mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

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

NAME OF APPLICANT: REPLI TRADING NO 27 (PTY) LTD

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FILE REFERENCE NUMBER SAMRAD: NC 30/5/1/2/2/(10138)MR

1. IMPORTANT NOTICE

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

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

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

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

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

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LIST OF ACRONYMS AND ABBREVIATIONS

ANFO	Ammonium Nitrate and Fuel Oil
AQSR	Air Quality Sensitive Receptor
BFS	Bankable Feasibility Study
BV	Biodiversity Value
CAF	Cemented Aggregate Fill
CBA	Critical Biodiversity Area
CI	Conservation Importance
CPF	Cemented Paste Fill
CRF	Cemented Rock Fill
CRR	Comment and Response Register
Cu	Copper
D&F	Drift and Fill
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
DSR	Draft Scoping Report
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
ESA	Ecological Support Area
FSR	Final Scoping Report
GGP	Gross Geographic Product
GLC	Ground Level Concentrations
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IFC	International Finance Corporation
IWULA	Integrated Water Use Licence Application
IWWMP	Integrated Water and Wastewater Management Plan
Kl	Kilolitre
Ktpa	Kilotons per annum
Ktpm	Kilotons per month
L	Litre
LED	Local Economic Development
LHOS	Long Hole Open Stoping
LOM	Life of Mine
M	Metre
mamsl	Metres above mean sea level
MAR	Mean Annual Runoff
Mm	Millimetre
MPRDA	Minerals and Petroleum Resources Development Act
MR	Mining Right

MRA	Mining Right Application
Mt	Million tons
Mtpa	Million tons per annum
NAAQS	National Ambient Air Quality Standards
NEMA	National Environmental Management Act
NEM:AQA	National Environmental Management: Air Quality Act
NEM:BA	National Environmental Management: Biodiversity Act
NEM:WA	National Environmental Management: Waste Act
NHRA	National Heritage Resources Act
NSR	Noise Sensitive Receptor
NWA	National Water Act
p.a.	Per annum
PCM	Prieska Copper Mine
PCML	Prieska Copper Mine Limited
PLC	Programmable Logic Control
PR	Prospecting Right
PRA	Prospecting Right Application
ROM	Run of Mine
RWD	Return Water Dam
SANS	South African Noise Standards
SARAO	South African Radio Astronomy Observatory
S&EIR	Scoping and Environmental Impact Reporting
SAHRA	South African Heritage Resource Agency
SDF	Spatial Development Framework
SLM	Siyathemba Local Municipality
SLP	Social and Labour Plan
TMM	Trackless Mining Machine
TSF	Tailings Storage Facility
WML	Waste Management Licence
WRD	Waste Rock Dump
WSA	Water Services Authority
WSP	Water Services Provider
WUL	Water Use Licence
Zn	Zinc

PART A
SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1 CONTACT PERSON AND CORRESPONDENCE ADDRESS

1.1 DETAILS OF THE EAP WHO PREPARED THE REPORT

NAME OF THE PRACTITIONER:	ABS Africa (Pty) Ltd.
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1.2 EXPERTISE OF THE EAP

1.2.1 THE QUALIFICATIONS OF THE EAP

Name: Mr. Paul Furniss

Academic Qualifications:

- Bachelor of Agricultural Science in Animal Science: University of Pretoria, 1998
- Bachelor of Science (Honours) in Wildlife Management: University of Pretoria, 1999
- Master of Science in Environmental Science (Water Resource Management): University of Pretoria, 2000

Professional Registration:

- Pr.Sci.Nat. Professional Natural Scientist (Environmental Science): The South African Council for Natural Scientific Professions, 2007
- Certified Environmental Assessment Practitioner: Environmental Assessment Practitioners Association of South Africa

1.2.2 SUMMARY OF THE EAPS PAST EXPERIENCE

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

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

The EAP responsible for this submission has 16 years environmental assessment and management experience in the energy, water, mining and infrastructure sectors. His project experience includes conducting environmental assessment studies in South Africa, Guinea, Nigeria, Lesotho, Democratic Republic of Congo, Sudan, Namibia, Botswana, Zimbabwe, and Mozambique.

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

2 DESCRIPTION OF THE PROPERTY

2.1 OVERVIEW

Prieska Copper Mine (PCM) is an existing mine situated approximately 3 km south of Copperton and 60 km south-west of the town of Prieska in the Northern Cape Province. The mine falls within the authority of the Siyathemba Local Municipality (Appendix 3 Map 1). The site is accessed via the R357 from Prieska. The mine was owned and operated by Prieska Copper Mine Limited (PCML) a subsidiary of Anglo-Transvaal Consolidated Investment Company Limited (Anglovaal), between 1971 and 1991. The mine operations ceased in 1991 and rehabilitation and closure of the mine was undertaken in accordance with agreements reached with the Department of Mineral and Energy Affairs. A closure certificate was issued by the latter on 19 October 1995. No mining activities have taken place at PCM since 1991.

Repli Trading No. 27 Pty Ltd (hereafter referred to as "the Applicant") is seeking to establish mining operations centred at the PCM, whereby the remaining copper and zinc-rich Prieska Zn-Cu Deposit is mined by surface and underground mining techniques.

The proposed Mining Rights Application (MRA) boundary comprises of the following properties:

- Portions 25 and 26 of the Farm Vogelstruisbult 104; and
- Portion 0 of the Farm Slimes Dam 154.

The location of the proposed Tailings Storage Facility (TSF) is on Portion 1 of the Farm Vogelstruisbult 104.

A Scoping and Environmental Impact Reporting (S&EIR) process is being undertaken in support of the Mining Right Application (MRA), Environmental Authorisation (EA), Waste Management Licence (WML), and Water Use Licence (WUL) required for the proposed mining and associated activities.

TABLE 2-1: DESCRIPTION OF THE PROPERTIES

FARM NAMES:	• Portion 1 of the Farm Vogelstruisbult 104 (For the proposed Tailings Storage Facility Site) • Portion 25 and 26 of the Farm Vogelstruisbult 104 • Portion 0 of the Farm Slimes Dam 154 (For the Mining Right Area and mine surface infrastructure)
APPLICATION AREA (HA):	6 859
MAGISTERIAL DISTRICT:	Prieska
MUNICIPALITIES	Siyathemba Local Municipality Pixley ka Seme District Municipality
DISTANCE AND DIRECTION TO NEAREST TOWNS	Copperton is situated approximately 3 km north of the proposed underground mining area. Prieska is approximately 60 km to the north-east.

TABLE 2-2: 21 DIGIT SURVEYOR-GENERAL CODE FOR EACH FARM PORTION

FARM NAME	PORTION	PROSPECTING RIGHT HOLDER	SURFACE RIGHT HOLDER	TITLE DEED	21 DIGIT SURVEY OR GENERAL CODE FOR EACH FARM PORTION
Vogelstruisbult 104	1	Vardocube (Pty) Ltd.	Request Trust	T1839/2003 CTN	C06000000000104000010
Vogelstruisbult 104	25	Repli	PCML	T18940/2003 CTN	C06000000000104000250
Vogelstruisbult 104	26	Repli	Request Trust	T33406/1999 CTN	C06000000000104000260
Slimes Dam 154	0	Repli	PCML	T76430/1993 CTN	C06000000000154000001

Based on the mine planning available at present, it is expected that the mine and all associated infrastructure and structures will have a maximum surface area footprint of approximately 300 hectares.

Approximately 121 ha of the total mine development surface area will take place on land disturbed by the historical mining activities.

2.2 LOCALITY MAP

Please refer to Appendix 3 Map 1.

3 DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY

3.1 LISTED AND SPECIFIED ACTIVITIES

The listed and specified activities for the preferred site layout is provided hereunder.

(Please refer to Appendix 3 Map 2 or the layout of the key infrastructure listed below).

NAME OF ACTIVITY (ALL ACTIVITIES INCLUDING ACTIVITIES NOT LISTED) (E.G. EXCAVATIONS, BLASTING, STOCKPILES, DISCARD DUMPS OR DAMS, LOADING, HAULING AND TRANSPORT, WATER SUPPLY DAMS AND BOREHOLES, ACCOMMODATION, OFFICES, ABLUTION, STORES, WORKSHOPS, PROCESSING PLANT, STORM WATER CONTROL, BERMS, ROADS, PIPELINES, POWER LINES, CONVEYORS, ETC…ETC…ETC.)	AERIAL EXTENT OF THE ACTIVITY HA OR M²	LISTED ACTIVITY MARK WITH AN X WHERE APPLICABLE OR AFFECTED	APPLICABLE LISTING NOTICE (GNR 544, GNR 545 OR GNR 546)/NOT LISTED[1]
Waste Rock Dump (WRD – Option 3)	76 ha	X	GNR 984 (17)
Tailings Storage Facility (TSF - Option 2)	100 ha	X	GNR 984 (17)
Surface Mining Area (Open Pit)	15 ha	X	GNR 984 (17)
Oxide Ore Stockpile	2 ha	X	GNR 984 (17)
Topsoil Stockpile	18 ha	X	GNR 984 (17)
Effluent Dam	32 ha	X	GNR 984 (17)
Pollution Control Dam	1 ha	X	GNR 984 (17)
Open Pit Dewatering Dam	1.3 ha	X	GNR 984 (17)
Process Plant Dam	0.3 ha	X	GNR 984 (17)
TSF Return Water Dam	5 - 7 ha	X	GNR 984 (17)
Management Offices	0.5 ha	X	GNR 984 (17)
Hutchings Shaft	0.02 ha	X	GNR 984 (17)
Decline Ramp	0.4 ha	X	GNR 984 (17)
Plant Terrace (Process plant, conveyors, stockpiles, backfill plant, sewage treatment plant, concentrate drying pad, workshops, offices, change houses, control room, first aid station, stores, waste handling area, vehicle parking area, fuel storage facility and wash bay)	18 ha	X	GNR 984 (17)
Power Generation (generator sets)	0.03 ha	X	GNR 984 (17)
Explosives Magazine (existing)	6 ha	X	GNR 984 (17)
Reinstatement of stormwater diversion berm	4 ha	X	GNR 984 (17)
Ventilation Shafts	0.4 ha	X	GNR 984 (17)
Mine Access and Internal Roads (aboveground)	15 ha	X	GNR 984 (17)

[1] Please refer to Section 4 for the specific listed activities applicable to the proposed mine development

The planned operations initially comprise of surface mining operations targeting the shallow remnants of the Prieska Zn-Cu Deposit. Follow-up phases of mining will target underground mining of the deeper portions of the Prieska Zn-Cu Deposit. A new tailings storage facility, as well as waste rock dumps, water storage facilities, ore processing plant and other associated infrastructure will be required. Dewatering of the old workings at PCM will be required as the mine is partially inundated.

The mine support infrastructure and structures are proposed to be located primarily on Portions 25 and 26 of the Farm Vogelstruisbult 104. The location of the proposed Tailings Storage Facility (TSF) is on Portion 1 of the Farm Vogelstruisbult 104.

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

- Surface (open pit) mining of the remaining near surface oxides and shallow supergene ore deposits on Portion 26 of Vogelstruisbult 104 for 1 to 2 years, on an estimated processing capacity of 100 ktpm run-of-mine ore;
- Underground mining of the deeper portions of the Prieska Zn-Cu Deposit, on an estimated processing capacity of 150 ktpm run-of-mine ore will commence after mining of the open pit;
- The near surface oxides, shallow supergene ore and deep hypogene ore will be processed on site, including ore stockpiling, crushing and screening, milling, flotation, filtration as well as tailings and waste rock deposition;
- Dewatering of the mine. The estimated volume to be dewatered is approximately 8.5 million m^3. Various technical options for dewatering are under investigation;
- Establishment of various ancillary mine support infrastructure such as power supply and water supply infrastructure to site, as well as explosives storage, mine offices, ventilation fans, change houses, and winder house;
- Development and upgrading of internal road, rail and power infrastructure;
- Construction of new wastewater treatment infrastructure for sewage; and
- Establishment of housing at Prieska and Copperton.

Below is a summarised list of the activities to be undertaken.

- Drilling and blasting (where necessary);
- Exploration geophysical surveying, drilling, pit sampling and trenching;
- Excavation, loading, hauling and transport of overburden and ore;
- Stockpiling of overburden, waste rock and ore concentrate;
- Dewatering of underground workings and natural and forced evaporation of excess water;
- Construction of stormwater control systems and pollution control dam;
- Construction of plant infrastructure (roads, workshops, change houses, offices, fencing etc.);
- Processing of ore;
- Drying and transportation of metal concentrates to market;
- Preparation of pastefill, cemented aggregate fill, hydraulic fill and classified tailings;
- Reclamation of tailings and waste rock material; and
- Establishment of tailings storage facilities and associated return water dam.

3.2 DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN[2]

3.2.1 CLEARING AND GRUBBING

Clearing will be undertaken to remove vegetation from the areas earmarked for development and infrastructure placement.

3.2.2 TOPSOIL REMOVAL AND STOCKPILING

Once the vegetation is removed, the topsoil will be removed and stored at a designated area (Appendix 3 Map 2). The topsoil will be used exclusively for rehabilitation purposes.

3.2.3 DEWATERING OF UNDERGROUND WORKINGS

3.2.3.1 Construction Phase Dewatering

Historically, PCM was a dry mine, with no significant groundwater inflows recorded.

With the decision to stop underground mining and shut the mine in 1991, the underground workings gradually filled with seepage water. The water level is now at approximately 330 m below surface.

The estimated volume of water within the void created by the historical underground mine workings and which will need to be removed during the construction phase of the mine development, is 8.5 million m^3. Initial water quality analysis of this water indicates that the water is not suitable for use or discharge without treatment.

The underground mining cannot take place without removing the water. Mine dewatering is a common practice throughout the world and with the appropriate environmental controls in place, can be managed without significant detrimental impact to the environment.

Factors influencing the dewatering of the PCM include, among others, the following:

- Large volume of water requiring removal;
- Poor quality of water;
- Climatic factors including low rainfall and very high evaporation rates;
- Limited water reuse options mainly because of the remoteness of the site, low population density, short duration of availability of the water (will only be available during the initial dewatering period), and general absence of surrounding land uses with a water demand requirement / water supply constraint;
- Local geomorphology and geological conditions such as the relatively flat topography, and sandy soils underlain by a well-defined calcrete layer. These conditions can retard natural drainage as they facilitate the rapid infiltration and ponding of water;
- Soils which are highly susceptible to erosion; and
- Absence of any significant perennial natural drainage systems near (within 5 km) to the mine site.

Design criteria are to investigate zero offsite discharge options as the preferred means of dealing with accumulated water. Various options for the dewatering were considered.

As part of the dewatering investigation, Repli / Orion distributed a letter on 31 January 2018 to various stakeholders in the region inviting expressions of interest for the use of water removed during dewatering. No feasible responses to the expression of interest were however received for consideration.

[2] The information presented in this section has primarily been summarised from the Orion Scoping Study Report (2017 and 2018), supplemented with additional engineering information from the ongoing Feasibility Study.

