coarse nature of the material of the rock dumps, therefore a reduction in surface water yield may occur.	Y	Y	Operational	Local in extent	3	3	Medium	Control	The WRDs will be constructed in accordance to the approved designs and footprint areas. No FRD, CRD, WRD or dam together with any associated structure or any other facility shall be located or placed 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 excluding if the mine has exemption. An annual report on water balance shall be submitted to DWS. This will provide information on the status of the water balance in the wet season and the dry season and under conditions of extreme rainfall. All water system shall be kept free from any matter or obstruction which may affect the efficiency thereof.	3	2	Medium			Operational / Decommissioning and Closure Phase

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68			Spillages of contaminated process water outside of the closed reticulation system may result in surface water pollution. The G-thickener and C-thickener both have EC, Cl, Na, SO_4, Mn, S solids, Se, above the acceptable Drinking Water Standard	N	Y	Operational	Local in extent	3	4	High	Prevent / Control	All pipes shall be kept in a good condition to prevent leaks. All leaks shall be reported and remediate as soon as possible. Reclamation and recycling of process or mining water shall be undertaken as far as possible. All dirty/process water shall be contained within the dirty water system. The infrastructure such as drains, trenches and berms shall be assessed to examine whether it has adequate capacity for water flow. The infrastructure such as drains, trenches and berms shall be maintained to keep out all vegetation and blockage that may prevent water flow maintained so as to ensure the system can handle the 1:100 year storm event.	3	3	Medium			Operational and Decommissioning Phase
69		Process water storage and activities	Inadequate process water recovery within the water reticulation system for reuse may result in a loss of water resources	N	Y	Operational	Local in extent	3	4	High	Prevent	Reclamation and recycling of process or mining water shall be undertaken as far as possible. Volumes of affected water abstracted for mining and beneficiation purposes and re-used shall be monitored on a frequent basis. An annual report on water balance shall be submitted to DWA. This will provide information on the status of the water balance in the wet season and the dry season and under conditions of extreme rainfall.	3	3	Medium			Operational and Decommissioning Phase
70			The ineffective maintenance of slurry transfer pumps and sumps or overflow due to inadequate operational controls of the water reticulation system and poor design of the water containment facilities leads to a depletion of the VG pipeline water resource.	N	Y	Operational	Local in extent	3	4	High	Prevent	All pipes shall be kept in a good condition to prevent leaks. All pumps shall be kept in a good condition to prevent leaks. All leaks shall be reported and remediate as soon as possible. Reclamation and recycling of process or mining water shall be undertaken as far as possible. Volumes of affected water abstracted for mining and beneficiation purposes and re-used shall be monitored on a frequent basis. All dirty/process water shall be contained within the dirty water system.	2	3	Medium			Operational Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
71		Storage of FeSi	The incorrect storage or handling of FeSi may lead to the siltation of surface run-off, which in turn may lead to the siltation of drainage channels and waterways downslope of the plant.	N	Y	Operational	Local in extent	3	3	Medium	Control / Prevent	All water system shall be kept free from any matter or obstruction which may affect the efficiency thereof. All unpolluted water shall be confined to a clean water system, away from any dirty area using infrastructure such as drains, trenches and berms. All dirty/process water shall be contained within the dirty water system. The infrastructure such as drains, trenches and berms shall be assessed to examine whether it has adequate capacity for water flow. The infrastructure such as drains, trenches and berms shall be maintained to keep out all vegetation and blockage that may prevent water flow maintained so as to ensure the system can handle the 1:100 year storm event.	2	2	Low			Operational Phase
72		Plant operation	Siltation of drainage channel may result in the pollution of surface water runoff	N	Y	Operational	Local	3	3	Medium	Prevent	All water system shall be kept free from any matter or obstruction which may affect the efficiency thereof. The infrastructure such as drains, trenches and berms shall be assessed to examine whether it has adequate capacity for water flow. The infrastructure such as drains, trenches and berms shall be maintained to keep out all vegetation and blockage that may prevent water flow maintained so as to ensure the system can handle the 1:100 year storm event.	2	2	Low			Operational and Decommissioning Phase
73			The non-availability of material safety data sheets (MSDSs) and inadequate training of personnel may further increase the risk of spillages and leakages of hazardous substances.	N	Y	Operational	Local in extent	3	3	Medium	Control / Prevent	Refer to mitigation measures as presented under Reference Number 8.	2	2	Low			Operational and Decommissioning Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
74		Constructed plant and associated infrastructure	Spillage of Sodium Nitrite, Flocculant or screen cleaning acids due to incorrect storage or handling may result in the pollution of the surface water resources	N	Y	Operational	Local in extent	3	3	Medium		All floors shall be sloped and bunded to contain any spills or leaks. Where items are stacked, adequate drip trays shall be made available to contain and confine any potential leaks. The drip trays shall aid in the cleaning-up of spills. Chemical compatibility shall be observed when storing chemicals. Corrosive liquids shall not be stored above eye level. Dry chemicals/powders shall be stored in one section and separated according to type i.e. oxidizing salts such as chlorine powder separated from other dry chemicals. Flammable or combustible liquids (oils, solvents, paints) shall be stored separately or in a separate flammable store. Store rooms containing hazardous substances shall be locked at all times. Only designated personnel shall have access to these areas. Pollution shall be prevented when transporting and offloading hazardous substances. Preventative measures shall include securing the closed containers on the vehicles as well as the use of drip trays and other spill corrective measures when transporting hazardous substances. All applicable procedures shall be followed when hazardous substances products are off-loaded in bulk or in small quantities. Any material or substances which can present threat to the safety and health of a person and which can be detrimental to the environment shall be evaluated.	2	2	Low			Operational and Decommissioning Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
75		Construction and operation of the Brits FRD; Two non-perennial pans were located within the footprint of the Brits FRD. These non perennial water bodies were lost after 2006 once the construction of the FRD commenced. The two non-perennial water bodies were located at the northern (northern pan) and southern (southern pan) ends of the FRD.	The Brits FRD leads to a change in the surface water yield of the area. This FRD is situated within sub-catchment-A within a drainage line. This drainage line flows towards the farm Rocky Flats.	N	Y	Operational Phase	Local in extent	3	3	Medium		The affected water management system shall be maintained to be as small as operationally possible. All unpolluted water shall be confined to a clean water system, away from any dirty area using infrastructure such as drains, trenches and berms, unless exemption is granted to do otherwise. The WRDs will be constructed in accordance to the approved designs and footprint areas. No FRD, CRD, WRD or dam together with any associated structure or any other facility shall be located or placed 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 excluding if the mine has exemption. An annual report on water balance shall be submitted to DWS. This will provide information on the status of the water balance in the wet season and the dry season and under conditions of extreme rainfall. All water system shall be kept free from any matter or obstruction which may affect the efficiency thereof.	3	2	Medium			Operational / Decommissioning and Closure Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
76		Operation and rehabilitation of old FRDs	The old FRDs lead to a change in the surface water yield of the area. These FRDs are situated within sub-catchment-B. Bonza farm and Bergplaats farm are either situated within or adjacent to this sub-catchment.	Y	Y	Operational / Decommissioning phase	Local in extent	3	3	Medium	Control	The affected water management system shall be maintained to be as small as operationally possible. All unpolluted water shall be confined to a clean water system, away from any dirty area using infrastructure such as drains, trenches and berms. The WRDs will be constructed in accordance to the approved designs and footprint areas. No FRD, CRD, WRD or dam together with any associated structure or any other facility shall be located or placed 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 excluding if the mine has exemption. An annual report on water balance shall be submitted to DWS. This will provide information on the status of the water balance in the wet season and the dry season and under conditions of extreme rainfall. All water system shall be kept free from any matter or obstruction which may affect the efficiency thereof.	3	2	Medium			Operational / Decommissioning and Closure Phase
77		Operation and rehabilitation of FRD paddocks	The FRD paddocks lead to a change in the surface water yield of the area. These FRD paddocks are situated within sub-catchment-B. Bonza farm and Bergplaats farm are either situated within or adjacent to this sub-catchment.	Y	Y	Operational / Decommissioning phase	Local in extent	3	3	Medium	Control	The affected water management system shall be maintained to be as small as operationally possible. All unpolluted water shall be confined to a clean water system, away from any dirty area using infrastructure such as drains, trenches and berms. The WRDs will be constructed in accordance to the approved designs and footprint areas. No FRD, CRD, WRD or dam together with any associated structure or any other facility shall be located or placed 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 excluding if the mine has exemption. An annual report on water balance shall be submitted to DWS. This will provide information on the status of the water balance in the wet season and the dry season and under conditions of extreme rainfall. All water system shall be kept free from any matter or obstruction which may affect the efficiency thereof.	3	2	Medium			Operational / Decommissioning and Closure Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
78		General operation and concurrent rehabilitation of all FRDs	Surface water run-off as well as soil erosion from the FRDs may lead to siltation of nearby water resources	N	Y	Operational / Decommissioning phase	Local in extent	3	3	Medium	Prevent / Control	Stormwater control infrastructure including diversion trenches and down chutes (where provided) shall be maintained in an acceptable condition such as that they conform to their design capacity at all times. Trenches shall be kept clear of vegetation, debris or silt that could impede flow. Any repairs to the infrastructure shall be carried out in accordance with the original design and construction specifications. Significant erosion down side slopes and particularly down re-profiled and capped slopes shall be repaired on identification using a suitable method to return the slope to at least to its original status. where possible. All side slopes to be addressed during rehabilitation.	3	2	Medium			Operational / Decommissioning and Closure Phase
79			Residual herbicides used for removal of alien vegetation and reeds on the dams may occur which will be washed down into the veld during rainy events and may result in the contamination of surface water resources	N	Y	Operational / Decommissioning phase	Local in extent	3	3	Medium	Prevent / Control	Herbicides to only be applied in accordance to the application instructions and specifications. Herbicides to be applied by personnel trained to conduct such activities.	2	2	Low			Operational / Decommissioning and Closure Phase
80		Construction and operation of the Brits FRD	The Brits FRD leads to a change in the surface water yield of the area. This FRD is situated within sub-catchment-A within a drainage line. This drainage line flows towards the farm Rocky Flats.	N	Y	Operational Phase	Local in extent	3	3	Medium	Control	Refer to mitigation measures as presented under Reference Number 75.	3	2	Medium			Operational / Decommissioning and Closure Phase
81		Construction and operation of CRDs	Ineffective water management and rehabilitation practices on the sidewalls of the CRDs may occur and result in impacts on surface water resources	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent / Control	Refer to mitigation measures as presented under Reference Number 10.	3	2	Medium			Operational / Decommissioning and Closure Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
82			Surface water run-off as well as soil erosion from the CRDs may lead to siltation.	Y	Y	Operational Phase	Local in extent	3	3	Medium	Prevent / Control	Refer to mitigation measures as presented under Reference Number 78.	3	2	Medium			Operational / Decommissioning and Closure Phase
83		Run of mine (stockpile areas)	Surface water run-off as well as soil erosion from the run of mine stockpiles may lead to siltation of surface water resources	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent / Control	Refer to mitigation measures as presented under Reference Number 78.	2	2	Low			Operational / Decommissioning and Closure Phase
84		General operation and construction of the WAMY	Increased surface water run-off due to removed vegetation, or decrease water infiltration from soil compaction leading to siltation. Siltation can be increased by soil erosion. Surface water siltation could result in an increase in suspended solids concentration in runoff water.	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent / Control	Storm water management to be aligned with the condition of the permit for the landfill site.	2	2	Low			Operational / Decommissioning and Closure Phase
85		Sewerage Farm Operations	Inadequately treated effluent pumped into the earth dam from where it enters the process water system.	N	Y	Operational Phase	Limited to site	3	3	Medium	Prevent	Refer to mitigation measures as presented under Reference Number 28.	2	2	Low			Operational and Decommissioning Phase
86		Potable water use; The mine obtains water from the Vaal–Gamagara Water Scheme for make-up water in the Ore Processing Treatment Plant and to supply the employees with potable water.	Ineffective use of water or inadequate maintenance of water storage facilities and pipelines may result in a loss of water resources.	Y	N	Operational Phase	Limited to site	2	2	Low	Control	The water balance for the mine shall be refined on an ongoing basis during the LoM. The water balance shall be used to check on an ongoing basis that the capacity of the dirty water holding facilities is adequate, taking the operational distribution and use of water into account. An annual report on water balance shall be submitted to DWA. This will provide information on the status of the water balance in the wet season and the dry season and under conditions of extreme rainfall. All pipes shall be kept in a good condition to prevent leaks. All leaks shall be reported and remediate as soon as possible.	1	2	Low			Operational and Decommissioning Phase

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87		Transportation of water	Ineffective maintenance of water transport or storage facilities may result in surface run-off siltation.	Y	N	Operational Phase	Local in extent	3	3	Medium	Control / Prevent	Maintenance of water taps shall take place on an ongoing basis. All water storage facilities shall be inspected on an ongoing basis for compromises and maintained where required Reclamation and recycling of process or mining water shall be undertaken as far as possible. Stormwater control infrastructure including diversion trenches and down chutes (where provided) shall be maintained in an acceptable condition such as that they conform to their design capacity at all times. Trenches shall be kept clear of vegetation, debris or silt that could impede flow. Any repairs to the infrastructure shall be carried out in accordance with the original design and construction specifications.	2	2	Low			Operational and Decommissioning Phase
88			Siltation of drainage channels resulting in loss of channel conveyance capacity may result in spillage of affected water	N	Y	Operational Phase	Local in extent	3	3	Medium	Control / Prevent		2	2	Low			Operational and Decommissioning Phase
89		Construction and maintenance of roads	Soil compaction due to dirt roads and gravel roads, leading to changes of all other physical characteristics. Surface areas that have been compacted due to the construction activities, may lead to localized increased runoff conditions.	Y	Y	Operational Phase	Limited to site	3	3	Medium	Control / Remedy	Refer to mitigation measures as presented under Reference Number 31 and 84.	2	2	Low			Operational and Decommissioning Phase
90			Increased surface water run-off due to removed vegetation, or decrease water infiltration from soil compaction leading to siltation. Siltation can be increased by soil erosion. Surface water siltation could result in an increase in suspended solids concentration in runoff water and aquatic habitats further downstream.	Y	Y	Operational Phase	Local in extent	3	3	Medium	Control / Prevent		2	2	Low			Operational / Decommissioning and Closure Phase
91		Maintenance activities above ground	The ineffective use of surface water at the workshops and other maintenance facilities and the evaporation of water from the wash bay above ground may lead to a depletion of the water resource (water from VG pipeline).	N	Y	Operational Phase	Local in extent	3	3	Medium	Control / Prevent	Employees will be made aware of in the conservation of water. Waste water from cleaning shall be diverted to the waste water system. All dirty/process water shall be contained within the dirty water system. The infrastructure such as drains, sumps, trenches and berms shall be assessed to examine whether it has adequate capacity for water flow.	2	2	Low			Operational and Decommissioning Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
92	Groundwater	Project development of underground infrastructure: Tunnel support: Batching Plant operations	Pollution of the underground water as a result: incorrect handling, storage or use can cause spillages of cement, additives, & other hazardous materials, blocked water drains	N	Y	Operational Phase	Site only May extend beyond site should control measures not be implemented	3	3	Medium	Control	Spills or leaks encountered anywhere) shall be reported to the responsible supervisor of the area, in which the spill occurs, immediately. Arrangements shall be made for the clean up by the person/section that cause the spill and the supervisor of the area shall monitor the situation where necessary. The section that caused the spill shall be responsible for the clean-up costs. The spill management procedure shall be followed and appropriate disposal of contaminated material shall be ensured. Excess diesel spills, which occur in a bunded area into 210-liter drums shall immediately be pumped/scooped. All oil and diesel spillage that contains water shall report to an oily water separator before being disposed of. All water shall report to the UG sump and pumped out via pump station at 70 level..	2	2	Low	To minimise the extent of disturbance of the aquifer and to prevent quality deterioration of groundwater resource.	Groundwater management: In line with the DWS Best Practice Guidelines, to prevent and minimise impacts and to ensure the separation of clean and dirty water management areas; specialist recommendations; and the IWUL conditions. Implementation also to be in compliance with the mine's internal procedures. Procedures to be in line with the latest legislation. Mine residue classification and characterisation in compliance with GNR 635 of August 2013, "National Norms and Standards for the Assessment of waste for landfill disposal" and GNR 636 of August 2013, "National Norms and Standards for disposal of waste to	Operational and Decommissioning Phase
93		Underground dewatering: Dewatering of the mine takes place in order to remove groundwater from the workings so that mining may take place.	Groundwater dewatering may lead to possible subsidence of ground, and alteration of the natural topography.	Y	Y	Operational Phase	Cone of depressions extending beyond boundary of mine to local area	3	4	High	Control	Lidar surveys to be undertaken to identify areas of subsidence. Identified areas of subsidence to be demarcated, surveyed and repaired as soon as possible, once the area is declared safe to do so, if possible.	3	3	Medium			Operational and Decommissioning Phase
94			Groundwater dewatering may lead to depletion of the groundwater resource.	Y	Y	Operational Phase		3	3	Medium	Control	Groundwater level monitoring to be undertaken to determine if the dewatering activities are impacting on the surrounding groundwater users. The mine to compensate surrounding groundwater users should impacts on groundwater level / supply be identified.	3	2	Medium			Operational and Decommissioning Phase
95		Underground dewatering. Groundwater users are neighbouring farmers and PPC Lime Quarry operations. The	The dewatering of the mine has resulted in the development of a cone of depression around the open pit. This may result in potential loss of groundwater resource by neighbours	Y	Y	Operational	Limited to site and local surrounding areas.	3	4	High	Remedy		3	2	Medium			Operational and Decommissioning Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
96		PPC Quarries and Finsch mining operations are likely to be hydraulically connected	Potential increase in the flow of seepage contaminated water from Brits FRD towards the open pit.	Y	Y	Operational	Limited site and surrounding area	3	3	Medium	Control	Volumes of affected water abstracted for mining and beneficiation purposes and re-used shall be monitored on a frequent basis. The water balance for the mine shall be refined on an ongoing basis during the LoM. The water balance shall be used to check on an ongoing basis that the capacity of the dirty water holding facilities is adequate, taking the operational distribution and use of water into account. Groundwater monitoring to be undertaken to determine potential increase in the flow from the Brtis FRD towards the pit. Return water from Brits FRD is to be re-used in the process.	3	2	Medium		landfill", in terms of NEMWA, 2008	Operational and Decommissioning Phase
97			The potential increase of water in the workings and potential increase in the risk of a mud push and / or mud rush	Y	Y	Operational	Limited site	3	4	High	Control / Prevent		3	3	Medium			Operational and Decommissioning Phase
98		Mining engineering; infrastructure operations; Headgear; Mechanical & electrical workshops operations: the use and maintenance of transformers, gearboxes & motors, winder drum, hydraulic power pack filters, fans, and winches	Spillages and leakages of hydrocarbons and the seep of hazardous chemicals (solvents, paints) may result in the pollution of groundwater resources.	N	Y	Operational	Limited site	3	3	Medium	Prevent / Remedy	Refer to mitigation measures as presented under Reference Number 4.	2	2	Low			Operational / Decommissioning and Closure Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
99		Bulk fuel & lubricant storage, dispensing & reticulation; Pollution prevention controls (bund walls, fuel dispensing shut off valves at refuelling Bays 62 /63 L; Diesel delivery shut off controls on surface; Oily water separator maintenance; Old oil reticulation system operations; Oily water separator operations	Failure of pollution control systems due to inadequate maintenance may result in pollution of groundwater resources.	N	Y	Operational	Local to regional in extent	4	4	High	Prevent	Refer to mitigation measures as presented under Reference Number 59.	3	3	Medium			Operational and Decommissioning Phase
100		Main shafts and headgear. This includes transformers, a diesel generator, gearboxes & motors, winder drum and ropes, hydraulic power pack ,braking system, filters, fans, and winches, fire suppression systems, workshop activities, weightometers containing nuclear materials, cage operations	Spillages and leakages of hydrocarbons from equipment in the Headgear may result in groundwater pollution.	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent / Remedy	Refer to mitigation measures as presented under Reference Number 4.	2	2	Low			Operational and Decommissioning Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
101		Underground Water Reticulation; Water treatment & flocculation 68 L (Chlorine); Water Recovery; Water & Mud pumping to Surface 70 L	Potential failure of pumps may result in the flooding of the mine and contamination of groundwater resources	Y	Y	Operational	Limited to site	3	5	High	Prevent / Control	All pumps will be inspected on a continuous basis and maintained where required. Back-up pumps (including power supply) will be made available for use in the event of pump failure. Sufficient underground storage will be available to buffer pumping failure, until the back-up pumps are initiated.	3	3	Medium			Operational and Decommissioning Phase
102		Reprocessing activities of Pre-1979 CRD – Wet Infield Screening (WIFS) Operations. Loading and hauling. The re-mining of Red Dumps and Post 80 CRD	Leakages or spillages may occur from earthmoving vehicles and machinery used for the re-mining of the residue deposits may result in contamination of groundwater resources.	N	Y	Operational	Local in extent	3	3	Medium	Prevent / Remedy	Refer to mitigation measures as presented under Reference Number 5.	2	2	Low			Operational and Decommissioning Phase
103		Constructed WRDs. The WRDs are mainly made up of coarse dolomite, dolerite and some banded ironstone which reflects the geology of the surrounding area. The stormwater is channelled into the natural environment. All the WRDs are rehabilitated and top-dressed with a finer banded ironstone material and over seeded.	Leaching of pollutants from WRDs may result in the pollution of groundwater resources.	N	Y	Operational	Local in extent	5	5	High	Control	Groundwater monitoring to be undertaken up-gradient and down-gradient of the WRDs to determine any potential sources of groundwater pollution. A geohydrological assessment and numerical model will determine the development and rate of travel of a pollution plume that has developed. Should the pollution migrate beyond the boundary the mine and affected surround groundwater users, long-term strategies are to be developed and the groundwater users compensated.	4	5	High			Operational and Decommissioning Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
104		Process water storage and activities	Spillages of contaminated process water outside of the closed reticulation system may result in groundwater pollution. The G-thickener and C-thickener both have EC, Cl, Na, SO_4, Mn, S solids, Se, above the acceptable Drinking Water Standard	N	Y	Operational	Local in extent	3	4	High	Control / Prevent	Refer to mitigation measures as presented under Reference Number 68.	3	3	Medium			Operational and Decommissioning Phase
105		Plant operations	The non-availability of material safety data sheets (MSDSs) and inadequate training of personnel may further increase the risk of spillages and leakages of hazardous substances.	N	Y	Operational	Local in extent	3	3	Medium	Control / Prevent	Refer to mitigation measures as presented under Reference Number 8.	2	2	Low			Operational and Decommissioning Phase
106		Operation and rehabilitation of old FRDs	The old FRDs cause seepage of EC, Ca, SO4, Mn, TDS, Turbidity, suspended solids, NO3, Mg and F into the groundwater. The monitoring data further shows that this pollution extends towards the south from the old FRDs as far as BH BA2 which is situated in the game farm.	Y	Y	Operational / Decommissioning phase	Local in extent	3	5	High	Control	Groundwater monitoring to be continued up-gradient and down-gradient of the FRD paddocks to determine any potential sources of groundwater pollution. A geohydrological assessment and numerical model will determine the development and rate of travel of a pollution plume that may develop. Should the pollution migrate beyond the boundary the mine property and affect neighbouring groundwater users, long-term strategies are to be developed and the groundwater users compensated.	3	3	Medium			Operational / Decommissioning and Closure Phase
107		Operation and rehabilitation of FRD paddocks	Elevated Mn, Mg, NO_3 and SO_4 levels have been observed at the FRD paddocks and may result in groundwater pollution.	N	Y	Operational / Decommissioning phase	Local in extent	3	5	High	Control	Groundwater monitoring to be undertaken up-gradient and down-gradient of the FRD paddocks to determine any potential sources of groundwater pollution. A geohydrological assessment and numerical model will determine the development and rate of travel of a pollution plume that may develop. Should the pollution migrate beyond the boundary the mine property and affect neighbouring groundwater users, long-term strategies are to be developed and the groundwater users compensated.	3	2	Medium			Operational / Decommissioning and Closure Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
108		Construction and operation of CRDs	Levels of Mg, EC, Mn, Ca, Al, NO3 above the acceptable standards occurs at the post-1979 CRD and pre-1979 CRD and seepage thereof may result in groundwater pollution	N	Y	Operational Phase	Local in extent	3	3	Medium	Control / Remedy	Groundwater monitoring to be undertaken up-gradient and down-gradient of the post-1979 CRD and pre-1979 CRD to determine any potential sources of groundwater pollution. A geohydrological assessment and numerical model will determine the development and rate of travel of a pollution plume that may develop. Should the pollution migrate beyond the boundary the mine property and affect neighbouring groundwater users, long-term strategies are to be developed and the groundwater users compensated.	3	2	Medium			Operational / Decommissioning and Closure Phase
109		Groundwater use; Groundwater from the underground workings is currently contained in the underground sumps. The mine affected water is then abstracted from these underground sumps and re-used in the process. As the mine extends downwards groundwater drains into the excavations. In order for mining to proceed, this water must be pumped out of the excavations	Groundwater abstraction from underground workings as well as boreholes may result in the decrease of groundwater availability.	Y	N	Operational Phase	Limited to site	2	2	Low	Control	Groundwater level monitoring to be undertaken to determine if the dewatering activities are impacting on the surrounding groundwater users. The mine to compensate surrounding groundwater users should impacts on groundwater level / supply be identified, according to agreement.	2	1	Low			Operational / Decommissioning and Closure Phase
110		Storage of process water	Bonza Quarry is unlined. The volume of the seepage is unknown; however, the poor quality of this water implies that a pollution plume may have developed from Bonza Quarry.	N	Y	Operational Phase	Local in extent	3	5	High	Control	Groundwater monitoring to be undertaken to determine sources of groundwater pollution. Groundwater monitoring data to be fed into a numerical model, and updated on a regular basis, to assist in determining pollution plumes, the development and the rate of movement thereof. The mine to compensate surrounding groundwater users should impacts on groundwater be identified, according to agreement.	3	3	Medium			Operational / Decommissioning and Closure Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
111		Groundwater use	The development of a cone of depression in the ground water around the open pit may lead to a potential loss in surrounding areas.	Y	Y	Operational Phase	Local in extent	3	5	High	Control	Groundwater level monitoring to be undertaken to determine if the dewatering activities are impacting on the surrounding groundwater users. The mine to compensate surrounding groundwater users should impacts on groundwater level / supply be identified, according to agreement.	3	3	Medium			Operational / Decommissioning and Closure Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT: Impact description	Reversible	Irreplaceable loss	PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated: Probability	Magnitude	Significance	MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated: Probability	Magnitude	Significance	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
112		Underground stores of hazardous chemical materials	Leakages or spillages from the incorrect storage of hazardous substances underground, such as fuel, oil, paint, batteries, chemicals, acid & corrosive salt, reagents, paint, solvents and Beryllium x-ray tubes may occur.	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent	All employees working with the storage, use or disposal of hazardous substances shall be trained and briefed on the relevant procedures and potential environmental impacts of not adhering to these. The MSDS's for all chemicals and hazardous substances will be made available to all employees working with the storage, use or disposal of hazardous substances. All floors shall be sloped and bunded to contain any spills or leaks. Where items are stacked, adequate drip trays shall be made available to contain and confine any potential leaks. The drip trays shall aid in the cleaning-up of spills. Chemical compatibility shall be observed when storing chemicals. Corrosive liquids shall not be stored above eye level. Dry chemicals/powders shall be stored in one section and separated according to type i.e. oxidizing salts such as chlorine powder separated from other dry chemicals. Flammable or combustible liquids (oils, solvents, paints) shall be stored separately or in a separate flammable store. Store rooms containing hazardous substances shall be locked at all times. Only designated personnel shall have access to these areas. Pollution shall be prevented when transporting and offloading hazardous substances. Preventative measures shall include securing the closed containers on the vehicles as well as the use of drip trays and other spill corrective measures when transporting hazardous substances. All applicable procedures shall be followed when hazardous substances products are off-loaded in bulk or in small quantities.	2	2	Low			Operational and Decommissioning Phase