Source: www.minetek.com

FIGURE 3-1: EXAMPLE OF WATER EVAPORATOR CANNONS IN USE AT A MINE

The outcome of the technical study on the dewatering, conducted as part of the ongoing feasibility study, was as follows:

- Treatment of the water is technically possible but does not show any significant economic benefit over the period of dewatering when compared to forced evaporation. Although the treated water could be used for the processing plant activities, this would require the construction of a large storage dam for the water, which would in turn significantly increase the capital cost of the project. This option would therefore more likely also require the offsite discharge of treated water into either non-perennial watercourses with a corresponding impact to the characteristics of these watercourses and affected landowners or the return of treated water back into the Prieska potable water system, which poses various other risks and would need permission from various authorities;
- The new TSF cannot initially be used as a water storage reservoir as this practice will affect the quality of the decant water on the TSF once tailings deposition commences. A dedicated effluent dam for the dewatering with a capacity of between 1 and 1.5 million m^3 is therefore required - the size will be economically optimized together with the number of evaporators over the remainder of the feasibility study;
- The underground works dewatering will be done utilising either submersible pumps or multi-stage pumps that will align with the LOM dewatering requirements, pumping at a rate of between 500 m^3/hour and 1000m^3/h to the lined effluent dam. Meteorologically controlled forced fan evaporators (typically 20 to 30 units) will be placed on the edge of the dam to allow the evaporator deposition area to fall inside the lined dam and accumulate the heavy metals and brine in the lined dam. The estimated duration to evaporate the estimated 8.5 million m^3 of water is between 12 and 18 months;
- The underground mine will be dewatered to the bottom level at approximately 1025 m deep;

- Droplet fallout beyond the effluent dam area will be minimised through the orientation and placement of the evaporator units as well as the automated settings on the units which shut the units down if the wind direction is unfavourable;
- Provision for drift of droplets, over an estimated maximum distance of 250 m from the evaporator units, is recommended. This fallout area will form part of the effluent dam basin which is lined;
- At mine closure, the residue which will collect in the effluent dam will be removed in a manner that prevents damage to the lining of the dam; and
- The groundwater monitoring programme will be used to detect any changes in groundwater quality, including any potential pollution from the effluent dam.

An accessible pump station is available on 310 level and will be re-equipped with multistage centrifugal pumps and new pump columns to surface will be installed.

Submersible pumps will be installed in the shaft to pump to the settlers on the 294 level which will feed the main pumps on 310 level. A second main pump station with settlers is under water on 720 level and it is intended to equip this pump station once pumping opens this level to complete the dewatering. It is anticipated that the same temporary submersible system will be utilized to dewater down to 957 level, the main operations level. Additional mud pumps are to be temporarily installed on 957 level with a mud column up to the 720 level settlers. From 957 level to shaft bottom will be dewatered using submersible slurry pumps as it is anticipated that the water will be muddy. These pumps will feed the mud pumps on 957 level. All pumped water will report to the 1,000,000 m^3 lined effluent dam where the water will be evaporated through natural and forced evaporation.

The evaporators atomise water which is effectively blown into the air at high velocity where the evaporation takes place. Each evaporator will eject water at a rate of 137 m^3/hr of which it is anticipated that the evaporation efficiency will be 35% to 60% depending on the season. On average an evaporation efficiency of 50% is planned. The remaining water will fall back into the effluent dam to be recirculated back to additional evaporators.

The evaporators are fitted with weather sensors and programmable logic controllers ("PLCs") in order to control and regulate pumping according to various weather conditions.

3.2.3.2 Operational Phase Dewatering

Dewatering volumes over the LOM modelled as part of the geohydrological study suggest that the rate of groundwater seepage for the underground mining will be very low (indicative average flow of 5 l/s), as these rock formations are expected to be unfractured with low permeability and thus not transmitting groundwater.

To ensure safe access for mining, water will continue to be removed from the underground workings and pumped to the effluent dam for natural and forced evaporation.

Although the deeper rock formations in the immediate vicinity of the underground workings and the shallow aquifers around the sinkholes are dewatered, groundwater seepage may still take place during surface mining, especially during the wet season. Fractured rock formations characterise the surface mining area and the rate of groundwater seepage for the surface mining is consequently expected to be higher (indicative average flow of 8 – 9 l/s), but may be lower, considering the expected impact of historical mine dewatering.

Seepage and any rainwater which collects in the open pit will be pumped to the open pit dewatering dam, from where it is pumped to the effluent dam for evaporation.

Dirty water from the mining operations will flow into a de-gritting section and then into clarifiers which will be dosed with flocculent. The accumulated mud will accumulate at the bottom of the clarifiers and be periodically released to a mud holding tank. This tank will feed a standard plate and frame filter press and the cake from the

press will be collected and fed into the ore pass, together with the grit. Filtrate will be recycled to the clarifiers. The clear water from the clarifiers will overflow to the clear water dams. Multi-stage centrifugal pumps will then handle the clearwater and will operate in a two running, one standby configuration. Each unit will be able to pump 300 m^3 per hour to an intermediate pump station located at the 310 metre Level.

The estimated water balance for the underground mine will be made up of the following:

- Fissure water – 450 000 litres per day
- Drill and cleaning water – 2.8 million litres per day
- Backfill flushing water – 150 000 m^3 per day

This gives a total estimate of 3.4 million litres per day for normal pumping requirements. The pumping system has been designed to handle a 1:50 year storm event which is 127 mm in 24 hours or 26.7 million litres over 24 hours. The three installed pumps running at full capacity will be able to pump 15 million litres per day so will be able to deal with this volume in 45 hours or just under two days.

3.2.4 MINING OVERVIEW

The applicant intends to mine the remaining ore in the Prieska Zn-Cu Deposit through a combination of surface (open pit) mining and underground mining. Surface mining will commence first whilst the underground mining operations are established.

3.2.4.1 Geological Overview

The geology is described[3] as follows:

- The Prieska Zn-Cu Deposit is located in the northern limb of a large recumbent asymmetric synformal fold with an axial plane striking 135°, dipping 40° north-east and a shallow ± 5° plunge to the south-east. The deposit crops out at surface and has a steep, up to 80°, dip in the fold limb. In depth the structure flattens in the fold hinge zone from about 40° to a sub-horizontal attitude in the fold trough zone which is approximately 1 km below surface.
- The ore body has a 2 km strike length at an orientation of 135° north. The ore body outcrops as a well-developed gossan, which is massively textured, composed of hard iron oxides (limonite and goethite) with some secondary copper minerals (minor malachite and azurite).
- The ore body has been oxidized, leached and supergene enriched from surface to a depth of 100 m.
- The transition zones from the oxidised and leached deposit to unaltered massive sulphide at depth occurs as relatively sharp distinctions.
- The gradation follows a typical supergene deposit oxidation profile, from a highly oxidised shallow horizon, becoming less oxidised with depth to the supergene horizon and then to primary fresh sulphides.
- Mineralisation widths range between 2 m to over 35 m in places, though it averages between 7 m and 9 m.

The Prieska Zn-Cu Deposit presents a classic supergene oxidation profile for VMS deposits in weathered terranes. There are five principal ore oxidation zones that can be divided into spatially distinct zones. From the surface downward, these are:

- A. a hematite-goethite-quartz oxide zone (or gossan). From surface to a depth of 33 m;

[3] Open Pit Mine Design Criteria, DRA 2018. PCM-DRA2071-ME-OPDC-001

- B. clay (kaolinite) zone is developed in places below 33 m. This zone is possibly better developed in the near surface central and south-eastern parts of the orebody;
- C. chalcocite–dominant supergene zone is developed between ~42 and ~70 m below surface. This supergene copper enrichment zone was not previously noted at Copperton;
- D. mixed supergene-sulphide zone which is developed ~70 to ~90 m below surface. This zone has a relatively sharp contract with the fresh underlying massive sulphides; and
- E. Fresh primary sulphide zone extending from 90m to depth.

PCML mined the steeply-dipping section of the ore-body down to the hinge zone. Before shutting the mine in 1991, PCML drilled several holes into the flat section / hinge zone of the ore-body generating an extensional target (the "deep sulphide target"). It's this shallow dipping / largely-flat portion of the ore-body, at approximately 1 km below surface that forms most of the mineable material for the proposed mine.

In addition to the underground sulphide material, there is an open pit sulphide material to a depth of approximately 100 m, ("+105 Level Exploration Target"). A large portion of this was left as part of the mine's crown pillar. It is suspected that parts of this pillar have failed creating sinkholes adjacent to the ore zone. Available information suggests that the sinkholes are plugged at depth by collapsed rock and fines.

A model of the extent of the surface and deep sulphide targets is provided in Figure 3-2.

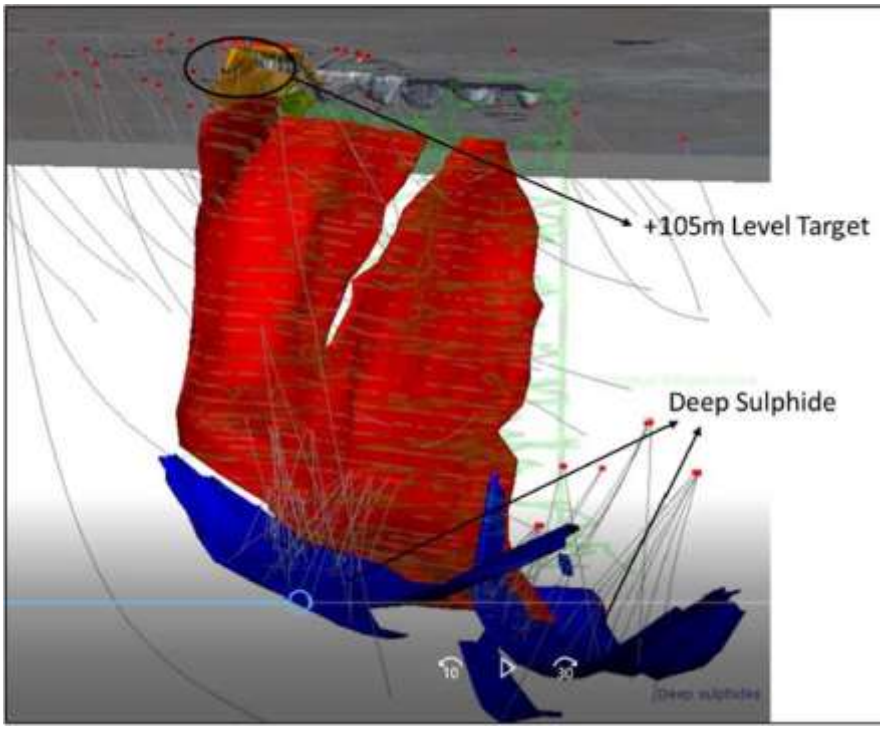


FIGURE 3-2: MODEL OF THE DEEP SULPHIDE AND SURFACE MINING TARGETS[4]

[4] Open Pit Mine Design Criteria, DRA 2018. PCM-DRA2071-ME-OPDC-001

3.2.4.2 *Mineral Resources Inventory*

The baseline mine plan is to establish an open pit mine, with associated ore processing plant, to treat 100 ktpm of ore while underground mining operations are established. A summary of the Mineral Resources being used to support conceptual designing for the Life of Mine (LOM) is provided in Table 3-1. Reportable Mineral Resources and Ore Reserves will be delineated as part of the ongoing feasibility studies.

TABLE 3-1: MINERAL RESOURCES INVENTORY[5]

DEPOSIT	ORE (TONNES)	METAL	
		ZINC (TONNES)	COPPER (TONNES)
OXIDE (INFERRED)	271 600	2 400	1 700
SUPERGENE (INDICATED)	1 240 600	31 900	29 500
DEEP SULPHIDE (INFERRED)	22 649 216	839 355	265 929
LIFE OF MINE ROM	**24 161 416**	**873 655**	**297 129**

The estimated mine production tonnage over the LOM for both the open pit and underground mining is shown in Figure 3-3.

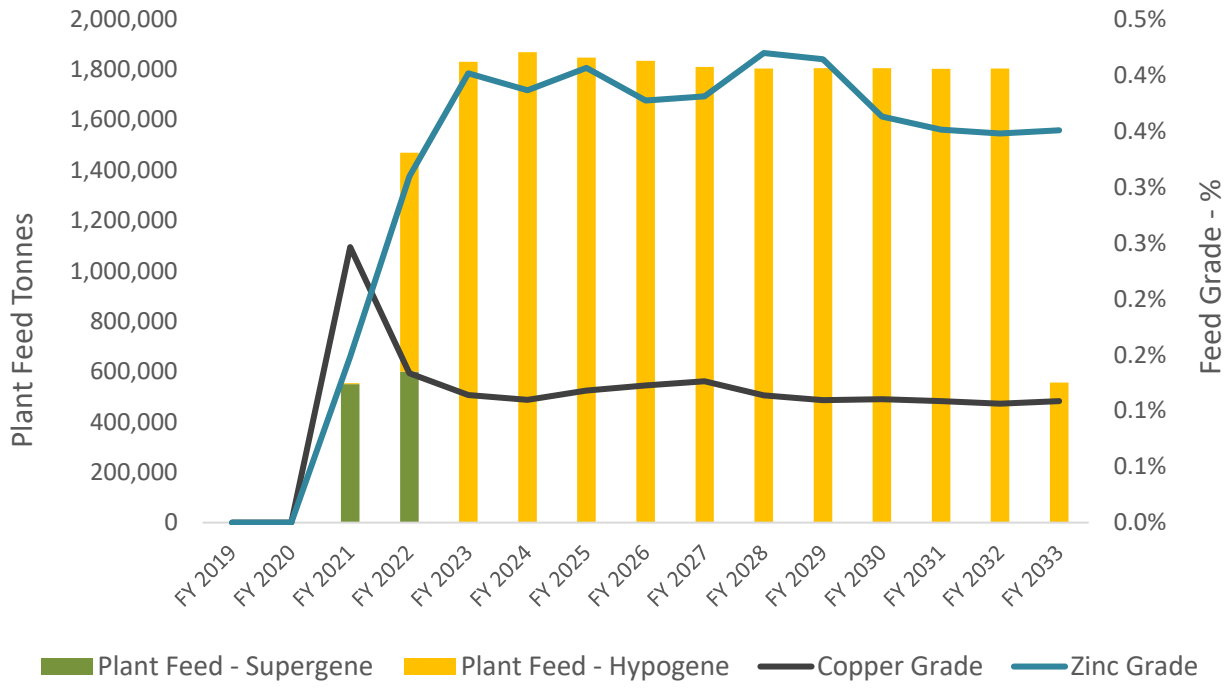


FIGURE 3-3: LIFE OF MINE ORE PRODUCTION

[5] (ASX/JSE Press Release 5 Feb 2018)

3.2.5 HOURS OF OPERATION

- Construction working hours will typically be between 10 and 12 hours per day, Monday to Saturday.
- Commissioning and mining working hours will be between 18 and 24 hours per day, Monday to Sunday.
- Process plant operating hours will be 24 hours per day, 365 days a year.

3.2.6 SURFACE MINING AND SINKHOLES[6]

The surface mining will exploit the remaining oxide ore (estimated at approximately 1.1 Mt) to the western side of the sinkholes. Figure 3-4 shows the proposed extent of the open pit area and Figure 3-5 shows the design of the open pit shell.

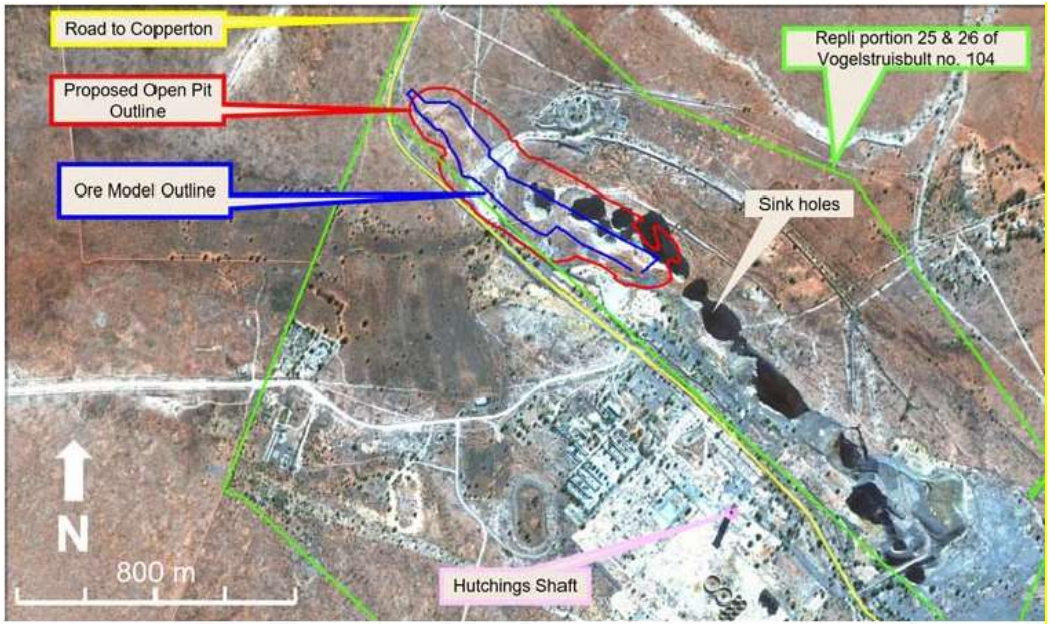


FIGURE 3-4: ORE MODEL AND OPEN PIT LOCATION

[6] Open Pit Mine Design Criteria, DRA 2018. PCM-DRA2071-ME-OPDC-001

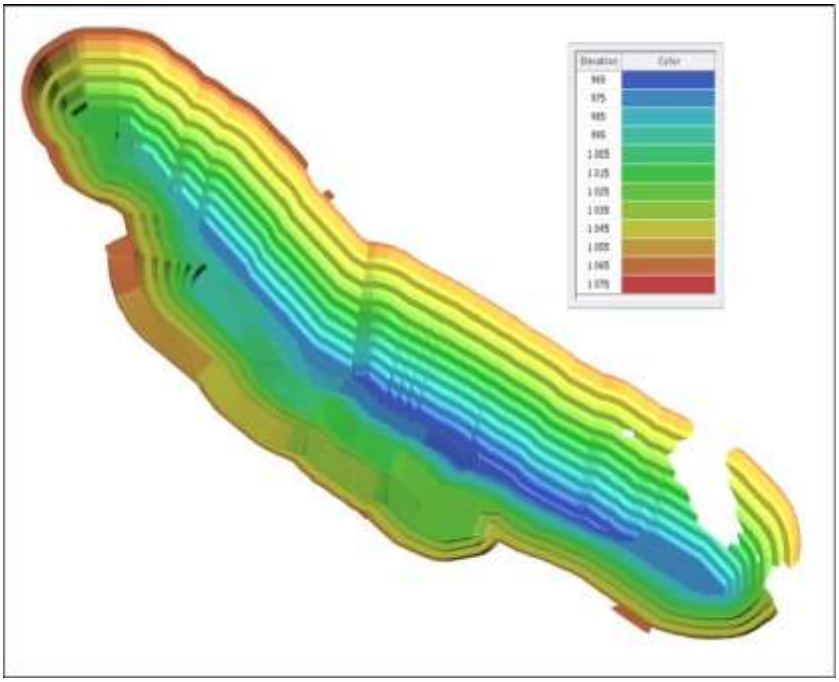


FIGURE 3-5: PIT SHELL DESIGN

The sinkholes formed during the historical mining activities and are suspected to be a result of the partial failure of the mine crown pillar, resulting in subsidence of ground into the excavated voids. It is suspected that mobilised sinkhole material has filled the underground cavities. The sinkholes have destabilised ground in a zone about 30 m to 50 m around the holes, as evidenced by surface cracking. Inspection of the historical sections of underground excavations suggests that there were sufficient pillars left to provide regional stability, hence it is likely that crown pillar failure was localised.

The final open pit is estimated to have a strike length of 970 m, a width of approximately 150 m at its widest point and final depth of 100 m. Mining will commence from the North Eastern section of the pit and progress southwards towards the sink-holes.

Top soil removal and waste pre-stripping should take place for 9 months following which mining of mineralised material will commence and continue for an estimated 11 months. The top soil is to be stockpiled for later use as rehabilitation material. Waste stripping will peak at 1.29 million tonnes per month and continues until the end of the mining period. The mining production target is aimed at approximately 100,000 tonnes per month.

The surface mining sequencing and production scheduling will comprise of the following key tasks:

- Access and haul roads construction will consist of local materials sourced in pit that are tested and found to be suitable to provide suitable wearing course properties suited to the basic civil layer works design;
- The topsoil will be stripped to an average depth of 1 m by a dozer and the heaps will be loaded with a backhoe excavator (3.5 m^3) and 40 t dump trucks. The designated top soil stockpile area will be regularly levelled with a dozer to the required maximum of 5 m dump bench height;
- The waste rock will be drill and blasted in 5 to 10 m benches and will be loaded and hauled to the waste rock stockpile. The tipped heaps will be dozed and levelled into 10 m high lifts and no rear tipping on the stockpile edges will be allowed. Loading will be done with two 9 m^3 excavators and a fleet of 90 t rigid dump trucks. On-going mine planning will ensure that all stripped waste is systematically replaced on the area designated for waste rock dumping and waste is stripped in such a manner that ore is continuously available for mining;

- Ore zone drilling and blasting in 5 m benches;
- Ore winning operations at the open pit is designed for a 1.2 Mtpa RoM target. The ore handling fleet has been over designed to allow for flexibility and to ensure adequate utilisation and consistency of supply to the processing plant. A 3.5 m^3 excavator and fleet of 40 t rigid dump trucks will do ore loading and transportation to the mineral processing plant;
- Oxide ore will be stockpiled on a separate stockpile for possible beneficiation in the future;
- The edges of every waste working bench will be protected by a 2 m high berm consisting of local waste materials while the edge of every ore seam bench will be demarcated by empty oil drums or other suitable means approved by the Mine Manager;
- Reclamation of tailings material from the historical TSF for use as backfill material;
- Preparation of a suitable backfilling mix at the backfill plant for backfilling to buttress the sinkholes;
- Probe drilling to ensure mining areas are safe from underground cavities;
- Dozing and dump maintenance;
- Maintaining the entire mine working areas, in-pit haul roads, waste dump areas, and external haul roads; and
- Building and maintaining in-pit and on-dump drainage structures.

3.2.7 UNDERGROUND MINING

Historic underground mining successfully extracted 46 Mt of sulphide ore from steep dipping, continuous open stopes, down to a depth of 900 m at a mining rate of 250 ktpm of ore. Excavations that were established to access production areas and transport ore back to the underground crusher are expected to still be in useable condition. This pre-existing network of excavations will provide the initial access and support ventilation for the planned mining until expanded upon.

Underground mining at a rate of 150 ktpm will focus on exploiting what remains of the Deep Sulphide Exploration Target. Ore production will come from stoping areas below the -900m Level.

Access to some of these deeper stoping areas was already established as part of the trial mining that was undertaken before mining operations ceased in 1991.

The LoM for the Deeps underground mine is estimated at 11 years and approximately 18.5 million tonnes is mined over this period. Mining is expected to start in the North-West section where existing development is in place. Production will then commence in the South-East section.

3.2.7.1 Geotechnical Investigations

Observations from the existing tunnels in the upper levels of the historical mine indicate very competent rock and very little tunnel support was installed. Localised roof-bolting was carried out in isolated areas where small amounts of fracturing was observed. Considering the time from when these tunnels were first opened, the rock conditions are still very competent.

For the planned Deeps underground mine, geotechnical studies were carried out to understand the rock mass characteristics at greater depth and to determine a rock support regime for the mine. A total of 8 drill holes have been assessed and 30 compressive and tensile strength tests were carried out to estimate Rock Mass Ratings.

The tests were carried out on the hanging-wall rocks, footwall rocks and the mineralised zone. These results indicate competent rock for all three rock types (Figure 3-6).

RQD (Rock Quality Designation)	Rock quality classification
0 -25%	Very Poor
25% - 50%	Poor
50% - 75%	Fair
75% - 90%	Good
90% - 100%	Excellent

RMR (Rock Mass Rating)	Rock quality classification
0-21	Very Poor
21 – 40	Poor
41 – 60	Fair
61 - 80	Good
81 - 100	Excellent

Q Index rating	Rock quality classification
0.001 - 0.01	Exceptionally Poor
0.01 - 0.1	Extremely Poor
0.1 - 1.0	Very Poor
1.0 - 4.0	Poor
4.0 - 10	Fair
10.0 - 40.0	Good
40.0 - 100.0	Very Good
100.0 -400.0	Extremely Good
400.0 - 1000	Exceptionally Good

FIGURE 3-6: UNDERGROUND ROCK QUALITY METRICS

Pattern bolting in all new development ends will be carried out. Tunnel dimensions will be 6 x 5 metres for main ramps and footwall tunnels while stope access tunnels will be 4 x 4 metres. The planned rock support is described below;

- 2 m resin grouted roof-bolts on a 1.5 x 1.5 m pattern for all tunnel development
- Meshing and lacing in addition to the bolting pattern will be installed over the last 10 m of access tunnels intersecting the deposit
- Larger excavations such as the crusher chamber and workshops will require primary roof-bolts as described above with additional 6.5 m cable anchors on a 3 m spacing. 50 mm of shotcrete will then be applied.

3.2.7.2 Access[7]

The primary access system will be via the Hutchings vertical shaft. The secondary access is a trackless decline ramp, extending from existing infrastructure development to access the North West and South East mining areas.

The Hutchings Shaft will be rehabilitated and recommissioned to serve as the main access for men and material. A rock hoist will be installed to hoist ore production to surface. Mining consumables will be loaded onto rail bound cars and lowered to the main production level (level 957) for distribution to working areas and underground buffer stores.

The Trackless Mining Machine (TMM) workshop is located on level 957. TMM's will travel from the workshop in existing infrastructure to working areas above level 957. New decline ramps (5 m H x 6 m W) will be developed at 9-degree declination to access mining areas below the current infrastructure.

Gathering haulages (5mW x 5mH) will lead from the decline ramps to access the mining blocks. Drift and fill mining development will be a minimum size of 4mW x 4mH to accommodate mining equipment.

[7] Mine Design Criteria, DRA 2018. PCM-DRA2071-ME-DC-001

3.2.7.3 Mining Methods

Mine production will be achieved using a combination of two mining methods:

- The continuation of longhole sub-level open stoping (LHOS), supplemented with pastefill and waste rock fill, where the orebody is steep enough for LHOS; and
- The introduction of drift-and-fill (D&F), where the orebody dip becomes too flat to allow gravitational flow of ore from the stopes.

3.2.7.4 Long Hole Open Stoping with Fill

LHOS will be established by first developing access drifts (typically 4.5 m wide x 4.5 m high) parallel to the strike in the footwall and at a predetermined distance from the reef contact. The access drifts will be developed at typically 15 m vertical intervals to match the designed stope heights. Cross-cuts will then be developed from the footwall access drift, perpendicular to the strike of the ore body to intersect and traverse the ore zone, terminating at the hanging wall contact. Crosscuts will be established every 80 m along strike of the orebody to service each stoping block.

Ore drill drives will then be developed in the ore zone, along strike of the ore, on the footwall side of the ore zone. The drill drive will be developed to define the full strike length of the orebody.

Each stope block will have a strike length of typically 60 m, with a group of three stopes adjacent to each other and separated from the next stope by a rib pillar.

Thus, an extraction ratio of at least 85% will be achieved, with 180 m of strike extracted in stopes and 30 m left for rib pillars. The rib pillars will also be eventually extracted.

The two end stopes in each group, adjacent to the rib pillars, will be mined out first as primary stopes. Once the primary stopes are mined out and backfilled with cemented rock fill (CRF), pastefill, waste rock or hydraulic fill, the middle or secondary stopes are then to be extracted. The remaining rib pillars will be extracted opportunistically as a tertiary production stage, depending on ground conditions. A typical LHOS layout is illustrated in Figure 3-7.

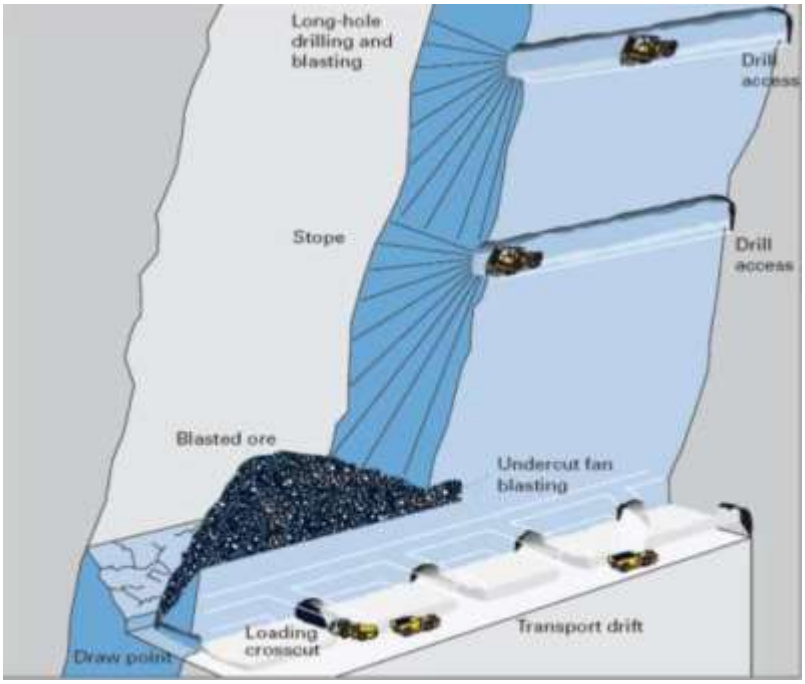
Once a stoping zone is established, the stoping front will retreat up-dip, with the lowest stopes being mined first, backfilled and used as the mucking floor for the adjacent upper stopes.

A typical LHOS stope is commenced by first establishing a raise at one end of the stope to link the lower drill drive to the one vertically above it. The raise is then widened to the width of the ore zone to create the relief slot, by blasting longholes drilled around the raise.

Production blast holes are drilled, either as down-holes or up-holes in rows, with the row interval spaced 1.5 m to 2.0 m along strike (termed the ring burden). Within each row, blast holes are collared in the drill drive and fanned out to cover the ore zone. Spacing of the drill holes at the toe of each hole is kept to below 2.0 m (spacing).

Once the slot is established, rings are fired sequentially into the created void, until the whole stope is blasted.

An LHD unit will manually muck the stope until the brow opens. Remote controls will then be used to muck out the rest of the stope. The maximum haul distance for the LHD mucking a stope is to be kept to within 250 m. The LHD will muck to reloading bays in the access drives.



Source: Orion Minerals, 2018. Scoping Study Report

FIGURE 3-7: TYPICAL LONGHOLE OPEN STOPE LAYOUT

Once a stope is emptied, the primary stopes will be filled with cemented rock fill, containing a 5 to 7% cement binder. The stopes will be filled via the upper cross-cut and drill drive until tightly filled. Secondary stopes will be mined adjacent to the backfilled primary stopes after sufficient fill cure time is allowed, typically more than 14 days. Secondary stopes are then to be filled with unconsolidated backfill.

Ammonium nitrate and fuel oil (ANFO) is assumed for most production blasting, with bulk emulsion explosives used only when wet conditions are encountered. The powder factors for the primary and secondary stopes have assumed to be 1.5 and 1.2 kg/t of ore, respectively, including the drop raise blasting.

3.2.7.5 Drift and Fill

Where vertical thickness of the ore is not high enough for efficient LHOS, orebody dip too flat or ground conditions inappropriate, then drift-and-fill (D&F) mining will be used.