113			Inadequate bunding underground that does not meet specifications, damaged bunding, inadequate or damaged equipment such as storage tanks and underground tanks leaking may cause hazardous substances to spill or seep out of the bunded areas / tanks.	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent / Control	All new bund shall have the following specifications and shall be big enough to contain the following: • Where there is one tank/transformer within the enclosed area, 110% of the capacity of the tank; • • Allowance shall be made to cope with maximum storm rainwater (100mm rainfall in 1 hour) and firewater. The bund floor and walls shall be constructed of materials that are impervious to the contents of any tank or container within the bund. The bunded area shall be capable of preventing the migration of any spillage or leakage to the surrounding environment and shall therefore be either: • Built of concrete; • Built of brick and then plastered with concrete and painted with an impervious paint; • Sealed with an impermeable liner; or • Constructed with steel. The area within the bund wall surrounding the tank or drums shall be kept entirely free and unoccupied and shall not be used as a storage area. High bund walls shall have steps for quick escape and/or to facilitate easy access from the outside. A collection sump shall be provided in the bund floor to make it easier to remove liquids. The floor shall be graded in such a way that liquid will collect in the sump. Spillage sumps shall be locked, preferably with "key-like" type devices to ensure availability of keys in case of emergency. Bund drain valves/stopcocks shall be/have: • Leak proof; • Able to continue functioning in a fire; • Controls outside the bunded area; • Able to open manually; • Valves that must be kept locked in the closed position unless in use; and • The "open" and "closed" positions that must be indicated and obvious. If there are coupling in the bund, they shall be placed where leaks or spillage will be contained within the bund. Areas where fuel/oil is dispensed/refuelled (surface and underground) shall have bund type facilities to collect leaks or spills, and a means of collecting and disposing of these wastes in a way that will not cause soil or water pollution. Adequate warning signs shall be displayed as per procedure FDM-HSE-91E Environmental specifications for fuel and oil storage facilities. The appropriate symbols shall also be displayed.	2	2	Low			Operational and Decommissioning Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
114		Operation of underground equipment	Redundant or mothballed equipment or material containing hydrocarbons underground may leak.	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent / Control	Refer to mitigation measures as presented under Reference Number 36.	2	2	Low			Operational and Decommissioning Phase
115		Maintenance activities underground; Welding and gas cutting; Fire suppression; Washbay operations; Servicing of Equipment; Batching Plant operations (underground)	The incorrect use of any hazardous materials during maintenance activities underground may cause hydrocarbon and other hazardous chemical spillages (including oil, paint, grease, etc) may result contamination of groundwater resources.	Y	Y	Operational Phase	Local in extent	3	3	Medium	Control	Refer to mitigation measures as presented under Reference Number 38.	2	2	Low			Operational and Decommissioning Phase
116			The inadequate maintenance of machinery underground may cause spillages of hydrocarbons and contaminate groundwater resources.	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent / Control	All machinery is inspected prior to use. Vehicles and equipment are serviced on a regular basis. Spills or leaks encountered anywhere) shall be reported to the responsible supervisor of the area, in which the spill occurs, immediately. Arrangements shall be made for the clean up by the person/section that cause the spill and the supervisor of the area shall monitor the situation where necessary. The section that caused the spill shall be responsible for the clean-up costs. The spill management procedure shall be followed and appropriate disposal of contaminated material shall be ensured. Excess diesel spills, which occur in a bunded area into 210-liter drums shall immediately be pumped/scooped. All oil and diesel spillage that contains water shall report to an oily water separator before being disposed of.	2	2	Low			Operational and Decommissioning Phase
117			The washing of contaminated parts, lack of maintenance of the sumps, inadequate or damaged bunding, ineffective operation, and uncontrolled water drainage at the wash bay underground may cause hydrocarbon and other hazardous chemical leaching and contaminated groundwater resources.	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent	Refer to mitigation measures as presented under Reference Number 39.	2	2	Low			Operational and Decommissioning Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
118			Pollutants in batching plant wastewater include cement, sand, aggregates and petroleum products. These substances can affect the water pH	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent	All dirty/process water shall be contained within the dirty water system. The infrastructure such as drains, and sumps shall be assessed to examine whether it has adequate capacity for water flow.	2	2	Low			Operational and Decommissioning Phase
119	Surface and groundwater	Plant operations	Hydrocarbon spillages due to lack of adequate maintenance of crushing and screening equipment, HPRC X, and other ore processing equipment and during maintenance of this equipment may result in surface and groundwater contamination.	N	Y	Operational	Local in extent	3	3	Medium	Prevent / Remedy	Spills on soil A bioremediation agent containing ''oil/diesel eating bacteria'' shall be used in the following manner: 1. The excess oil and/or diesel shall be removed as quickly as possible to prevent further penetration into the ground by scooping up excess with shovels. 2. Plastic sheeting shall be used where necessary to divert and pick up the soil. 3. Any excess oil/diesel/chemicals shall be placed into a drum marked for that purpose and sends it to the WAMY. 4. Bioremediation of oil/diesel polluted soil on site shall be done where practicable. Spills on concrete or other non tarmac surface 1. Oil, diesel, acid or other liquid chemical spills on concrete cement floors shall be mopped up with loose absorbent fibre. 2. Used fibre shall be put into a 210 litre drum marked for that purpose. 3. The drums shall be sent to the WAMY once it is full. 4. All diesel, oil and petrol contaminated fibre or soil shall be handled as hazardous waste. 5. Large oil spills shall be contained with fibre booms, bio tubes or sand filled plastic bags. 6. The spread of the substance shall be prevented. 7. Excess oil, diesel and liquid chemicals shall be pumped up and/or scooped into a holding tank/drum marked for that purpose. 8. The use of chemicals to absorb/emulsify oil shall be avoided. 9. The biological degreasers shall be used to remove traces of oil left on the concrete surface. 10. Only degreasers that are compatible with oil separators and water shall be used where there is oil separators installed.	2	2	Low	To prevent quality deterioration of surface water quality and prevent impact on catchment yield To minimise the extent of disturbance of the aquifer and to prevent quality deterioration of groundwater resource.	Surface water management: In line with the DWS Best Practice Guidelines, to prevent and minimise impacts and to ensure the separation of clean and dirty water management areas; GN704, dated 1999; the NWA (1998) and Regulations there under and amendments thereto; the storm water management plan and / or amendments thereto; specialist recommendations; and the IWUL conditions. Implementation also to be in compliance with the mine's internal procedures.	Operational and Decommissioning Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
120		Construction and operation of the Brits FRD; Two non-perennial pans were located within the footprint of the Brits FRD. These non perennial water bodies were lost after 2006 once the construction of the FRD commenced. The two non-perennial water bodies were located at the northern (northern pan) and southern (southern pan) ends of the FRD.	Seepage water accumulation behind the north and southern dam walls may result in impacts on the surface and groundwater.	N	Y	Operational Phase	Local in extent	3	4	High	Prevent / Control	All areas of natural, indigenous vegetation shall be identified and mapped. Surface disturbance shall be kept to a minimum by concentrating activities at the already disturbed mining infrastructure area. Human and vehicular activity shall be restricted to operational sites. Dirty water from mine surface infrastructure areas shall be retained within the mine's stormwater control system. Erosion shall be prevented or controlled where vegetation has been disturbed. Seepage water must be contained and pumped back to the mines affected water management system.	3	3	Medium		Procedures to be in line with the latest legislation. Groundwater management: In line with the DWS Best Practice Guidelines, to prevent and minimise impacts and to ensure the separation of clean and dirty water management areas; specialist recommendations; and the IWUL conditions. g	Operational / Decommissioning and Closure Phase
121			Fine residue spillages from pumping activities on the rehabilitated WRD may result in impacts on surface and groundwater.	N	Y	Operational Phase	Local in extent	3	3	Medium	Control / Remedy	Refer to mitigation measures as presented under Reference Number 9.	3	2	Medium			Operational Phase
122		Construction and operation of the Brits FRD	The Brits FRD may lead to seepage into the drainage line continuing towards the farm Rocky Flats and result in surface and groundwater pollution of adjacent landowner.	N	Y	Operational Phase	Local in extent	3	5	High	Prevent / Control	Should seepage within the drainage line be identified, measure (e.g. pumps, berms, trenches) will be utilised to contain the seepage and pump the seepage back to the Brits FRD.	3	3	Medium			Operational and Decommissioning Phase
123		Construction and operation of CRDs	Residual herbicides used for removal of alien vegetation may occur which will be washed down into the veld during rainy events and impact on surface and groundwater resources.	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent	Refer to mitigation measures as presented under Reference Number 79.	2	2	Low			Operational and Decommissioning Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
124		Transportation of CRD material	Increase in salt and siltation a may occur due to spillages of coarse residue from the conveyor belts, and may result in contamination of surface and groundwater resources.	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent / Remedy	Conveyor belts to be inspected on a regular for spills. Any spilled material underneath the conveyor belt is to be loaded back on to the conveyor belt as soon as possible.	2	2	Low			Operational Phase
125		Waste separation	The incorrect separation of non-hazardous and hazardous waste at all sources throughout the mine may lead to waste contamination by hazardous substances disposed at the general waste landfill site.	N	Y	Operational Phase	Limited to site	3	3	Medium	Prevent	Waste on surface shall be separated into four categories namely hazardous waste, general waste, recyclables and garden refuse. Hazardous waste shall be stored in black containers with a red rim, general waste in black with a white rim containers, recyclable material in grey containers and garden refuse in green containers. Extra telecons shall be requested for any project on surface where significant quantities are generated. All working areas underground shall classify and separated their waste into hazardous waste and general waste which includes scrap metal. Hazardous waste shall be stored in black containers and general waste in grey or yellow containers. Extra cassettes for the removal of underground waste shall be requested. Hazardous waste shall not be mixed with general waste. Ensure compliance to Waste Classification and Management Regulations, 2013 GN.R634 (dated August 2013), under the National Environmental Management: Waste Act, 2008 (Act No.59 of 2008). Ensure compliance to the Norms and Standards for the storage of waste, GN 926 (dated November 2013), under the National Environmental Management: Waste Act, 2008 (Act No.59 of 2008). Old oil filters shall be drained before they are placed into the hazardous waste telecom/cassette. Oil, diesel or grease contaminated soil/sludge; absorbent material (hazardous waste) shall not be mixed with other hazardous or general waste. Used products and containers shall be returned to the supplier for recycling if this is possible.	2	2	Low			Operational and Decommissioning Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
126		Waste transportation	Incorrect transportation of hazardous waste, such as the use of damaged drums, may lead to spillages onto the ground and result in surface water and groundwater pollution	Y	Y	Operational Phase	Limited to site	3	3	Medium	Prevent	Refer to mitigation measures as presented under Reference Number 13 and 14.	2	2	Low			Operational and Decommissioning Phase
127		Handling and storage of hazardous waste	Incorrect handling of hazardous waste while off-loading and storage at non-designated areas at the HWSA may cause spillages of hazardous substances and result in impacts on surface and groundwater.	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent		2	2	Low			Operational and Decommissioning Phase
128			Incorrect design and inadequate maintenance of the bunded area for hazardous waste may cause spillages or seepage from this waste and may impact on surface and groundwater resources.	N	Y	Operational Phase	Limited to site	3	3	Low	Prevent / Control	Refer to mitigation measures as presented under Reference Number 15.	2	2	Low			Operational and Decommissioning Phase
129		General operation and construction of the WAMY	The historical incorrect disposal of hazardous and non-hazardous waste at the WAMY may result in impacts on surface and groundwater.	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent / Remedy	Refer to mitigation measures as presented under Reference Number 16.	2	2	Low			Operational and Decommissioning Phase
130		Storage of tyres	Infiltration of decomposing liquid products or gradual leaching of ash and unburned residue, from accidental burning of rubber due to cutting of steel or the storage or tyres during a fire, may result in impacts on surface and groundwater.	N	Y	Operational Phase	Limited to site	3	4	High	Control / Remedy	Refer to mitigation measures as presented under Reference Number 18, 19 and 20.	2	4	Medium			Operational Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
131			Incomplete tyre combustion leading to dioxin (highly toxic compounds) and noxious gases, leaching into the soil during accidental burning of rubber due to cutting of steel or the storage or tyres during a fire. Other substances released include Volatile organic compounds (VOCs) polynuclear aromatic hydrocarbons (PAHs), furans, hydrogen chloride, benzene, PCBs arsenic, cadmium, nickel, mercury, zinc, chromium and vanadium.	N	Y	Operational Phase	Local in extent	3	4	High	Control / Remedy		2	4	Medium			Operational and Decommissioning Phase
132		Operation of incinerator	Incorrect disposal of incinerator bottom ash. The mass and volume reduction of waste incineration causes an enrichment of a number of heavy metals in the bottom ashes compared to their concentration in the waste feed. The leaching ability of the bottom ash depends on the type of material that was incinerated.	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent	Refer to mitigation measures as presented under Reference Number 20.	2	2	Low			Operational and Decommissioning Phase
133		Bioremediation activities. The bio remediated kimberlite and other material is put back into the Ore Treatment Process. The contaminated material is placed on the concrete hydrocarbon consuming bacteria is added to the material. During a process that can last up to 12 weeks depending on the weather and time of the year the material is kept moist and aerated by turning	Seepage or incorrect water drainage of materials e.g. heavy metals during bioremediation processes at the bioremediation site due to incorrect bunding or maintenance of the bunded area.	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent	Refer to mitigation measures as presented under Reference Number 22.	2	3	Low			Operational and Decommissioning Phase
134			Incorrect or inadequate bioremediation practises on site	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent	Refer to mitigation measures as presented under Reference Number 23.	2	2	Low			Operational and Decommissioning Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT: Impact description	Reversible	Irreplaceable loss	PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated: Probability	Magnitude	Significance	MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated: Probability	Magnitude	Significance	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
135		Sewerage farm composting operations	Incomplete or incorrect treatment of sewage sludge used as compost for rehabilitation leading to leaching of heavy metals or pathogenic bacteria, viruses and protozoa along with other parasites.	N	Y	Operational Phase	Limited to site	3	3	Medium	Prevent / Control	Refer to mitigation measures as presented under Reference Number 27.	2	2	Low			Operational and Decommissioning Phase
136		Storage of process water	The potential failure of the process water dams may cause spillages of process water and impact on soil.	N	Y	Operational Phase	Local in extent	3	5	High	Control / Prevent	Refer to mitigation measures as presented under Reference Number 24.	2	4	Medium			Operational and Decommissioning Phase
137		Transportation of water	Spillages may occur due to burst pipes, overflows, seepage from dirty water drains and pump failures and result in impacts surface and groundwater	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent / Control	Refer to mitigation measures as presented under Reference Number 25.	2	2	Low			Operational and Decommissioning Phase
138		Sewage Operations	Leakages or spillages from the honeysucker and sewage containers during the removal of sewage from the underground toilets and all other toilets on surface not connected to wastewater care works may occur. This spillage may result in impacts on surface and groundwater.	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent / Remedy	Refer to mitigation measures as presented under Reference Number 26.	2	2	Low			Operational and Decommissioning Phase
139			Incomplete or incorrect treatment of sewage sludge used as compost for rehabilitation leading to leaching of heavy metals or pathogenic bacteria, viruses and protozoa along with other parasitic helminths. This will result in the contamination of surface and groundwater.	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent / Control	Refer to mitigation measures as presented under Reference Number 27.	2	2	Low			Operational and Decommissioning Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
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140		Inadequate stormwater management	Inadequate stormwater management may result in siltation and contamination or surface and groundwater resources.	Y	Y	Operational Phase	Limited to site	3	3	Medium	Prevent	Stormwater drainage shall be established and includes the constructions of berms, contours and water channels. All water system shall be kept free from any matter or obstruction which may affect the efficiency thereof. All unpolluted water shall be confined to a clean water system, away from any dirty area using infrastructure such as drains, trenches and berms. All dirty/process water shall be contained within the dirty water system. The infrastructure such as drains, trenches and berms shall be assessed to examine whether it has adequate capacity for water flow. The infrastructure such as drains, trenches and berms shall be maintained to keep out all vegetation and blockage that may prevent water flow maintained so as to ensure the system can handle the 1:100 year storm event.	2	2	Low			Operational and Decommissioning Phase
141			Any inadequate stormwater drainage design or lack of stormwater structures & lack of maintenance of existing structures may result in surface and groundwater contamination.	N	Y	Operational Phase	Limited to site	3	3	Medium	Prevent		2	2	Low			Operational and Decommissioning Phase
142		Transportation activities via road; The transportation of hazardous materials such as hazardous waste, hydrocarbons, explosives from the magazine the shaft bank on surface as well as the transportation of hazardous materials from the shaft to underground working. This includes the transportation of waste to the WAMY; the transportation of all goods and materials on and off the mine, and all earth-moving activities.	Hydrocarbon leakages or spillages from vehicles transporting material as well as parked vehicles may contaminate surface and groundwater.	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent / Remedy	Refer to mitigation measures as presented under Reference Number 29.	2	2	Low			Operational and Decommissioning Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
143		Construction and maintenance of roads	Leakages or spillages of machinery during maintenance of roads may result in contamination soil.	Y	Y	Operational Phase	Limited to site	3	3	Medium	Prevent / Remedy	Refer to mitigation measures as presented under Reference Number 32 above.	2	2	Low			Operational and Decommissioning Phase
144		Operation and storage above ground; There are various diesel, petrol and oil storage tanks above ground on site	Leakages or spillages from the incorrect transport, loading, storage, use and removal of hazardous substances above ground, such as fuel, oil, paint, batteries, chemicals, acid & corrosive salt, reagents, paint and solvents. Spillages from off-loading may take place during refuelling of vehicles, or due to spillages from damaged delivery lines, or overfill at bulk storage tanks. Such leakages and spillages may result in the contamination of surface and groundwater resources.	N	Y	Operational Phase	Local in extent	3	3	Medium	Control / Prevent	Refer to mitigation measures as presented under Reference Number 35 above.	2	2	Low			Operational and Decommissioning Phase
145			Inadequate bunding above ground that does not meet specifications, damaged bunding, inadequate or damaged equipment such as storage tanks and underground tanks leaking may cause hazardous substances to spill or seep out of the bunded areas / tanks. Such leakages and spillages may result in the contamination of surface and groundwater.	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent / Control	Refer to mitigation measures as presented under Reference Number 33 above.	2	2	Low			Operational and Decommissioning Phase
146			Ineffective oil separator may cause hydrocarbon spillages or leakages. The oil separators have all reported oil and grease values above allowable level, but no diesel. The oil separators contain no VOCs and semi-volatile organic compounds (SVOCs), but 4 unknown halogenated compounds were detected. Such spillages and leakages may result in the contamination of surface and groundwater.	N	Y	Operational Phase	Local in extent	3	3	Medium	Control / Prevent	Refer to mitigation measures as presented under Reference Number 33.	2	2	Low			Operational and Decommissioning Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
147			Redundant or mothballed equipment or material containing hydrocarbons above ground may leak and contaminate soil.	N	Y	Operational Phase	Local in extent	3	3	Medium	Control / Prevent	Refer to mitigation measures as presented under Reference Number 36.	2	2	Low			Operational and Decommissioning Phase
148			The incorrect storage or use of foam, Water with Additive and Wet Chemical (F Class) extinguisher contents containing chemicals may cause leakages or spillages and result in the contamination of surface and groundwater.	Y	Y	Operational Phase	Local in extent	3	3	Medium	Prevent	Refer to mitigation measures as presented under Reference Number 37 and 38.	2	2	Low			Operational and Decommissioning Phase
149		Maintenance activities above ground	The incorrect use of any hazardous materials during maintenance activities above ground may cause hydrocarbon and other hazardous chemical spillages (includes oil, paint, grease, etc) and may contaminate surface and groundwater.	N	Y	Operational Phase	Limited to site	3	3	Medium	Prevent		2	2	Low			Operational and Decommissioning Phase
150			The washing of contaminated parts, lack of maintenance of the sumps, inadequate or damaged bunding, ineffective operation, and uncontrolled water drainage at the wash bay above ground may cause hydrocarbon and other hazardous chemical spillage that may contaminate surface and groundwater resources.	Y	N	Operational Phase	Local in extent	3	3	Medium	Prevent / Control	Refer to mitigation measures as presented under Reference Number 39.	2	2	Low			Operational and Decommissioning Phase

<table>
<tr><th rowspan="2">NO.</th><th rowspan="2">ASPECTS AFFECTED</th><th rowspan="2">ACTIVITY whether listed or not listed</th><th colspan="3">POTENTIAL IMPACT</th><th rowspan="2">PHASE in which impact is anticipated</th><th rowspan="2">SIZE AND SCALE of disturbance</th><th colspan="3">SIGNIFICANCE if not mitigated</th><th rowspan="2">MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)</th><th rowspan="2">MITIGATION MEASURES</th><th colspan="3">SIGNIFICANCE If mitigated</th><th rowspan="2">STANDARD TO BE ACHIEVED</th><th rowspan="2">COMPLIANCE WITH STANDARDS</th><th rowspan="2">TIME PERIOD FOR IMPLEMENTATION</th></tr>
<tr><th>Impact description</th><th>Reversible</th><th>Irreplaceable loss</th><th>Probability</th><th>Magnitude</th><th>Significance</th><th>Probability</th><th>Magnitude</th><th>Significance</th></tr>
<tr><td>151</td><td rowspan="2"></td><td rowspan="2">Use of water</td><td>The ineffective use of surface and groundwater or damaged water pipes and taps at any of these building may lead to a depletion of the water resource (water from VG pipeline).</td><td>N</td><td>Y</td><td>Operational Phase</td><td>Local in extent</td><td>3</td><td>3</td><td>Medium</td><td>Control</td><td>The water balance for the mine shall be refined on an ongoing basis during the LoM. The water balance shall be used to check on an ongoing basis that the capacity of the dirty water holding facilities is adequate, taking the operational distribution and use of water into account.

An annual report on water balance shall be submitted to DWA. This will provide information on the status of the water balance in the wet season and the dry season and under conditions of extreme rainfall.

All pipes shall be kept in a good condition to prevent leaks.

All leaks shall be reported and remediate as soon as possible.

Maintenance of water taps shall take place on an ongoing basis.

All water storage facilities shall be inspected on an ongoing basis for compromises and maintained where required

Reclamation and recycling of process or mining water shall be undertaken as far as possible.
Stormwater control infrastructure including diversion trenches and down chutes (where provided) shall be maintained in an acceptable condition such as that they conform to their design capacity at all times.

Trenches shall be kept clear of vegetation, debris or silt that could impede flow.

Any repairs to the infrastructure shall be carried out in accordance with the original design and construction specifications.</td><td>2</td><td>2</td><td>Low</td><td rowspan="2"></td><td rowspan="2"></td><td>Operational and Decommissioning Phase</td></tr>
<tr><td>152</td><td>Overdosing of wash water with soaps and detergents for cleaning purposes and the use of acid based cleaning reagents in the change houses. Should spillage of the wash water occur, it may result in the contamination soil</td><td>N</td><td>Y</td><td>Operational Phase</td><td>Local in extent</td><td>2</td><td>2</td><td>Low</td><td>Control / Prevent</td><td>Refer to mitigation measures as presented under Reference Number 41.</td><td>1</td><td>2</td><td>Low</td><td>Operational and Decommissioning Phase</td></tr>
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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
153	Sensitive land scape	Construction and operation of the Brits FRD; Two non-perennial pans were located within the footprint of the Brits FRD. These non perennial water bodies were lost after 2006 once the construction of the FRD commenced. The two non-perennial water bodies were located at the northern (northern pan) and southern (southern pan) ends of the FRD.	Seepage water accumulation behind the north and southern dam walls may result in impacts on the pan wetlands.	N	Y	Operational Phase	Local in extent	3	4	High	Prevent / Control	All areas of natural, indigenous vegetation shall be identified and mapped. Surface disturbance shall be kept to a minimum by concentrating activities at the already disturbed mining infrastructure area. Human and vehicular activity shall be restricted to operational sites. Dirty water from mine surface infrastructure areas shall be retained within the mine's stormwater control system. Erosion shall be prevented or controlled where vegetation has been disturbed. Seepage water must be contained and pumped back to the mines affected water management system.	3	3	Medium	Prevent / minimise visual intrusions on sensitive receptors	In terms of Government Gazette 39425. Government Notice R.1147 dated 2015 (Financial Provision Regulations) and any amendments thereto In compliance with the Rehabilitation, Decommissioning- and Closure plans and Closure Objectives.	Operational and Decommissioning Phase
154			Elevated Manganese levels in surface water runoff may result in the loss of vegetation: There are a number of species with conservation importance present in the nearby pan. These include Harpagophytum procumbens, Acacia erioloba Ammocharis coranica, Boophone disticha, Boscia albitrunca, Hereroa cf. wilmaniae, Orbeopsis lutea, Pachypodium succulentum, Ruscia cf. sedimentata, Lebeckia macrantha, Rhus tridactyla and Tarchonanthus cf. Obovatus	N	Y	Operational Phase	Local in extent	3	3	Medium	Prevent / Control	All unpolluted water shall be confined to a clean water system, away from any dirty area using infrastructure such as drains, trenches and berms. All dirty/process water shall be contained within the dirty water system. The infrastructure such as drains, trenches and berms shall be assessed to examine whether it has adequate capacity for water flow. The infrastructure such as drains, trenches and berms shall be maintained to keep out all vegetation and blockage that may prevent water flow maintained so as to ensure the system can handle the 1:100 year storm event.	2	3	Medium			Operational and Decommissioning Phase
155		Stormwater control measures	Inadequate stormwater management may result in a loss of sensitive vegetation.	Y	Y	Operational Phase	Limited to site	3	3	Medium	Prevent	Stormwater drainage shall be established and includes the constructions of berms, contours and water channels. All water systems shall be kept free from any matter or obstruction which may affect the efficiency thereof.	2	2	Low			Operational and Decommissioning Phase
156	Air quality	Energy supplies for mining. Finsch uses a significant amount of purchased Eskom generated electricity	Use of purchased electricity: 150,000 tons of CO_2 per annum contributing to climate change	N	Y	Operational	Regional to national in extent	3	3	Medium	Prevent	Electricity and fossil fuel usage tracking will be continuously monitored. Over usage anomalies will be investigated. All employees will be made aware of energy and electricity efficiency and conservation.	2	2	Low	Prevent the deterioration of air quality and indirect effects on floral, faunal and human health	Air quality management in accordance with the National Environmental Management: Air Quality Act (Act No 39	Operational and Decommissioning Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
157		Operation of ventilation shafts and passes	Particulate matter, SO2, NO2 and CO, released from shaft vents primarily as a result of blasting and drilling operations, and diesel powered vehicles working underground, may result in air pollution.	N	Y	Operational	Local in extent	3	3	Medium	Control	Refer to mitigation measures as presented under Reference Number 43.	2	2	Low		of 2004); Regulations there under and amendments thereto. Emergency preparedness and response in compliance with the compliance with the Mine Health and Safety Regulations under the Mine Health and Safety Act (1996); MPRDA, 2002; NEMA; 1998 and NWA; 1998 and the National Veld and Forest Fire Act, 1998 (Act No 101 of 1998), (and regulations there under), and amendments thereto. Implementation also to be in compliance with the mine's internal procedures. Procedures to be in line with the latest legislation.	Operational and Decommissioning Phase
158		Underground mining operations	Underground mining result in PM, SO2, NO2 and CO2, CO released from shaft vents primarily as a result of blasting and drilling operations, and diesel powered vehicles working underground, may result in health hazards. Particulate matter inhalation causes respiratory problems. SO_2 inhalation can cause respiratory difficulties and disease. NO_2 inhalation may cause severe irritation and burns of eyes, skin, mucous membranes, and any other exposed tissue as well as breathing difficulties. Over exposure to CO may cause damage to target organs.	N	Y	Operational	Local in extent	3	4	High	Control	If dust pollution levels exceed the relevant requirements as described under the NEMAQA and the Mine Health and Safety Act, dust shall be managed by means of a water bowser and the implementation of lower speed limits on the mine's roads. If there are any complaints with regards to dust pollution, dust samples shall be taken to assess the intensity of such an impact on the applicable complainants' land or residences. Dust suppression methods for the WRDs shall be undertaken if required. All machinery shall be kept in a good working order and serviced regularly to reduce emissions. Service / maintenance data / annual roadworthy inspections of all vehicles shall be reflected. Visual inspections on vehicles for black smoke shall be undertaken. Vehicles shall be prioritized from oldest vehicles to newest. Vehicles shall be submitted for vehicle emission testing. Contractors undertaking transporting on behalf of the mine shall be requested to provide evidence of their vehicle emission levels compliance or at least proper maintenance on their vehicles. Burning of conveyor belts, cables or waste shall be prevented.	3	3	Medium			Operational and Decommissioning Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
159		Reprocessing activities of Pre-1979 CRD – Wet Infield Screening (WIFS) Operations. Loading and hauling. The re-mining of Red Dumps and Post 80 CRD	Dust generation during the loading and hauling of pre-79 tailings may result in air pollution impact on human health and ecological resources	N	Y	Operational	Limited to site	3	3	Medium	Control	In the case of project-related areas, such areas shall be re-vegetated as soon as is practically possible to reduce the amount of open areas exposed to wind erosion. If dust pollution levels exceed the relevant requirements as described under the NEMAQA and the Mine Health and Safety Act, dust shall be managed by means of a water bowser and the implementation of lower speed limits on the mine's roads. Strict speed limits shall be implemented. This includes speed signs on mine as well as the training of drivers. If there are any complaints with regards to dust pollution, dust samples shall be taken to assess the intensity of such an impact on the applicable complainants' land or residences.	3	2	Medium			Operational Phase
160		Storage and transport of explosives. Explosives are stored in the various bunkers at the magazines. Maintenance of the area is carried out according to the Explosives and Hazardous Materials Regulations	Fire may occur at the magazines as a result of inadequate clearing of vegetation, inadequate maintenance of lightning conductors and may result in potential air pollution	N	Y	Operational		2	4	Medium	Prevent / Control	Fire-breaks to initiated across the mine, including around the explosives magzines. The explosives magazine to inspected on a regular basis and maintained where required. Access control implemented at the explosives magazine. If possible the fire shall be extinguished immediately. The incident shall then be reported. If the fire cannot be extinguished, a responsible person shall be contacted. All persons shall be removed. Burning explosives shall never be extinguished; people shall be removed to safe place.	1	3	Low			Operational and Decommissioning Phase
161		Crushing, screening and milling of kimberlite ore and country rock.	Dust fallout and inhalable PM emissions are generated at the Buffer Stockpile, on tramming routes and from dry ground ore spillages.	N	N	Operational	Local in extent	3	3	Medium	Control	Strict speed limits shall be implemented. This includes speed signs on mine as well as the training of drivers. If there are any complaints with regards to dust pollution, dust samples shall be taken to assess the intensity of such an impact on the applicable complainants' land or residences. Dust suppression as mist spraying shall take place.	2	2	Low			Operational Phase
162		Dust plants	Dust emissions occur at some of the dust plant as well as transfer points on conveyor systems (transfer houses). Inadequate design and maintenance of dust plant leads to dust generation.	N	Y	Operational	Local in extent	3	3	Medium	Control	Dust plants to be inspected on a regular basis. Maintenance to be undertaken at the dust plants when required. Dust related incidents to be reported and investigated.	2	2	Low			Operational Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
163		General operation and concurrent rehabilitation of all FRDs	Wind erosion of the FRD takes place when the surfaces are dry and result in the generation of dust.	N	Y	Operational / Decommissioning phase	Local in extent	3	3	Medium	Control	Refer to mitigation measures as presented under Reference Number 11.	2	2	Low			Operational and Decommissioning Phase
164		Run of mine (stockpile areas)	The run of mine stockpile areas used intermittently may generate dust.	N	Y	Operational Phase	Local in extent	3	3	Medium	Control	Dust suppression to be implemented on the run of mine stockpiled if required.	2	2	Low			Operational Phase
165		Operation of landfill area	Dust generation due to removal of vegetation and soil erosion.	N	Y	Operational Phase	Limited to site	3	3	Medium	Control	Dust suppression to be undertaken when required. Earth moving activities to be limited during high wind conditions. Vegetation stripping to be limited to areas as required for the landfill site. Vegetation establishment to be encouraged on areas no longer required for the landfill site.	2	2	Low			Operational and Decommissioning Phase

166		Operation of landfill area	Disturbance of topsoil, nuisance of odour, flies or other vectors, dust generation or CO_2 and toxic gases generation due to inadequate stabilisation and covering of the landfill.	Y	N	Operational Phase	Limited to site	3	3	Medium	Control	Adequate facilities, equipment and suitably trained staff shall be in place to manage the site. A bulldozer or tractor and compactor shall be on site to compact and cover waste. Equipment shall be maintained in good working order. The maintenance of the landfill or the supervision of the maintenance shall rest with the registered contractor and shall be carried out on a continuous basis. The landfill site shall be correctly stabilised at regular intervals. The water drainage from the landfill site shall be adequately constructed so that water is drained away from the landfill to prevent leachate from the waste. • A buffer zone shall be maintained around the waste disposal site at all times. • All runoff water arising on the land adjacent to the site shall be drained and diverted • Under flood conditions a freeboard of ½m shall be maintained • All runoff water which arises on the working site shall be drained and diverted Such runoff from coming into contact with any leachate from the site shall be prevented. The correct type of material / waste rock shall be used for land-filling. Record shall be kept of the general waste that is disposed of into the landfill; quantities, dates and origins of waste received. The maximum height of the site above ground shall not exceed 3m. There shall be adequate sanitation facilities on site. Weather proof, durable and legible notices shall be displayed at the entrance to the site which prohibits unauthorized entry and includes hours of operation, name, address and telephone number of the registered person responsible for the operation of the site. The roads shall be maintained in a good condition All gates shall be locked outside of operational hours Illegal dumping outside the gates shall be reported If necessary, for special or emergency reasons after-hours access shall be provided for. The operator must ensure that no hazardous wastes, sludge's, liquid wastes or even sealed drums are disposed of into the landfill.	2	2	Low			Operational and Decommissioning Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
167		Storage of tyres	Accidental burning of rubber due to cutting of steel or the storage or tyres may start fires and result in air pollution.	N	Y	Operational Phase	Local in extent	2	3	Medium	Prevent / Control	If possible the fire shall be extinguished immediately. The incident shall then be reported. If the fire cannot be extinguished, a responsible person shall be contacted. All persons shall be removed. Tyres shall not be land filled as they cannot be compacted and tend to rise up through the waste. Tyres shall be stockpiled and recycled whenever possible. 20m fire breaks are currently established around the town and around the game farms and shall be maintained. Waste tyre should be managed and stockpiled in accordance to the waste tyre abatement plan. Burnt tyres and the remains thereof to be disposed of as hazardous waste. Soil contaminated through tyre combustion to be rehabilitated / disposed of as hazardous waste.	2	2	Low			Operational and Decommissioning Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
168		Bioremediation activities. The bio remediated kimberlite and other material is put back into the Ore Treatment Process. The contaminated material is placed on the concrete hydrocarbon consuming bacteria is added to the material. During a process that can last up to 12 weeks depending on the weather and time of the year the material is kept moist and aerated by turning	VOCs are generated at the bioremediation site.	N	Y	Operational Phase	Limited to site	3	3	Medium	Control	All polluted material shall be stored and remediated within the concreted area. Untreated material shall be separated from treated material and piled in windrows approximately 1m in height. The untreated material can be mixed with the Bobcat (or manually with shovels) to introduce air into the soil. The mixing of the material shall be done as described below: • At the time of mixing one large spade/shovel of Bioremediation powder shall be added for every m³ of contaminated material or more if the material is heavily polluted. • Clean fresh soil, if available can also be added in order to dilute the degree of contamination and provide additional bacteria to the contaminated ground. • Organic material such as grass cuttings, leaves, small sticks, compost, shredded paper and/or wood chips can also be added to the contaminated ground. This organic material will help to maintain air in the mix, add nutrients will speed up bioremediation process. • The quantity of organic material added can be in the ratio of 1:1 if available. • Enough water shall be added to wet the mixture. • The mixture shall not be saturated. The treated heaps shall be turned approximately every two weeks and water added to keep the mixture moist. Bioremediation shall be monitored by changes in the colour and smell of the material or by chemical analysis of the material. The material shall be aerated (mixed) regularly and kept damp to keep the oil/diesel consuming bacteria alive and ensure that the process is successful. The bioremediation process shall be completed within 3 months. It shall be verify that bioremediation has been successful. The treated material shall not be disposed of into the landfill site if it contains kimberlite residues because of the polluting potential of kimberlite. Treated kimberlite sludge or residue shall be disposed of in the process via Boyo's Bin if the level of contamination is Treated soil or absorbent fibre that does not contain kimberlite shall be disposed of to the landfill or onto the WRD as top dressing if deemed clean enough	2	2	Low			Operational and Decommissioning Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
169		Sewage Operations	There is a potential for emissions of VOCs at the wastewater works.	N	Y	Operational Phase	Local in extent	3	3	Medium	Control	Refer to mitigation measures as presented under Reference Number 29.	2	2	Low			Operational and Decommissioning Phase
170		Conveyance activities excluding road activities; Use of skips and conveyors underground and on surface to transport ore	Dust generation from tipping of ore into the surge bin at the shaft.	N	N	Operational Phase	Limited to site	3	3	Medium	Control / Prevent	Tipping to be undertaken in a controlled and steady manner. Care to be implemented during high wind conditions. Wetting of ore where required.	2	2	Low			Operational Phase
171		Transportation activities via road; The transportation of hazardous materials such as hazardous waste, hydrocarbons, explosives from the magazine the shaft bank on surface as well as the transportation of hazardous materials from the shaft to underground working. This includes the transportation of waste to the WAMY; the transportation of all goods and materials on and off the mine, and all earth-moving activities.	All fuel transport activities generate emissions and potential air pollution. Primary air pollutants emitted by vehicles may include NOx, CO_2, HCs, SO_2, particulate matter and Pb. Secondary pollutants associated with vehicle emissions include NO_2, photochemical oxidants (e.g. ozone) and sulphuric or nitric acids, and sulphate and nitrate aerosols. Toxic hydrocarbons emitted include benzene, 1.2-butadiene, aldehydes and polycyclic aromatics hydrocarbons (PAH). Benzene represents an aromatic HC present in petrol, with 85% to 90% of benzene emissions emanating from the exhaust and the remainder from evaporative losses. Light-duty petrol vehicles not equipped with pollution control devices have the highest exhaust emissions during acceleration, followed by deceleration, cruising and idling cycles. At higher cruise speeds HC and CO emissions decrease, while NOx and CO_2 emissions increase.	N	Y	Operational Phase	Limited to site	3	3	Medium	Control	All machinery shall be kept in a good working order and serviced regularly to reduce emissions. All diesel driven vehicles operating on public roads shall be listed. Service / maintenance data / annual roadworthy inspections of all vehicles shall be reflected. Visual inspections on vehicles for black smoke shall be undertaken. Vehicles shall be prioritized from oldest vehicles to newest. Vehicles shall be submitted for vehicle emission testing. Contractors undertaking transporting on behalf of the mine shall be requested to provide evidence of their vehicle emission levels compliance or at least proper maintenance on their vehicles.	2	1	Low			Operational and Decommissioning Phase
172			Emissions from diesel-fuelled vehicles include particulate matter, NOx, SO_2, CO and HC, the majority of which occurs from the exhaust.	N	Y	Operational Phase	Limited to site	3	3	Medium	Control		2	1	Low			Operational / Decommissioning and Closure Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT: Impact description	Reversible	Irreplaceable loss	PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated: Probability	Magnitude	Significance	MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated: Probability	Magnitude	Significance	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
173			Dust generation during driving on dirt and gravel roads.	N	Y	Operational Phase	Limited to site	3	3	Medium	Control	Dust suppression to be on gravel and access roads Strict speed limits shall be implemented. This includes speed signs on mine as well as the training of drivers. If there are any complaints with regards to dust pollution, dust samples shall be taken to assess the intensity of such an impact on the applicable complainants' land or residences.	2	2	Low			Operational / Decommissioning and Closure Phase
174		Aircraft transportation	The airport at the mine is associated with the emission released from aircraft, motor vehicles, and aircraft maintenance procedures. An airport is anticipated to contribute to NO_2 health threshold exceedance in its vicinity. The other most significant emissions released include CO_2 and CO. Smaller quantities of VOCs, SO_2, non-methane VOCs, methane, lead, and PM are also associated with these activities.	N	Y	Operational Phase	Local in extent	3	3	Medium	Control	All aircraft and vehicles shall be kept in a good working order and serviced regularly to reduce emissions. Service / maintenance data shall be available on request. . Contractors undertaking transporting on behalf of the mine shall be requested to provide evidence of proper maintenance on their aircraft and vehicles.	2	1	Low			Operational and Decommissioning Phase
175		Operation and storage above ground; There are various diesel, petrol and oil storage tanks above ground on site	There are various diesel, petrol and oil storage tanks above ground that will add to pollutants such as VOCs. When inhaled, TCE may produce the following effect: • Central nervous system depression resulting in general anaesthesia; • Tachypnea; • Many types of cardiac arrhythmias; • Cranial nerve dysfunction; and • Occasionally facial numbness	N	Y	Operational Phase	Local in extent	3	3	Medium	Control	Ensure appropriate ventilation is maintained at the above storage tanks. PPE is to be worn should work be conducted on the storage tanks to protect against the inhalation of the fumes.	2	1	Low			Operational and Decommissioning Phase
176		Maintenance activities underground; Welding and gas cutting; Fire suppression; Washbay operations; Servicing of Equipment; Batching Plant operations (underground)	The generation of fumes and gases from this activity underground may be a safety risk.	Y	Y	Operational Phase	Limited to site	3	3	Medium	Control	Ensure effective operation of the ventilation shafts. The respective and necessary PPE to worn by all employees. Should the detection of fumes and gasses be above allowable limits, all emploees will be removed to an area of safety.	2	2	Low			Operational and Decommissioning Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
177	Noise	Operation of ventilation shafts and passes	Generation of noise from ventilation fans may result in noise pollution.	Y	N	Operational	Limited to site	3	3	Medium	Control	If significant increases in noise levels are identified technological alternatives shall be considered. If complaints of any noise pollution are made, noise levels at the applicable sites shall be measured to assess the intensity of the alleged impact. • These noise levels shall then be interpreted relative to the baseline information already gathered to indicate whether steps would be necessary. The mine's employees, contractors and visitors, shall use the prescribed protective equipment / clothing when and where applicable. This equipment shall be supplied free of charge but shall remain the property of the mine.	2	2	Low			Operational and Decommissioning Phase
178		Underground mining operations	Noise is generated from operating fans and drill rigs may become a nuisance to workers and community.	Y	N	Operational	Limited to site	3	3	Medium	Control		2	2	Low			Operational and Decommissioning Phase
179		Reprocessing activities of Pre-1979 CRD – Wet Infield Screening (WIFS) Operations. Loading and hauling. The re-mining of Red Dumps and Post 80 CRD	Generation of noise from hauling and tramming of material	Y	N	Operational	Limited to site	3	3	Medium	Control / Prevent	Diesel powered vehicles shall be regularly maintained. • Monitoring shall be done, and included on a monitoring schedule. Any obvious increase in the noisiness of any vehicles shall result in that it being scheduled for a maintenance check. • Reports as well as monitoring data shall be kept and analyzed. A good maintenance management scheme shall be implemented to ensure that vehicles are properly maintained thus reducing the occurrence of excessive emissions. If significant increases in noise levels are identified technological alternatives such as silencers shall be considered. All vehicles owned by the mine, operating on public roads shall be submitted for vehicle noise testing. All contractors undertaking transportation on behalf of the mine shall be requested to provide evidence of their vehicles' noise levels compliance. If complaints of any noise pollution are made, noise levels at the applicable sites shall be measured to assess the intensity of the alleged impact. • These noise levels shall then be interpreted relative to the baseline information already gathered to indicate whether steps would be necessary.	3	2	Medium			Operational and Decommissioning Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
180		Constructed plant and associated infrastructure	Generation of noise at the processing plant. Is audible from the villages.	N	N	Operational	Local in extent	3	3	Medium	Control	If significant increases in noise levels are identified technological alternatives shall be considered. If complaints of any noise pollution are made, noise levels at the applicable sites shall be measured to assess the intensity of the alleged impact. • These noise levels shall then be interpreted relative to the baseline information already gathered to indicate whether steps would be necessary.	3	2	Medium			Operational Phase
181		Conveyance activities excluding road activities; Use of skips and conveyors underground and on surface to transport ore	Noise generation as a result of conveyance and transport activities.	Y	N	Operational Phase	Limited to site	3	3	Medium	Control	Diesel powered vehicles shall be regularly maintained. • Monitoring shall be done, and included on a monitoring schedule. Any obvious increase in the noisiness of any vehicles shall result in that it being scheduled for a maintenance check. • Reports as well as monitoring data shall be kept and analyzed. A good maintenance management scheme shall be implemented to ensure that vehicles are properly maintained thus reducing the occurrence of excessive emissions. If significant increases in noise levels are identified technological alternatives such as silencers shall be considered. All vehicles owned by the mine, operating on public roads shall be submitted for vehicle noise testing. All contractors undertaking transportation on behalf of the mine shall be requested to provide evidence of their vehicles' noise levels compliance. If complaints of any noise pollution are made, noise levels at the applicable sites shall be measured to assess the intensity of the alleged impact. • These noise levels shall then be interpreted relative to the baseline information already gathered to indicate whether steps would be necessary.	2	2	Low			Operational and Decommissioning Phase
182		Transportation activities via road	Noise on the mine can be generated by vehicular traffic and earth moving machinery. This includes the transportation of waste to the WAMY, the transportation of all goods and materials on and off the mine, all earth-moving activities, and road maintenance.	Y	N	Operational Phase	Limited to site	3	3	Medium	Control		2	2	Low			Operational and Decommissioning Phase
183		Maintenance activities above ground	Noise generation at above ground workshops may occur during carpentry operations.	Y	N	Operational Phase	Limited to site	3	3	Medium	Control		2	2	Low			Operational and Decommissioning Phase
184	Visual	Reprocessing activities of Pre-1979 CRD – Wet Infield Screening (WIFS) Operations. Loading and hauling. The re-mining of Red Dumps and Post 79 CRD	The reprocessing of the 1979 CRD, Red Dumps and Post-79 CRD will result in an additional change in topography and visual impact.	Y	N	Operational	Local in extent	3	3	Medium	Control	Dust suppression will be undertaken as and where required. Reprocessing of the dumps to be undertaken methodically to prevent long standing visible scars on the respective dumps.	1	2	Low	Prevent / minimise visual intrusions on sensitive receptors	In terms of Government Gazette 39425. Government Notice R.1147 dated 2015 (Financial Provision Regulations) and any amendments thereto	Operational Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
185		Constructed plant and associated infrastructure	The plant and associated infrastructure has changed the local topography and resulted in a visual impact	Y	N	Operational	Local in extent	5	1	Low	Remedy	Limit the use of highly metallic and reflective surfaces on the plant and relating infrastructure. Utilise neutral colours where possible. The plant and associated infrastructure is to be removed and the area rehabilitated during the decommissioning and rehabilitation phase.	3	1	Low		In compliance with the Rehabilitation, Decommissioning- and Closure plans and Closure Objectives.	Operational and Decommissioning Phase
186		Construction and operation of the Brits FRD; Two non-perennial pans were located within the footprint of the Brits FRD. These non perennial water bodies were lost after 2006 once the construction of the FRD commenced. The two non-perennial water bodies were located at the northern (northern pan) and southern (southern pan) ends of the FRD.	The Brits FRDs leads to a change in the topography and creates a visual impact. The Brits FRD walls rise marginally above the surrounding ridgeline in a small section to the north and blend in with the existing WRD.	N	Y	Operational Phase	Local in extent	3	3	Medium	Control	The Brits FRDs will continue be constructed in accordance to the approved designs and footprint areas. Where possible, concurrent rehabilitation of the side walls of the Brits FRDs is to be considered.	3	2	Medium			Operational / Decommissioning and Closure Phase

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187		Main shafts and headgear. This includes transformers, a diesel generator, gearboxes & motors, winder drum and ropes, hydraulic power pack ,braking system, filters, fans, and winches, fire suppression systems, workshop activities, weightometers containing nuclear materials, cage operations	The constructed mine shaft and head gear changes the topography of the landscape. And may result in a visual impact.	Y	N	Operational	Local in extent	3	3	Medium	Control	Limit the use of highly metallic and reflective surfaces on the plant and relating infrastructure. Utilise neutral colours where possible. The plant and associated infrastructure is to be removed and the area rehabilitated during the decommissioning and rehabilitation phase.	2	2	Low			Operational Phase
188		Construction and operation of CRDs	The CRDs lead to a change of the topography. The final height of the post-97 CRD will be 1,598mamsl and will result in a visual impact.	N	Y	Operational Phase	Local in extent	3	3	Medium	Control	The CRD's are be constructed and managed in accordance to the approved designs and footprint areas. Where possible, concurrent rehabilitation of the side walls of the is to be considered.	3	2	Medium			Operational / Decommissioning and Closure Phase
189		General operation and construction of the WAMY	Littering by windblown waste at the WAMY will result in a visual impact.	Y	N	Operational Phase	Limited to site	3	1	Low	Control	Wind-blown waste and litter throughout the mine is to be collected as and when identified to reduce visual impacts and maintain good housekeeping practices. Training and induction of employees with regards to good waste management practices.	2	1	Low			Operational and Decommissioning Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
190	Socio-economic	Underground mining operations	The formation of a mud push or mud rush at the draw point from the breakdown of kimberlite and shale in the presence of water may result in a safety hazard to workers.	N	Y	Operational	Limited to site	3	5	High	Control / Prevent	All employees shall be trained in emergency preparedness prior to commencing with work. All employees will be provided with the correct PPE required to undertake specific activities. All employees will be evacuated from areas where safety concerns are identified.	3	3	Medium	To prevent and / or limit impacts on I&APs and the surrounding community	Continued implementation in compliance with the DMR Guideline for Consultation with communities and Interested and Affected Parties. As required in terms of Sections 16(4)(b) or 27(5)(b) of the Mineral and Petroleum Resources Development Act (Act 28 of 2002), and in accordance with the standard directive for the compilation thereof as published on the official website of the DMR. Continued compliance with the Mine Health and Safety Regulations under the Mine Health and Safety Act (1996); MPRDA, 2002; National Road Traffic Act; Regulations there under and amendments thereto. Implementation also to be in compliance with the mine's internal procedures.	Operational and Decommissioning Phase
191		Underground mining operations	Radiation exposure may occur due to the use of nuclear sources such as weightometers and measuring flasks on skips may present a health hazard to workers.	N	Y	Operational	Limited to site	3	5	High	Control / Prevent	The mine's employees, contractors and visitors, shall use the prescribed protective equipment / clothing when and where applicable. This equipment shall be supplied free of charge but shall remain the property of the mine. No short pants shall be allowed to be worn underground or in the process plant. The provided footwear shall be worn in designated areas. Employees shall take reasonable care to prevent injuries when wearing any other footwear in areas which are not designated safety footwear areas.	3	3	Medium			Operational and Decommissioning Phase
192		Use and storage of explosives	Blasting activities may result structural damage of near-by infrastructure	N	N	Operational Phase	Limited to site and local area	3	5	High	Control / Prevent	All blasting is to be undertaken by a qualified blasting technician. Blasting is to be undertaken in accordance to mines blasting procedure. Should any complaints be received with regards to structural damage, such will be logged as incidents and the result thereof investigated.	3	3	Medium			Operational Phase
193			Use and storage of explosives may result in theft of explosives	N	Y	Operational	Local in extent	3	5	High	Control / Prevent	Explosive waste such as cut off from ignition cords, detonators as well as old, excess or damaged stock shall be transported by a responsible person within the mine where it is destroyed by exploding the waste in an underground area during normal blasting processes. All explosives shall be stored in identifiable red, locked explosive boxes. Old explosive shall not be disposed of as waste. In the event that they are, the appropriate person shall be notified. Explosives shall be placed and locked in relevant marked boxes. Detonators shall not be stored with other explosive components.	3	3	Medium			Operational and Decommissioning Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
194		Storage and transport of explosives. Explosives are stored in the various bunkers at the magazines. Maintenance of the area is carried out according to the Explosives and Hazardous Materials Regulations	Inadequate maintenance of magazines and possible spillage of Anfex may occur. Anfex can cause skin and eye irritation and respiratory problems if inhaled.	N	Y	Operational	Limited to site	2	5	High	Control	The explosives magazine and emulsion silo shall be inspected on a regular basis and maintained where required. Strict access control to these areas is implemented. Emulsion spillages shall be reported and cleaned immediately in accordance to the Explosives Handling Procedure and the correct PPE worn.	2	2	Low		Procedures to be in line with the latest legislation.	Operational and Decommissioning Phase
195		The Open pit has an area of approximately 55ha. The pit bottom is lowered as the underground mining continues.	The pit perimeter will break back over time until it is stable. This may present a safety risk to workers of pit perimeter break-back affecting infrastructure as well as a loss of in-pit storm-capture dams and safety of people and equipment.	N	Y	Operational / Decommissioning Phase	Limited to site	3	4	High	Control	Refer to mitigation measures as presented under Reference Number 2 and 3.	3	3	Medium			Operational / Decommissioning and Closure Phase
196		Construction and operation of the FRDs	FRD wall failure may occur and create safety hazards for the employees and the community.	N	Y	Operational Phase	Local in extent	2	5	High	Prevent	The FRDs are to be inspected, by a qualified engineer, to ensure the integrity thereof. Any signs of potential concern will be repaired immediately.	2	3	Medium			Operational / Decommissioning and Closure Phase
197		Waste separation	The incorrect separation of non-hazardous and hazardous waste at all sources throughout the mine may lead to excess waste transported to Holfontein.	N	Y	Operational Phase	Limited to site	3	1	Low	Control / Prevent	Refer to mitigation measures as presented under Reference Number 125.	2	1	Low			Operational and Decommissioning Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
198		On mine waste management	Incorrect handling, storage & disposal of asbestos waste (old pipes, gaskets, structures) may result in a health hazard to workers and the community.	N	Y	Operational Phase	Local in extent	3	4	High	Prevent	The Environmental Management Section should be contacted for advice before any asbestos waste is handled. A risk assessment must be conducted. Where demolition work is to be conducted for the removal of asbestos a registered asbestos contractor must be used. Asbestos waste should only be handled by trained personnel Asbestos must be handled with great care to prevent people from exposure to fibres. Personnel must use the correct PPE i.e. long gloves, FFP2 dust masks and overalls. The Medical Department should be informed if employees know that they will be handling asbestos. PPE must be disposed of as asbestos waste after use. Personnel must shower and put on fresh clothes before leaving the mine. Asbestos waste must be collected and transported to a safe storage area at the WAMY. The WAMY supervisor must be notified of the asbestos waste. Asbestos waste, where possible, should be kept separate and be sealed in drums or plastic bags. Asbestos waste must be labelled. Old water pipes, sheeting; gaskets should not be broken up or crushed. People handling asbestos waste must be trained to do so. Asbestos waste is removed from site by a registered waste disposal company. Records of asbestos waste removed must be kept.	2	2	Low			Operational and Decommissioning Phase
199			Incorrect storage and handling of medical waste at the medical facilities and transport and disposal of medical waste by the contractor may result in a health hazard to workers and the community.	N	Y	Operational Phase	Local in extent	3	4	High	Prevent	Medical waste, where possible, should be kept separate and be sealed in plastic bags. Medical waste must be labelled. Medical waste is removed from site by a registered hygiene services company and disposed of to a registered medical waste disposal facility. Records of medical waste removed must be kept.	2	2	Low			Operational and Decommissioning Phase