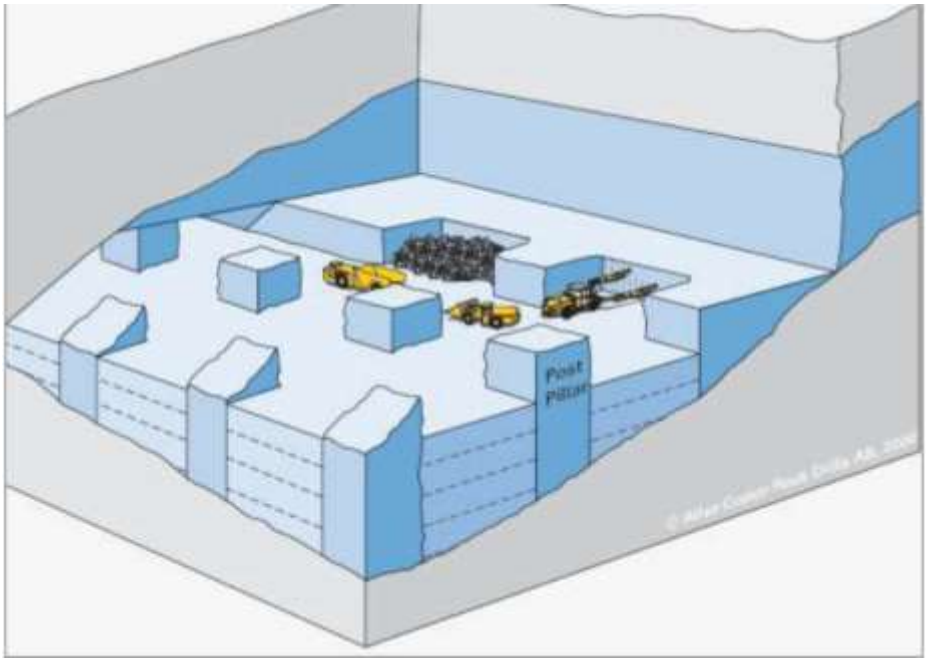
The drift-and-fill sequence can be described as follows:

- A series of on-strike and on-ore access drives, typically 4.5m wide x 4.5m high, spaced at 60m along-dip intervals and parallel to each other are first established, (these are the equivalent of LHOS level drill drives);
- Primary drift drives are then developed from the access ore drives, in both the up-dip and down dip direction, sub-parallel to the dip direction. The drift drives will be developed within the ore zone and at the upper extent of it. The drift drives will be extended to either breakthrough to the adjacent access ore drive or meet up with a corresponding drift drive from the adjacent access ore drive;
- Primary drift drives are established at intervals that leave sufficient room for secondary and then tertiary drives to be later developed;
- Where ore remains underfoot of the drift drive, the ore is removed by benching the floor; and

- Once benching is completed and the drives emptied, backfilling is done using cement rock fill, as is to be done for LHOS.

A three-stage extraction sequence will be used to ensure that there is always adequate support (either virgin ground, well-cured CRF, paste fill or other selected supplementary support method) adjacent to a drift being extracted and no slender backfill ribs are formed.

Where backfill walls are exposed, (especially primary drifts), cement content will be increased to ensure freestanding backfill. The secondary drifts will require less cement and tertiary only enough cement to prevent liquefaction. A typical D&F layout is illustrated in Figure 3-8.



Source: Orion Minerals, 2018. Scoping Study Report

FIGURE 3-8: TYPICAL DRIFT AND FILL LAYOUT

3.2.7.6 Underground Material Handling Systems[8]

Mining consumables and materials will be stored on surface and transported underground to section buffer stores for distribution to mining areas as required. Broken rock will be truck hauled from mining areas and tipped into designated truck tips. Electric locos will haul hoppers from the loading points below the orepasses to the existing rail tips feeding the underground crusher station.

Ore will be crushed UG (nominally to minus 150 mm) and hoisted to surface via the Hutchings Shaft. The main shaft will be designed to a rock hoisting capacity of 2.0 million tonnes per annum utilising two 14 tonne skips with a hoisting speed of 12 metres/sec.

After delivery to site, Trackless Mining Machines (TMM) will be disassembled and slung beneath the main cage to level 957. The TMM will be reassembled and commissioned in the underground workshop on level 957.

[8] Mine Design Criteria, DRA 2018. PCM-DRA2071-ME-DC-001

To minimise electrical energy requirements, limited compressed air will be used for workshops, refuge bays and potential gas (methane) control. Diesel-driven electro-hydraulic drill jumbos and roof bolters will be used. 40t underground trucks (some fitted with ejector buckets) will transport broken rock. LHD's will muck broken rock.

All infrastructure to support the deeps sulphide mining will be positioned underground. Engineering workshops and stores will be located at the trackless mining workshop.

3.2.7.7 Mine Ventilation

The Hutchings Shaft and Main Decline will be used as the primary intakes. The Beecroft Shaft will be refurbished as up-cast ventilation shafts (they were previously used for upcasting). New ventilation fans will be erected on the shaft collars. Deepening the shaft will allow sufficient ventilation to reach the new underground workings below the 1024 level. Underground return airways required to transport air to the new up-cast shaft positions will be identified and refurbished.

Refurbishing of required tunnels will include clearing any restrictions that may have developed over time to eliminate pressure losses in the ventilation system.

Additional raise-bore ventilation airways will be installed to allow fresh air to enter the development and production area along strike as the mine develops over time. Moveable fans will be used for ventilation throughout the underground mine and will range in ratings from 22 kW to 50 kW depending on the areas and tunnel length to be ventilated. 22 kW fans will also be utilised to provide ventilation in workshops, offices and pump stations.

Where appropriate the old working areas will be sealed off with ventilation walls and installing mechanical ventilation doors where required.

3.2.8 BACKFILLING

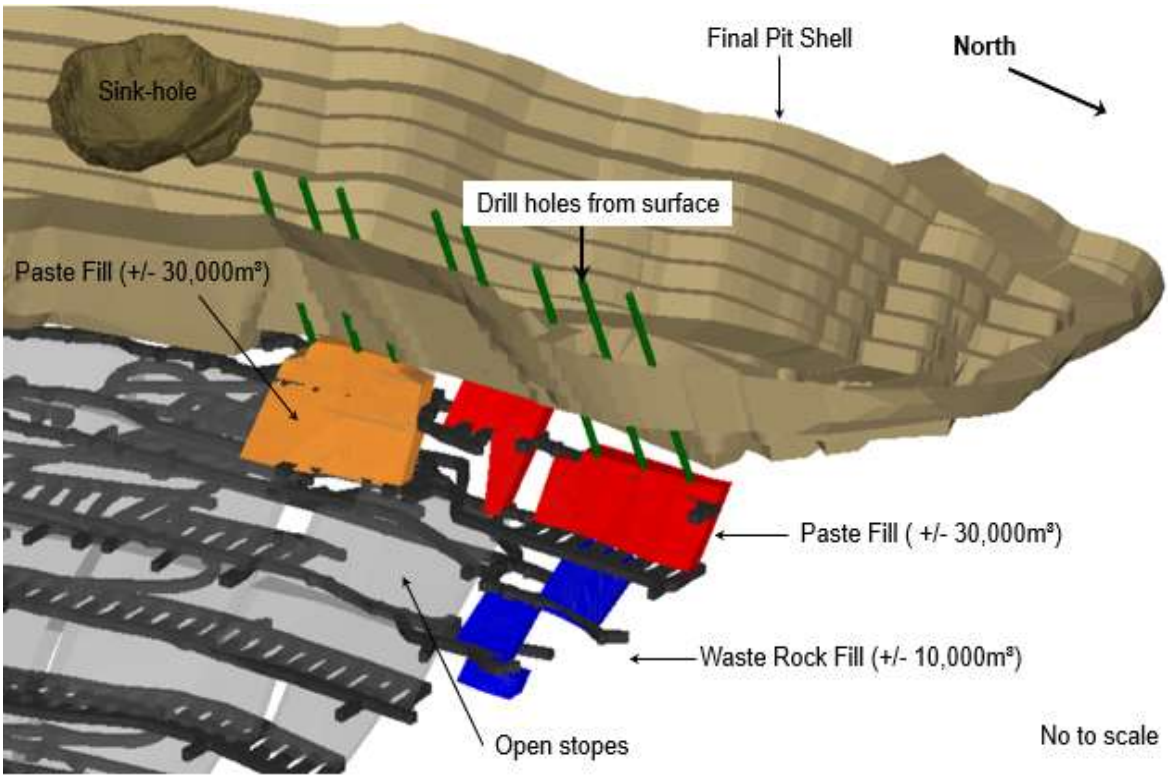
3.2.8.1 For Surface Mining

Backfilling of the voids beneath the planned surface mining area is required in order to maintain structural integrity during mining operations. Material for the 105 level backfill (to support the open pit mining) will be sourced from the existing WRD adjacent to the sinkholes and the existing TSF. All back-filling will be complete before drilling and blasting of the open-pit commences.

The waste rock material will be crushed and screened for use in the preparation of Cemented Aggregate Fill (CAF) and old tailings from the TSF will be used in the preparation of the Cemented Paste Fill (CPF) as various combinations of both fill types are planned to be used for the filling exercise. Both the waste rock the old tailings will be loaded via a front-end loader and will be transported to the back-fill plant by tipper trucks.

CAF will be trucked from surface from the back-fill plant and tipped into the stopes from underground while the paste fill will be fed via dedicated cased back-fill holes from surface Figure 3-9. The paste fill will be trucked to these back-fill holes. The total anticipated volume required for the void filling associated with this exercise is to be confirmed but is not expected to be more than 100 000 m^3.

A dedicated backfill plant (Figure 3-10) will be constructed for the purpose of producing the backfill to fill the voids which will be pumped underground via dedicated 300 mm drill holes (the same plant will be used to produce backfill for the underground mining).



Source: Orion Minerals, 2018. Scoping Study Report

FIGURE 3-9: 3-D VIEW SHOWING VOID AREAS TO BE FILLED

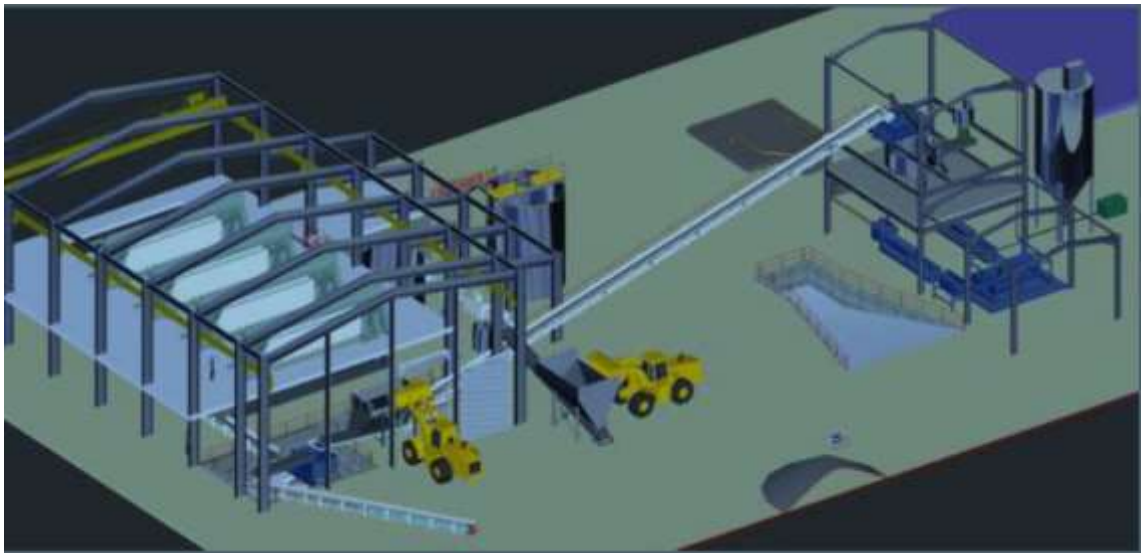
3.2.8.2 For Underground Mining

A combination of paste backfill and waste rock backfill will be used to fill both LHOS and D&F mining stopes. It is estimated that approximately 80% of all mining areas will be backfilled. Once LHOS have been established and access for trucks are available, 40 tonne ejector bucket truck will haul and dump development waste into completed LHOS stopes prior to completion of the paste filling process. Where possible, LHD's will dump waste rock in D&F heading prior to paste fill.

The waste rock will typically be placed un-cemented, followed by the introduction of a free-flowing tailings-cement mix to fill the voids. A full cement backfill will be required in places to create a stable wall.

The paste plant that was constructed for the open pit will be utilised for the underground mining backfill requirements. Tailings from the TSF will be used with cement at various mix ratios depending on the fill and strength requirement.

The backfill delivery system will be based on a dedicated 250 mm HDPE pipe-line from surface via one of the existing ventilation shafts to the 310 m level. From this point the pipe-line will be fed down newly installed ventilation raise-bore holes into the Deeps mining section. It is planned to install a piping system within the mining areas to allow two stopes to be filled at any one time.



Source: Orion Minerals, 2018. Scoping Study Report

FIGURE 3-10: TYPICAL BACKFILL PLANT LAYOUT

3.2.9 MINERAL PROCESS PLANT

The mineral process plant is required to handle both an oxide ore (surface mining) and sulphide ore (underground mining). The new mineral process plant will be constructed near the Hutchings Shaft and will be based on a production capacity of 150 ktpm for sulphide ore and 100 ktpm for oxide ore.

The process description below should be read in conjunction with the block flow diagram (JZASP2071-PROC-BFD-002), attached in Appendix 9.

The diagram indicates two processing strategies, one for the treatment of Supergene (Open Pit) ore and another for the treatment of Hypogene (Deeps) ore. The two process strategies are discussed below.

3.2.9.1 Treatment of Hypogene / Deeps Ore

Run-of-mine material (ROM) from underground and open cast mining activities is stored in and withdrawn from a stockpile to feed the process plant. The ROM material is screened on a double-deck screen, oversize material is fed to secondary and tertiary cone crushers. The screened product undersize material is conveyed to a mill feed bin from where it is withdrawn to feed a primary ball mill.

The primary ball mill is operated in closed circuit with a sizing screen, for recycle of oversize material back to the feed of the mill. Sizing screen undersize from the primary milling circuit is fed to a secondary mill, which is operated in closed circuit with a cluster of hydrocyclones. The cyclones remove oversize material back to the feed of the mill. The cyclone overflow product from the secondary milling circuit is aerated, the pH is adjusted, and the slurry is conditioned with flotation reagents ahead of the Copper rougher flotation circuit.

The Copper flotation circuit is comprised of rougher and a cleaner flotation circuit with regrind in a stirred mill to further reduce the particle size of the rougher concentrate prior to cleaner flotation. The Copper flotation circuit generates a Copper rich concentrate and a Zinc rich tailings stream, which is fed to the Copper flotation tailings thickener for dewatering.

The dewatered material undergoes pH adjustment, density correction and conditioning with flotation reagents prior to Zinc flotation.

The Zinc flotation circuit is comprised of rougher and a cleaner flotation circuit. The Zinc rougher flotation circuit yields high (HG) and low (LG) grade concentrate streams which are treated separately in the cleaner flotation circuit. The LG Zinc rougher concentrate undergoes regrind in a stirred mill to further reduce the particle size prior to reagent conditioning and cleaner flotation.

The Zinc flotation circuit generates Zinc rich concentrate (combined HG and LG) and a final tailings stream, which is fed to a cyanide detoxification circuit before being pumped to the tailings thickener for dewatering. Thickened tailings is pumped to either the backfill plant or the TSF.