200		Hazardous waste disposal by contractors	Incorrect storage and handling of hazardous waste at the WAMY and transportation of Hazardous waste from the WAMY to Holtfontein or other hazardous waste facility may present health risk to people.	N	Y	Operational Phase	Local in extent	3	4	High	Prevent	All telecons containing general and/or hazardous waste from the outside areas, namely outside training centre, single-quarters, hospitals and FRDs, shall either be transported to the demarcated inside areas or taken to the PPC general landfill site. If a security escort is available, the waste shall be transported directly to the WAMY. All telecons containing general and/or hazardous waste in the inside areas shall be transported to the WAMY. Special transport shall be arranged for the following items: • Items heavier than 50 Kg; • Items of dimensions> 1 m³; • Electrical cable; • Hoist cable; • Conveyor belting; • Batteries; and • Fluorescent tubes. Waste shall not be spilled while the telecom or cassette is in transit or in the process of being offloaded or tipped. The transportation of waste to the WAMY shall take place during normal day shift, working hours. Special arrangements could be made for an additional shift should it be necessary. When weekend work is carried out where waste must be disposed of to the WAMY, the project owner shall make prior arrangements with the WAMY Supervisor to arrange for access and the appropriate offloading of the waste. Waste shall be safely offloaded at the WAMY. Equipment and/or material, identified for salvage purposes shall be safely offloaded to minimise the damage thereof. Cassettes shall be collected and transported from underground to the marshalling yard. Any non-compliance with regards to waste separation in the cassettes from underground shall be reported Cassettes shall be transported from the marshalling yard to the WAMY. The cassettes shall be off loaded and tipped at a designated place after the content has been inspected. Contaminated waste shall be placed in a 210 litre drum, marked for that purpose, before being placed in a cassette or telecom or on a bakkie for transportation to the WAMY. Arrangements shall be made to transport hazardous waste from the marshalling yard separately to the WAMY where possible. If there are large quantities of polluted soil, a telecom or cassette shall be requested and transported to the WAMY. All batteries (dry cell and acid/lead batteries) shall be transported separately to the WAMY as hazardous waste. They shall not be placed in a telecom or cassette with any other waste types. Incorrect transport of batteries can lead to short circuits which may result in explosions and/or fires or the chemicals of wet cell batteries may leak out and contaminated the rest of the waste.	2	2	Low			Operational and Decommissioning Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT: Impact description	Reversible	Irreplaceable loss	PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated: Probability	Magnitude	Significance	MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated: Probability	Magnitude	Significance	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
												Whenever any failed fluorescent tubes, mercury vapour, high-pressure sodium or incandescent lamps are replaced on mine the lamps shall transported intact to the electrical workshop where they will be collected and placed in the correct disposal box or bag for recycling. Incinerator ash shall be sent directly to the contractor or to the WAMY until collected by the contractor as hazardous waste. Safe disposal certificates as issued by the contractor shall be kept on record.						
201		WAMY landfill operations	Disturbance of topsoil, nuisance of odour, flies or other vectors, dust generation or CO_2 and toxic gases generation due to inadequate stabilisation and covering of the landfill.	Y	N	Operational Phase	Limited to site	3	3	Medium	Control	Refer to mitigation measures as presented under Reference Number 166.	2	2	Low			Operational and Decommissioning Phase
202			Nuisance of odour, flies or other vectors.	Y	N	Operational Phase	Limited to site	3	3	Medium	Control		2	2	Low			Operational and Decommissioning Phase
203			Accidental burning of rubber due to cutting of steel or the storage or tyres may start fires.	Y	N	Operational Phase	Limited to site	2	3	Medium	Prevent / Control	If possible the fire shall be extinguished immediately. The incident shall then be reported. If the fire cannot be extinguished, a responsible person shall be contacted. All persons shall be removed. Tyres shall not be land filled as they cannot be compacted and tend to rise up through the waste. Tyres shall be stockpiled and recycled whenever possible. 20m fire breaks are currently established around the town and around the game farms and shall be maintained. Waste tyre should be managed and stockpiled in accordance to the waste tyre abatement plan.	2	2	Low			Operational and Decommissioning Phase
204		On mine waste management	Complete tyre combustion produces CO_2; incomplete tyre combustion release dioxins and noxious gases. Other substances released include VOCs, PAHs, furans, hydrogen chloride, benzene, PCBs arsenic, cadmium, nickel, mercury, zinc, chromium and vanadium.	N	Y	Operational Phase	Limited to site	3	4	High	Prevent / Control		2	4	Medium			Operational and Decommissioning Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
205		On mine waste management	Accidental fires from storage of dry wood chippings.	N	Y	Operational Phase	Limited to site	2	3	Medium	Prevent / Control	Burnt tyres and the remains thereof to be disposed of as hazardous waste. Soil contaminated through tyre combustion to be rehabilitated / disposed of as hazardous waste.	2	2	Low			Operational and Decommissioning Phase
206		Storage of tyres	Accidental burning of rubber due to cutting of steel or the storage or tyres may start fires and result in hazards to the surrounding community.	N	Y	Operational Phase	Limited to site	3	3	Medium	Prevent / Control		2	2	Low			Operational and Decommissioning Phase
207		Underground stores of hazardous chemical materials	Fire can occur which is caused by storage of incompatible reagents in a storage area underground and presents a health and safety hazard to workers.	N	Y	Operational Phase	Limited to site	3	3	Medium	Prevent	If possible the fire shall be extinguished immediately. The incident shall then be reported. If the fire cannot be extinguished, a responsible person shall be contacted. All persons shall be removed. If an early warning device is available and indicates that the CO gas level is increasing or if discomfort from smoke is felt, the self rescuer shall be donned and persons shall proceed to the nearest refuge bay, or a place of safety. Where items are stacked, adequate drip trays shall be made available to contain and confine any potential leaks. Chemical compatibility shall be observed when storing chemicals. Corrosive liquids shall not be stored above eye level. Dry chemicals/powders shall be stored in one section and separated according to type i.e. oxidizing salts such as chlorine powder separated from other dry chemicals. Flammable or combustible liquids (oils, solvents, paints) shall be stored separately or in a separate flammable store. Store rooms containing hazardous substances shall be locked at all times. Only designated personnel shall have access to these areas.	1	2	Low			Operational and Decommissioning Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT: Impact description	Reversible	Irreplaceable loss	PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated: Probability	Magnitude	Significance	MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated: Probability	Magnitude	Significance	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
208			Incorrect storage and operation of explosives at explosive bay underground may cause fire or explosions and presents a health and safety hazard to workers	N	Y	Operational Phase	Limited to site	3	3	Medium	Prevent	Explosive waste such as cut off from ignition cords, detonators as well as old, excess or damaged stock shall be transported by a responsible person within the mine where it is destroyed by exploding the waste in an underground area during normal blasting processes. All explosives shall be stored in identifiable red, locked explosive boxes. Explosives shall be placed and locked in relevant marked boxes. Detonators shall not be stored with other explosive components. All blasting is to be undertaken by a qualified blasting technician. Blasting is to be undertaken in accordance to mines blasting procedure.	1	3	Low			Operational and Decommissioning Phase
209		Maintenance activities underground	Welding and gas cutting as well as the generation of fumes and gases from this activity underground may be a safety risk. This impact is increased if mine employees are not adequately trained, not wearing correct PPE or if fire extinguishers are not in place and correctly working.	N	Y	Operational Phase	Limited to site	3	3	Medium	Prevent / Control	Only trained persons shall use cutting equipment. No cutting shall take place in an unventilated area. Approved welding goggles shall be used by welder as well as any person assisting. In welding and cutting areas butane lighters shall not to be worn on a person or kept in the vicinity of such an area. The mine's employees, contractors and visitors, shall use the prescribed protective equipment / clothing when and where applicable. This equipment shall be supplied free of charge but shall remain the property of the mine. No short pants shall be allowed to be worn underground or in the process plant. The provided footwear shall be worn in designated areas. Employees shall take reasonable care to prevent injuries when wearing any other footwear in areas which are not designated safety footwear areas. When taking off the two piece jacket or when only wearing the overall trousers, employees working underground or working night shift on surface shall wear a shirt or T-shirt with reflective strips/reflective vest.	2	2	Low			Operational and Decommissioning Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
210	Sites of cultural and archaeological importance	Construction and operation of CRDs, FRD's, WRDs and mining related activities	Mining related activities may impact on sites of cultural and archaeological importance	N	Y	Operational Phase	Regional	1	5	Medium	Prevent	All identified sites of cultural and archaeological importance are to be plotted on a map and maintained by the environmental department. No mining or mining related activities are to be undertaken in the direct vicinity the identified sites of cultural and archaeological importance. All employees who may have an influence on the areas are to be trained on the importance of cultural and archaeological importance The disturbance of sites of cultural and archaeological importance may only be undertaken once authorisation from the appropriate competent authority is obtained. Should archaeological artefacts be uncovered during earth works, such activities must cease and the site assessed by a qualified specialist.	1	2	Low	Prevent the destruction of and loss of sites of cultural and archaeological importance.	The management of heritage resources: In compliance with the National Heritage Resources Act (Act No. 25 of 1999), and amendments thereto.	Operational / Decommissioning and Closure Phase

Table 42: Detailed Risk Assessment – Decommissioning Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
1	Soil	Rehabilitation of FRDs, CRDs and WRDs	Lack of stormwater control on the newly top-dressed slopes may result in the soil erosion and the loss of topsoil.	Y	Y	Decommissioning Phase	Limited to site	2	3	Medium	Control / Prevent	Plant cover especially grass shall be maintained. If natural vegetation fails to establish within one growing season the area shall be re-vegetated. Unseasonal veld fires shall be controlled. Stormwater drainage shall be established on all waste rock dumps and rehabilitated areas to prevent erosion which includes the constructions of berms, contours and water channels. In the event of erosion occurring: • The extent and rate of change of soil erosion shall be monitored on all rehabilitation areas. • The FRDs shall be monitored quarterly for erosion. • Erosion gullies shall be stabilised with infill material.	2	2	Low	To limit the impact on soil	In Compliance with the National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GNR.331 of 2014), thereunder. In compliance with the Rehabilitation, Decommissioning- and Closure plans and Closure Objectives. Implementation also to be in compliance with the mine's internal procedures. Procedures to be in line with the latest legislation.	Decommissioning and Closure Phase
2	Soil	Rehabilitation of FRDs, CRDs and WRDs	Increased surface water runoff due to incorrect placement of stormwater control structures e.g. contours or drains around the FRDs, CRDs and WRDs may result in soil erosion.	Y	Y	Decommissioning Phase	Local in extent	2	3	Medium	Control / Prevent		2	2	Low			Decommissioning and Closure Phase
3	Soil	Rehabilitation of FRDs, CRDs and WRDs	Leakages or spillages may occur from earthmoving and construction vehicles during the dismantling and removal of the shaft and plant and associated infrastructure Such leakages and spillages may result in the contamination of soil.	Y	N	Decommissioning Phase	Limited to site	3	3	Medium	Prevent / Control	All vehicles are inspected prior to use. Vehicles and equipment are serviced on a regular basis. In the event of leakages or spillages are identified, the following spillage removal procedure is followed: A bioremediation agent containing ''oil/diesel eating bacteria'' shall be used in the following manner: 1. The excess oil and/or diesel shall be removed as quickly as possible to prevent further penetration into the ground by scooping up excess with shovels. 2. Plastic sheeting shall be used where necessary to divert and pick up the soil. 3. Any excess oil/diesel/chemicals shall be placed into a drum marked for that purpose and sends it to the WAMY. 4. Bioremediation of oil/diesel polluted soil on site shall be done where practicable.	2	2	Low			Decommissioning Phase
4	Soil	Rehabilitation of earth dams	Incorrect disposal of silt and liner that may contain pollutants from the process water may contaminate soil.	Y	N	Decommissioning Phase	Limited to site	3	3	Medium	Prevent / Control	Silt removed during the decommissioning of the process water facilities is to be disposed of onto the FRD's. The liner removed from the process water facilities is to be disposed of appropriately.	2	2	Low			Decommissioning Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
5	Soil	Soil replacement	Removal of topsoil from the topsoil stockpiles may cause the liberation of soil. A total of 60,000m³ topsoil will be removed from the stockpile west of the infill dam. The topsoil on the stockpile east of the infill dam has already been used for the rehabilitation of the northern slope of No. 3 FRD. A total of 22,500m³ topsoil will be removed from the stockpile north of the FRD. The removal and replacement of topsoil may result in soil erosion	N	Y	Decommissioning Phase	Limited to site	3	3	Medium	Control / Prevent	Topsoil shall not be stripped when saturated, as this will exacerbate the damage to the soil structure. To avoid compaction and consequent damage to the soils, equipment movement on the stockpiles shall be limited. Erosion control measures shall be implemented to ensure that the topsoil is not washed away and erosion gullies do not develop in the arable land. Rapid growth of vegetation shall be promoted. Unseasonal veld fires shall be controlled. Stormwater drainage shall be established on all rehabilitated areas to prevent erosion which may include the constructions of berms, contours and water channels.	2	2	Low			Decommissioning Phase
6	Soil	Soil replacement	Leakages or spillages may occur from earthmoving and construction vehicles and machinery used for the removal of soil from the stockpiles and may contaminate the soil.	Y	N	Decommissioning Phase	Limited to site	3	3	Medium	Prevent / Control	Refer to mitigation measures as presented under Reference Number 3 above.	2	1	Low			Decommissioning Phase
7	Soil	General surface rehabilitation	Inadequate placement of topsoil in slopes or the placement of topsoil creating a catena.	Y	N	Decommissioning Phase	Limited to site	3	3	Medium	Control / Prevent	Topsoil to be placed according to the rehabilitation plan to ensure free drainage of areas Topsoiled and rehabilitated areas will be inspected on a regular basis for signs of erosion and surface water ponding. Areas of concern will be reshaped and re-dressed where required.	2	2	Low			Decommissioning and Closure Phase
8	Soil	General surface rehabilitation	Incorrect placement of topsoil on rehabilitation areas may lead to soil compaction, increased runoff and soil erosion.	Y	Y	Decommissioning Phase	Limited to site	3	3	Medium	Control / Prevent		2	2	Low			Decommissioning and Closure Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
9	Soil	Re-establishment of Biodiversity	Replacement of species not adapted to the local conditions may lead to bare areas prone to soil erosion.	Y	N	Decommissioning Phase	Limited to site	3	3	Medium		An approved seed-mix of indigenous plants shall be used in all new rehabilitation programmes on the mine. Consecutive rehabilitation shall be undertaken on areas impacted where rehabilitation has taken place.	1	1	Low			Decommissioning and Closure Phase
10	Soil	Re-establishment of Biodiversity	Potential spillages of herbicides used for the control alien vegetation may result in the contamination of soil.	Y	N	Decommissioning Phase	Limited to site	3	2	Medium	Prevent	Herbicides to be stored as the specification of that specific herbicide Herbicides to only be applied in accordance to the application instructions and specification. Herbicides to be applied by personnel trained to conduct such activities.	2	2	Low			Decommissioning and Closure Phase

11	Soil and land capability	Additional borrow pits	Removal of topsoil will take place for the additional borrow pit. A total of 1 037 500m³ soil will be removed, and may impact on the land capability.	Y	N	Decommissioning Phase	Limited to site	3	3	Medium	Prevent	Rehabilitation of the borrow pit to be undertaken to ensure the pre-disturbance land capability can be restored.	2	2	Low	To restore the land use and land capability to the agreed upon end land use, taking the recommendations of the DMR and municipalities into account.	In terms of Government Gazette 39425. Government Notice R.1147 dated 2015 (Financial Provision Regulations) and any amendments thereto In compliance with the Rehabilitation, Decommissioning- and Closure plans and Closure Objectives. In compliance with principles contained in the MPRDA, 2002, Mine Health and Safety Act, 1996, NEMA, 1998, NEM:WA, 2008, Regulations there under and amendments thereto. Implementation also to be in compliance with the mine's internal procedures. Procedures to be in line with the latest legislation. The continued implementation of requirements contained in the NEM:BA (2004) and the regulations thereunder.	Decommissioning and Closure Phase
12	Ecology	Rehabilitation of FRDs, CRDs and WRDs	Insufficient quantity and quality of growing medium applied to profiled slopes resulting in a decrease in vegetation growth.	Y	N	Decommissioning Phase	Limited to site	3	3	Medium	Prevent	Trials to be undertaken to determine the appropriate growing medium required. Analysis and test of the growth medium to be undertaken to determine fertiliser requirements, if any.	2	2	Low	Prevent the destruction of vegetation and subsequent impacts species of conservation concern and protected species.	Biodiversity management: The continued implementation of requirements contained in:	Decommissioning and Closure Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
13	Ecology	Rehabilitation of FRDs, CRDs and WRDs	Placement of soil during rehabilitation may result in the establishment of alien vegetation.	Y	N	Decommissioning Phase	Limited to site	3	3	Medium	Prevent / Control	Refer to mitigation measures as presented under Reference Number 46 of the operational phase.	2	2	Low	Prevent the destruction of habitats and subsequent impacts on faunal species	The NEM:BA (2004) and the regulations thereunder, the Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector, Environmental Conservation Act, 1989 (Act No 73 of 1989).	Decommissioning and Closure Phase
14	Ecology	Rehabilitation of earth dams	Infertile soil being used for rehabilitation will result in a decrease of vegetation growth.	Y	N	Decommissioning Phase	Limited to site	3	2	Medium	Control	Where vegetation has not re-established within one growing season, soil analysis will be undertaken to determine fertiliser requirements. Redressing of areas will be undertaken where required.	2	2	Low			Decommissioning and Closure Phase
16	Ecology	General surface rehabilitation	Incorrect placement of topsoil on rehabilitation areas may lead to soil compaction and a potential decrease in vegetation growth. The effect of compaction on plant growth and yield depends on the type of vegetation and the environmental conditions that is encountered. In general, under dry conditions some compaction is beneficial, but under wet conditions compaction decreases vegetation.	Y	N	Decommissioning Phase	Limited to site	3	2	Medium	Prevent	Movement of vehicles and personnel on rehabilitated areas is to be limited. Where compaction is identified, the area will be ripped and re-dressed if plant growth is poor	2	1	Low			Decommissioning and Closure Phase
17	Ecology	General surface rehabilitation	Increased surface water run-off due or decrease water infiltration from soil compaction leading to siltation. Siltation can be increased by soil erosion.	N	Y	Decommissioning Phase	Local in extent	3	3	Medium	Prevent / Remedy	Erosion features will be repaired immediately, the area reshaped and re-dressed.	2	2	Low			Decommissioning and Closure Phase
18	Ecology	General surface rehabilitation	Inadequate or no application of fertiliser and/or organic material into the soil used for rehabilitation may inhibit the growth of vegetation	Y	N	Decommissioning Phase	Limited to site	3	3	Medium	Prevent / Remedy	Should vegetation not re-stablish within one growing season, soil analysis is to be undertaken to determine fertiliser requirements, if any.	1	2	Low			Decommissioning and Closure Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
19	Ecology	General surface rehabilitation	Invasive plant might be established. This may lead to: • Displacement of indigenous vegetation. • Change in plant species composition. • Change in vegetation composition and structure. • Competition for sunlight and 'living space' will increase between indigenous and alien species. • Competition for water and minerals between alien and indigenous vegetation. • Change in plant-pollinator composition. • Loss of habitat • Change in flammability of existing vegetation structure – pending the introduction of the alien species. • The spread of alien vegetation in areas previously free from such species causing a change in biodiversity.	Y	N	Decommissioning Phase	Limited to site	3	3	Medium	Control / Prevent	Refer to mitigation measures as presented under Reference Number 45 of the operational phase.	2	2	Low			Decommissioning and Closure Phase
20	Ecology	General surface rehabilitation	Increased surface water runoff due to incorrect placement of stormwater control structures around the rehabilitation areas may result in soil erosion and increased siltation. This in turn may have an impact on aquatic vegetation and animal life.	Y	N	Decommissioning Phase	Local in extent	3	3	Medium	Prevent	Rehabilitation to be undertaken to ensure free draining. Where require, additional storm water management structures will be implemented.	1	2	Low			Decommissioning Phase
21	Ecology	Re-establishment of Biodiversity	Replacement of species not adapted to the local conditions may result in a decrease in vegetation establishment.	Y	N	Decommissioning Phase	Limited to site	3	3	Medium	Prevent	Topsoil and young/small vegetation shall be stripped together on all areas earmarked for new development to ensure the seedbed is maintained to facilitate with rehabilitation. An approved seed-mix of indigenous plants shall be used in all new rehabilitation programmes on the mine. Consecutive rehabilitation shall be undertaken on areas impacted where rehabilitation has taken place.	2	2	Low			Decommissioning and Closure Phase
22	Surface water	Rehabilitation of FRDs, CRDs and WRDs	Increased surface water run-off due to decrease water infiltration as a result of soil compaction	Y	Y	Decommissioning Phase	Local in extent	3	3	Medium	Control.	Movement of vehicles and personnel on rehabilitated areas is to be limited. Where compaction is identified, the area will be ripped and re-dressed if needed for vegetation establishment. Erosion features will be repaired immediately, the area reshaped and re-dressed.	1	2	Low	To prevent quality deterioration of surface water quality and prevent impact on catchment yield k	Surface water management: In line with the DWS Best Practice Guidelines, to prevent and minimise impacts and to ensure the	Decommissioning and Closure Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT: Impact description	POTENTIAL IMPACT: Reversible	POTENTIAL IMPACT: Irreplaceable loss	PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated: Probability	SIGNIFICANCE if not mitigated: Magnitude	SIGNIFICANCE if not mitigated: Significance	MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated: Probability	SIGNIFICANCE If mitigated: Magnitude	SIGNIFICANCE If mitigated: Significance	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
23	Surface water	Rehabilitation of FRDs, CRDs and WRDs	Ponding of water due to incorrect profiling of rehabilitation areas.	Y	N	Decommissioning Phase	Local in extent	3	3	Medium	Control / Prevent	Topsoil to be placed to ensure free drainage. Topsoiled and rehabilitated areas will be inspected on a regular basis for signs of erosion and surface water ponding. Areas of concern will be reshaped and re-dressed where required.	2	2	Low		separation of clean and dirty water management areas; GN704, dated 1999; the NWA (1998) and Regulations there under and amendments thereto; the storm water management plan and / or amendments thereto; specialist recommendations; and the IWUL conditions (once issued). Implementation also to be in compliance with the mine's internal procedures. Procedures to be in line with the latest legislation.	Decommissioning and Closure Phase
24	Surface water	Rehabilitation of earth dams	Incorrect sloping of the earth dam walls leading to surface water runoff and siltation.	N	Y	Decommissioning Phase	Local in extent	2	4	Medium	Prevent	All rehabilitated areas will be sloped to be free draining. Reshaped areas will mimic the surrounding environment. Steep slopes will be avoided where possible.	1	2	Low			Decommissioning and Closure Phase
25	Surface water	Open pit	Surface water runoff into the pit in the event of incorrect construction of stormwater berms may result in a decrease of catchment yield.	Y	N	Decommissioning Phase	Local in extent	2	4	Medium	Prevent	An earth berm is to berm established around the open pit. Regular inspection and maintenance of the berm is to be undertaken until closure is obtained.	2	2	Low			Decommissioning and Closure Phase
26	Surface water	Soil replacement	Surface water runoff on the topsoil stockpile may occur during the liberation of the soil,.	Y	Y	Decommissioning Phase	Limited to site	3	2	Medium	Prevent	Increase in runoff from the topsoil stockpiles will be avoided through dozing and tripping practices.	2	1	Low			Decommissioning Phase
27	Surface water	General surface rehabilitation	Ponding of water due to incorrect sloping of rehabilitation areas thereby decreasing the catchment yield.	Y	N	Decommissioning Phase	Local in extent	2	3	Medium	Control / Prevent	Topsoil to be placed to ensure free drainage. Topsoiled and rehabilitated areas will be inspected on a regular basis for signs of erosion and surface water ponding. Areas of concern will be reshaped and re-dressed where required.	1	1	Low			Decommissioning and Closure Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
28	Surface water	General surface rehabilitation	Increased surface water runoff due to incorrect placement of stormwater control structures around the rehabilitation areas may result in soil erosion and increased siltation.	N	Y	Decommissioning Phase	Local in extent	3	3	Medium	Prevent	storm water control measures to be established on rehabilitated areas to ensure free draining of these areas without causing erosion.	1	2	Low			Decommissioning and Closure Phase
29	Surface and groundwater	Rehabilitation of FRDs, CRDs and WRDs	Leakages or spillages may occur from earthmoving and construction vehicles during the dismantling and removal of the shaft and plant and associated infrastructure. Such leakages and spillages may result in the contamination of surface and groundwater resources	N	Y	Decommissioning Phase	Local in extent	3	3	Medium	Prevent / Control	Refer to mitigation measures as presented under Reference Number 3 above.	2	1	Low			Decommissioning Phase
30	Surface and groundwater	Rehabilitation of earth dams	Incorrect disposal of silt and liner that may contain pollutants from the process water may contaminate surface and groundwater resources.	N	Y	Decommissioning Phase	Local in extent	3	3	Medium	Prevent / Control	Refer to mitigation measures as presented under Reference Number 4 above.	2	2	Low			Decommissioning Phase
31	Surface and groundwater	Soil replacement	Leakages or spillages may occur from earthmoving and construction vehicles and machinery used for the removal of soil from the stockpiles and may contaminate surface and groundwater resources.	N	Y	Decommissioning Phase	Local in extent	2	3	Medium	Prevent / Control	Refer to mitigation measures as presented under Reference Number 3 above.	1	1	Low			Decommissioning Phase
32	Surface and groundwater	General surface rehabilitation	Leaching of minerals due to incorrect application of fertilisers into topsoil, used for rehabilitation of disturbed areas, may result in the contamination of surface and groundwater resources.	N	Y	Decommissioning Phase	Local in extent	3	3	Medium	Prevent	Should vegetation not re-stablish within one growing season, soil analysis is to be undertaken to determine fertiliser requirements, if any. Fertiliser to only be applied in accordance to the application instructions and specification of the rehab plan or specialist instruction Fertiliser to be applied by personnel trained to conduct such activities.	1	2	Low			Decommissioning and Closure Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
33	Surface and groundwater	Re-establishment of Biodiversity	Potential spillages of herbicides used for the control alien vegetation may result in the contamination of surface and ground water.	N	Y	Decommissioning Phase	Local in extent	3	3	Medium	Prevent	Herbicides to be stored as per specification of that specific herbicide Herbicides to only be applied in accordance to the application instructions and specification. Herbicides to be applied by personnel trained to conduct such activities.	1	2	Low			Decommissioning and Closure Phase
34	Air quality	Soil replacement	Dust may be generated at the topsoil stockpile during removal of the soil.	N	Y	Decommissioning Phase	Limited to site	3	2	Medium	Control	Removal of vegetation cover shall be kept to a minimum. Open areas shall be kept to a minimum. In the case of project-related areas, such areas shall be re-vegetated as soon as is practically possible to reduce the amount of open areas exposed to wind erosion. Limited dust generating activities will be taken on windy days. If dust pollution levels exceed the relevant requirements as described under the NEMAQA and the Mine Health and Safety Act, dust shall be managed by means of a water bowser and the implementation of lower speed limits on the mine's roads. Strict speed limits shall be implemented. This includes speed signs on mine as well as the training of drivers.	2	1	Low	Prevent the generation of dust and indirect effects on floral, faunal and human health	Air quality management in accordance with the National Environmental Management: Air Quality Act (Act No 39 of 2004); Regulations there under and amendments thereto. Emergency preparedness and response in compliance with the	Decommissioning Phase
35	Air quality	Dismantling of the shafts, Plant areas, associated infrastructure and additional buildings / infrastructure	Dust may be generated during the dismantling and removal of the shaft and plant and associated infrastructure	N	Y	Decommissioning Phase	Local in extent	3	2	Medium	Control		2	1	Low			Decommissioning Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
36	Air quality	Rehabilitation of disturbed areas by profiling, ripping and topdressing& overseeding where necessary	Dust generated by rehabilitation earthworks	N	Y	Decommissioning Phase	Limited to site	3	2	Medium	Control / Prevent	If there are any complaints with regards to dust pollution, dust samples shall be taken to assess the intensity of such an impact on the applicable complainants' land or residences. Dust suppression methods for the WRDs shall be undertaken if required.	2	1	Low		compliance with the Mine Health and Safety Regulations under the Mine Health and Safety Act (1996); MPRDA, 2002; NEMA; 1998 and NWA; 1998 and the National Veld and Forest Fire Act, 1998 (Act No 101 of 1998), (and regulations there under), and amendments thereto. Implementation also to be in compliance with the mine's internal procedures. Procedures to be in line with the latest legislation.	Decommissioning Phase
37	Noise	Dismantling of the shafts, Plant areas, associated infrastructure and additional buildings / infrastructure	Noise generated during the dismantling and removal of the shaft and plant and associated infrastructure may result in nuisance to the community.	Y	N	Decommissioning Phase	Limited to site	3	3	Medium	Control	Diesel powered vehicles shall be regularly maintained. • Monitoring shall be done, and included on a monitoring schedule. Any obvious increase in the noisiness of any vehicles shall result in that it being scheduled for a maintenance check. • Reports as well as monitoring data shall be kept and analyzed.	2	1	Low	Prevent and mitigate against the effects of noise on sensitive receptors (including employees and surrounding communities and towns).	In accordance with relevant sections of the National Environmental Management: Air Quality Act (Act No 39 of 2004); Regulations	Decommissioning Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
38	Noise	Rehabilitation of disturbed areas by profiling, ripping and topdressing& overseeding where necessary	Noise generation from earthmoving equipment may result in a nuisance to the community	Y	N	Decommissioning Phase	Limited to site	3	3	Medium	Control	A good maintenance management scheme shall be implemented to ensure that vehicles are properly maintained thus reducing the occurrence of excessive emissions. If significant increases in noise levels are identified technological alternatives such as silencers shall be considered. All vehicles owned by the mine, operating on public roads shall be submitted for vehicle noise testing. All contractors undertaking transportation on behalf of the mine shall be requested to provide evidence of their vehicles' noise levels compliance. If complaints of any noise pollution are made, noise levels at the applicable sites shall be measured to assess the intensity of the alleged impact. • These noise levels shall then be interpreted relative to the baseline information already gathered to indicate whether steps would be necessary.	2	2	Low		there under and amendments thereto SABS Code of Practice 0103 of 2008: The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication. SABS Code of Practice 0328 of 2008: Environmental Noise Impact Assessments	Decommissioning Phase
39	Visual	Rehabilitation of FRDs, CRDs and WRDs	Incorrect profiling of the rehabilitation areas will result in the deviation from the natural topography, resulting in a visual intrusion	Y	N	Decommissioning Phase	Local in extent	2	4	Medium	Prevent	All rehabilitated areas will be sloped to be free draining. Reshaped areas will mimic the surrounding environment. Steep slopes will be avoided where possible. Topsoiled and rehabilitated areas will be inspected on a regular basis for signs of erosion and surface water ponding. Areas of concern will be reshaped and re-dressed where required.	1	2	Low	Prevent / minimise visual intrusions on sensitive receptors	In terms of Government Gazette 39425. Government Notice R.1147 dated 2015 (Financial Provision Regulations) and any amendments thereto	Decommissioning and Closure Phase
40	Visual	Additional borrow pits	Additional borrow pits for topsoil will lead to a void in the topography and create a visual intrusion..	Y	N	Decommissioning Phase	Local in extent	3	3	Medium	Prevent	Closure objectives with regards to the additional borrow pits should be determined. Rehabilitation of the additional borrow pit to be undertaken to ensure the pre-disturbance land capability can be restored and no scar remains post-closure.	2	2	Low		In compliance with the Rehabilitation, Decommissioning- and Closure plans and Closure Objectives.	Decommissioning and Closure Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
41	Visual	General surface rehabilitation	Incorrect sloping of the rehabilitation areas will result in the topography remaining changed from natural topography and a continued visual intrusion.	Y	N	Decommissioning Phase	Local in extent	3	3	Medium	Prevent	All rehabilitated areas will be sloped to be free draining. Reshaped areas will mimic the surrounding environment, where possible Steep slopes will be avoided where possible. Topsoiled and rehabilitated areas will be inspected on a regular basis for signs of erosion and surface water ponding. Areas of concern will be reshaped and re-dressed where required.	1	2	Low			Decommissioning and Closure Phase
42	Visual	General surface rehabilitation	Inadequate removal of heaps of excess material from rehabilitation areas will result in a continued visual intrusion.	Y	N	Decommissioning Phase	Local in extent	3	3	Medium	Prevent	All disturbed areas will be rehabilitated. All heaps of excess material will be removed and the area rehabilitated. Regular inspections to be undertaken to determine any areas available for rehabilitation.	2	2	Low			Decommissioning and Closure Phase
43	Visual	Dismantling of the shafts, Plant areas, associated infrastructure and additional buildings / infrastructure	The inadequate dismantling of steel structures from the shaft and plant will result in a continued visual intrusion post closure.	Y	N	Decommissioning Phase	Local in extent	2	4	Medium	Prevent	Dismantling of the shaft, plant and supporting infrastructure to be undertaken in such a manner so as to ensure that: • Rehabilitation and closure objectives are met; • The visual intrusion of the mine is reduced; • No redundant infrastructure remains on surface; and • The area can be deemed as safe after closure.	1	1	Low			Decommissioning and Closure Phase
44	Socio-economic	Open pit	Unauthorised access to open pit if a Enviro berm is not erected around the pit or not correctly erected around the pit, and may result in a safety and health risk to the community	Y	Y	Decommissioning Phase	Local in extent	2	4	Medium	Prevent	An earth berm is to be established around the open pit. Regular inspection and maintenance of the berm is to be undertaken until closure is obtained.	2	2	Low			Decommissioning and Closure Phase
45	Socio-economic	Dismantling of the shafts, Plant areas, associated infrastructure and additional buildings / infrastructure	The inadequate dismantling of steel structures from the shaft and plant may result in safety and health risks to the community.	Y	Y	Decommissioning Phase	Limited to site	2	4	Medium	Prevent	All steel structure are to be dismantled in such a manner as to prevent safety and health risks to the community. Security and access control to be maintained at areas of dismantling, decommissioning and rehabilitation.	1	2	Low			Decommissioning and Closure Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
46	Socio-economic	Dismantling of the shafts, Plant areas, associated infrastructure and additional buildings / infrastructure	Incorrect identification of risks whilst dismantling steel structures from the shaft and plant may result in safety and health risks to the community.	Y	Y	Decommissioning Phase	Limited to site	2	4	Medium	Prevent	Security and access control to be maintained at areas of dismantling, decommissioning and rehabilitation. All risks associated with the dismantling of the shaft and plant are to identified and assess prior to the commencement thereof	1	2	Low			Decommissioning Phase
47	Socio-economic	Dismantling of the shafts, Plant areas, associated infrastructure and additional buildings / infrastructure	Incorrect sealing/plugging of the shaft may result in safety and health risks to the community.	Y	Y	Decommissioning Phase	Limited to site	2	4	Medium	Prevent	Sealing and plugging of the shaft to be undertaken in accordance to designs and legal requirements. The sealing and plugging of the shaft will be undertaken in the presence of an approved civil engineer	2	2	Low			Decommissioning and Closure Phase

7.6 Methodology used in determining and ranking potential environmental impacts and risks

In terms of section 16(3)(b) of the Environmental Impact Assessment (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) of the Regulations. The Department of Mineral Resources (DMR) therefore instructed 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, the template provided by the Competent Authority.

It is the purpose of this section to provide the Competent Authority with the detail associated with the impact assessment table template below and included into the various sections of the EIAR / EMPr. As per the introduction of this document, this EMPr amendment will not increase the level or nature of the impacts, which were initially assessed and considered when the applications were made for environmental authorisation. There, the risks and impacts (including associated impact levels) as per the approved EMPr (dated 2012) have been used to compile the risk assessment included in this EMPr amendment.

The following table and column headings (shown in Table 43 below), form part of the risk assessment table template, which takes into account the DMR's EIAR / EMPr template.

For ease of reference, the various table columns, as required by the DMR, have been incorporated into one integrated risk assessment table, as is presented in Table 43 below.

7.6.1 Risk assessment table template in relation to the requirements as per the DMR report template

Table 43: Risk assessment table template in relation to the requirements as per the DMR report template and table content[37]

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated				MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversibility[38]	Irreplaceable loss[39]			Probability	Magnitude	Significance				Probability	Magnitude	Significance			
For referencing purposes	As required in the following sections of the DMR EIAR / EMPr template: • Section 3(i) of Part A • Section 1 (e) of Part B	As required in the following sections of the DMR EIAR / EMPr template: • Section 3(g) (v) of Part A • Section 3(i) of Part A • Section 1(d) (ix) of Part B • Section 1 (e) of Part B • Section 1 (f) of Part B	As required in the following sections of the DMR EIAR / EMPr template: • Section 3(g) (v) of Part A • Section 3(i) of Part A • Section 1 (e) of Part B • Section 1 (f) of Part B			As required in the following sections of the DMR EIAR / EMPr template: • Section 3(i) of Part A • Section 1 (e) of Part B	As required in the following sections of the DMR EIAR / EMPr template: • Section 1(d) (ix) of Part B.	As required in the following sections of the DMR EIAR / EMPr template: • Section 3(g) (v) of Part A • Section 3(i) of Part A This also takes *Duration* into account				As required in the following sections of the DMR EIAR / EMPr template: • Section 3(g) (v) of Part A • Section 3(i) of Part A • Section 1 (e) of Part B • Section 1 (f) of Part B	As required in the following sections of the DMR EIAR / EMPr template: • Section 1(d) (ix) of Part B	As required in the following sections of the DMR EIAR / EMPr template: • Section 3(g) (v) of Part A • Section 3(i) of Part A This also takes *Duration* into account			As required in the following sections of the DMR EIAR / EMPr template: • Section 1 (e) of Part B	As required in the following sections of the DMR EIAR / EMPr template: • Section 1(d) (ix) of Part B. • Section 1 (f) of Part B	As required in the following sections of the DMR EIAR / EMPr template: • Section 1(d) (ix) of Part B. • Section 1 (f) of Part B

[37] Headings of tables in Section 5 relate to the *phase of the operation in which the activity will take place* (as required in Section 1 (ix) of Part B of the DMR EIAR / EMPr template)

[38] L = Low, M = Medium, H = High

[39] L = Low, M = Medium, H = High

The environmental risk of any aspect is determined by a combination of parameters associated with the impact. Each parameter connects the physical characteristics of an impact to a quantifiable value to rate the environmental risk.

Impact assessments should be conducted based on a methodology that includes the following:

- Clear processes for impact identification, predication and evaluation.
- Specification of the impact identification techniques.
- Criteria to evaluate the significance of impacts.
- Design of mitigation measures to lessen impacts.
- Definition of the different types of impacts (indirect, direct or cumulative).
- Specification of uncertainties.

After all impacts have been identified, the nature and scale of each impact can be predicted. The impact prediction will take into account physical, biological, socio-economic and cultural information and will then estimate the likely parameters and characteristics of the impacts. The impact prediction will aim to provide a basis from which the significance of each impact can be determined, and appropriate mitigation measures can be developed.

The risk assessment methodology is based on defining and understanding the three basic components of the risk, i.e. the source of the risk, the pathway and the target that experiences the risk (receptor). Refer to Figure 26 below for a model representing the above principle (as contained in the DWA's Best Practice Guideline: G4 – Impact Prediction.

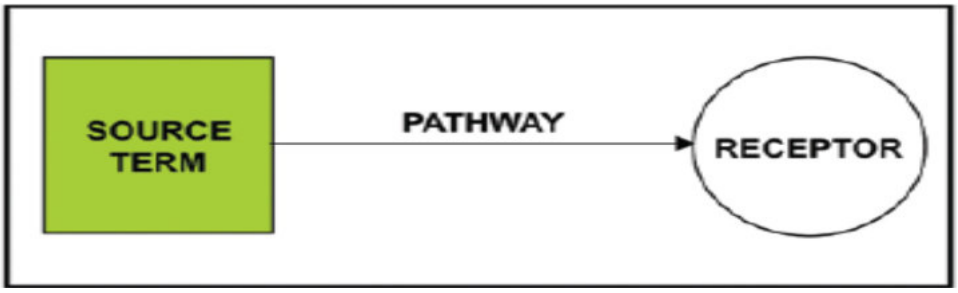

Figure 26: Impact prediction model

Table 44 and Table 45 below indicate the methodology to be used in order to assess the Probability and Magnitude of the impact, respectively, and Table 46 provides the Risk Matrix that will be used to plot the Probability against the Magnitude in order to determine the Severity of the impact.

Table 44: Determination of Probability of impact

SCORE	FREQUENCY OF ASPECT / UNWANTED EVENT	AVAILABILITY OF PATHWAY FROM THE SOURCE TO THE RECEPTOR	AVAILABILITY OF RECEPTOR
1	Never known to have happened, but may happen	A pathway to allow for the impact to occur is never available	The receptor is never available
2	Known to happen in industry	A pathway to allow for the impact to occur is almost never available	The receptor is almost never available
3	< once a year	A pathway to allow for the impact to occur is sometimes available	The receptor is sometimes available
4	Once per year to up to once per month	A pathway to allow for the impact to occur is almost always available	The receptor is almost always available
5	Once a month - Continuous	A pathway to allow for the impact to occur is always available	The receptor is always available

***Step 1**: Determine the **PROBABILITY** of the impact by calculating the average between the Frequency of the Aspect, the Availability of a pathway to the receptor and the availability of the receptor.*

Table 45: Determination of Magnitude of impact

Score	SOURCE				RECEPTOR	
	Duration of impact	**Extent**	**Volume / Quantity / Intensity**	**Toxicity / Destruction Effect**	**Reversibility**	**Sensitivity of environmental component**
1	Lasting days to a month	Effect limited to the site. (metres);	Very small quantities / volumes / intensity (e.g. < 50L or < 1Ha)	Non-toxic (e.g. water) / Very low potential to create damage or destruction to the environment	Bio-physical and/or social functions and/or processes will remain unaltered.	Current environmental component(s) are largely disturbed from the natural state. Receptor of low significance / sensitivity
2	Lasting 1 month to 1 year	Effect limited to the activity and its immediate surroundings. (tens of metres)	Small quantities / volumes / intensity (e.g. 50L to 210L or 1Ha to 5Ha)	Slightly toxic / Harmful (e.g. diluted brine) / Low potential to create damage or destruction to the environment	Bio-physical and/or social functions and/or processes might be negligibly altered or enhanced / Still reversible	Current environmental component(s) are moderately disturbed from the natural state. No environmentally sensitive components.
3	Lasting 1 – 5 years	Impacts on extended area beyond site boundary (hundreds of metres)	Moderate quantities / volumes / intensity (e.g. > 210 L < 5000L or 5 – 8Ha)	Moderately toxic (e.g. slimes) Potential to create damage or destruction to the environment	Bio-physical and/or social functions and/or processes might be notably altered or enhanced / Partially reversible	Current environmental component(s) are a mix of disturbed and undisturbed areas. Area with some environmental sensitivity (scarce / valuable environment etc.).
4	Lasting 5 years to Life of Organisation	Impact on local scale / adjacent sites (km's)	Very large quantities / volumes / intensity (e.g. 5000 L –	Toxic (e.g. diesel & Sodium Hydroxide)	Bio-physical and/or social functions and/or processes might be considerably	Current environmental component(s) are in a natural state.

Score	SOURCE				RECEPTOR	
	Duration of impact	**Extent**	**Volume / Quantity / Intensity**	**Toxicity / Destruction Effect**	**Reversibility**	**Sensitivity of environmental component**
			10 000L or 8Ha–12Ha)		altered or enhanced / potentially irreversible	Environmentally sensitive environment / receptor (endangered species / habitats etc.).
5	Beyond life of Organisation / Permanent impacts	Extends widely (nationally or globally)	Very large quantities / volumes / intensity (e.g. > 10 000 L or > 12Ha)	Highly toxic (e.g. arsenic or TCE)	Bio-physical and/or social functions and/or processes might be severely/substantially altered or enhanced / Irreversible	Current environmental component(s) are in a pristine natural state. Highly Sensitive area (endangered species, protected habitats etc.)

*Step 2: Determine the **MAGNITUDE** of the impact by calculating the average of the factors above.*

Table 46: Determination of Severity of impact

ENVIRONMENTAL IMPACT RATING / PRIORITY					
SEVERITY	**MAGNITUDE**				
PROBABILITY	**1** **Minor**	**2** **Low**	**3** **Medium**	**4** **High**	**5** **Major**
5 **Almost Certain**	Low	Medium	High	High	High
4 **Likely**	Low	Medium	High	High	High
3 **Possible**	Low	Medium	Medium	High	High
2 **Unlikely**	Low	Low	Medium	Medium	High
1 **Rare**	Low	Low	Low	Medium	Medium

*Step 3: Determine the **SEVERITY** of the impact by plotting the averages that were obtained above for Probability and Magnitude*

7.6.2 The need to review the initial site layout

Petra Diamonds (Pty) Ltd. purchased the mine as a fully-staffed, operating mine from De Beers on 14 September 2011. Therefore, the Finsch Diamond Mine is an existing mine and a review of the initial site layout is not considered as part of this EMPr amendment.

7.7 Positive and negatives that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and community affected.

Please refer to section on “The need to review the initial site layout” above.

7.8 Possible mitigation measures that could be applied and the level of risk

Table 47 below provides a summary of the issues and concerns as raised by affected parties and an assessment 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.

Table 47: Summary of issues and concerns raised by I&APs

Concerns / Comments	Mitigation measures or site alternative
Refer to Section 7.3 (Part A)	

This table will be finalised subsequent to the public review period and prior to submission of the final EIAR / EMPr to DMR.

7.9 Motivation where no alternative sites were considered

Petra Diamonds (Pty) Ltd. purchased the mine as a fully-staffed, operating mine from De Beers on 14 September 2011. Therefore, the Finsch Diamond Mine is an existing mine and no alternative sites are considered as part of this EMPr amendment.

7.10 Statement motivating the alternative development location within overall site

No alternative development location is applicable, with the mine being an existing mine, and no new developments are considered as part of this EMPr amendment.

8. 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.

All impacts and risks as identified are contained within Part 7.5. As further provided is 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. The methodology applied in assessing and ranking the impacts and risks on the preferred site and associated preferred alternatives is described in Part 7.6.

9. Assessment of each identified potentially significant impact and risk

Refer to the full risk assessment and mitigation measures table provided in Section 7.5 (Part A) above.

10. Summary of specialist reports

List of specialist studies	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report (Mark with an X where applicable)	Reference to applicable section of report where specialist recommendations have been included
Groundwater assessment	All recommendations and mitigation / management measures contained in specialist reports contained in Annexure C, Annexure G, Annexure I and Annexure J, have been included in Section 7.5 (Part A) of this report.	X	Section 7.5 (Part A)
Storm water management plan		X	Section 7.5 (Part A)
Updated cultural heritage assessment		X	Section 7.5 (Part A)
Waste characterisation		X	Section 7.5 (Part A)
Environmental Noise monitoring		X	Section 7.5 (Part A)
Closure Plan		X	Section 7.5 (Part A)
Rehabilitation Plan		X	Section 7.5 (Part A)

11. Environmental Impact Statement

11.1 Summary of the key findings of the environmental impact assessment

A detailed description of the methodology utilised to determining the environmental impacts and their respective probability, magnitude and severity is provided in Section 7.6 above.

Significant environmental impacts

During the risk assessment process, it was found that the operations at Finsch Diamond Mine would result in a number of impacts with a “High” severity rating, and these impacts include impacts on geology, soil, surface and groundwater, air quality, and socio-economic aspects (mine closure and hazards to the community). The impact on geology will be permanent in nature and is inevitable consequence of mining. The impact will however be local (within Mining Rights area) and control mechanisms (to limit the disturbance of geological strata) will be implemented.

Surface water may be impacted upon as a result of spillages from both hazardous materials and chemicals as well leaks and potential failures associated with affected and process water management systems. Similarly, surface water resources may be impacted on as a result of possible leaks and failures associated with the operation and maintenance of the Waste Water Care Works (including any conservancy tanks associated thereto). The inadequate handling, storage and use of explosives (including emulsion) as well as any explosive waste may impact on surface water resources. Due to the arid environment, additional impacts on surface water (as resource) may result from the inadequate use, recovery and recycling of affected and process water. Such would result in Finsch Diamond Mine utilising additional potable water, in support of process water, at the plant.

Impacts on groundwater include the contamination of groundwater resources as well as the depletion of groundwater (as a result of pumping activities). The contamination of groundwater can occur as a result of spillages of hazardous materials and chemicals both on the surface as well as in the underground workings. Contamination may further occur from the inadequate operation and management of wastes (including hazardous waste) at the WAMY and the landfill sites, and the incorrect disposal of waste at such sites. Groundwater contamination may further occur as a result of the development and migration of the pollution as a result of seepage from the FRD’s, CRD’s and the WRDs. Continued groundwater abstraction from the open pit has further resulted in the development of a cone of depression (groundwater sink) and may affect the groundwater availability for adjacent groundwater users.

Potentially harmful emissions and pollutants may be generated in the underground workings as a result of blasting and drilling operations, and diesel-powered vehicles working underground. These emissions will in return be released into the atmosphere from the ventilation shaft as a result of the removal of stale air from the underground workings. The impact is likely to be local to regional extent, however, control measures and monitoring programmes will be implemented to determine the quality of the air being released.

During the risk assessment process, it was further determined that impacts with a “High" severity rating are likely to occur on socio-economic aspects. Such impacts include health and safety risks to employees, structural damage as a result of any blasting activities, use and storage of explosives and emulsion, break-back of the open pit, possible failure of the FRD’s, incorrect handling, storage and disposal of waste (e.g. general, hazardous, medical) and safety risk to the community as a result of incorrect decommissioning, removal of infrastructure and rehabilitation.

Several other impacts on the bio-physical and socio-economic environment have been identified and assessed, and include impacts on the following:

a) Soil.
b) Flora and fauna.
c) Sensitive landscapes.
d) Air quality.
e) Noise.
f) Visual aspects.

Refer also to Section 11.3 below for a summary of the negative and positive environmental impacts, after mitigation.

Concerns raised by I&APs

Because of the fact that Shangoni has no interest in this activity other than the fair remuneration for the work done by it and the fact that payment for the work done by Shangoni is not subject to a positive outcome of the application, no circumstances exist that may compromise the objectivity of the EAP (as required per the definition of “independence”).

Due attention and consideration have been placed to consider the inputs from I&AP’s within this EMPr amendment, and the comments/concerns received from I&AP’s are highly regarded for the value and merit in compiling of this EMPr amendment. Section 7.3 above provides a summary of the comment as received during the public participation as well as a reference to where the comments have been incorporated into the document.

11.2 Final Site Map

Refer to Figure 2 in Section 3 above, as well as Annexure A.

11.3 Summary of the positive and negative implications and risks of the proposed activity and identified alternatives

Table 48: Summary of negative and positive environmental impacts, post-mitigation, associated with the operation phase.

ASPECTS AFFECTED	Summary of the potential impact	Significance - Post-mitigation
Geology	Loss of geological structures Depletion of the ore body and a certain amount of country rock.	Low
	Geological instability	High
Geology and Topography	The pit perimeter will break back over time until it is stable	High
Soil	Spillages and leakages of hydrocarbons and hazardous chemicals (solvents, paints) may result in impacts on soil.	Low
	Leakages or spillages may occur from earthmoving vehicles and machinery used for the re-mining of the residue deposits may result in soil pollution.	Low
	The rehabilitation trials of WRDs using composted garden waste, wood chippings and sewage sludge will improve the physical properties and fertility of soil.	Positive
	Soil has been removed due to the footprint of the plant and has resulted in a loss of soil	Low
	The non-availability of material safety data sheets (MSDSs) and inadequate training of personnel may further increase the risk of spillages and leakages of hazardous substances.	Low
	Fine residue spillages from pumping activities on the rehabilitated WRD may result in soil pollution	Medium
	Ineffective water management and rehabilitation practices on the sidewalls may occur and result in soil erosion.	Medium
	Wind erosion of the FRD takes place when the surfaces are dry. Contamination of the surrounding environment with kimberlite FRD may further occur	Medium
	The CRDs cover Hutton and Mispah soil types which have not been removed prior to disposal and therefore result in a loss of soil and land capability	Medium
	Incorrect transportation of hazardous waste, such as the use of damaged drums, may lead to spillages onto the ground and result in soil pollution	Low
	Incorrect handling of hazardous waste while off-loading and storage at non-designated areas at the HWSA may cause spillages of hazardous substances and result in soil pollution.	Low

ASPECTS AFFECTED	Summary of the potential impact	Significance - Post-mitigation
	Incorrect design and inadequate maintenance of the bunded area for hazardous waste may cause spillages or seepage from this waste and may impact on soil.	Low
	The historical incorrect disposal of hazardous and non-hazardous waste at the WAMY may result in impacts on surrounding soil.	Low
	Any striping of topsoil and removal of vegetation, during the operation of the facility, may result in the erosion of soil.	Medium
	Potential veld fires may lead to leaching of hazardous substances if tyres catch a light.	Medium
	Incomplete tyre combustion leading to dioxin (highly toxic compounds) and noxious gases, leaching into the soil during accidental burning of rubber due to cutting of steel or the storage or tyres during a fire. Other substances released include Volatile organic compounds (VOCs) polynuclear aromatic hydrocarbons (PAHs), furans, hydrogen chloride, benzene, PCBs arsenic, cadmium, nickel, mercury, zinc, chromium and vanadium.	Medium
	Incorrect disposal of incinerator ash	Low
	Potential spillages on soil from diesel tank held on site for the operation of the incinerator.	Low
	Seepage or incorrect water drainage of materials e.g. heavy metals during bioremediation processes at the bioremediation site due to incorrect bunding or maintenance of the bunded area.	Medium
	Incorrect or inadequate bioremediation practices on site	Low
	The potential failure of the process water dams may cause spillages of process water and impact on soil.	Medium
	Spillages may occur due to burst pipes, overflows, seepage from dirty water drains and pump failures and result in impacts on soil.	Low
	Leakages or spillages from the honeysucker and sewage containers during the removal of sewage from the underground toilets and all other toilets on surface not connected to wastewater care works may occur. This spillage may result in impacts on soil.	Low
	Incomplete or incorrect treatment of sewage sludge used as compost for rehabilitation. This will result in an impact on soil fertility and structure.	Low
	Inadequate stormwater management may result in erosion where vegetation has been removed and / or the topsoil has been compacted.	Low
	Hydrocarbon leakages or spillages from vehicles transporting material as well as parked vehicles may contaminate soil.	Low
	Increased run-off from rain water flowing off roads which are not connected to a drainage system may result in soil erosion.	Low

ASPECTS AFFECTED	Summary of the potential impact	Significance - Post-mitigation
	Soil compaction due to dirt roads and gravel roads, leading to changes of all other physical characteristics. Compacted soil may lead to the decrease of water infiltration therefore leading to soil erosion.	Low
	Leakages or spillages from machinery during maintenance of roads may result in contamination of soil.	Low
	Inadequate bunding above ground that does not meet specifications, damaged bunding, inadequate or damaged equipment such as storage tanks and underground tanks leaking may cause hazardous substances to spill or seep out of the bunded areas / tanks. Such leakages and spillages may result in the contamination of soil.	Low
	Ineffective oil/water separators may cause hydrocarbon spillages/ leakages. This could lead to soil pollution.	Low
	Leakages or spillages from the incorrect transport, loading, storage, use and removal of hazardous substances above ground, such as fuel, oil, paint, batteries, chemicals, acid & corrosive salt, reagents, paint and solvents. Spillages from off-loading may take place during refuelling of vehicles, or due to spillages from damaged delivery lines, or overfill at bulk storage tanks. Such leakages and spillages may result in the contamination of soil.	Low
	Redundant or mothballed equipment or material containing hydrocarbons above ground may leak and contaminate soil.	Low
	The incorrect storage or use of foam, Water with Additive and Wet Chemical (F Class) extinguisher contents containing chemicals may cause leakages or spillages and result in the contamination of soil.	Low
	The incorrect use of any hazardous materials during maintenance activities above ground may cause hydrocarbon and other hazardous chemical spillages (includes oil, paint, grease, etc) and may contaminate soil.	Low
	The washing of contaminated parts, lack of maintenance of the sumps, inadequate or damaged bunding, ineffective operation, and uncontrolled water drainage at the wash bay above ground may cause hydrocarbon and other hazardous chemical spillage that may contaminate soil.	Low
	Inadequate maintenance of the pumping system, the 2 000l storage tanks, and the bunding of the storage tank from the lube bay above ground may result in leakages or spillages of oil and may contaminate soil.	Low
	Overdosing of wash water with soaps and detergents for cleaning purposes and the use of acid based cleaning reagents in the change houses. Should spillage of the wash water occur, it may result in the contamination soil	Low

ASPECTS AFFECTED	Summary of the potential impact	Significance - Post-mitigation
Land Capability	Soil has been removed due to the footprint of the plant and has resulted in a loss of land capability	Low
Ecology	Particulate matter, SO_2, NO_2 and CO, released from shaft vents primarily as a result of blasting and drilling operations, and diesel-powered vehicles working underground, may impact of vegetation. Particulate matter can clog stomatal openings of plants and interfere with photosynthesis functions and may lead to growth stunting or mortality in some plant species.	Medium
	Use of topsoil taken from undisturbed areas containing a seed bank of indigenous flora provides a growth medium for indigenous plant species. This allows for an increase in biodiversity with the establishment of indigenous vegetation.	Positive
	Invasive plants may establish. This may lead to: • Displacement of indigenous vegetation. • Change in plant species composition. • Change in vegetation composition and structure. • Competition for sunlight, nutrients, water and 'living space' will increase between indigenous and alien species. • Change in plant-pollinator composition. • Loss of habitat • Change in flammability of existing vegetation structure – pending the introduction of the alien species. • The spread of alien vegetation in areas previously free from such species causing a change in biodiversity.	Low
	Soil has been removed due to the footprint of the plant and has resulted in a loss of biodiversity.	Medium
	Seepage water accumulation behind the north and southern dam walls may result in the loss of biodiversity.	Low
	The destruction of the pans has lead to a loss of aquatic habitats.	Medium
	Accidental burning of tyres due to veld fires or other accidental spark/ fire may lead to toxic leachate forming that may be taken up by the vegetation through soil.	Medium
	Using of garden waste or wood chippings contaminated by invasive vegetation seeds or other vegetative parts, for composting.	Low
	Installation or replacing of pipelines may disturb vegetation as well as animal habitats.	Low
	Installation or replacing of pipelines may disturb animal habitat.	Low

ASPECTS AFFECTED	Summary of the potential impact	Significance - Post-mitigation
	Soil compaction due to dirt roads and gravel roads, leading to changes of all other physical characteristics. Potential decrease in vegetation growth. The effect of compaction on plant growth and yield depends on the type of vegetation and the environmental conditions that is encountered. In general, under dry conditions some compaction is beneficial, but under wet conditions compaction decreases vegetation.	Low
	Disturbed areas along roads may cause alien invasive plants to establish.	Low
	Veld disturbance may take place during road maintenance and may result in a loss of vegetation and subsequent fragmentation or destruction of habitats.	Low
Surface Water	Incorrect maintenance and operations of explosive storage areas may result in pollution of surface and groundwater	Low
	The CRDs lead to a change in the surface water yield of the area. The CRDs are located within sub-catchment B and sub-catchment C. Bonza farm and Bergplaas farm are either situated within or adjacent to this sub-catchment.	Medium
	The inflow of surface water during rainfall events into the Open Pit may result in a loss of surface water resource. No adjacent community is likely to be adversely influenced by this loss of surface water	Low
	Failure of pollution control systems due to inadequate maintenance may result in pollution of surface water resources.	Medium
	Inadequate treatment of water may result in the pollution of water with E coli	Medium
	Use of chlorine mixes with hydrocarbons in the water to form organo chlorine which is a toxic substance with the potential to pollute water at the Settlers.	Medium
	Surface water run-off from the new face of the re-mined residue, may lead to siltation of drainage channels down slope from the residue as well as pollution of surface water	Low
	Siltation of drainage channels resulting in siltation of the storage dams limiting the storage capacity, causing overflow and pollution of soil and surface water resources.	Low
	Leakages or spillages may occur from earthmoving vehicles and machinery used for the re-mining of the residue deposits may result in contamination of surface water runoff.	Low
	Inadequate maintenance of magazines and possible spillage of Anfex may occur. Anfex can lead to eutrophication (nutrient enrichment) of water bodies.	Low
	The inflow of surface water during rainfall events into the open pit occurs and results in a loss of surface water resource.	Low

ASPECTS AFFECTED	Summary of the potential impact	Significance - Post-mitigation
	Stormwater will only flow off the dumps in severe rainstorm events, which happen infrequently due the arid climate. Infiltration rates are high due to the coarse nature of the material of the rock dumps, therefore a reduction in surface water yield may occur.	Medium
	Spillages of contaminated process water outside of the closed reticulation system may result in surface water pollution. The G-thickener and C-thickener both have EC, Cl, Na, SO_4, Mn, S solids, Se, above the acceptable Drinking Water Standard	Medium
	Inadequate process water recovery within the water reticulation system for reuse may result in a loss of water resources	Medium
	The ineffective maintenance of slurry transfer pumps and sumps or overflow due to inadequate operational controls of the water reticulation system and poor design of the water containment facilities leads to a depletion of the VG pipeline water resource.	Medium
	The incorrect storage or handling of FeSi may lead to the siltation of surface run-off, which in turn may lead to the siltation of drainage channels and waterways downslope of the plant.	Low
	Siltation of drainage channel may result in the pollution of surface water runoff	Low
	The non-availability of material safety data sheets (MSDSs) and inadequate training of personnel may further increase the risk of spillages and leakages of hazardous substances.	Low
	Spillage of Sodium Nitrite, Flocculant or screen cleaning acids due to incorrect storage or handling may result in the pollution of the surface water resources	Low
	The Brits FRD leads to a change in the surface water yield of the area. This FRD is situated within sub-catchment-A within a drainage line. This drainage line flows towards the farm Rocky Flats.	Medium
	The old FRDs lead to a change in the surface water yield of the area. These FRDs are situated within sub-catchment-B. Bonza farm and Bergplaats farm are either situated within or adjacent to this sub-catchment.	Medium
	The FRD paddocks lead to a change in the surface water yield of the area. These FRD paddocks are situated within sub-catchment-B. Bonza farm and Bergplaats farm are either situated within or adjacent to this sub-catchment.	Medium
	Surface water run-off as well as soil erosion from the FRDs may lead to siltation of nearby water resources	Medium
	Residual herbicides used for removal of alien vegetation and reeds on the dams may occur which will be washed down into the veld during rainy events and may result in the contamination of surface water resources	Low