Copper and Zinc flotation concentrates are dewatered in dedicated thickeners and filters. The material is allowed to dry further in solar drying pads to reduce the moisture content for safe shipment. The concentrates are loaded into containers and removed from site by means of trucks.

3.2.9.2 Reagents

The reagents that will be used during processing and the estimated consumption amount per annum is provided in Table 3-2. Material Safety Data Sheets for the reagents are provided in Appendix 10.

TABLE 3-2: REAGENTS AND USE PER ANNUM

REAGENT	ESTIMATED USE (TONNES PER ANNUM)
Lime	1 800
NaCN	600
$ZnSO_4$	2100
$CuSO_4$	400
Frother	50
Flocculant	60
Na_2S	2200
Promoter	20
Collector	100
SMBS	3000

3.2.10 DESIGN SAFETY MEASURES

In general, Mine Health and Safety Act and Regulations, the latest editions of the applicable South African National Standards and National Building Regulations establish the minimum requirements for design, materials and construction unless otherwise noted. In the absence of an applicable South African National Standard, the latest edition of British Standards and Standard Code of Practice shall govern the quality of design, materials and construction, except where otherwise indicated.

For plant structures specific attention will be given to the ergonomics, safety and ease of operation and maintenance as well as escape routes in case of emergency. Emergency lighting is provided on stairways and escape routes. Emergency fittings are positioned to allow personnel to safely exit the plant.

A fire protection system design will be based on NFPA specifications and generally includes mains reticulation, control valves, hydrants, hose reels and extinguishers. Fire detection and extinguishing systems will be included in all substations and MCC buildings. Fire detection to be included for all other buildings.

3.2.11 CONCENTRATE TRANSPORTATION

The air-dried copper and zinc concentrate is intended to be exported via the Port of Ngqura and/or the Port of Port Elizabeth.

3.2.12 WASTE ROCK DUMP

A new Waste Rock Dump (WRD) with a storage capacity of approximately 40 Mt will be established as part of the mine development. The WRD will primarily be required for the waste rock material arising from the surface mining and mining of other targets. Preliminary design criteria for this residue stockpile are presented in Table 3-3.

Excavators and trucks will be used for the loading and hauling of waste rock and ore. Some of the waste rock will be used for the reinstatement of the stormwater diversion berms established in the mid-1970s to prevent flooding. In addition, some waste rock will be used to create a safety berm around the surface mining area.

All excess overburden waste will be stored separately at the designated WRD facility area, which will be used for rehabilitation at the end of mining operations, if required.

The proposed location for the WRD comprises of concrete slabs and demolished building rubble from historical mining activities. Where necessary, the WRD base will comprise of G7 compacted fill material.

The geochemical characterisation and waste classification of the waste rock material indicates that the material is of low risk to the environment. Consequently, the proposed WRD will not be lined with a geosynthetic liner.

Prior to preparation of the surface of each WRD, topsoil will be removed and stockpiled for use in later rehabilitation. The WRD will then be constructed in benches in accordance with the key design elements.

TABLE 3-3: SELECTED PRELIMINARY DESIGN CRITERIA FOR THE WRD

COMPONENT	CRITERION
WASTE ROCK TYPE	Gneiss
WASTE ROCK PRODUCTION	23 Mt
REQUIRED CAPACITY	40 Mt
OVERALL OUTER SLOPES	1:3 (35-40 degrees; natural angle of repose)
AREA OF EXTERNAL FOOTPRINT	70 - 110 ha
HEIGHT OF WRD ABOVE LOWEST POINT	30 m – 40 m
BARRIER / LINING	G7 compacted fill material

Three site options were identified for the WRD. A comparative summary of the WRD site options is presented in Table 3-4. WRD 3 has been selected as the preferred option.

The historical WRD is situated adjacent to the sinkholes. Material from this facility was included in the mineral processing plant during the final years of mining by PCML. Preliminary investigations on including this material into the feedstock of the current mine plan have indicated that this is not feasible. Deposition of waste rock onto the existing WRD footprint is not possible due to structural stability concerns. Some of the waste rock from the existing WRD will however be used for preparation of the backfill material necessary for void stabilisation.

TABLE 3-4: COMPARATIVE SUMMARY OF WRD SITE OPTIONS

PARAMETER	WRD OPTIONS		
	OPTION 1	**OPTION 2**	**OPTION 3 (PREFERRED)**
SURFACE AREA	9 ha	22 ha	44 ha
HEIGHT	82 m	33 m	40 m
TECHNICAL CONSIDERATIONS	➲ Nearest to surface mining ➲ Smaller area available for footprint expansion ➲ Only suitable for part of the waste rock or in conjunction with one of the other WRD options	➲ Nearest to surface mining ➲ Smaller area available for footprint expansion ➲ Significantly greater height than Option 3	➲ Furthest from surface mining ➲ Larger area available for footprint expansion ➲ Technically preferred
HAZARD POTENTIAL	➲ Proximity to sinkholes is a concern	➲ Proximity to sinkholes is a concern	➲ None
ENVIRONMENTAL IMPACT CONSIDERATIONS	➲ Located within a spatially designated Critical Biodiversity Area. The terrestrial ecology specialist study has determined that the area comprises of non-natural habitat and thus does not support a CBA designation ➲ Majority of the WRD footprint within the 500 m buffer of a spatially designated endorheic pan (wetland). The surface water ecosystems specialist study has since identified this feature as a borrow pit depression ➲ No sensitive receptors in close proximity ➲ May have lesser dust fallout impact on existing solar power plant due to proximity	➲ Located on disturbed land ➲ Small portion of the WRD is within the 500 m buffer of an endorheic pan (wetland) ➲ No sensitive receptors in close proximity ➲ May have greater dust fallout impact on existing solar power plant due to proximity	➲ Located within a spatially designated Critical Biodiversity Area. The terrestrial ecology specialist study has determined that the area comprises of non-natural habitat and thus does not support a CBA designation ➲ Area is disturbed by previous mining activities / structures ➲ WRD footprint outside of wetland and other watercourse buffers ➲ No sensitive receptors in close proximity ➲ May have lesser dust fallout impact on existing solar power plant due to proximity

3.2.13 TAILINGS STORAGE FACILITY

A TSF capable of holding 15.5 Mt of material will be required for the first phase of mining. By comparison, the existing TSF on site has an estimated capacity of approximately 41 Mt. Selected preliminary design criteria for this residue stockpile are summarised in Table 3-5.

Thickened tailings, with a typical solid percentage between 65% and 72% by mass, will be pumped to the TSF in a slurry form. The TSF system will include a return water system consisting of a decant system and a HDPE lined return water dam and return water pumps to pump the return water to the process water system at the plant.

The storage capacity has been designed after allowing for 40% of the tailings being returned underground as paste back-fill over the life of the mine. The outside slopes of the TSF will be at 1:4 with a 1.6 m high starter wall.

A Return Water Dam (RWD) is included within the design of the TSF. The TSF and RWD are expected to be constructed over a 12-month period.

TABLE 3-5: SELECTED PRELIMINARY DESIGN CRITERIA FOR THE TSF

COMPONENT	CRITERION
ORE TYPE	Zinc and copper
TAILINGS PRODUCTION	15.5 Mt
REQUIRED CAPACITY	30 Mt
STORAGE CAPACITY	18, 400, 400 m^3
CONSTRUCTION METHOD	Upstream construction
DISPOSAL METHOD	Thickened
OVERALL OUTER SLOPES	1:4
AREA OF EXTERNAL FOOTPRINT	100 ha
IN-SITU DENSITY	1.65 t/m^3
HEIGHT OF TSF ABOVE LOWEST POINT	15 m
BARRIER / LINING	1.5 mm HDPE
RWD SURFACE AREA	28 000 m^2
RWD CAPACITY	163 000 m^3

Source: Knight Piesold (2018)

Three site options were identified for the TSF. A trade off study on these three options was undertaken by Knight Piesold (2017).

The site selection criteria included:

- Site conditions,
- Geology,
- Hydrology considerations,
- TSF components,
- Hazard potential,
- Environmental impact,
- Potential disposal options,
- Return water management,
- Closure and final land use; and
- Cost effectiveness.

These criteria were assessed for all options and used to rank the options. The ranking comprised a trade-off matrix with a built-in weighting factor for each criterion.

From the observations, analyses and trade-off matrix it was concluded that TSF Option 2 is the preferred site. The site is located within reasonable distance of the plant (3 km) and not within any buffer zones, wetlands or floodlines. There is also enough space surrounding the facility to construct the return water dam and have the water conveyed via gravity to the facility.

TSF Option 1 was less favourable by virtue of being further away from the plant and abutting against the existing TSF would require additional liner, drainage and stormwater considerations.

The TSF site selection report is included in Appendix 5.

As with the existing WRD, reclamation of the historical TSF and blending of this material into the mineral processing plant has been investigated but is not considered to be feasible.

A conceptual design of the TSF is provided in Appendix 6.

3.2.14 BORROW PITS

Aggregate material will be required for the construction of, among others, the access roads and terraces for the process plant and TSF among others. Consideration will be given to the use of permitted, commercial aggregate suppliers in proximity to the site.

Establishment of new borrow pits within the proposed Mine Rights Application Area and potentially on surrounding properties may be required.

3.2.15 MATERIAL CHARACTERISTICS

Selected physical characteristics of the materials handled during the mining process are provided in Table 3-6.

TABLE 3-6: SELECTED PHYSICAL CHARACTERISTICS OF MATERIALS

CHARATERISTIC	MATERIAL TYPE			
	ROM MATERIAL	CU CONCENTRATE	ZN CONCENTRATE	TAILINGS
PARTICLE DENSITY	2.7 – 4.0	4.5	4.5	2.7 – 4.0
BULK DENSITY	~1.9	unknown	unknown	unknown
MOISTURE CONTENT	3-5%	12	12	50 -55%
PARTICLE SIZE DISTRIBUTION	P100=150mm	P80 = 75micron	P80 = 75micron	P80 = 75micron

3.3 OTHER MINE INFRASTRUCTURE AND MINE FACILITIES

Other mine infrastructure and facilities that will be required in support of the mine development includes:

- The refurbishment and refitting of the Hutchings Shaft, ventilation fans, underground workshops, pump stations, electrical substations, dirty and clean water system;
- Establishment of new offices, stores, accommodation, ablution facilities, change-houses, workshops, washbay facilities, fuel storage and dispensing facilities, and refuge chambers;
- Water reticulation, compressed air reticulation, power reticulation, engineering systems, communications network; emergency alarm system, lighting, rock conveying services, and materials handling; and
- Surge silos, a primary underground crusher, shaft ore conveying linking up with a secondary crusher and related process plant facilities on surface to support ore processing.

3.3.1 POWER

It is anticipated that the mine site will require 33 MVA of power for operations and ancillary activities. The construction phase power requirement is around 10 MVA.

Power supply is expected to be obtained from the Eskom Cuprum Substation located onsite. The Cuprum Substation is supplied by the Kronos Substation nearby which is linked to the national grid via a 400 kV line. The Cuprum Substation is the principal power supply source for the Siyathemba Local Municipality via the Mooidraai and Burchell Substations downstream.

A new 11 kV distribution power line was installed as part of the prospecting activities being undertaken on Portion 25 and Portion 26 of Vogelstruisbult 104.

In the event of a power failure, backup generators will be used for strategic equipment and mine infrastructure. The backup generators will be mobile, diesel-powered units with a cumulative power generation capacity of around 10 MW.

3.3.2 EXPLOSIVES STORAGE AREA

The explosives storage area used by PCM during historical mining is on Portion 1 of Vogelstruisbult 104. Until recently, the facility has been used and maintained by Alkantpan. Following an agreement reached between the respective parties, the explosive materials stored in this facility have since been relocated to a position within the Alkantpan site. It is thus proposed to make use of this existing facility for the storage of the explosives necessary for the blasting.

The facility comprises of 8 explosive magazines and 3 double accessories magazines. The walls of the explosive magazines are double sand-filled walls. The doors are a double door with the inner door being a strong room double door. Minor repairs are needed to the facility.

Detonators and boosters will be stored in the facility. The estimated quantity of explosive and accessory material that will be stored during a two week period is provided in Table 3-7.

TABLE 3-7: EXPLOSIVE MATERIAL STORAGE

MINING PHASE	EMULSION STORAGE (TONNES)	ACCESSORIES STORAGE (TONNES)
Open-pit phase	136	1.36
Underground phase	67	1.34

Material Safety Data Sheets for the explosive materials and accessories are provided in Appendix 10.

Bulk emulsion will be stored in silo storage structures near the Hutchings Shaft.

3.3.3 WATER

In general, water requirements are expected to be in the order of 1 m^3 per tonne of run-of-mine (ROM) ore processed.

A 400 mm internal diameter, 60 km long, water pipeline system running from Prieska to Copperton was built by PCML. The pipeline historically supplied 475 kl per hour to the locality. It still supplies water to Alkantpan, Copperton and farms adjacent to it. The water is clarified, treated and filtered by the Siyathemba Local Municipality to a potable water quality standard at the river pump station in Prieska. From Prieska, the water is pumped via the 400 mm pipeline to five reservoirs, situated some 40 km from Prieska. From the reservoirs, the water is gravitationally fed to Alkantpan and Copperton.

Investigations on the integrity and capacity of the water pipeline system have concluded that no significant upgrade or maintenance of the pipeline is required. Refurbishment of components of the Water Treatment Works in Prieska will be required as well as the replacement of some of the existing pumps with larger capacity pumps. No additional pipeline infrastructure between Prieska and the mine site is necessary.

Service and process make up water will include water from dewatering (seepage) during the operational phase, collected rainfall run-off, tailings return water and treated water from the sewage treatment plant.

The planned water consumption for the Project and Copperton is 5.5 million litres per day.

3.3.4 SEWAGE

A modular sewage treatment package plant will be installed within the processing plant terrace area.

The sewage plant will be capable of treating up to 250 m^3 of waste-water per day. Treated water from the plant will be pumped to the Process Water Dam for reuse in the processing plant.

Chemical toilets will be used for the underground mining. These will be serviced at the required frequency by a contractor.

3.3.5 WATER MANAGEMENT

3.3.5.1 Overview

The conceptual mine water balance is provided in Table 3-8.

Water removed from the underground workings will be pumped to the effluent dam for natural and forced evaporation.

All dirty rainfall run-off, process plant discharge, treated sewage and grey water will be collected, stored, treated and recycled as far as possible.

All clean rainfall run-off will be diverted from dirty and contaminated areas to minimise the risk of environmental and water pollution. Trenches and berms will be constructed to divert clean run-off, collect dirty run-off and route dirty water to suitable storage dams.

A surface collection dam (pollution control dam) will be constructed to store all dirty water from the mining area. All dirty water shall be diverted to the pollution control dam and then pumped to the process water dam, as make up water to the process plant. This philosophy is in line with the A4 Best Practice Guideline – Pollution Control Dams; Directorate: Resource Protection and Waste issued by the Department of Water & Forestry.

Water management will be in compliance with all requirements of Government Notice 704, promulgated in terms of the National Water Act, Act 36 of 1998, specifically in respect of the following:

- Collection of the water arising within any dirty area, including water seeping from mining operations, outcrops or any other activity, into a dirty water system;
- Design, construction, maintenance and operation of the clean water and dirty water management systems so that it is not likely for either system to spill into the other more than once in 50 years;
- Design, construction, maintenance and operation of any dam that forms part of a dirty water system to have a minimum freeboard of 0.8 metres above full supply level, unless otherwise specified in terms of Chapter 12 of the Act;
- Design, construction, and maintenance of all water systems in such a manner as to guarantee the serviceability of such conveyances, for flows up to and including those arising as a result of the maximum flood, with an average period of recurrence of once in 50 years; and
- Prevention of erosion or leaching of materials from any residue deposit or stockpile from any area and containment of material or substances so eroded or leached in such area by providing suitable barrier dams, evaporation dams or any other effective measures to prevent this material or substance from entering and polluting any water resources.