ASPECTS AFFECTED	Summary of the potential impact	Significance - Post-mitigation
	The Brits FRD leads to a change in the surface water yield of the area. This FRD is situated within sub-catchment-A within a drainage line. This drainage line flows towards the farm Rocky Flats.	Medium
	Ineffective water management and rehabilitation practices on the sidewalls of the CRDs may occur and result in impacts on surface water resources	Medium
	Surface water run-off as well as soil erosion from the CRDs may lead to siltation.	Medium
	Surface water run-off as well as soil erosion from the run of mine stockpiles may lead to siltation of surface water resources	Low
	Increased surface water run-off due to removed vegetation, or decrease water infiltration from soil compaction leading to siltation. Siltation can be increased by soil erosion. Surface water siltation could result in an increase in suspended solids concentration in runoff water.	Low
	Inadequately treated effluent pumped into the earth dam from where it enters the process water system.	Low
	Ineffective use of water or inadequate maintenance of water storage facilities and pipelines may result in a loss of water resources.	Low
	Ineffective maintenance of water transport or storage facilities may result in surface run-off siltation.	Low
	Siltation of drainage channels resulting in loss of channel conveyance capacity may result in spillage of affected water	Low
	Soil compaction due to dirt roads and gravel roads, leading to changes of all other physical characteristics. Surface areas that have been compacted due to the construction activities, may lead to localized increased runoff conditions.	Low
	Increased surface water run-off due to removed vegetation, or decrease water infiltration from soil compaction leading to siltation. Siltation can be increased by soil erosion. Surface water siltation could result in an increase in suspended solids concentration in runoff water and aquatic habitats further downstream.	Low
	The ineffective use of surface water at the workshops and other maintenance facilities and the evaporation of water from the wash bay above ground may lead to a depletion of the water resource (water from VG pipeline).	Low
Groundwater	Pollution of the underground water as a result: incorrect handling, storage or use can cause spillages of cement, additives, & other hazardous materials, blocked water drains	Low

ASPECTS AFFECTED	Summary of the potential impact	Significance - Post-mitigation
	Groundwater dewatering may lead to possible subsidence of ground, and alteration of the natural topography.	Medium
	Groundwater dewatering may lead to depletion of the groundwater resource.	Medium
	The dewatering of the mine has resulted in the development of a cone of depression around the open pit. This may result in potential loss of groundwater resource by neighbours	Medium
	Potential increase in the flow of seepage contaminated water from Brits FRD towards the open pit.	Medium
	The potential increase of water in the workings and potential increase in the risk of a mud push and / or mud rush	Medium
	Spillages and leakages of hydrocarbons and the seep of hazardous chemicals (solvents, paints) may result in the pollution of groundwater resources.	Low
	Failure of pollution control systems due to inadequate maintenance may result in pollution of groundwater resources.	Medium
	Spillages and leakages of hydrocarbons from equipment in the Headgear may result in groundwater pollution.	Low
	Potential failure of pumps may result in the flooding of the mine and contamination of groundwater resources	Medium
	Leakages or spillages may occur from earthmoving vehicles and machinery used for the re-mining of the residue deposits may result in contamination of groundwater resources.	Low
	Leaching of pollutants from WRDs may result in the pollution of groundwater resources.	High
	Spillages of contaminated process water outside of the closed reticulation system may result in groundwater pollution. The G-thickener and C-thickener both have EC, Cl, Na, SO_4, Mn, S solids, Se, above the acceptable Drinking Water Standard	Medium
	The non-availability of material safety data sheets (MSDSs) and inadequate training of personnel may further increase the risk of spillages and leakages of hazardous substances.	Low
	The old FRDs cause seepage of EC, Ca, SO4, Mn, TDS, Turbidity, suspended solids, NO3, Mg and F into the groundwater. The monitoring data further shows that this pollution extends towards the south from the old FRDs as far as BH BA2 which is situated in the game farm.	Medium
	Elevated Mn, Mg, NO_3 and SO_4 levels have been observed at the FRD paddocks and may result in groundwater pollution.	Medium
	Levels of Mg, EC, Mn, Ca, Al, NO3 above the acceptable standards occurs at the post-1979 CRD and pre-1979 CRD and seepage thereof may result in groundwater pollution	Medium

ASPECTS AFFECTED	Summary of the potential impact	Significance - Post-mitigation
	Groundwater abstraction from underground workings as well as boreholes may result in the decrease of groundwater availability.	Low
	Bonza Quarry is unlined. The volume of the seepage is unknown; however, the poor quality of this water implies that a pollution plume may have developed from Bonza Quarry.	Medium
	The development of a cone of depression in the ground water around the open pit may lead to a potential loss in surrounding areas.	Medium
	Leakages or spillages from the incorrect storage of hazardous substances underground, such as fuel, oil, paint, batteries, chemicals, acid & corrosive salt, reagents, paint, solvents and Beryllium x-ray tubes may occur.	Low
	Inadequate bunding underground that does not meet specifications, damaged bunding, inadequate or damaged equipment such as storage tanks and underground tanks leaking may cause hazardous substances to spill or seep out of the bunded areas / tanks.	Low
	Redundant or mothballed equipment or material containing hydrocarbons underground may leak.	Low
	The incorrect use of any hazardous materials during maintenance activities underground may cause hydrocarbon and other hazardous chemical spillages (including oil, paint, grease, etc) may result contamination of groundwater resources.	Low
	The inadequate maintenance of machinery underground may cause spillages of hydrocarbons and contaminate groundwater resources.	Low
	The washing of contaminated parts, lack of maintenance of the sumps, inadequate or damaged bunding, ineffective operation, and uncontrolled water drainage at the wash bay underground may cause hydrocarbon and other hazardous chemical leaching and contaminated groundwater resources.	Low
	Pollutants in batching plant wastewater include cement, sand, aggregates and petroleum products. These substances can affect the water pH	Low
Surface and groundwater	Hydrocarbon spillages due to lack of adequate maintenance of crushing and screening equipment, HPRC X, and other ore processing equipment and during maintenance of this equipment may result in surface and groundwater contamination.	Low
	Seepage water accumulation behind the north and southern dam walls may result in impacts on the surface and groundwater.	Medium
	Fine residue spillages from pumping activities on the rehabilitated WRD may result in impacts on surface and groundwater.	Medium

ASPECTS AFFECTED	Summary of the potential impact	Significance - Post-mitigation
	The Brits FRD may lead to seepage into the drainage line continuing towards the farm Rocky Flats and result in surface and groundwater pollution of adjacent landowner.	Medium
	Residual herbicides used for removal of alien vegetation may occur which will be washed down into the veld during rainy events and impact on surface and groundwater resources.	Low
	Increase in salt and siltation a may occur due to spillages of coarse residue from the conveyor belts, and may result in contamination of surface and groundwater resources.	Low
	The incorrect separation of non-hazardous and hazardous waste at all sources throughout the mine may lead to waste contamination by hazardous substances disposed at the general waste landfill site.	Low
	Incorrect transportation of hazardous waste, such as the use of damaged drums, may lead to spillages onto the ground and result in surface water and groundwater pollution	Low
	Incorrect handling of hazardous waste while off-loading and storage at non-designated areas at the HWSA may cause spillages of hazardous substances and result in impacts on surface and groundwater.	Low
	Incorrect design and inadequate maintenance of the bunded area for hazardous waste may cause spillages or seepage from this waste and may impact on surface and groundwater resources.	Low
	The historical incorrect disposal of hazardous and non-hazardous waste at the WAMY may result in impacts on surface and groundwater.	Low
	Infiltration of decomposing liquid products or gradual leaching of ash and unburned residue, from accidental burning of rubber due to cutting of steel or the storage or tyres during a fire, may result in impacts on surface and groundwater.	Medium
	Incomplete tyre combustion leading to dioxin (highly toxic compounds) and noxious gases, leaching into the soil during accidental burning of rubber due to cutting of steel or the storage or tyres during a fire. Other substances released include Volatile organic compounds (VOCs) polynuclear aromatic hydrocarbons (PAHs), furans, hydrogen chloride, benzene, PCBs arsenic, cadmium, nickel, mercury, zinc, chromium and vanadium.	Medium
	Incorrect disposal of incinerator bottom ash. The mass and volume reduction of waste incineration causes an enrichment of a number of heavy metals in the bottom ashes compared to their concentration in the waste feed. The leaching ability of the bottom ash depends on the type of material that was incinerated.	Low

ASPECTS AFFECTED	Summary of the potential impact	Significance - Post-mitigation
	Seepage or incorrect water drainage of materials e.g. heavy metals during bioremediation processes at the bioremediation site due to incorrect bunding or maintenance of the bunded area.	Low
	Incorrect or inadequate bioremediation practises on site	Low
	Incomplete or incorrect treatment of sewage sludge used as compost for rehabilitation leading to leaching of heavy metals or pathogenic bacteria, viruses and protozoa along with other parasites.	Low
	The potential failure of the process water dams may cause spillages of process water and impact on soil.	Medium
	Spillages may occur due to burst pipes, overflows, seepage from dirty water drains and pump failures and result in impacts surface and groundwater	Low
	Leakages or spillages from the honeysucker and sewage containers during the removal of sewage from the underground toilets and all other toilets on surface not connected to wastewater care works may occur. This spillage may result in impacts on surface and groundwater.	Low
	Incomplete or incorrect treatment of sewage sludge used as compost for rehabilitation leading to leaching of heavy metals or pathogenic bacteria, viruses and protozoa along with other parasitic helminths. This will result in the contamination of surface and groundwater.	Low
	Inadequate stormwater management may result in siltation and contamination or surface and groundwater resources.	Low
	Any inadequate stormwater drainage design or lack of stormwater structures & lack of maintenance of existing structures may result in surface and groundwater contamination.	Low
	Hydrocarbon leakages or spillages from vehicles transporting material as well as parked vehicles may contaminate surface and groundwater.	Low
	Leakages or spillages of machinery during maintenance of roads may result in contamination soil.	Low
	Leakages or spillages from the incorrect transport, loading, storage, use and removal of hazardous substances above ground, such as fuel, oil, paint, batteries, chemicals, acid & corrosive salt, reagents, paint and solvents. Spillages from off-loading may take place during refuelling of vehicles, or due to spillages from damaged delivery lines, or overfill at bulk storage tanks. Such leakages and spillages may result in the contamination of surface and groundwater resources.	Low
	Inadequate bunding above ground that does not meet specifications, damaged bunding, inadequate or damaged equipment such as storage tanks and underground tanks leaking may cause hazardous substances to spill or seep out of the bunded areas / tanks. Such leakages and spillages may result in the contamination of surface and groundwater.	Low

ASPECTS AFFECTED	Summary of the potential impact	Significance - Post-mitigation
	Ineffective oil separator may cause hydrocarbon spillages or leakages. The oil separators have all reported oil and grease values above allowable level, but no diesel. The oil separators contain no VOCs and semi-volatile organic compounds (SVOCs), but 4 unknown halogenated compounds were detected. Such spillages and leakages may result in the contamination of surface and groundwater.	Low
	Redundant or mothballed equipment or material containing hydrocarbons above ground may leak and contaminate soil.	Low
	The incorrect storage or use of foam, Water with Additive and Wet Chemical (F Class) extinguisher contents containing chemicals may cause leakages or spillages and result in the contamination of surface and groundwater.	Low
	The incorrect use of any hazardous materials during maintenance activities above ground may cause hydrocarbon and other hazardous chemical spillages (includes oil, paint, grease, etc) and may contaminate surface and groundwater.	Low
	The washing of contaminated parts, lack of maintenance of the sumps, inadequate or damaged bunding, ineffective operation, and uncontrolled water drainage at the wash bay above ground may cause hydrocarbon and other hazardous chemical spillage that may contaminate surface and groundwater resources.	Low
	The ineffective use of surface and groundwater or damaged water pipes and taps at any of these building may lead to a depletion of the water resource (water from VG pipeline).	Low
	Overdosing of wash water with soaps and detergents for cleaning purposes and the use of acid based cleaning reagents in the change houses. Should spillage of the wash water occur, it may result in the contamination soil	Low
Sensitive land scape	Seepage water accumulation behind the north and southern dam walls may result in impacts on the pan wetlands.	Medium
	Elevated Manganese levels in surface water runoff may result in the loss of vegetation: There are a number of species with conservation importance present in the nearby pan. These include Harpagophytum procumbens, Acacia erioloba Ammocharis coranica, Boophone disticha, Boscia albitrunca, Hereroa cf. wilmaniae, Orbeopsis lutea, Pachypodium succulentum, Ruscia cf. sedimentata, Lebeckia macrantha, Rhus tridactyla and Tarchonanthus cf. Obovatus	Medium
	Inadequate stormwater management may result in a loss of sensitive vegetation.	Low

ASPECTS AFFECTED	Summary of the potential impact	Significance - Post-mitigation
Air quality	Use of purchased electricity: 150,000 tons of CO_2 per annum contributing to climate change	Low
	Particulate matter, SO2, NO2 and CO, released from shaft vents primarily as a result of blasting and drilling operations, and diesel powered vehicles working underground, may result in air pollution.	Low
	Underground mining result in PM, SO2, NO2 and CO2, CO released from shaft vents primarily as a result of blasting and drilling operations, and diesel powered vehicles working underground, may result in health hazards. Particulate matter inhalation causes respiratory problems. SO_2 inhalation can cause respiratory difficulties and disease. NO_2 inhalation may cause severe irritation and burns of eyes, skin, mucous membranes, and any other exposed tissue as well as breathing difficulties. Over exposure to CO may cause damage to target organs.	Medium
	Dust generation during the loading and hauling of pre-79 tailings may result in air pollution impact on human health and ecological resources	Medium
	Fire may occur at the magazines as a result of inadequate clearing of vegetation, inadequate maintenance of lightning conductors and may result in potential air pollution	Low
	Dust fallout and inhalable PM emissions are generated at the Buffer Stockpile, on tramming routes and from dry ground ore spillages.	Low
	Dust emissions occur at some of the dust plant as well as transfer points on conveyor systems (transfer houses). Inadequate design and maintenance of dust plant leads to dust generation.	Low
	Wind erosion of the FRD takes place when the surfaces are dry and result in the generation of dust.	Low
	The run of mine stockpile areas used intermittently may generate dust.	Low
	Dust generation due to removal of vegetation and soil erosion.	Low
	Disturbance of topsoil, nuisance of odour, flies or other vectors, dust generation or CO_2 and toxic gases generation due to inadequate stabilisation and covering of the landfill.	Low
	Accidental burning of rubber due to cutting of steel or the storage or tyres may start fires and result in air pollution.	Low
	VOCs are generated at the bioremediation site.	Low
	There is a potential for emissions of VOCs at the wastewater works.	Low
	Dust generation from tipping of ore into the surge bin at the shaft.	Low

ASPECTS AFFECTED	Summary of the potential impact	Significance - Post-mitigation
	All fuel transport activities generate emissions and potential air pollution. Primary air pollutants emitted by vehicles may include NOx, CO_2, HCs, SO_2, particulate matter and Pb. Secondary pollutants associated with vehicle emissions include NO_2, photochemical oxidants (e.g. ozone) and sulphuric or nitric acids, and sulphate and nitrate aerosols. Toxic hydrocarbons emitted include benzene, 1.2-butadiene, aldehydes and polycyclic aromatics hydrocarbons (PAH). Benzene represents an aromatic HC present in petrol, with 85% to 90% of benzene emissions emanating from the exhaust and the remainder from evaporative losses. Light-duty petrol vehicles not equipped with pollution control devices have the highest exhaust emissions during acceleration, followed by deceleration, cruising and idling cycles. At higher cruise speeds HC and CO emissions decrease, while NOx and CO_2 emissions increase.	Low
	Emissions from diesel-fuelled vehicles include particulate matter, NOx, SO_2, CO and HC, the majority of which occurs from the exhaust.	Low
	Dust generation during driving on dirt and gravel roads.	Low
	The airport at the mine is associated with the emission released from aircraft, motor vehicles, and aircraft maintenance procedures. An airport is anticipated to contribute to NO_2 health threshold exceedance in its vicinity. The other most significant emissions released include CO_2 and CO. Smaller quantities of VOCs, SO_2, non-methane VOCs, methane, lead, and PM are also associated with these activities.	Low
	There are various diesel, petrol and oil storage tanks above ground that will add to pollutants such as VOCs. When inhaled, TCE may produce the following effect: • Central nervous system depression resulting in general anaesthesia; • Tachypnea; • Many types of cardiac arrhythmias; • Cranial nerve dysfunction; and • Occasionally facial numbness	Low
	The generation of fumes and gases from this activity underground may be a safety risk.	Low
Noise	Generation of noise from ventilation fans may result in noise pollution.	Low
	Noise is generated from operating fans and drill rigs may become a nuisance to workers and community.	Low
	Generation of noise from hauling and tramming of material	Medium
	Generation of noise at the processing plant. Is audible from the villages.	Medium
	Noise generation as a result of conveyance and transport activities.	Low

ASPECTS AFFECTED	Summary of the potential impact	Significance - Post-mitigation
	Noise on the mine can be generated by vehicular traffic and earth moving machinery. This includes the transportation of waste to the WAMY, the transportation of all goods and materials on and off the mine, all earth-moving activities, and road maintenance.	Low
	Noise generation at above ground workshops may occur during carpentry operations.	Low
Visual	The reprocessing of the 1979 CRD, Red Dumps and Post-79 CRD will result in an additional change in topography and visual impact.	Low
	The plant and associated infrastructure has changed the local topography and resulted in a visual impact	Low
	The Brits FRDs leads to a change in the topography and creates a visual impact. The Brits FRD walls rise marginally above the surrounding ridgeline in a small section to the north and blend in with the existing WRD.	Medium
	The constructed mine shaft and head gear changes the topography of the landscape. And may result in a visual impact.	Low
	The CRDs lead to a change of the topography. The final height of the post-97 CRD will be 1,598mamsl and will result in a visual impact.	Medium
	Littering by windblown waste at the WAMY will result in a visual impact.	Low
Socio-economic	The formation of a mud push or mud rush at the draw point from the breakdown of kimberlite and shale in the presence of water may result in a safety hazard to workers.	Medium
	Radiation exposure may occur due to the use of nuclear sources such as weightometers and measuring flasks on skips may present a health hazard to workers.	Medium
	Blasting activities may result structural damage of near-by infrastructure	Medium
	Use and storage of explosives may result in theft of explosives	Medium
	Inadequate maintenance of magazines and possible spillage of Anfex may occur. Anfex can cause skin and eye irritation and respiratory problems if inhaled.	Low
	The pit perimeter will break back over time until it is stable. This may present a safety risk to workers of pit perimeter break-back affecting infrastructure as well as a loss of in-pit storm-capture dams and safety of people and equipment.	Medium
	FRD wall failure may occur and create safety hazards for the employees and the community.	Medium
	The incorrect separation of non-hazardous and hazardous waste at all sources throughout the mine may lead to excess waste transported to Holfontein.	Low

ASPECTS AFFECTED	Summary of the potential impact	Significance - Post-mitigation
	Incorrect handling, storage & disposal of asbestos waste (old pipes, gaskets, structures) may result in a health hazard to workers and the community.	Low
	Incorrect storage and handling of medical waste at the medical facilities and transport and disposal of medical waste by the contractor may result in a health hazard to workers and the community.	Low
	Incorrect storage and handling of hazardous waste at the WAMY and transportation of Hazardous waste from the WAMY to Holtfontein or other hazardous waste facility may present health risk to people.	Low
	Disturbance of topsoil, nuisance of odour, flies or other vectors, dust generation or CO_2 and toxic gases generation due to inadequate stabilisation and covering of the landfill.	Low
	Nuisance of odour, flies or other vectors.	Low
	Accidental burning of rubber due to cutting of steel or the storage or tyres may start fires.	Low
	Complete tyre combustion produces CO_2; incomplete tyre combustion release dioxins and noxious gases. Other substances released include VOCs, PAHs, furans, hydrogen chloride, benzene, PCBs arsenic, cadmium, nickel, mercury, zinc, chromium and vanadium.	Medium
	Accidental fires from storage of dry wood chippings.	Low
	Accidental burning of rubber due to cutting of steel or the storage or tyres may start fires and result in hazards to the surrounding community.	Low
	Fire can occur which is caused by storage of incompatible reagents in a storage area underground and presents a health and safety hazard to workers.	Low
	Incorrect storage and operation of explosives at explosive bay underground may cause fire or explosions and presents a health and safety hazard to workers	Low
	Welding and gas cutting as well as the generation of fumes and gases from this activity underground may be a safety risk. This impact is increased if mine employees are not adequately trained, not wearing correct PPE or if fire extinguishers are not in place and correctly working.	Low
Sites of cultural and archaeological importance	Mining related activities may impact on sites of cultural and archaeological importance	Low

Table 49: Summary of negative and positive environmental impacts, post-mitigation, associated with the decommissioning phase.

ACTIVITY whether listed or not listed	Summary of potential impact	Significance – Post mitigation
Rehabilitation of FRDs, CRDs and WRDs	Lack of stormwater control on the newly top-dressed slopes may result in the soil erosion and the loss of topsoil.	Low
Rehabilitation of FRDs, CRDs and WRDs	Increased surface water runoff due to incorrect placement of stormwater control structures e.g. contours or drains around the FRDs, CRDs and WRDs may result in soil erosion.	Low
Rehabilitation of FRDs, CRDs and WRDs	Leakages or spillages may occur from earthmoving and construction vehicles during the dismantling and removal of the shaft and plant and associated infrastructure Such leakages and spillages may result in the contamination of soil.	Low
Rehabilitation of earth dams	Incorrect disposal of silt and liner that may contain pollutants from the process water may contaminate soil.	Low
Soil replacement	Removal of topsoil from the topsoil stockpiles may cause the liberation of soil. A total of 60,000m³ topsoil will be removed from the stockpile west of the infill dam. The topsoil on the stockpile east of the infill dam has already been used for the rehabilitation of the northern slope of No. 3 FRD. A total of 22,500m³ topsoil will be removed from the stockpile north of the FRD. The removal and replacement of topsoil may result in soil erosion	Low
Soil replacement	Leakages or spillages may occur from earthmoving and construction vehicles and machinery used for the removal of soil from the stockpiles and may contaminate the soil.	Low
General surface rehabilitation	Inadequate placement of topsoil in slopes or the placement of topsoil creating a catena.	Low
General surface rehabilitation	Incorrect placement of topsoil on rehabilitation areas may lead to soil compaction, increased runoff and soil erosion.	Low
Re-establishment of Biodiversity	Replacement of species not adapted to the local conditions may lead to bare areas prone to soil erosion.	Low
Re-establishment of Biodiversity	Potential spillages of herbicides used for the control alien vegetation may result in the contamination of soil.	Low
Additional borrow pits	Removal of topsoil will take place for the additional borrow pit. A total of 1 037 500m³ soil will be removed, and may impact on the land capability.	Low

ACTIVITY whether listed or not listed	Summary of potential impact	Significance – Post mitigation
Rehabilitation of FRDs, CRDs and WRDs	Insufficient quantity and quality of growing medium applied to profiled slopes resulting in a decrease in vegetation growth.	Low
Rehabilitation of FRDs, CRDs and WRDs	Placement of soil during rehabilitation may result in the establishment of alien vegetation.	Low
Rehabilitation of earth dams	Infertile soil being used for rehabilitation will result in a decrease of vegetation growth.	Low
General surface rehabilitation	Incorrect placement of topsoil on rehabilitation areas may lead to soil compaction and a potential decrease in vegetation growth. The effect of compaction on plant growth and yield depends on the type of vegetation and the environmental conditions that is encountered. In general, under dry conditions some compaction is beneficial, but under wet conditions compaction decreases vegetation.	Low
General surface rehabilitation	Increased surface water run-off due or decrease water infiltration from soil compaction leading to siltation. Siltation can be increased by soil erosion.	Low
General surface rehabilitation	Inadequate or no application of fertiliser and/or organic material into the soil used for rehabilitation may inhibit the growth of vegetation	Low
General surface rehabilitation	Invasive plant might be established. This may lead to: • Displacement of indigenous vegetation. • Change in plant species composition. • Change in vegetation composition and structure. • Competition for sunlight and 'living space' will increase between indigenous and alien species. • Competition for water and minerals between alien and indigenous vegetation. • Change in plant-pollinator composition. • Loss of habitat • Change in flammability of existing vegetation structure – pending the introduction of the alien species. • The spread of alien vegetation in areas previously free from such species causing a change in biodiversity.	Low

ACTIVITY whether listed or not listed	Summary of potential impact	Significance – Post mitigation
General surface rehabilitation	Increased surface water runoff due to incorrect placement of stormwater control structures around the rehabilitation areas may result in soil erosion and increased siltation. This in turn may have an impact on aquatic vegetation and animal life.	Low
Re-establishment of Biodiversity	Replacement of species not adapted to the local conditions may result in a decrease in vegetation establishment.	Low
Rehabilitation of FRDs, CRDs and WRDs	Increased surface water run-off due to decrease water infiltration as a result of soil compaction	Low
Rehabilitation of FRDs, CRDs and WRDs	Ponding of water due to incorrect profiling of rehabilitation areas.	Low
Rehabilitation of earth dams	Incorrect sloping of the earth dam walls leading to surface water runoff and siltation.	Low
Open pit	Surface water runoff into the pit in the event of incorrect construction of stormwater berms may result in a decrease of catchment yield.	Low
Soil replacement	Surface water runoff on the topsoil stockpile may occur during the liberation of the soil,.	Low
General surface rehabilitation	Ponding of water due to incorrect sloping of rehabilitation areas thereby decreasing the catchment yield.	Low
General surface rehabilitation	Increased surface water runoff due to incorrect placement of stormwater control structures around the rehabilitation areas may result in soil erosion and increased siltation.	Low
Rehabilitation of FRDs, CRDs and WRDs	Leakages or spillages may occur from earthmoving and construction vehicles during the dismantling and removal of the shaft and plant and associated infrastructure. Such leakages and spillages may result in the contamination of surface and groundwater resources	Low
Rehabilitation of earth dams	Incorrect disposal of silt and liner that may contain pollutants from the process water may contaminate surface and groundwater resources.	Low
Soil replacement	Leakages or spillages may occur from earthmoving and construction vehicles and machinery used for the removal of soil from the stockpiles and may contaminate surface and groundwater resources.	Low
General surface rehabilitation	Leaching of minerals due to incorrect application of fertilisers into topsoil, used for rehabilitation of disturbed areas, may result in the contamination of surface and groundwater resources.	Low

ACTIVITY whether listed or not listed	Summary of potential impact	Significance – Post mitigation
Re-establishment of Biodiversity	Potential spillages of herbicides used for the control alien vegetation may result in the contamination of surface and ground water.	Low
Soil replacement	Dust may be generated at the topsoil stockpile during removal of the soil.	Low
Dismantling of the shafts, Plant areas, associated infrastructure and additional buildings / infrastructure	Dust may be generated during the dismantling and removal of the shaft and plant and associated infrastructure	Low
Rehabilitation of disturbed areas by profiling, ripping and topdressing& overseeding where necessary	Dust generated by rehabilitation earthworks	Low
Dismantling of the shafts, Plant areas, associated infrastructure and additional buildings / infrastructure	Noise generated during the dismantling and removal of the shaft and plant and associated infrastructure may result in nuisance to the community.	Low
Rehabilitation of disturbed areas by profiling, ripping and topdressing& overseeding where necessary	Noise generation from earthmoving equipment may result in a nuisance to the community	Low

ACTIVITY whether listed or not listed	Summary of potential impact	Significance – Post mitigation
Rehabilitation of FRDs, CRDs and WRDs	Incorrect profiling of the rehabilitation areas will result in the deviation from the natural topography, resulting in a visual intrusion	Low
Additional borrow pits	Additional borrow pits for topsoil will lead to a void in the topography and create a visual intrusion..	Low
General surface rehabilitation	Incorrect sloping of the rehabilitation areas will result in the topography remaining changed from natural topography and a continued visual intrusion.	Low
General surface rehabilitation	Inadequate removal of heaps of excess material from rehabilitation areas will result in a continued visual intrusion.	Low
Dismantling of the shafts, Plant areas, associated infrastructure and additional buildings / infrastructure	The inadequate dismantling of steel structures from the shaft and plant will result in a continued visual intrusion post closure.	Low
Open pit	Unauthorised access to open pit if a Enviro berm is not erected around the pit or not correctly erected around the pit, and may result in a safety and health risk to the community	Low
Dismantling of the shafts, Plant areas, associated infrastructure and additional buildings / infrastructure	The inadequate dismantling of steel structures from the shaft and plant may result in safety and health risks to the community.	Low
Dismantling of the shafts, Plant areas, associated infrastructure and additional buildings / infrastructure	Incorrect identification of risks whilst dismantling steel structures from the shaft and plant may result in safety and health risks to the community.	Low

ACTIVITY whether listed or not listed	Summary of potential impact	Significance – Post mitigation
Dismantling of the shafts, Plant areas, associated infrastructure and additional buildings / infrastructure	Incorrect sealing/plugging of the shaft may result in safety and health risks to the community.	Low

12. Proposed impact management objectives and the impact management outcomes for inclusion into the EMPr

Based on the assessment and where applicable the recommendations form specialist reports, the table below summarises the 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.

Table 50: Impact management objectives and the impact management outcomes – Operational Phase

Aspect	Impact management objective	Impact management outcomes and compliance to standards
Geology	To minimise the destruction of the geological strata and to prevent the unnecessary loss of geology	Comply with the Mining Rights issued in terms of the MPRDA (2002) and the EMPr.
Geology and Topography		

Aspect	Impact management objective	Impact management outcomes and compliance to standards
Soil	To limit the impact on soil.	Comply with the National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GNR.331 of 2014), thereunder. Comply with the Waste Classification and Management Regulations, 2013 GN.R634 (dated August 2013), under the National Environmental Management: Waste Act, 2008 (Act No.59 of 2008). Comply with the Norms and Standards for the storage of waste, GN 926 (dated November 2013), under the National Environmental Management: Waste Act, 2008 (Act No.59 of 2008). Comply with the Rehabilitation, Decommissioning- and Closure plans and Closure Objectives. Implementation also to be in compliance with the mine's internal procedures. Procedures to be in line with the latest legislation.

Aspect	Impact management objective	Impact management outcomes and compliance to standards
Land Capability	To restore the land use and land capability to the agreed upon end land use, taking the recommendations of the DMR and municipalities into account.	In terms of Government Gazette 41236. Government Notice R.1228 dated 2017 (Financial Provision Regulations) and any amendments thereto Comply with the Rehabilitation, Decommissioning- and Closure plans and Closure Objectives. Comply with principles contained in the MPRDA, 2002, Mine Health and Safety Act, 1996, NEMA, 1998, NEM:WA, 2008, Regulations there under and amendments thereto. Implementation also to be in compliance with the mine's internal procedures. Procedures to be in line with the latest legislation. The continued implementation of requirements contained in the NEM:BA (2004) and the regulations thereunder.
Ecology	Prevent the destruction of vegetation and subsequent impacts species of conservation concern and protected species. Prevent the destruction of habitats and subsequent impacts on faunal species	Biodiversity management: The continued implementation of requirements contained in: The NEM:BA (2004) and the regulations thereunder, the Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector, Environmental Conservation Act, 1989 (Act No 73 of 1989).

Aspect	Impact management objective	Impact management outcomes and compliance to standards
	Prevent the destruction of vegetation and subsequent impacts on species of conservation concern and protected species. Prevent the destruction of habitats and subsequent impacts on faunal species	Biodiversity management: The continued implementation of requirements contained in: The NEM:BA (2004) and the regulations thereunder, the Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector, Environmental Conservation Act, 1989 (Act No 73 of 1989).
Surface Water	To prevent quality deterioration of surface water quality and prevent impact on catchment yield	Surface water management: In line with the DWS Best Practice Guidelines, to prevent and minimise impacts and to ensure the separation of clean and dirty water management areas; GN704, dated 1999; the NWA (1998) and Regulations there under and amendments thereto; the storm water management plan and / or amendments thereto; specialist recommendations; and the IWUL conditions. Implementation also to be in compliance with the mine's internal procedures. Procedures to be in line with the latest legislation.

Aspect	Impact management objective	Impact management outcomes and compliance to standards
Groundwater	To minimise the extent of disturbance of the aquifer and to prevent quality deterioration of groundwater resource.	Groundwater management: In line with the DWS Best Practice Guidelines, to prevent and minimise impacts and to ensure the separation of clean and dirty water management areas; specialist recommendations; and the IWUL conditions. Implementation also to be in compliance with the mine's internal procedures. Procedures to be in line with the latest legislation. Mine residue classification and characterisation in compliance with GNR 635 of August 2013, "National Norms and Standards for the Assessment of waste for landfill disposal" and GNR 636 of August 2013, "National Norms and Standards for disposal of waste to landfill", in terms of NEMWA, 2008

Aspect	Impact management objective	Impact management outcomes and compliance to standards
Surface and groundwater	To prevent quality deterioration of surface water quality and prevent impact on catchment yield To minimise the extent of disturbance of the aquifer and to prevent quality deterioration of groundwater resource.	Surface water management: In line with the DWS Best Practice Guidelines, to prevent and minimise impacts and to ensure the separation of clean and dirty water management areas; GN704, dated 1999; the NWA (1998) and Regulations there under and amendments thereto; the storm water management plan and / or amendments thereto; specialist recommendations; and the IWUL conditions. Implementation also to be in compliance with the mine's internal procedures. Procedures to be in line with the latest legislation. Groundwater management: In line with the DWS Best Practice Guidelines, to prevent and minimise impacts and to ensure the separation of clean and dirty water management areas; specialist recommendations; and the IWUL conditions.
Sensitive land scape	Prevent / minimise visual intrusions on sensitive receptors	In terms of Government Gazette 39425. Government Notice R.1147 dated 2015 (Financial Provision Regulations) and any amendments thereto Comply with the Rehabilitation, Decommissioning- and Closure plans and Closure Objectives.
Air quality		

Aspect	Impact management objective	Impact management outcomes and compliance to standards
Noise	Prevent the deterioration of air quality and indirect effects on floral, faunal and human health	Air quality management in accordance with the National Environmental Management: Air Quality Act (Act No 39 of 2004); Regulations there under and amendments thereto. Emergency preparedness and response in compliance with the compliance with the Mine Health and Safety Regulations under the Mine Health and Safety Act (1996); MPRDA, 2002; NEMA; 1998 and NWA; 1998 and the National Veld and Forest Fire Act, 1998 (Act No 101 of 1998), (and regulations there under), and amendments thereto. Implementation also to be in compliance with the mine's internal procedures. Procedures to be in line with the latest legislation.
Visual	Prevent / minimise visual intrusions on sensitive receptors	In terms of Government Gazette 39425. Government Notice R.1147 dated 2015 (Financial Provision Regulations) and any amendments thereto Comply with the Rehabilitation, Decommissioning- and Closure plans and Closure Objectives.

Aspect	Impact management objective	Impact management outcomes and compliance to standards
Socio-economic	To prevent and / or limit impacts on I&APs and the surrounding community	Continued implementation in compliance with the DMR Guideline for Consultation with communities and Interested and Affected Parties. As required in terms of Sections 16(4)(b) or 27(5)(b) of the Mineral and Petroleum Resources Development Act (Act 28 of 2002), and in accordance with the standard directive for the compilation thereof as published on the official website of the DMR. Continued compliance with the Mine Health and Safety Regulations under the Mine Health and Safety Act (1996); MPRDA, 2002; National Road Traffic Act; Regulations there under and amendments thereto. Implementation also to be in compliance with the mine's internal procedures. Procedures to be in line with the latest legislation.
Sites of cultural and archaeological importance	Prevent the destruction of and loss of sites of cultural and archaeological importance.	The management of heritage resources: In compliance with the National Heritage Resources Act (Act No. 25 of 1999), and amendments thereto.

Table 51: Impact management objectives and the impact management outcomes – Operational Phase

ASPECTS AFFECTED	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS
Soil	To limit the impact on soil	Comply with the National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GNR.331 of 2014), thereunder. Comply with the Rehabilitation, Decommissioning- and Closure plans and Closure Objectives. Implementation also to be in compliance with the mine's internal procedures. Procedures to be in line with the latest legislation.

ASPECTS AFFECTED	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS
Soil and land capability	To restore the land use and land capability to the agreed upon end land use, taking the recommendations of the DMR and municipalities into account.	In terms of Government Gazette 39425. Government Notice R.1147 dated 2015 (Financial Provision Regulations) and any amendments thereto Comply with the Rehabilitation, Decommissioning- and Closure plans and Closure Objectives. Comply with principles contained in the MPRDA, 2002, Mine Health and Safety Act, 1996, NEMA, 1998, NEM:WA, 2008, Regulations there under and amendments thereto. Implementation also to be in compliance with the mine's internal procedures. Procedures to be in line with the latest legislation. The continued implementation of requirements contained in the NEM:BA (2004) and the regulations thereunder.
Ecology	Prevent the destruction of vegetation and subsequent impacts species of conservation concern and protected species. Prevent the destruction of habitats and subsequent impacts on faunal species	Biodiversity management: The continued implementation of requirements contained in: The NEM:BA (2004) and the regulations thereunder, the Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector, Environmental Conservation Act, 1989 (Act No 73 of 1989).
Surface water		Surface water management:

ASPECTS AFFECTED	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS
Surface and groundwater	To prevent quality deterioration of surface water quality and prevent impact on catchment yield k	In line with the DWS Best Practice Guidelines, to prevent and minimise impacts and to ensure the separation of clean and dirty water management areas; GN704, dated 1999; the NWA (1998) and Regulations there under and amendments thereto; the storm water management plan and / or amendments thereto; specialist recommendations; and the IWUL conditions (once issued). Implementation also to be in compliance with the mine's internal procedures. Procedures to be in line with the latest legislation.

ASPECTS AFFECTED	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS
Air quality	Prevent the generation of dust and indirect effects on floral, faunal and human health	Air quality management in accordance with the National Environmental Management: Air Quality Act (Act No 39 of 2004); Regulations there under and amendments thereto. Emergency preparedness and response in compliance with the compliance with the Mine Health and Safety Regulations under the Mine Health and Safety Act (1996); MPRDA, 2002; NEMA; 1998 and NWA; 1998 and the National Veld and Forest Fire Act, 1998 (Act No 101 of 1998), (and regulations there under), and amendments thereto. Implementation also to be in compliance with the mine's internal procedures. Procedures to be in line with the latest legislation.
Noise	Prevent and mitigate against the effects of noise on sensitive receptors (including employees and surrounding communities and towns).	In accordance with relevant sections of the National Environmental Management: Air Quality Act (Act No 39 of 2004); Regulations there under and amendments thereto SABS Code of Practice 0103 of 2008: The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication. SABS Code of Practice 0328 of 2008: Environmental Noise Impact Assessments
Visual		

ASPECTS AFFECTED	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS
Socio-economic	Prevent / minimise visual intrusions on sensitive receptors	In terms of Government Gazette 39425. Government Notice R.1147 dated 2015 (Financial Provision Regulations) and any amendments thereto Comply with the Rehabilitation, Decommissioning- and Closure plans and Closure Objectives.

13. Final proposed alternatives

Petra Diamonds (Pty) Ltd. purchased the mine as a fully-staffed, operating mine from De Beers on 14 September 2011. Therefore, the Finsch Diamond Mine is an existing mine and no alternatives (in terms of activity, process and scheduling) have been considered as part of this EMPr amendment project.

14. Aspects for inclusion as conditions of Authorisation

Section 26 of the EIA Regulations GNR. 982, dated 04 December 2014 specifies the requirements and content of an environmental authorisation. The content requirements of the environmental authorisation is described in Table 52 below, and where applicable, a reference to the section as to where the requirement has been addressed as part of the EIR/:EMPr has been included.

Table 52: Content of environmental authorisation as per Section 26 of the EIA Regulation GNR.982, dated 04 December 2015.

Ref. No.		Requirement as per Section 26	Reference to EIR/EMPr (where applicable)
a		the name, address and contact details of the person to whom the environmental authorisation is issued	Refer to Section 1 of Part A for details.
b		a description of the activity that is authorised;	Section 4 of Part A for details.
c		a description of the location of the activity, including	
	(i)	the 21 digit Surveyor General code of each cadastral land parcel,	Section 2 of Part A for details.

Ref. No.			Requirement as per Section 26	Reference to EIR/EMPr (where applicable)
	(ii)		where available, the physical address or farm name,	Section 2 of Part A for details.
	(iii)		where the required information in sub-regulation (i) and (ii) is not available, the coordinates of the boundary of the property or properties,	-
	(iv)		a plan which locates the proposed activity or activities authorised at an appropriate scale, or, if it is-	Refer to Figure 1 and Figure 2.
		(aa)	a linear activity, a description and coordinates of the approved corridor of the activity or activities; or	-
		(bb)	on land where the property has not been defined, the coordinates of the area within which the activity is to be undertaken;	-
d			the conditions subject to which the activity may be undertaken, including conditions determining-	-
	(i)		the period within which commencement must occur, which period may not exceed 10 years and may not be extended beyond such 10 year period, unless the process to amend the environmental authorisation contemplated in regulation 32 is followed;	As determined by the competent authority.
	(ii)		the period for which the environmental authorisation is granted and the date on which the activity is deemed to have been concluded, where the environmental authorisation does not include operational aspects;	As determined by the competent authority.
	(iii)		a distinction between the portions of the environmental authorisation that deal with operational and non- operational aspects respectively and the respective periods for which the distinct portions of the environmental authorisation is granted, where the environmental authorisation contains operational and non- operational aspects;	As determined by the competent authority.
	(iv)		requirements for the avoidance, management, mitigation, monitoring and reporting of the impacts of the activity on the environment throughout the life of the activity. additional to those contained in the approved EMPr, and where applicable the closure plan; and	As determined by the competent authority.
e			the frequency of auditing of compliance with the conditions of the environmental authorisation and of compliance with the EMPr, and where applicable the closure plan, in order to determine whether such EMPr and closure plan continuously meet mitigation requirements and addresses environmental impacts, taking into account processes for such auditing	Refer to Section 1.8 and Section 1.11 of Part B for details and / or as determined by the competent authority.

Ref. No.		Requirement as per Section 26	Reference to EIR/EMPr (where applicable)
		prescribed in terms of these Regulations: provided that the frequency of the auditing of compliance with the conditions of the environmental authorisation and of compliance with the EMPr may not exceed intervals of five years;	
f		the frequency of submission of an environmental audit report to the competent authority, including the timeframe within which a final environmental audit report must be submitted to the competent authority;	Refer to Section 1.11 of Part B details and / or as determined by the competent authority.
g		the frequency of updating the EMPr, and where applicable the closure plan, and the manner in which the updated EMPr and closure plan will be approved, taking into account processes for such amendments prescribed in terms of these Regulations;	As determined by the competent authority.
h		a requirement that the environmental authorisation, EMPr, any independent assessments of financial provision for rehabilitation and environmental liability, closure plans, where applicable, audit reports including the environmental audit report contemplated by regulation 34, and all compliance monitoring reports be made available for inspection and copying-	-
	(i)	at the site of the authorised activity;	-
	(ii)	to anyone on request; and	-
	(iii)	where the holder of the environmental authorisation has a website, on such publicly accessible website; and	-
i		any relevant conditions which the competent authority deems appropriate.	As determined by the competent authority.

Furthermore, should the Section 102 application and EMPr amendment document be approved, the following condition should be included and / or taken into account:

- The project should remain in full compliance with the requirements of the EMPr and with all regulatory requirements.
- Stakeholder engagement must be maintained during the life of mine and Closure / Rehabilitation Phases of the mine, with the emphasis on the continuing provision of information.

15. Description of any assumptions, uncertainties and gaps in knowledge

In terms of Section 3(p) of Appendix 3 to the EIA Regulations GN 982, the Environmental Impact Assessment Practitioner (EAP) must provide a description of any assumptions, uncertainties and gaps in knowledge upon which the impact assessment has been based. The table below provides the assumptions and limitations applicable to the various specialist assessments.

Table 53: Specialist assumptions and limitations

Specialist	Assumptions and limitations
Storm Water Management Plan	• Whilst all due care has been taken in reviewing the supplied information, the accuracy of the results and conclusions from the SWMP update are entirely reliant on the accuracy and completeness of the supplied data. • Flood peak calculations were supplied by the client and it is assumed that calculations are correct. • Storm water control recommendations are based on industry experience and best practice. Final designs for construction should be authorised by an approved engineer. • Contour and elevation data as provided during the analysis are assumed to be accurate and representative of the site and catchment areas. • Upstream catchment activities are interpreted according to common practices and no detailed insight is available on possible storm water measures beyond the site. The assessment does not guarantee the integrity of downstream infrastructure in the event of release or discharge from site. • The SWMP update does not impose preference over existing or proposed measures as this is an operational document to assist in the complete management of all storm water measures. • This storm water management plan does not specifically cover considerations relevant to storm water management for the purpose of safety, like mine flooding and loss of life, the primary focus being environmental management. • Recommendations represented in this report apply to the site conditions and features as they existed at the time of Shangoni’s investigations, and those reasonable foreseeable. The recommendations do not necessarily apply to conditions and features that may arise after the date of this SMWP update, for which Shangoni had no prior knowledge nor had the opportunity to evaluate.

Closure Plan	• No allowances have been made for money received from sale of equipment, recyclable materials, structures, vehicles or the hiring out of infrastructure.
	• The following infrastructure, including support infrastructure, will be left to the community after closure and was subsequently excluded from the calculation:
	  • All housing facilities;
	  • Recreational facilities such as the golf club;

Specialist	Assumptions and limitations
	• The training centre; • Water care facilities; and • The airstrip. • Shafts will be sealed to 1000mm, as per DMR guidelines. • Besides the removal of all transformers, old oil storage and diesel storage underground no assessment has been done for the removal of any other structures underground due to the fact that these structures are deemed to be no source of pollution. • Prior to determining what buildings should be demolished the requirements of section 44 of the Mineral and Petroleum Resource Development Act was considered. • Roads to be rehabilitated will be ripped and tar surface disposed of to the waste disposal site. All areas will be re-vegetated. • It is assumed that not all the power lines will have to be removed, as it is anticipated that some of the power lines will be kept as a source of power supply for post-closure use.
Rehabilitation Plan Financial Provisioning	• The tailings resources would still be considered as a viable resource, should the mine face immediate closure. The decision has therefore been taken to sell off the resource in the event that the mine closes, in order for the tailings resources to be reworked. • Current Life of Mine has been calculated at 2030. • No allowances have been made for money received from sale of equipment, recyclable materials, structures, vehicles or the hiring out of infrastructure. • The following infrastructure, including support infrastructure, will be left to the community after closure and was subsequently excluded from the calculation: • All housing facilities; • Recreational facilities such as the golf club; • The training centre; • Water care facilities; and • The airstrip. • Shafts will be sealed to 1000mm, as per DMR guidelines. • The information on concurrent rehabilitation on the rehabilitation plan (August 2015) is correct. • Besides the removal of all transformers, old oil storage and diesel storage underground no assessment has been done for the removal of any other structures underground due to the fact that these structures are deemed to be no source of pollution. • Prior to determining what buildings should be demolished the requirements of section 44 of the Mineral and Petroleum Resource Development Act was considered.

Specialist	Assumptions and limitations
	• Roads to be rehabilitated will be ripped and tar surface disposed of to the waste disposal site. All areas will be re-vegetated. • It is assumed that not all the power lines will have to be removed, as it is anticipated that some of the power lines will be kept as a source of power supply for post-closure use. • The review of the quantum is based on existing information. Volumes/quantities as provided by the mine surveyors are assumed to be correct. • Water management costs were taken from the mine's water strategy. • Separate items for sealing and dismantling of shaft. • Steel costing = R 1349 / tonne = 0.232 t/ m2 (rate converted).

The impact assessments have assumed that all specialist assessments are essentially correct.

16. Reasoned opinion as to whether the proposed activity should or should not be authorised.

16.1 Reasons why the activity should be authorised or not

In accordance with Section 3(q) of Appendix 3 to the EIA Regulations GN R982, the Environmental Impact Assessment Practitioner (EAP) must provide an opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation must be stated.

An impact assessment was undertaken using qualified specialists, which has incorporated extensive consultation with and participation of interested and affected parties. Applying the hierarchical approach to impact management, alternatives were firstly considered to avoid negative impacts, but where avoidance was not possible, to better mitigate and manage negative impacts. Where impacts were found to be potentially significant, various mitigation measures to manage and monitor the impacts of the project have been proposed.

In terms of collectively considering ecological, social and economic impacts it is important to remember that while there might be some trade-offs between the considerations, in South Africa all development must in terms of Section 24 of the Constitution be ecologically sustainable, while economic and social development must be justifiable. There are therefore specific "trade-off" rules that apply. Environmental integrity may never be compromised and the social and economic development must take a certain form and meet certain specific objectives in order for it to be considered justifiable.[40]

The EAP is of the opinion that economic benefit, on both a local and national level, will be derived from the continuation of mining at the Finsch Diamond Mine. As previously described above and as per the mines SLP (attached hereto as Annexure F), the majority of the labour force is sourced from the local community. The continuation of the mining activities will also likely benefit the local, regional and national economy, not only through the continued provision employment, but also through the use of external contractors as well as the production and sale of diamonds. It is however important to note that a socio-economic assessment has to date not been conducted and therefore a quantitative assessment of the positive and negative impacts has not been undertaken.

Furthermore, the mine is an existing mine with Petra Diamonds (Pty) Ltd. taking full ownership of the mine and all related assets on 14 September 2011. Therefore, a Construction Phase is not applicable to the EMPr amendment.. All impacts, with a number of impacts with a “High” severity rating, will be associated with the Operational and Closure Phases of Finsch Diamond Mine. A number of the “High” significant impacts are reversible and may not lead to irreplaceable loss, if the recommended mitigation measures are effectively implemented. As a result of the above description and the results of the impact assessment, the EAP is of the opinion that the EMPr amendment be approved, with the condition that the management objectives and management measures as presented in the EMPr amendment be implemented to effectively manage, prevent, control and / or stop environmental impacts from occurring.

16.2 Conditions that must be included in the authorisation

16.2.1 Specific conditions to be included into the compilation and approval of the EMPr

Should the DMR grant authorisation for this project, it should be subject to the following conditions:

- The project should remain in full compliance with the requirements of the EMPr and with all regulatory requirements.
- The EMPr should be implemented by qualified environmental personnel who have the competence and credibility to interpret the requirements of the EMPr. Such persons must be issued with a written mandate by Petra Diamonds (Pty) Ltd. management to provide guidance and instructions to employees and contractors.
- Stakeholder engagement must be maintained during the operational and closure/rehabilitation phases of the project, with the emphasis on the continuing provision of information.

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[40] Guideline on need and desirability in terms of the Environmental Impact Assessment (EIA) Regulations, 2010 (GN 891 of 20 October 2014);

16.2.2 Rehabilitation requirements

Finsch Diamond Mine has developed and implemented a rehabilitation plan (refer to Annexure I). The rehabilitation plan titled: "*Petra Diamonds – Finsch Diamond Mine Pty. Ltd Rehabilitation Plan*" dated September 2016 and compiled by Shangoni, provides a full description with regards to the rehabilitation requirements (as per Appendix 3 of the Financial Provision Regulations, GN 1147, dated November 2015, under the NEMA, 1998) and the annual rehabilitation. The rehabilitation also provides details with regards to areas that will be rehabilitated, how they will be rehabilitated, and what the long-term objectives of the mine are, for each area to be rehabilitated.

The rehabilitation plan is however a working document and is continually reviewed on an annual basis and as the 10-year plan for Finsch Diamond Mine is updated.

17. Period for which the authorisation is required

The total period for which authorisation is required, is approximately 17 years, with a breakdown as provided in the table below.

Stages of operation	Timeframe (Years)
Planning	N/A
Construction	N/A
Operation	12 years
Closure	5 years
TOTAL Period	**17 years**

18. Undertaking

The undertaking by the EAP is provided in Section 2 of Part B (Environmental Management Programme) below. This undertaking confirms: the correctness of the information provided in the reports, the inclusion of comments and inputs from stakeholders and I&APs, the inclusion of inputs and recommendations from the specialist reports where relevant and the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.

19. Financial Provision

19.1 Explain how the aforesaid amount was derived.

A detailed description of the derivation and calculation of quantum is included in the document titled: "*Petra Diamonds (Pty) Ltd. – Finsch Diamond Mine, Mine closure liability assessment*" dated October 2017 and compiled by Shangoni Management Services (Pty) Ltd. (*Shangoni FinPro, 2017*). The report is attached hereto as Annexure G.

A brief description of the process followed in deriving and calculating the quantum is provided below.

19.1.1 Process followed

A detailed site assessment was conducted on the 28th of July 2017 to identify all the relevant infrastructure and actions that would need to be included in the calculation of the financial provision. A site layout plan was used to identify and mark the entire related infrastructure. Once this was complete a list of the entire infrastructure was compiled. The infrastructure was classified in accordance with the tariffs list and the surface areas of the infrastructure were calculated to determine the volume or surface requiring rehabilitation or demolition.

19.1.2 Tariffs

The guideline for the calculation of closure cost issued by DMR in 2005 was used to support the calculation of the closure cost quanta. The tariffs used in the guideline document have been increased to support inflation increases since 2005. Tariffs were increase by 6% per annum to 2016, based on the inflation levels as documented by the Reserve Bank of South Africa. Refer to the mine closure liability report attached hereto as Annexure G.

The closure budget consists of the following areas:

- Physical - Demolition of infrastructure where infrastructure does not form part of end land use. Potential to transfer to third party was identified.
- Biophysical - Actions to safeguard (making safe and stable) and re-establish the biophysical to ensure a sustainable landform and mitigate identified risks. This includes levelling of the dumps, seeding of the trees and grass.

Table 54: DMR Tariffs used for quantum determination (2005 escalated rates to 2016)

Cat No.	Description	Rate
1	Dismantling of processing plant and related structures (including overland conveyors)	R 14.62
1a	Substations & transformers	R 28 461.00
2(A)	Demolition of steel buildings and structures	R 203.67

Cat No.	Description	Rate
2(B)	Demolition of reinforced concrete buildings and structures	R 300.15
3	Rehabilitation of access roads	R 36.43
4(A)	Demolition and rehabilitation of electrified railway lines	R 353.90
4(B)	Demolition and rehabilitation of non-electrified railway lines	R 192.96
5	Demolition of housing and/or administration facilities	R 407.36
6	Opencast rehabilitation including final voids and ramps (Enviroberm)	R 23.90
7	Sealing of shafts adits and inclines	R 109.34
8(A)	Rehabilitation of overburden and spoils	R 142 361.29
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	R 177 308.41
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	R 514 987.67
9	Rehabilitation of subsided areas	R 119 206.11
10	General surface rehabilitation (Including grassing if disturbed areas)	R 112 774.16
11	River diversions	R 112 774.16
12	Fencing	R 128.63
13	Water management	Mine cost
14	2 to 3 years of maintenance and aftercare	R 14 158.44

19.2 Confirm that this amount can be provided for from operating expenditure

The financial provision that is available for rehabilitation is **R362 374 694.32** (Guarantee). The revised environmental total, utilising 2017 DMR rates, is **R 362 587 146.17** (including contingency, P&G and VAT). The result is a shortfall in financial provision of **R 212 452.00** and will be made available in the form of a bank guarantee. A detailed calculation of the quantum in accordance with the applicable guideline is contained in Annexure G. This shortfall will be provided for and included into the guarantee.

20. Deviations from the approved scoping report and plan of study

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

This EIA and EMPr serves the purpose of updating and amending the approved EMPr for Finsch Diamond Mine. As described previously, this EMPr amendment project is undertaken as since the approval of the EMPr it has been identified that certain activities, commitments, mitigation measures and rehabilitation objectives are no longer aligned with activities undertaken at Finsch Diamond Mine. These changes are as follows:

- Description of the mining method.
- Changes in terms of procedures and practices based on legislative changes.
- Changes to approved EMPr commitments based on current practices.
- Changes to the rehabilitation objectives and monitoring based on the latest Rehabilitation Plan and Mine Closure Plan.

It is for this reason that **no** Scoping Report has been compiled as this report constitutes a revision of the approved EMPr and therefore there is no deviation from the Scoping Report for the proposed project.

20.2 Motivation for the deviation.

Refer to Section 20.1 above for an explanation as to why there is no deviation of activities of the Scoping Report.

21. Other information required by the competent Authority

No specific information has been requested by the Competent Authority.

A Risk Assessment has been compiled (refer to Section 7.5) in support of this EMPr amendment document and provides information regarding the potential environmental impacts associated with the proposed activities as well as an assessment of the significance of the potential environmental impacts.

22. Other matters required in terms of section 24(4)(a) and (b) of the Act.

Section 24(4)(b)(i) of the NEMA (1998) states that the following:

"24(4) Procedures for the investigation, assessment and communication of the potential consequences or impacts of activities on the environment -

- *must include, with respect to every application for an environmental authorisation and where applicable-*

(i) *investigation of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity;"*

A Risk Assessment has been compiled (refer to Section 7.5) in support of this EMPr amendment document and provides information regarding the potential environmental impacts associated with the proposed activities as well as an assessment of the significance of the potential environmental impacts.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1. Draft environmental management programme.

1.1 Details of the EAP.

The requirements for the provision of the detail and expertise of the EAP are included in Part A, Section 1.1.

1.2 Description of the Aspects of the Activity.

The requirement to describe the aspects of the activity that are covered by the environmental management programme is included in Part A, Section 8.

1.3 Composite Map.

Refer to the maps below that superimposes the Finsch Diamond Mine, on the environmental sensitivities of the preferred sites, also indicating any areas that should be avoided, including buffers.