3.3.5.2 Potable Water

From the bulk water line, potable water will be distributed from existing onsite reservoirs. Water will be pumped from the reservoirs through an inline chlorinator to two 1,000 m^3 potable water and fire water tanks located on the shaft platform. A smaller tank fitted with a pump will then be used to distribute water around the mine site as required.

3.3.5.3 Effluent Dam

The Effluent Dam is a containment structure for the storage of the water arising from the dewatering of the underground mine workings. The dewatering will proceed in two phases. The first phase will be the initial dewatering of the estimated 8.5 million m^3 of water during the construction phase. This dewatering phase is anticipated to take between 12 and 18 months. The second phase of dewatering is during the mine operational phase and involves dewatering of seepage into the underground workings. This dewatering period will be for the duration of the LOM.

3.3.5.4 Pollution Control Dam

Dirty stormwater runoff from the process plant area, topsoil stockpile and oxide ore stockpile is directed through surface drainage channels to the Pollution Control Dam. From this structure, the water is pumped to the Process Water Dam for reuse in the process plant. Some water in the dam is lost to natural evaporation. The dam will be lined with HDPE and designed in accordance with GN 704. It has a design storage capacity of approximately 163 000 m^3.

3.3.5.5 Open Pit Dewatering Dam

Water in the Open Pit Dewatering Dam is pumped from the open pit mine workings. The water in this dam is unsuitable for reuse in the process plant and is pumped to the Effluent Dam for natural and forced evaporation. The dam will be lined with HDPE and designed in accordance with GN 704. It has a design storage capacity of approximately 26 000 m^3.

3.3.5.6 Process Water Dam

The Process Water Dam receives water from the TSF Return Water Dam. This water is used in ore processing. The dam will be lined with HDPE and designed in accordance with GN 704. It has a design storage capacity of approximately 5 000 m^3.

3.3.5.7 TSF Return Water Dam

The TSF Return Water Dam receives excess water from the TSF. This water is pumped back to the Process Water Dam for reuse in ore processing. The dam will be lined with HDPE and designed in accordance with GN 704. It has a design storage capacity of approximately 163 000 m^3.

TABLE 3-8: CONCEPTUAL MINE WATER BALANCE

INFLOW FACILITY/USE	INFLOW VOLUME (ML/ANNUM)	OUTFLOW FACILITY/USE	OUTFLOW VOLUME (ML/ANNUM)
Abstraction/ dewatering of underground water in mine workings (construction phase dewatering) – 18 mo.	**8,500**	Effluent Dam	**8,500**
Effluent dam - 18 mo.	**8,500**	Natural and Forced Evaporation	**8,500**
Abstraction/ dewatering of underground water in mine workings (operational phase dewatering) – 24 years	**73**	Moisture with ore and waste rock	**51**
		Evaporation losses in ventilation	**22**
Effluent dam (Rain and excess plant water)	**102**	Natural and Forced Evaporation	**102**
Open Pit dewatering dam (12-month period)	**184**	Natural Evaporation	**33**
		Excess to Effluent Dam	**151**
Pollution Control Dam (Dirty stormwater)	**218**	Natural Evaporation	**17**
		TSF (via process plant)	**201**
Backfill once-off for open pit	**25**	Backfill entrainment	**25**
Backfill plant	**71**	Backfill Slurry water (Deeps Mining)	**35**
		Return water	**31**
		Flushing Water	**5**
TSF	**1,548**	Natural Evaporation	**930**
		Entrainment	**309**
		Return Water Dam	**309**
Return water dam (including rainfall)	**337**	Process Plant	**309**
		Effluent Dam	**28**
Process Water Dam (Buffer storage)	**1,021**	Evaporation	**1.0**
		Process Plant	**1020**
Municipal Water	**1,544**	Mining	**403**
		Process Plant	**1081**
		Potable Water	**60**
Potable Use	**55**	Mining	**33**
		Process Plant	**6**
		Infrastructure	**16**
Sewer Plant + Drying Beds	**55**	TSF (via process plant)	**50**
		Evaporation (drying beds)	**5**

3.3.6 NON-MINERAL WASTE MANAGEMENT

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

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

Recyclable waste like glass, wood and plastic will similarly be segregated on site and removed by licensed waste transporters. An oil recycling company will also be appointed to remove waste oil generated by the mining activities. Medical waste arising from the on-site clinic will also be removed from site by a contractor.

The on-site waste storage area is proposed to be located within the process plant footprint.

3.3.7 MAIN MINE ACCESS ROAD AND INTERNAL ROADS

PCM is serviced and accessed by a tarred regional road, namely the R357 to Prieska.

An existing tarred road is in place from the R357 which provides direct access to the mine site as well as to Alkantpan and Copperton. The road is tarred up to the T-junction to Alkantpan and Copperton.

From the existing tarred road two site access options were considered. Both options comprise of existing unsurfaced roads. Option 1 passes around the sinkholes. This road is also used for access to Alkantpan. The proposed open pit, WRD, and topsoil placement intersect with the road and the road will therefore need to be diverted.

Option 2 provides direct mine access from an existing road which branches off the tarred road at a position before the sinkholes. This road was tarred in the past but, with the closure of the mine, has fallen into disrepair. This option has been selected for the main mine access as it is safer in that it allows for the Alkantpan and Copperton traffic to be kept separate from mine traffic.

Areas such as the process plant and mining area will have their own dedicated internal roads. These roads will include the in-plant service roads, main haul road and in-pit roads. These will all have their own specific design criteria suiting the needs and requirements of each area.

In general, the roads will meet the following design specifications:

- Road to be a minimum of 150 mm above adjacent ground levels
- Width: 2 x 3.5 m
- Shoulder: 1 m either side
- Surface type: Stabilised gravel
- Design speed: 25 km/h for internal roads and 100 km/h for main access roads
- Stormwater drainage for the main access roads will be provided as required to meet a 1 in 50 year 24 hour rainfall event. Drainage for internal roads will meet a 1:5 year 24 hour rainfall event.

3.3.8 VEHICLES AND EQUIPMENT

A list of typical vehicles and equipment required for the construction and operational phases is provided in Table 3-9.

TABLE 3-9: TYPICAL VEHICLES AND EQUIPMENT

CONSTRUCTION PHASE	OPERATIONAL PHASE
➲ Loaders/ADT's/Tipper trucks ➲ Front End loaders ➲ Bull dozers ➲ Excavators ➲ Vibratory rollers ➲ Water bowsers ➲ Graders ➲ TLB's ➲ Mobile Cranes of all sizes ➲ Concrete batch plant (if commercially sourced concrete is not available) ➲ Concrete mixer trucks ➲ Concrete dumper carts ➲ Delivery trucks ➲ LDV's ➲ Compressors and rock breakers ➲ Telehandlers ➲ Passenger busses ➲ Piling pre-Drilled Rig (if needed) ➲ Pile Rigs (If needed) ➲ Truck and flatbed trailer ➲ Cherry Picker ➲ Tractor and Trailer ➲ Generators	➲ ADT's (typically CAT740 size) ➲ Front End loaders (typically CAT950 size) ➲ Bull dozers (typically CAT D6 size) ➲ Water bowsers (typically a 10 000l unit) ➲ Graders (typically CAT140G size) ➲ TLB's (typically Cat 428 size) ➲ Mobile Cranes (Ad hoc mobile cranes from a 25t to 220t) ➲ Delivery trucks (general road truck and trailers) ➲ LDV's (typically single and double cabs) ➲ Telehandlers (typically CAT314D size) ➲ Passenger busses (typically 16 seaters and) ➲ Cherry Picker (Ad hoc typically Genie Z80/60 size) ➲ Skidsteers (typically a CAT242 size)

3.3.9 SECURITY AND ACCESS CONTROL

A perimeter fence will be constructed around the mining area south of the existing tarred road to Copperton. Internal fences will also be established around facilities such as the surface mining area, process plant, explosives magazine, and TSF.

Access control points with modular office units and posted guards and gates will be placed at the main mine entrance.

3.3.10 PLANT TERRACE AREA

The plant terrace area will be the area from where the mining contractor and relevant technical services personnel will manage the mine.

Access to the site will be controlled by security personnel posted at the access to this site. The mine site will include offices, change houses, control room, first aid station, stores, waste handling area, earth moving vehicle and engineering workshops as well as an earth moving vehicle parking area, fuel storage facility and a wash bay.

The open pit mining contractor will establish its own workshop and wash-bay facilities and offices. The Project will establish stores, offices, change-house and lamp room, engineering workshops, MCC's substations, canteen, protoroom, and other infrastructure of which the open pit mining contractor will make use of during the open pit mining phase. Thereafter, the underground mining employees will make use of this facility.

The fuel storage facilities will all be self-contained bunded areas including the storage of oils, lubricants and paints. The area around the workshop facility and the wash-bay facility will be constructed in such a way that wash-down and rainwater will be collected through a silt trap facility and go through an oil/water separator before it is directed to the Pollution Control Dam.

Collected waste oils from here will be stored in drums and removed from site by an appointed contractor.

3.3.11 ACCOMMODATION AND HOUSING STRATEGY

The accommodation and housing of mine personnel during the construction and operational phase is one of the most important aspects influencing the social impact of the proposed development.

The Applicant's draft strategy for accommodation and housing (Orion Minerals Limited, 2018) is under discussion with the SLM and other stakeholders in Copperton and Prieska to confirm aspects such as the availability of land, services and residential housing options. Current planning is based on an initial life of operation of 11 years, with an expectation of extending the mine life by a further 14 years from the exploitation of other nearby deposits which are currently under investigation.

3.3.11.1 Construction Phase

The housing strategy is to erect a construction camp for the build phase of the project. The proposed location of the construction camp in Copperton or near the Project site is still to be confirmed and the Company is in discussion with relevant stakeholders and landowners.

The quality of the construction camp will be in accordance with the Mining Charter standards. The accommodation will later be used for mine operational employee housing which is described below. Cognisance of the required standards for the employee accommodation will be allowed for in the camp design.

The total peak workforce during mine construction and commissioning is estimated at 810 people which includes surface and underground construction. During most of the construction period while the underground mine and associated infrastructure is being built, the steady state construction crew is estimated at 600 people.

3.3.11.2 Operational Phase

Once construction and commissioning are completed, it is proposed that permanent staff will be housed in the construction camp from where they will be integrated into Prieska over a six-year period. The reason for this phased housing strategy is to ensure that there is a smooth market entry into the Prieska residential area, and that any boom in property prices is mitigated.

A continuous operation roster working 2 x 12-hour shifts is proposed. The planned labour complement for the operational phase steady-state is shown in Table 3-10.

TABLE 3-10: OPERATIONAL PHASE STEADY-STATE LABOUR COMPLEMENT

STAFF CATEGORY	NO. OF PERSONNEL	
	OPEN PIT MINING	UNDERGROUND MINING
Management & administration	48	69
Engineering	36	141
Processing	112	131
Open pit (Contractors)	122	0
Underground mining	0	271
Allowance for leave and training (12%)	32	58
Consultants and visitors	50	50
TOTAL LABOUR FORCE	**400**	**720**

The underground mining operation will follow on after the open pit has been completed in year three of the project. The numbers in Table 3-10 are the total payroll numbers at steady state. The on-shift work force at any one time will be approximately 130 for the open-pit and 370 for the underground.

It is expected that the 122 open-pit contractor employees will be housed in the construction camp. The remaining company employees associated with the open-pit mining phase (management, treatment plant and general engineering) will also be accommodated in the construction camp.

Once the open-pit is completed and the underground mining phase starts, the construction camp will continue to house the above-mentioned company employees and the additional underground employees. A portion of the total staff complement are expected to move to housing in Prieska over a three to six-year period. It is anticipated that at the end of the six-year period an average of 75% of the total labour force will live off-mine, either in Prieska or in a location of their choosing and the remining 25% will remain living in the mine accommodation camp.

Residential housing in Prieska is limited. Therefore, over the three to six-year period, it is intended that Orion will facilitate the construction of the required number of housing units in Prieska, and to move the mine employees in a phased manner from site to Prieska. The accommodation strategy is to invite private developers to build the required housing units, for purchase by mine employees.

Systems for the bussing of employees to and from their residential areas will be facilitated. Transporting of employees may also create opportunities for entrepreneurs to provide shift-time related transport on assigned routes, which will be promoted by the mine. This transport service would link into the provision of public transport (Orion Minerals Limited, 2018).

3.4 INDICATIVE MINE DEVELOPMENT SEQUENCE

The indicative sequencing of the primary mine development and ore processing activities is as follows:

- Construction works commence with mobilisation over a 5-month period, followed by site establishment for a month;
- Open pit mine infrastructure is established, including the surface buildings and capital mining fleet required to start mining operations;
- Construction of the ore processing plant, suitable for treating surface mining ore, commences in Month 1. Work on the tailings storage facility also commences at the same time;
- Surface mining commences with pit rehabilitation, overburden stripping and some ore mining as the processing plant is commissioned;

- The remainder of surface infrastructure to support underground mining is established;
- Shaft refurbishment commences in the first 6 months with the installation of the man and materials, as well as the rock winder. Thereafter dewatering of the underground mine commences and continues for between 8 to 12 months;
- Shaft refurbishment runs for an estimated 24 months. During this time, the shaft is fully equipped, crusher station rehabilitated and levels rehabilitated to allow access;
- Work on upgrading the processing plant in preparation for underground ore feed is completed. Surface infrastructure works continue and orders for the underground mining fleet are placed; and
- Steady-state underground mining then continues until the mining inventory is depleted after 25 years from the commencement of operations.

3.5 CONCEPTUAL MINE CLOSURE PLAN

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

Rehabilitation and closure of areas disturbed in mining and related operations will be considered to be complete when:

- All structures, equipment and infrastructure not consistent with the post-closure land use have been decommissioned, demolished and removed from site;
- Ownership of all remaining infrastructure and services required to support the proposed post closure land use have been formally transferred to the local authority responsible for the administration of the area;
- The area has been made safe for all post-closure land users and livestock;
- All surface disturbances and remaining landforms are structurally and ecologically stable and have sustainable soil and vegetation covers where applicable;
- Surface water management structures are in place and are free of damage due to erosion; and
- All surface and groundwater discharges from the site satisfy agreed target water quality objectives.

As various facilities reach the end of their period of use, Repli will initiate rehabilitation activities concurrent with on-going mining operations. Rehabilitation activities will be undertaken during all phases of the project in order to restore the land back to a c sustainable usable condition.

The detailed Closure Plan for the mine is provided in Appendix 10.

4 POLICY AND LEGISLATIVE CONTEXT

A non-exhaustive summary list of the various legislation applicable to the proposed development is provided in Appendix 2.

Table 4-1 provides a description of the legislation which has particular importance to the S&EIR process being undertaken for the development.

TABLE 4-1: 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**
ACTS	
National Environmental Management Act, 1998 (Act No. 107 of 1998)(NEMA)	NEMA provides 18 specific principles relating to Environmental Management. Of key importance are the precautionary principle and the polluter pays principle. The 18 principles of NEMA are to be recognised during the undertaking of the Impact Assessment Process and play a key role during the decision-making process. Section 24 of NEMA requires environmental authorisation to be obtained for certain activities identified in three listing notices, published on 4 December 2014. The procedure for obtaining an environmental authorisation requires either a basic assessment (activities in Listing Notice 1 and 3) or scoping and Environmental Impact Assessment (activities in Listing Notice 2) process to be undertaken to inform the application for authorisation. **The proposed mining activities fall within the ambit of various listed activities in Listing Notice 1, 2 and 3. Since activities in Listing Notice 2 apply to the proposed mining activities, a S&EIR process is being followed. The S&EIR process is being undertaken in compliance with the requirements of NEMA and the EIA Regulations, 2014.**
Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA)	The MPRDA regulates the acquisition, use and disposal of mineral and petroleum rights. **PCM is applying for a mining right in terms of section 22 of the MPRDA.**
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA)	The NEM: WA provides for the reform of waste management legislation and repeals or amends the legislation under which waste was previously regulated. Part 4 of the NEM: WA pertains to listed waste management activities. In accordance with section 19(2) of the NEM: WA, the Minister published a schedule of listed waste management activities in Government Notice (GN) 921 of 29 November 2013. These are considered activities that have or are likely to have a detrimental effect on the environment.

	According to regulation 2 of GN 921, no person may commence, undertake, or conduct a listed waste management activity unless a licence is issued in respect of that activity. **The PCM Project will require a WML for the required mine residue stockpiles (WRDs and TSF). Mine residue stockpiles are included in the definition of hazardous waste in NEMWA. In addition, all mineral and non-mineral waste generated by the mine activities will need to be managed in accordance with the provisions of NEMWA and its associated regulations, norms and standards.**
Mine Health and Safety Act, 1996 (Act No. 29 of 1996) (MHSA)	The objective of the Act is to cover all aspects relating to health and safety of employees and other persons on the mine property. The Act places the responsibility on the mine owner for ensuring that the mine is designed, constructed and equipped in a manner which allows for a safe and healthy working environment. **The safety precautions in Section 7 of the MHSA have been incorporated in the environmental sensitivity map compiled for the PCM Project.**
The National Water Act, 1998 (Act No. 36 of 1998)(NWA)	The National Water Act, 1998 (Act No. 36 of 1998), identifies 11 consumptive and non-consumptive water uses, which must be authorised under a tiered authorisation system, which include Scheduled uses, General Authorisations, or Licenses. In terms of the National Water Act, the following water uses are identified: (a) Taking water from a water resource; (b) Storing water; (c) Impeding or diverting the flow of water in a watercourse; (d) Engaging in a stream flow reduction activity contemplated in section 36; (e) Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1); (f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit; (g) Disposing of waste in a manner which may detrimentally impact on a water resource; (h) Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process; (i) Altering the bed, banks, course or characteristics of a watercourse; (j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and (k) Using water for recreational purposes. **The proposed mining activities require a water use licence for a number of listed water uses. An Integrated Water Use Licence Application (IWULA) is in preparation in parallel with the S&EIR process.**
National Environmental Management: Air Quality Act 2004 (Act No. 39 of 2004)(NEM:AQA)	The main objectives of the National Environmental Management: Air Quality Act 2004 (Act no. 39 of 2004) (NEM: AQA) are to protect the environment by providing reasonable legislative and other measures to: ➲ Prevent air pollution; and ➲ Promote conservation and secure ecologically sustainable development. **No AEL application has been identified as being necessary for the PCM Project.**
Hazardous Substances Act (Act No. 15 of 1973)	The objective of the Act is to provide for the control of substances which may cause injury or ill health to or death of human beings due to their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation

	of pressure. In terms of the Act, substances are divided into schedules, based on their relative degree of toxicity and the Act provides for the control of importation, manufacture, sale, use, operation, application, modification, disposal and dumping of substances in each schedule. **The reagent chemicals to be used in the mineral processing plant, as well as chemicals typically found in petroleum products, for example, benzene, are regulated in terms of this Act. The processing plant, chemical storage area, proposed fuel storage facility and refuelling bay, with all appropriate controls in place, will not conflict with the Act. The EMPr will provide details in this regard.**
National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA)	The NHRA describes the importance of heritage in the South African context, and designates the South African Heritage Resource Agency (SAHRA) as guardian of the national estate which may include heritage resources of cultural significance that link to biodiversity, such as places to which oral traditions are attached or which are associated with living heritage, historical settlements, landscapes and natural features of cultural significance, archaeological and paleontological sites, graves and burial grounds, or movable objects associated with living heritage. Section 38 of the Act requires a Heritage Impact Assessment (HIA) to be undertaken for various types of development. If the HIA demonstrates that the development will have an impact on a heritage resource, approval from the South African Heritage Resource Agency, or the relevant provincial heritage authority is needed prior to proceeding with the development. **An HIA is being undertaken as part of the environmental authorisation process.**
Astronomy Geographic Advantage Act, 2007 (Act No. 21 of 2007)	Provides for the protection, preservation and maintenance, in respect of radio frequency interference or interference in any other way, of declared astronomy advantage areas. Three Central Astronomy Advantage Areas have been established to date, namely: ➲ The Northern Cape Province, excluding Sol Plaatje Municipality ➲ The Karoo Core AAA ➲ The Karoo Central AAA **PCM is located within the Northern Cape Province and the Karoo Central AAA. Restrictions may apply with respect to mine-related radio and electrical activities, if these are deemed to interfere with radio astronomy work.**
GUIDELINES	
Department of Environmental Affairs Guideline Series 7: Public Participation (2012)	The public participation guideline outlines the importance of public participation as well as the minimum legal requirements for the public participation process, the steps to be taken and the guideline for planning a public participation process. **The public participation process for this application has incorporated relevant requirements of the guideline.**
Department of Environmental Affairs Guideline Series 9: Need and Desirability (2012)	The need and desirability guideline highlights the importance of establishing and assessing the need and desirability for a project. The consideration of need and desirability in the EIA decision making process requires the consideration of the strategic importance of the development alongside the broader societal need and public interests. **The need and desirability description for the proposed development has taken cognisance of this guideline.**

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

TABLE 4-2: NEMA LISTED ACTIVITIES APPLICABLE TO THE PCM PROJECT

REGULATION	ACTIVITY NUMBER	SUMMARY DESCRIPTION
GN R.983, 8 December 2014 (as amended on 7 April 2017)	1(2)	The development and related operation of facilities or infrastructure for the generation of electricity from a non-renewable resource where (i) the electricity output is more than 10 megawatts but less than 20 megawatts or (ii) the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare. **The back-up power requirements (diesel generator sets) in the event of a power failure may fall within the ambit of this activity.**
Listing Notice 1: Basic Assessment	1(9)	The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water. **Pipelines will be established for the mine infrastructure, including for potable water, storm water and dewatering of the historical underground mine workings.**
	1(10)	The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes. **Various pipelines will be established for the mine infrastructure, including for the pumping of tailings, and return water pipe to the plant.**
	1(12)	The development of (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more; or (ii) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; **TSF Option 1 may trigger this activity as there are several watercourses near the historical TSF.**
	1(13)	The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014. **The various dams required for effectively managing water on the site, including the effluent water dam, return water dam, and pollution control dam, may exceed a combined capacity of 50 000 m^3 whilst not necessarily failing within the ambit of activity 16 in Listing Notice 2.**
	1(14)	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres. **This includes explosives, solvents, lubricants, vehicle and generator fuel, waste oils etc. Various storage containers and storage areas, each of different sizes will be required for the different dangerous goods that will be necessary for the mining activity.**
	1(19)	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse. **TSF Option 1 may trigger this activity as there are several watercourses near the historical TSF.**

	1(20)	Any activity including the operation of that activity which requires a prospecting right in terms of section 16 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including (a) associated infrastructure, structures and earthworks, directly related to prospecting of a mineral resource; or (b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing; but excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in Listing Notice 2 applies. **This activity may be triggered by prospecting activities for minerals applied for by the Applicant and included in the Mining Right Application applicable to this S&EIR Process.**
	1(21)	Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including (a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or (b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing; but excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in Listing Notice 2 applies. This activity may be triggered by the establishment of borrow pits and other small-scale mining of minerals applied for by the Applicant. **This activity may be triggered by the establishment of borrow pits and other small-scale mining of minerals applied for by the Applicant and included in the Mining Right Application applicable to this S&EIR Process.**
	1(24)	The development of a road— (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres but excluding a road (a) which is identified and included in activity 27 in Listing Notice 2 of 2014; (b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter. **This activity may be triggered by the cumulative extent of internal mine haul roads developed to provide safe and efficient movement of man and materials across the site.**
	1(25)	The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2 000 cubic metres but less than 15 000 cubic metres. **A wastewater treatment facility will be required for the treatment of sewage while a treatment facility for contaminated water may also be necessary.**
	1(28)	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 1 April 1998 and where such development will occur outside an urban area, where the total land to be developed is bigger than 1 hectare. **The area to be affected by mining and infrastructure development exceeds 1ha.**
	1(34)	The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution. **The mining operation will require a water use licence as per the NWA.**

	1(45)	The expansion of infrastructure for the bulk transportation of water or storm water where the existing infrastructure— (i) has an internal diameter of 0,36 metres or more; or (ii) has a peak throughput of 120 litres per second or more; and (a) where the facility or infrastructure is expanded by more than 1 000 metres in length; or (b) where the throughput capacity of the facility or infrastructure will be increased by 10% or more; excluding where such expansion— (aa) relates to transportation of water or storm water within a road reserve or railway line reserve; or (bb) will occur within an urban area. **Pipelines will be required for the mine infrastructure, including for potable water, storm water and dewatering of the historical underground mine workings. Use may be made of existing infrastructure.**
	1(46)	The expansion and related operation of infrastructure for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes where the existing infrastructure— (i) has an internal diameter of 0,36 metres or more; or (ii) has a peak throughput of 120 litres per second or more; and (a) where the facility or infrastructure is expanded by more than 1 000 metres in length; or (b) where the throughput capacity of the facility or infrastructure will be increased by 10% or more; excluding where such expansion— (aa) relates to the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes within a road reserve or railway line reserve; or (bb) will occur within an urban area. **The development will require transportation of sewage, effluent, process water, wastewater, return water, industrial discharge or slime/tailings on the property. Use may be made of existing infrastructure.**
	1(48)	The expansion of (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or (ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more; where such expansion occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; **TSF Option 1 may trigger this activity as there are several watercourses in the vicinity of the historical TSF.**
	1(56)	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas. **This activity may be triggered by the cumulative extent of widening or lengthening existing roads necessary for the safe and efficient transport of man and materials.**

	1(64)	The expansion of railway lines, stations or shunting yards where there will be an increased development footprint, excluding— (i) railway lines, shunting yards and railway stations in industrial complexes or zones; (ii) underground railway lines in mines; or (iii) additional railway lines within the railway line reserve. **The expansion of the existing railway line may be required as part of the PCM Project.**
GN R.984, 8 December 2014 (as amended on 7 April 2017) **Listing Notice 2: Scoping and EIA**	2(6)	The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding— (i) activities which are identified and included in Listing Notice 1 of 2014; (ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; (iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or (iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day. **The mining operation will require a water use licence as per the NWA.**
	2(11)	The development of facilities or infrastructure for the transfer of 50 000 cubic metres or more water per day, from and to or between any combination of the following — (i) water catchments; (ii) water treatment works; or (iii) impoundments; excluding treatment works where water is to be treated for drinking purposes. **Although considered unlikely, the discharge of treated water from the dewatering of the underground mine workings may fall within the ambit of this activity.**
	2(12)	The development of railway lines, stations or shunting yards excluding — (i) railway lines, shunting yards and railway stations in industrial complexes or zones; (ii) underground railway lines in a mining area; or (iii) additional railway lines within the railway line reserve. **The refurbishment and further development of the existing railway line may be required as part of the PCM Project.**
	2(15)	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan. **More than 200 ha of indigenous vegetation is planned to be removed for the development of the mine.**
	2(16)	The development of a dam where the highest part of the dam wall is 5 metres or higher or where the highwater mark of the dam covers an area of 10 hectares or more. **The TSF will reach a height of more than 5 m and the highwater mark of the TSF dam will be greater than 10 ha. The effluent water dam may also fall within the ambit of this activity.**

	2(17)	Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including (a)associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or (b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing. **This Scoping Report EIA is undertaken in support of a mining right application as per the Mineral and Petroleum Resources Development Act.**
GN R.985, 8 December 2014 (as amended on 7 April 2017) **Listing Notice 3: Basic Assessment**	3(4)	The development of a road wider than 4 metres with a reserve less than 13,5 metres (ii) outside urban areas (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. **The development of internal roads in the vicinity of the WRD (Option 2 and Option 3) and TSF (Option 3), the topsoil stockpile, and surface mining area may trigger this activity.**
	3(10)	The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres (ii) outside urban areas (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. **Fuel storage facilities in the vicinity of the WRD (Option 2 and Option 3) and TSF (Option 3), the topsoil stockpile, and surface mining area may trigger this activity.**
	3(12)	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. (iv.) On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning. **Removal of more than 300 m^2 of indigenous vegetation will be required for TSF Option 2 (if selected).**
	3(14)	The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse (ii) outside urban areas (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans **Access road option 2 and TSF Option 1, if selected, may fall within the ambit of this activity.**
	3[18 g ii (ii)]	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland **Access road option 2, if selected, may trigger this activity.**
	3(23)	The expansion of (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or

		(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse (ii) outside urban areas (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans **Access road option 2 and TSF Option 1, if selected, may fall within the ambit of this activity.**

TABLE 4-3: LISTED WASTE MANAGEMENT ACTIVITIES APPLICABLE TO THE PCM PROJECT

REGULATION	ACTIVITY NUMBER	SUMMARY DESCRIPTION
GN R.718, 3 July 2009 **Category B: Scoping and EIA**	**1**	The storage of general waste in lagoons. **The dams needed for return water, effluent water and dirty stormwater could be regarded as evaporation dams, as per the definition of lagoon in GN R. 718.**
GN R.718, 3 July 2009 **Category B: Scoping and EIA**	**3**	The recovery of waste including the refining, utilisation, or co- processing of the waste at a facility that processes in excess of 100 tons of general waste per day or in excess of 1 ton of hazardous waste per day, excluding recovery that takes place as an integral part of an internal manufacturing process within the same premises. **The proposed backfill plant required for the preparation of the Cement Aggregate Fill and Cement Paste Fill for the surface and underground void stabilisation and backfilling will make use of waste rock and tailings material.**
GN R.718, 3 July 2009 **Category B: Scoping and EIA**	**9**	The disposal of inert waste to land in excess of 25 000 tons, excluding the disposal of such waste for the purposes of levelling and building which has been authorised by or under other legislation. **The establishment of a WRD for the waste rock removed during mining may fall within the ambit of this activity.**
GN R.718, 3 July 2009 **Category B: Scoping and EIA**	**10**	The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity). **The construction of the TSF, WRD and backfill plant will within the ambit of this activity.**
GN R.718, 3 July 2009 **Category B: Scoping and EIA**	**11**	The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002). **The proposed new TSF and WRD fall within the definition of a residue stockpile. The possible reclamation of the existing TSF to provide backfill material for stabilisation of the voids ahead of the surface mining will also fall within the ambit of this activity.**

TABLE 4-4: POTENTIAL WATER USES IDENTIFIED FOR THE PROPOSED PROJECT

FARM AND PORTION NUMBER	WATER USE	DESCRIPTION
Portion 26 of Vogelstruisbult 104	21 (c) and (i)	A section of Access Road Option 1 is within 500 m of a wetland. A section of Access Road Option 1 intersects with a non-perennial watercourse. A section of the proposed surface mining area is within 500 m of a spatially designated wetland feature. The surface water ecosystems study has indicated that this feature is an existing borrow pit.
	21 (g)	Establishment of facilities for disposal of waste (e.g. evaporation dam from dewatering of open pit)
Portion 25 of Vogelstruisbult 104	21 (a)	Taking of water from underground workings.
	21 (g)	Establishment of various structures / facilities for disposal of waste (e.g. WRD, pollution control dam, effluent dam etc.)
	21 (j)	Removal of water from the flooded underground workings (dewatering).
Portion 1 of Vogelstruisbult 104	21 (c) and (i)	Access Road (Option 2) is within 500 m of a wetland. Reinstatement of a section of the historical diversion berm is within 500 m of a wetland (borrow pit) and intersects several non-perennial watercourses. The existing servitude to the historical TSF intersects two non-perennial watercourses.
	21 (g)	Establishment of TSF Option 2.