Figure 27: Ecosystem protection level

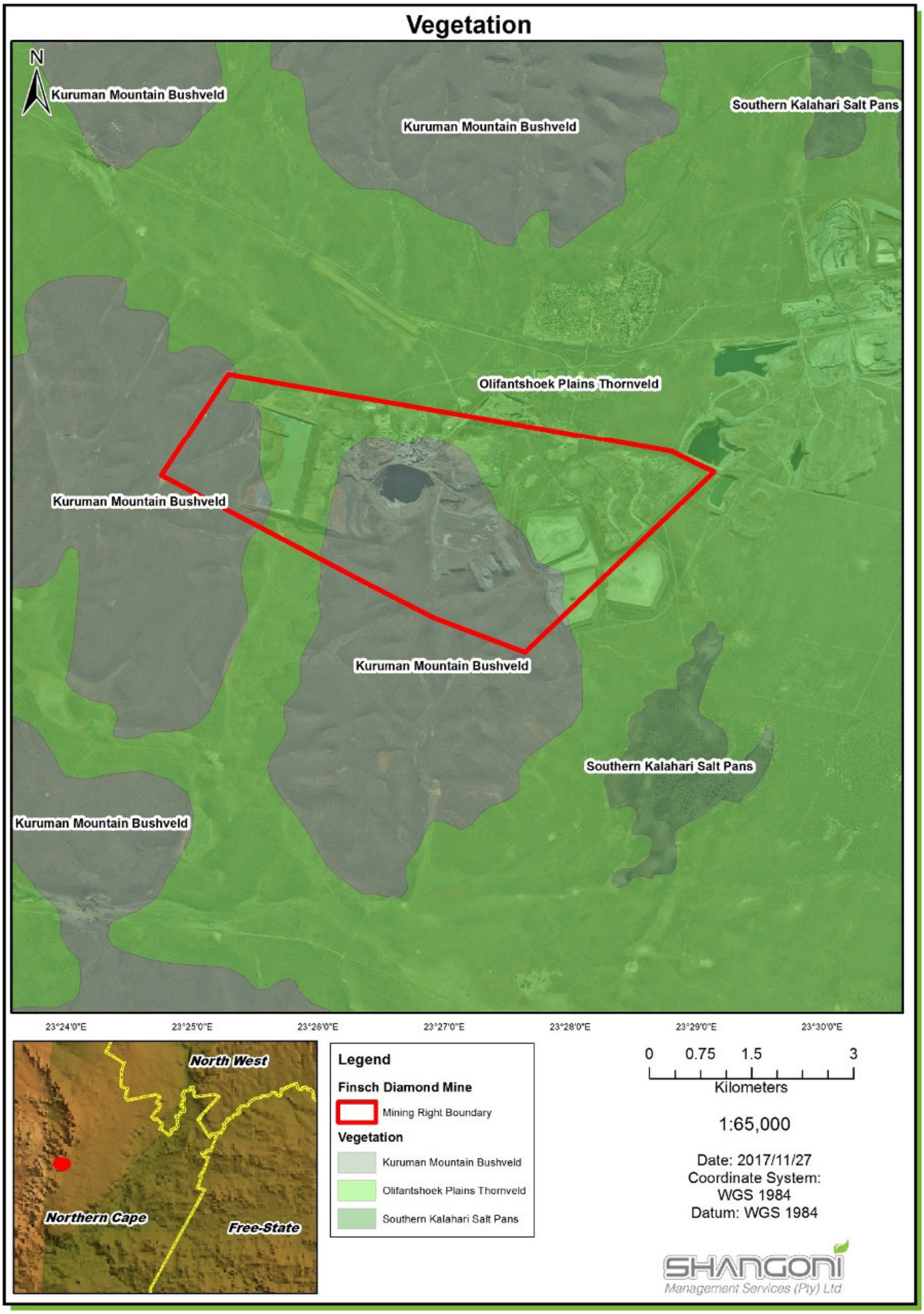

Figure 28: Vegetation map

Figure 29: Soil map

1.4 Description of Impact management objectives including management statements

1.4.1 Determination of closure objectives

Table 55 below presents the closure objectives of the Finsch Diamond Mine. Refer to the Section 1.7.1 of Part B below for a description of the closure objectives as compared to the baseline environment as well as the Mine Closure Liability Update Report attached hereto as Annexure G.

Table 55: Mine closure objectives of the Finsch Diamond Mine

Closure objectives
General
Rehabilitate disturbed areas to their pre-mining land capability and use potentials. The rehabilitation of disturbed land will be to the extent that it is within compliance of current national environmental quality objectives;
Limit the short and longer-term impacts of pollution on surface and groundwater and related biodiversity;
Control the further generation of dust;
Minimise the visual impact of the permanent features at the mine e.g. CRDs and FRDs;
Ensure that people and animals are not harmed by falling off or into hazardous excavations or off steep slopes. The management objectives for these are to minimise safety risks to the public and livestock;
Limit the impact on staff whose positions become redundant on closure of the mine;
Keep relevant authorities informed of the progress of the decommissioning phase;
Submit monitoring data to the relevant authorities; and
Build and maintain meaningful relations with all stakeholders (I&APs).
Objectives for Restorable land (Land that can be returned to its pre-mining land capability):
The land must be left in a safe condition;
The land must be chemically, physically and ecologically stable;
Waste will be managed responsibly and in line with legal requirements;
All infrastructure not required for the post-mining end land use must be removed;
A suitable growth medium and sustainable indigenous vegetation must be established; and
The land should be returned to the pre-mining capability.
Objectives for non-restorable land (Land that cannot be returned to its pre-mining land capability):
The land must be left in a safe condition;
The land must be chemically, physically and ecologically stable;
Waste will be managed responsibly and in line with legal requirements; and
A suitable growth medium and sustainable indigenous vegetation layer must be established.

1.4.2 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.

The potential impacts that may result from the mining have been presented in this document in Section 7.4. The impacts were identified through the input from various specialists' reports and the approved EMPr. The impacts were identified, described, assessed and their significance ranked. Mitigation measures were then put forward to prevent these impacts from occurring, and where they could not be prevented, mitigation measures were put forward to minimise, remedy and / or avoid the impacts.

1.4.3 Potential risk of Acid Mine Drainage.

Kimberlite MRD facilities produce a saline leachate, which includes raised levels of sulphates. (National Drinking Water Standard, SANS 241:2:2011). No acid mine drainage (AMD) is produced due to the large neutralising potential of carbonates present in the geochemistry of the kimberlite, (Pulles, W. 2005). The pH of the process water and leachates ranges from 7.7 – 8.5.

Waste classification was undertaken by Solution[H+], on all mine residue deposits at Finsch Diamond Mine. The waste classification report "*Waste assessment of samples from Finsch*" compiled by Soultion[H+] and dated May 2016 (Refer to Annexure C6, presents the following results:

- Red dump (Composite sample) - Type 3 waste;
- CRD - Type 3 waste;
- CRD pre-79 - Type 3 waste;
- FRD pre-79 - Type 3 waste; and
- FRD post-79 - Type 3 waste.

The analytical results from this assessment suggest that there is a basis for the tested materials to be considered Type 4 waste, based on low leachability of inorganic elements, and the likely elevated background concentrations of some inorganic elements.

1.4.4 Steps taken to investigate, assess, and evaluate the impact of acid mine drainage

Refer to discussions under Section 1.4.3 above.

1.4.5 Engineering or mine design solutions to be implemented to avoid or remedy acid mine drainage

Refer to discussions under Section 1.4.3 above. Refer also to the risk assessment tables (attached hereto as Annexure E).

1.4.6 Measures that will be put in place to remedy any residual or cumulative impacts that may result from acid mine drainage

Refer to discussions under Section 1.4.3 above. Refer also to the risk assessment tables (attached hereto as Annexure E).

1.4.7 Volumes and rate of water use required for the mining, trenching or bulk sampling operation

Refer to Part A Section 4.2.3.6 for the Finsch Diamonds Mines water balance.

1.4.8 Has a water use licence been applied for

The Finsch Diamond mine is in possession of an approved Water Use Licence with Licence Number: 10/C92C/ABCEGIJ/414 (amendment pending at time of compilation of this EMPr amendment document.

1.4.9 Impacts to be mitigated in their respective phases.

Refer to the full risk assessment and mitigation measures table provided in Section 7.5 (Part A) above.

1.5 Impact Management Outcomes.

Refer to the full risk assessment and mitigation measures table provided in Section 7.5 (Part A) above.

1.6 Impact Management Actions

Refer to the full risk assessment and mitigation measures table provided in Section 7.5 (Part A) above.

1.7 Financial Provision

1.7.1 Describe the closure objectives and the extent to which they have been aligned with the baseline environment described under Regulation 22(2)(d) as described in Section 7.4.1

Closure objectives	Alignment to baseline environment
General	During the rehabilitation phase, all identified disturbed area should be sequentially rehabilitated to, where possible, mimic the current (pre-mining) conditions that will enable re-establishment of the conditions. Ultimately, the overarching aim for land use related closure is that of Finsch Diamond Mine will contribute to a sustainable situation once mining has ceased in the region. To achieve
Rehabilitate disturbed areas to their pre-mining land capability and use potentials. The rehabilitation of disturbed land will be to the extent that it is within compliance of current national environmental quality objectives;	
Limit the short and longer-term impacts of pollution on surface and groundwater and related biodiversity;	
Control the further generation of dust;	

Closure objectives	Alignment to baseline environment
Minimise the visual impact of the permanent features at the mine e.g. CRDs and FRDs;	this, land uses that will be viable in the long run must, where possible, be progressively realised throughout the remaining operational life of the mine. The rehabilitation plan and associated development strategies must, therefore, be reviewed continually to align to changes in the receiving biophysical environment, as well as policy changes at national level, planning requirements at local levels, shifts in mine planning and closure focus by the applicant and changing socio-economic conditions in the area. Furthermore, the establishment of a regional land use planning strategy supported by the local and district municipalities as well as the community should be pursued, to ensure that all role players strive towards an aligned long-term use vision for the region. With specific reference, the rehabilitation plan of the non-restorable mine residue sites is to rehabilitate disturbed areas in such a way that new habitats are created and that the establishment of indigenous fauna and flora is encouraged. The rehabilitation should comply with the national environmental quality objectives in terms of short- and longer-term impacts on surface water, ground water and all related biodiversity aspects. The closure objectives for these facilities are to ensure the land is left in a safe condition, chemically, physically and ecologically stable. The final end land use for most of the rehabilitated areas will be grazing areas for game farming while the residue sites will be returned to wilderness. The residue sites need
Ensure that people and animals are not harmed by falling off or into hazardous excavations or off steep slopes. The management objectives for these are to minimise safety risks to the public and livestock;	
Limit the impact on staff whose positions become redundant on closure of the mine;	
Keep relevant authorities informed of the progress of the decommissioning phase;	
Submit monitoring data to the relevant authorities; and	
Build and maintain meaningful relations with all stakeholders (I&APs).	
Objectives for Restorable land (Land that can be returned to its pre-mining land capability):	
The land must be left in a safe condition	
The land must be chemically, physically and ecologically stable	
Waste will be managed responsibly and in line with legal requirements	
All infrastructure not required for the post-mining end land use must be removed	
A suitable growth medium and sustainable indigenous vegetation must be established and	
The land should be returned to the pre-mining capability.	
Objectives for non-restorable land (Land that cannot be returned to its pre-mining land capability):	
The land must be left in a safe condition	
The land must be chemically, physically and ecologically stable	
Waste will be managed responsibly and in line with legal requirements; and	
A suitable growth medium and sustainable indigenous vegetation layer must be established.	

Closure objectives	Alignment to baseline environment
	to be managed carefully as these areas are more sensitive than other rehabilitated areas.

1.7.2 Confirm specifically that the environmental objectives in relation to closure have been consulted with landowners and interested and affected parties.

This EMPr amendment will be made available to the public for comment for a period thirty (30) days. The public are also encouraged to comment on sections of this report (with specific reference to the closure objectives as presented in Section 1.7.1 above), any aspect of the proposed project and raise any concerns and / or issues they may have. The comments, concerns and / or issues will be addressed and responded to and will be taken into consideration in finalising this EMPr amendment.

1.7.3 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.

Refer to Part A Section 16.2.2, Part B Section 1.7.1 above, as well as Annexure I and Annexure J for information in terms of the rehabilitation plan and closure plan.

1.7.4 Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives.

Refer to Part A Section 16.2.2, Part B Section 1.7.1 above, as well as Annexure I and Annexure J for information in terms of the rehabilitation plan and closure plan.

1.7.5 Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline.

A detailed description of the derivation and calculation of quantum is included in the document titled: "*Petra Diamonds (Pty) Ltd. – Finsch Diamond Mine, Mine closure liability assessment*" dated October 2017 and compiled by Shangoni Management Services (Pty) Ltd. (*Shangoni FinPro, 2017*). The report is attached hereto as Annexure G.

Refer to Section 19 of Part A, for the calculated quantum as well as for a description of the process followed in deriving and calculating the quantum.

1.7.6 Confirm that the financial provision will be provided as determined.

The financial provision that is available for rehabilitation is **R362 374 694.32** (Guarantee). The revised environmental total, utilising 2017 DMR rates, is **R 362 587 146.17** (including contingency, P&G and VAT). The following table contains a summary of the calculations made for the premature closure cost.

The result is a shortfall in financial provision of **R 212 452.00**. A detailed calculation of the quantum in accordance with the applicable guideline is contained in Annexure G.

This shortfall will be provided for and included into the guarantee.

1.8 Mechanisms for monitoring compliance with and performance assessments against the environmental management programme.

Mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon, including

- Monitoring of Impact Management Actions
- Monitoring and reporting frequency
- Responsible persons
- Time period for implementing impact management actions
- Mechanism for monitoring compliance

<table>
<tr><th>SOURCE ACTIVITY</th><th>IMPACTS REQUIRING MONITORING PROGRAMMES</th><th>FUNCTIONAL REQUIREMENTS FOR MONITORING</th><th>ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)</th><th>MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS</th></tr>
<tr><td>Pumping of water, found underground, to the surface.</td><td>The pumping of groundwater may result in the development of a cone of depression.</td><td rowspan="2">A groundwater monitoring programme is to be developed and implemented to determine if there are any impacts on groundwater quantity and quality.</td><td rowspan="2">The Environmental Manager is to ensure that groundwater monitoring is taking place. The resultant groundwater monitoring reports need to be submitted to the DWS and kept on record.

The Mine Manager does however take full responsibility to ensure that the monitoring programme is being implemented.</td><td rowspan="2">Groundwater quality monitoring to be conducted on a monthly basis and groundwater level monitoring to be conducted on a quarterly basis.

The reports will be submitted to the DWS quarterly.</td></tr>
<tr><td>Mining of kimberlite ore.</td><td>Groundwater quality may be impacted upon as a result of spillages and unauthorised disposal of contaminated substances as well as seepage from the underground dams.</td></tr>
</table>

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
Mining and mining related activities conducted at the shaft surface areas (including workshops, stores, washbays).	Surface water runoff may become contaminated should it come into contact with pollutants (chemicals, hydrocarbons, general waste, and sewage).	A surface water monitoring programme is to be developed and implemented to determine the quality of the water within the dirty water containment facilities as well the quality of the water within the adjacent surface water bodies, both upstream and downstream.	The Environmental Manager is to ensure that the surface water monitoring is taking place. The resultant surface water monitoring reports need to be submitted to the DWS and kept on record. The Mine Manager takes full responsibility to ensure that the monitoring programme is being implemented.	Surface water monitoring to be conducted on a monthly basis and the reports submitted to the DWS on a quarterly basis.
Activities that may result in the generation of waste.	Waste will be generated at the various departments on the mine (offices, ablutions, workshops, stores) which may result in the contamination of surface water runoff, groundwater resources, and soil and may impact on fauna, flora and visual aspects.	A waste monitoring programme is to be developed and implemented as per Regulation GNR 634 of 23 August 2013 under the NEM:WA (2008). Sub-regulation 10 of GNR 634 requires the following: 1. Waste generators must keep accurate and up to date records of the management of the waste they generate, which records must reflect- • the classification of the wastes.	The Environmental Manager is to ensure that all departments at the Mine are keeping accurate and up to date records of the waste generated. The Environmental Manager will ensure that all waste reports are combined and kept on record. The Mine Manager takes full responsibility to ensure that the monitoring programme is being implemented.	Annual internal and external audits will be conducted on the commitments as stipulated in the IWWMP and the Water Use Licence and will be submitted to the DWS on an annual basis.

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 quantity of each waste generated, expressed in tons or cubic metres per month. • the quantities of each waste that has either been re-used, recycled, recovered, treated or disposed of. • by whom the waste was managed. 2. The records contemplated above must be- (b) retained for a period of at least five (5) years. (c) made available to the Department upon request.		
Mining and Mining related activities at the Finsch Diamond Mine.	Potential environmental impacts resulting from the non-compliance with legislation.	Environmental legal compliance audits are to be conducted to ensure compliance against all applicable environmental legislation and policies.	The Environmental Manager is to ensure that the Environmental Legal Compliance audit is conducted by an independent and suitably qualified individual.	The Environmental Legal Compliance audit is to be conducted on a biennial basis.
Mining related activities including the transportation of mined ore to the plant.	Dust may generated as a result of mining related activities conducted on the surface.	A dust fallout and air quality monitoring plan (as currently conducted at the Finsch Diamond Mine) will be continued throughout the Life of Mine in order to	The Environmental Manager is to ensure that the dust fallout and air quality monitoring is conducted by a suitably qualified individual. The dust fallout	The dust fallout and air quality monitoring reports are to be submitted annually to the DMR and the Northern Cape Department of

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
	Air quality within the surrounding areas may be impacted upon as a result of the mining and mining related activities conducted the Finsch Diamond Mine.	determine potential impacts and sources of dust.	monitoring programme must establish a network of monitoring points using method AST D1739 (1970) or equivalent. The Environmental Manager is to determine whether monitoring of PM10 and PM 2.5 is required, based on the outcome of an Atmospheric Impact Assessment. Should it be found applicable to the mine, monitoring thereof is to be implemented. The Mine Manager does however take full responsibility to ensure that the monitoring programme is being implemented.	Environmental Affairs and Nature Conservation.
Decommissioning and rehabilitation activities.	Impacts such as soil erosion, deterioration of vegetation and dust may result in the event that the rehabilitation techniques were incorrectly implemented	The rehabilitation monitoring programme will be implemented to ensure that the rehabilitation techniques that were implemented are sufficient for the rehabilitation of the Finsch Diamond Mine and that no significant impact (soil erosion, dust, weed and invasive plant species establishment) are occurring on the rehabilitated areas.	The Environmental Manager will ensure that the rehabilitation monitoring programme is being implemented, and the monitoring techniques are implemented correctly. The Mine Manager does however take full responsibility to ensure that the monitoring programme is being implemented.	Monitoring of the rehabilitation success will take place for at least 3 years and will include corrective follow-up action.

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
Mining related and decommissioning and rehabilitation activities	Mining related activities as well as the decommissioning and infrastructure removal activities may result in the generation of noise that may impact on the I&APS, surrounding communities and animal life.	A noise monitoring programme will be implemented in order to determine the ambient noise levels generated as part of the activities conducted on site and to ensure that a constant noise contour of 85 dBA within the mine boundary area is not exceeded, as required by the Mine Health and Safety Act (1996) and the DMR.	The Environmental Manager will ensure that the noise monitoring programme is being implemented, and that all reports are kept on record and made available upon request by the DMR and during audits.	Noise monitoring will be conducted on a monthly basis and the reports kept on record.

1.9 Indicate the frequency of the submission of the performance assessment report.

According to section 24N of the *National Environmental Management Act* 107 of 1998 (NEMA) the holder of an environmental authorisation "*must manage all environmental impacts in accordance with his or her approved environmental management programme*" and "*monitor and audit compliance with the requirements of the environmental management programme*".

According to Regulation 34 of the Environmental Impact Assessment (EIA) Regulations (GN R982 of 4 December 2014), "*Auditing of compliance with environmental authorisation, environmental management programme and closure plan:*

34 (1) The holder of an environmental authorisation must, for the period during which the environmental authorisation and EMPr, and where applicable the closure plan, remain valid-

- *(a) ensure that the compliance with the conditions of the environmental authorisation and the EMPr, and where applicable the closure plan, is audited; and*
- *(b) submit an environmental audit report to the relevant competent authority.*

(2) The environmental audit report contemplated in subregulation (1) must-

- *(a) be prepared by an independent person with the relevant environmental auditing expertise;*
- *(b) provide verifiable findings, in a structured and systematic manner, on-*
  - *(i) the level of performance against and compliance of an organization or project with the provisions of the requisite environmental authorisation or EMPr and, where applicable, the closure plan; and*
  - *(ii) the ability of the measures contained in the EMPr, and where applicable the closure plan, to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity;*
- *(c) contain the information set out in Appendix 7; and*
- *(d) be conducted and submitted to the competent authority at intervals as indicated in the environmental authorisation.*

(3) The environmental audit report contemplated in subregulation (1) must determine-

- *(a) the ability of the EMPr, and where applicable the closure plan, to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity on an ongoing basis and to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the closure of the facility; and*
- *(b) the level of compliance with the provisions of environmental authorisation, EMPr and where applicable the closure plan.*

(4) Where the findings of the environmental audit report contemplated in subregulation (1) indicate-

(a) insufficient mitigation of environmental impacts associated with the undertaking of the activity; or

(b) insufficient levels of compliance with the environmental authorisation or EMPr and, where applicable the closure plan;

the holder must, when submitting the environmental audit report to the competent authority in terms of subregulation (1), submit recommendations to amend the EMPr or closure plan in order to rectify the shortcomings identified in the environmental audit report.

(5) When submitting recommendation in terms of subregulation (4), such recommendations must have been subjected to a public participation process, which process has been agreed to by the competent authority and was appropriate to bring the proposed amendment of the EMPr and, where applicable the closure plan, to the attention of potential and registered interested and affected parties, including organs of state which have jurisdiction in respect of any aspect of the relevant activity and the competent authority, for approval by the competent authority.

(6) Within 7 days of the date of submission of an environmental audit report to the competent authority, the holder of an environmental authorisation must notify all potential and registered interested and affected parties of the submission of that report, and make such report immediately available-

(a) to anyone on request; and

(b) on a publicly accessible website, where the holder has such a website.

(7) An environmental audit report must contain all information set out in Appendix 7 to these Regulations."

In addition to the requirements provided for in the NEMA read with the EIA Regulations 2014 as set out above, the Regulations promulgated in terms of section 107(1) of the Mineral and Petroleum Resources Development Act 107 of 1998 (MPRDA) (*GNR 527 of 23 April 2004)* provides for Monitoring and Performance Assessments of an environmental management programme or environmental management plan. Regulation 55 of GNR 527 reads as follows:

"(1) As part of the general terms and conditions for a prospecting right, mining right or mining permit and in order to ensure compliance with an environmental management programme or environmental management plan and to assess the continued appropriateness and adequacy of the environmental management programme or environmental management plan, a holder of such permit or right must-

(a) conduct monitoring on a continuous basis;

(b) conduct performance assessments of the environmental management plan or environmental management programme as required; and

(c) compile and submit a performance assessment report to the Minister in which compliance with paragraph (b) is demonstrated.

(2) The frequency of performance assessment reporting shall be-

(a) in accordance with the period specified in the approved environmental management programme or plan; or

(b) every two years; or

(c) as agreed to in writing by the Minister.

(3) A performance assessment report contemplated in subregulation (1)(c), shall be in the format provided in guidelines that will from time to time be published by the Department and shall as a minimum contain the following:

(a) Information regarding the period applicable to the performance assessment;

(b) the scope of the assessment;

(c) the procedure used for the assessment;

(d) the interpreted information gained from monitoring the approved environmental management programme or environmental management plan;

(e) the evaluation criteria used during the assessment;

(f) the results of the assessment; and

(g) recommendations on how and when non-compliance and deficiencies will be rectified.

(4) A holder of a prospecting right, mining right or mining permit may appoint an independent competent person(s) to conduct a performance assessment and compile a performance assessment report: Provided that such appointment shall not exonerate the holder of the responsibilities in terms of these regulations.

(5) Subject to section 30(2) of the Act, the performance assessment report submitted by the holder may be disclosed by the Minister to any person on request.

(6) If upon consideration by the Minister, the performance assessment executed by the holder of a prospecting right, mining right or mining permit is not satisfactory or the performance assessment report submitted by the holder is found to be unacceptable, the holder must-

(a) repeat the whole or relevant parts of the performance assessment and revise and resubmit the report;

(b) submit relevant supporting information;

(c) appoint an independent competent person(s) to conduct the whole or part of the performance assessment and to compile the report.

(7) If a reasonable assessment indicates that the performance assessment cannot be executed satisfactorily by a holder of a prospecting right, mining right or mining permit or a competent person(s) appointed by the holder, the Minister may appoint an independent competent person(s) to conduct such performance assessment and such appointment and execution shall be for the cost of the holder.

(8) When the holder of a prospecting right, mining right or mining permit intends closing an operation, a final performance assessment must be conducted and a report submitted to the Minister to ensure the following -

(a) the requirements of the relevant legislation have been complied with;

(b) *the closure objectives as described in the environmental management programme or environmental management plan have been, met; and*

(c) *all residual environmental impacts resulting from the holder's operations have been identified and the risks of latent impacts which may occur have been identified, quantified and arrangements for the management thereof have been assessed.*

(9) *A final performance assessment report must either precede or accompany an application for a closure certificate in terms of the Act."*

Therefore, in accordance to the above regulations, unless otherwise instructed by the DMR or as a condition to the authorisation, the audits on this EMPr will be under taken on a biennial basis, and the resultant environmental audit reports will be submitted to the DMR.

1.10 Environmental Awareness Plan.

1.10.1 Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work.

Formal training will be provided to all employees regarding the hazards of the duties to be performed to both their health as well as the surrounding environment. It is the responsibility of the Mine Manager and the Health and Safety Officer to ensure that adequate training is provided to all employees. It is also the responsibility of the relevant Head of Departments to identify the need for further training. As part of the mandatory training provided to all employees and contractors, environmental awareness training will be provided, as described in Section 1.10.2 below.

1.10.2 Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment.

The following Environmental Awareness Training will be implemented by Finsch Diamond Mine in order to inform employees and contractors of the environmental risk that may result from their work, or the risk of their interaction with the sensitive environment. The training will be conducted as part of the induction process for all new employees (including contractors) that will perform work in terms of the proposed activities. Proof of all training provided must be kept on-site.

The Environmental Awareness Training will, as a minimum cover the following topics:

- Air Quality
  - Activities that may result or mitigate impact on air quality; speeding on roads, covering of haul trucks etc.
  - Negative impacts on the receiving environment if mitigation measures are not implemented.
- Surface and groundwater

  - Risks to surface and groundwater, e.g. fuel and chemical handling and further risks of erosion or damage to riparian vegetation.
  - How incidents should be reported, and emergency requirements.
  - The importance of storm water control, maintenance of pollution control infrastructure.
  - The importance to reuse water and to prevent spillages.
- Cultural Heritage
  - To respect all cultures and believes.
  - To remain within working areas and not to enter or interfere with any cultural heritage.
  - How to report any sightings as identified during operation activities (e.g. fossils).
- Fauna
  - Overview of the fauna found on site and the uniqueness thereof.
  - Mitigation measures that all contractors and employees need to abide by.
  - No contractor or personnel allowed to catch or kill any species, and how any sightings should be reported if further actions are required (e.g. to catch and release).
- Flora
  - Overview of the flora diversity on site, and the rare and endangered nature thereof.
  - Measures taken by the mine to protect species.
  - No contractor or personnel allowed to remove, harvest or destroy any flora species unless clearly instructed based on the construction and operational plans.
- Waste management
  - The correct segregation of general and hazardous waste.
  - Do's and don'ts with respect to waste disposal.
  - Measures to avoid waste generation and to participate in waste minimisation/reduction strategies.
- Traffic
  - Abide by traffic rules, no speeding allowed.
  - To stay on designated roads (and not to drive on areas that are not fit and designed for this purpose).
  - To be aware of the fauna species and to be on the lookout and avoid collisions.
- Natural Resource Consumption
  - Minimise unnecessary use of energy by making use of energy saving devices, switching off non-essential appliances etc.
  - Optimise utilisation of mining and plant equipment, travelling routes etc.
- Emergency Preparedness and Response
  - Designated smoking areas.
  - How to report any emergency or incident.
  - How to respond when emergency alarm goes off.
- General rules and conduct
  - Respect for the sensitive environment.

- Do not litter.
- HIV/AIDS awareness.
- Respect for each other and for different cultures.
- Safety and health requirements.

1.11 Specific information required by the Competent Authority.

The following information will be required by the competent authority.

Information	Frequency of submission
Quantum of Financial Provision	Annually
Performance Assessment Report	Biennially
Surface water monitoring	Quarterly
Groundwater quality monitoring	Quarterly
Groundwater level monitoring	Quarterly
Air quality	Annually
Ambient noise level monitoring	Annually

2. Undertaking

The EAP herewith confirms

- the correctness of the information provided in the reports ☒
- the inclusion of comments and inputs from stakeholders and I&APs ; ☒
- the inclusion of inputs and recommendations from the specialist reports where relevant; ☒and
- the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed; ☒

Signature of EAP

Date

-END-