The Integrated Water Use Licence Application (IWULA) will comprise of the water uses associated with the preferred site infrastructure layout options.

4.2 REQUIRED ENVIRONMENTAL LICENCES

The proposed mine development requires a Mining Right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act No. 28 of 2002 (MPRDA). In addition to the Mining Right, the proposed activities also require that the applicant obtain the following:

- Environmental Authorisation in terms of the National Environmental Management Act 107 of 1998 (NEMA);
- Waste Management Licence in terms of the National Environmental Management: Waste Act 59 of 2008; and
- Water Use Licence in terms of the National Water Act 36 of 1998.

4.3 INTERNATIONAL PERFORMANCE STANDARDS AND ENVIRONMENTAL DESIGN CRITERIA

A design criteria framework for environmental and social aspects relevant to the Prieska Copper Mine (PCM) Project has been compiled and is attached in Appendix 6.

The design criteria for the PCM Project are primarily based on the requirements of legislation, norms and standards applicable in South Africa and the environmental performance standards of the International Finance Corporation (IFC).

5 NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES

5.1 NEED

The information obtained from the prospecting and related metallurgical testwork undertaken to date indicates that there is valuable zinc and copper metal remaining in the Prieska Zn-Cu Deposit which can be mined in a cost-effective manner. The market demand for zinc and copper concentrate is strong with a projection for a supply-side constraint for these metals, especially in developed economies. The proposed development is ideally situated to provide for this demand.

In addition to the export market need for zinc and copper concentrate, there is a significant need in South Africa for developments which facilitate economic growth and provide employment opportunities at a local and regional scale. The royalties and taxes arising from the mineral extraction, payable to the South African Government in terms of the MPRDA, will provide revenue to the country. The construction and operational phases of the development will furthermore result in employment opportunities and contribute to local economic development through the procurement of goods and services and the implementation of the mine's social development commitments. The latter are described in the Social and Labour Plan (SLP), which the Applicant has compiled in accordance with the requirements of the Minerals and Petroleum Resources Development Act 28 of 2002 and Mining Charter II.

The SLP addresses the Applicant's plans for ensuring that it achieves commercial success whilst also developing its employees and community for the better and in compliance with transformation targets as stipulated in the Mining Charter II, as it may be amended and developed from time to time (Repli Trading No. 27, 2018).

A detailed summary of the SLP is provided in the Social Impact Assessment Report (Appendix 10).

5.2 DESIRABILITY

Due to the nature of mineral extraction and processing, mining developments do have various physical, social and environmental hazards. These hazards are generally controlled through the application of various engineering design standards and the health, safety and environmental procedures and plans which the operating company implements during the day to day operation of the site.

The impact assessment studies conducted for the proposed development have not identified any significant risks or impacts associated with the development at the proposed site. The negative impacts which have been identified to date can be satisfactorily mitigated.

The proposed development has also been found to be consistent with the spatial development planning context applicable to the area. With the appropriate environmental controls in place, the proposed development is also considered to be compatible with surrounding land uses.

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

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

6.1 DETAILS OF THE DEVELOPMENT FOOTPRINT ALTERNATIVES CONSIDERED

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

The location of the proposed surface and underground mining activities are fixed by the orebody and other mineral resources which are being targeted.

6.1.2 THE TYPE OF ACTIVITY TO BE UNDERTAKEN

As a previous mine, with existing infrastructure that supports the mining operation, mining and ore processing is the only activity relevant to this assessment.

6.1.3 THE DESIGN OR LAYOUT OF THE ACTIVITY

With the orebody target area primarily located on Portion 25 and Portion 26 of Vogelstruisbult 104, the engineering team has concentrated the required surface infrastructure on these farm portions.

The land surface area of these properties is already transformed in large parts by the historical mining activities. The footprint area for the preferred TSF site option comprises of undisturbed land.

Site location options for the TSF, WRD and main mine access road have been identified. These are described in greater detail in the preceding sections of this report.

The broad placement of the surface infrastructure was informed by an environmental sensitivity plan which considered the location of all known sensitive physical, social and environmental features within the Mine Rights Application surface area:

- Natural features, for example watercourses, and existing physical structures, such as roads, railways were identified;
- The extent of the proposed orebody, as presently understood, to be mined over the Life of Mine was delineated;
- The town of Copperton was identified as a residential area and deemed to be a potentially sensitive receptor; and
- Other development activities in the area, current and planned, were identified. These comprised of predominantly renewable energy projects.

Buffer distances (minimum safe distances), determined primarily from legislation, including GN704 and the MHSA, were then applied (Table 6-1).

The placement of proposed site infrastructure options in relation to the identified sensitive areas is shown in Appendix 3 Map 17

Following the completion of the scoping phase, input from I&APs and the findings of the specialist studies were used to refine the preferred development footprint. The specialist studies did not identify any fatal flaws associated with any of the infrastructure site layout options. However, the heritage and terrestrial ecology studies indicated that TSF Option 2 (preferred TSF option) was the least preferred in comparison with TSF Option 1 and 3, as the latter options were both on already transformed land parcels. TSF Option 1 and 3 were not suitable due to technical criteria (Appendix 5).

TABLE 6-1: ENVIRONMENTAL BUFFER ZONES

INFRASTRUCTURE	BUFFER (M)	LEGISLATION / COMMENT
Buildings	100	MHSA and Regulations
Roads		
Railways		
Tailings Storage Facility and Waste Rock Dump		
Structures		

INFRASTRUCTURE	BUFFER (M)	LEGISLATION / COMMENT
Restricted areas	50	MHSA GN93
Watercourses	100	NWA GN704
Wetlands	500	NWA GN704 GN1199
Operating and authorised (but not yet constructed) solar PV power plants	500	A buffer has been suggested, mainly for the possible dust fallout impact on the solar PV panels
Copperton	500	A buffer has been suggested for noise, dust and air quality impacts
Powerlines	25	A proposed buffer (either side of centre-line) for protection of powerline infrastructure
Explosives magazine	500	A proposed buffer for safety and avoidance of damage to new infrastructure (in the event of an explosion)

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

The proposed mining method of conventional drill, blast and hauling to be used for the surface mining and the LHOS and Drift and Fill methods proposed for underground mining are the only methods deemed suitable for the safe and efficient extraction of the ore.

The design of the mineral processing plant is similarly based on the demands of the export market, which require a separate zinc and copper concentrate.

6.1.5 THE OPTION OF NOT IMPLEMENTING THE ACTIVITY

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

- The royalties and tax revenue from mining will not accrue to the South African Government;
- The local economic development opportunities associated with the procurement of local goods and services to support the mine activities will not be realised;
- Projected employment opportunities during the construction and operational phases will not be fulfilled;
- The various local economic development projects agreed in principle with the Siyathemba Local Municipality as part of the applicant's social and labour plan commitments, will not be implemented; and
- The additional surface infrastructure needed for the mining will not be constructed and the potential negative impacts of the mining and related activities will not occur.

6.2 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

6.2.1 NOTIFICATION

The proposed MRA surface area comprises of properties for which a Prospecting Right Application was undertaken in 2010. Further consultation was undertaken in 2016 and 2017 as part of the Interested and Affected Party (I&AP) consultation activities for the Vardocube and Bartotrax Prospecting Right Applications. The latter are immediately adjacent to the proposed MRA surface area.

I&APs, including landowners, land users and surrounding landowners/land users, have therefore previously been consulted with in terms of the prospecting activities. In addition, access agreements have been signed between the Applicant and the surface right owners of the affected properties for prospecting on Portion 25 of Vogelstruisbult 104 and for access to Portion 1 of Vogelstruisbult 104 for feasibility study investigations. An agreement has also been signed between the Applicant and the owner of nearby solar power plant projects, both operational and proposed.

Building on this prior and ongoing consultation, the following tasks have been undertaken as part of the Project Notification Phase, providing opportunities for I&APs to participate in the S&EIR Process, including the site selection and alternatives analysis process:

- Landowners directly affected by the proposed project have been identified and encouraged to participate in the EIA process through personal letters (post and email);
- Written notification of the project and associated application for Environmental Authorisation was provided to the municipality, municipal councillor and relevant organs of state;
- Distribution of a Draft Scoping Report in January 2018 which also served as a Background Information Document and Comment Sheet to all registered and identified I&APs;
- Placement of statutory advertisements in the Volksblad on the 12th of January 2018 and the Noordwester on the 11th of January 2018; and
- Placement of On-Site Notice Boards at various locations within the study area and additional notices at the municipal offices in Prieska, Marydale and Niekerkshoop.

6.2.2 SCOPING PHASE

As part of project notification, a Draft Scoping Report was made available for public review and comment for a period of 30 days from 9 January 2018 to 13 February 2018. The report was made available as follows:

- By download: http://www.abs-africa.com/project-documents/
- By e-mail: prieskappp@abs-africa.com
- Hard copies were made available for review at the following venues:
  - Alkantpan Lodge in Copperton
  - Prieska Municipal Library, Stewart Street, Prieska
  - Prieska Municipal Office, Victoria Street, Prieska
  - Marydale Municipal Office, Van Wyk Street, Marydale
  - Niekerkshoop Municipal Office, Church Street, Niekerkshoop

On submission of the application for environmental authorisation, an updated Draft Scoping Report was made available for a second 30-day comment period from 6 April 2018 to 9 May 2018. The document was made available for comment in the same way as was done in January 2018.

A copy of the updated Scoping Report was also made available for comment at the Repli / Orion Office in Loods Boulevard, Prieska.

All registered I&APs were notified of the submission of the Final Scoping Report as well as the amended application for Environmental Authorisation / Waste Management Licence. A copy of the Final Scoping Report was made available on the ABS Africa website and was also available on request from ABS Africa and the Repli/ Orion office in Prieska.

Various key stakeholder meetings undertaken as part of the Notification Phase of the Project are summarised in Table 6-2.

The register of I&APs, copies of written notification, site notices and newspaper notices developed and distributed to date are provided in Appendix 7.

TABLE 6-2: STAKEHOLDER MEETINGS

STAKEHOLDER	DATE
Department of Mineral Resources (Mineral Law Unit)	9 January 2018
Department of Mineral Resources (Environment Unit)	16 January 2018
Department of Science and Technology / Square Kilometre Array Project	25 January 2018
Department of Water and Sanitation	16 January 2018

6.2.3 EIA PHASE

The Draft EIR (this document) will be made available for public review and comment for a period of 30 days. The report will be made available in the same manner as was done in the Scoping Phase.

The Draft EIR, EMPr and IWWMP will be updated based on the comments received from registered I&APs. The reports will be submitted to the DMR and DWS respectively. Registered I&APs will be notified of the availability of the Final EIR, EMPr and IWWMP. Additional comments received from registered I&APs through the public comment period and at feedback meetings will be included in the Issues Response Report. This report will be included as an appendix to the Final EIR to allow registered I&APs to confirm how their comments and concerns have been addressed.

Regulation 24(1) of Government Notice R.982 provides that the DMR must review the Final EIR and EMPr and issue a decision on the EA and WML application within 107 days of submission of the document. The competent authority for the IWULA is required to issue a decision on the application within 144 days of the submission of the technical report.

6.2.4 NOTIFICATION OF DECISION

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

6.2.5 APPLICANT STAKEHOLDER ENGAGEMENT

In December 2017, the Applicant opened an office in Prieska to facilitate engagement with stakeholders including community members seeking information on the Project and for enquiries regarding employment opportunities.

The Applicant has and continues to engage with various stakeholders, including the community of Prieska and Copperton, SLM, and SARAO. The main engagement undertaken is summarised in Table 6-3. This engagement has been considered as part of the environmental impact assessment process undertaken for the Project.

Please refer to Appendix 7 for copies of correspondence.

TABLE 6-3: APPLICANT ENGAGEMENT WITH STAKEHOLDERS

DATE	TYPE OF ENGAGEMENT	PURPOSE
10 April 2017	Copperton Community Meeting and Braai	To introduce the residents of Copperton and neighbouring areas to Orion, the plans for the Prieska Zn-Cu Project and the Orion management team in an informal setting.
22 July 2017	Meeting with Siyathemba Municipal Council	To introduce the Siyathemba Municipal Council to Orion, the plans for the Prieska Zn-Cu Project and the Orion management team. Email attached.
22 July 2017	Prieska Community Meeting	To introduce the Prieska Community to Orion, the plans for the Prieska Zn-Cu Project and the Orion management team. Email attached.
07 November 2017	Prieska Community Meeting	Representatives of Orion management (M Birch, S Fanie) were present at a community meeting relating to land occupations, on a purely observational basis. Record attached.
21 November 2017	Prieska Greening Committee	Participation in meeting by Orion management (M Birch, N Mosiapoa)
17 January 2018	Meeting with Siyathemba Mayor	Representatives of Orion management (N Mosiapoa, M Birch) met with Mayor Tsume to address concerns raised by the community regarding use by external contractors (e.g. drilling contractor) of staff from outside the area. Email attached.
29 January 2018	Inaugural Meeting of the Siyathemba – Orion Minerals Collaboration Steering Committee	The purpose of the meeting was: • To duly constitute the Steering Committee (SteerCom) to manage the collaborations on community and social investment initiatives between the Siyathemba Municipality and Orion as outlined in the Memorandum of Understanding signed on the 20th October 2017 by the Parties. • With representatives from Orion and the Municipality present, quorum was achieved to allow for the nomination and appointment of the SteerCom.
31 January 2018	Letter: Request for proposals of suggested uses for pumped out mine water	Repli Trading No. 27 Pty Ltd ('Repli Trading') invited all interested parties to submit proposals or expressions of interest for the alternative use of mine water pumped out from the old Prieska Copper Mine.
01 March 2018	Prieska Greening Committee	Participation in meeting by Orion management (M Birch, N Mosiapoa). Minutes attached.
02 March 2018	Meeting of the Siyathemba – Orion Minerals Collaboration Steering Committee	Planning and coordinating mutually agreed Projects for collaborative implementation, including those agreed in the SLP.
19 March 2018	Meeting with Provincial Department of Education in Kimberley	EduVOD proposal was presented to the Provincial Department of Education in Kimberley and received strong interest. EduVOD is a content delivery solution developed by UEC to deliver e-Learning content to schools via satellite or terrestrial broadcast networks. As part of Orions local economic commitments, Orion intends to implement the EduVod learning system into schools within Prieska
23 March 2018	Career Expo in Prieska	Attendance by S Fanie, representing Orion.
27 March 2018	Presentation of Social and Labour Plan (SLP) for the Prieska Zn-Cu Project by Orion management to the	Endorsement of the SLP by Council prior to submission of Mining Right Application by Orion.

	Siyathemba Municipal Council.	
25 April 2018	Site Visit by Siyathemba Mayor, Councillors and Municipal Managers.	To provide insight into the exploration program, mining studies and future plans at the Copperton site. Included underground visit.
3 May 2018	Walk-in visitor to Prieska Office	Assistance with registering a local business on SCNET.
17 May 2018	Telephonic and/or personal meetings with water users taking water from the Prieska-Copperton pipe line	To inform landowners and water users of Orion's intention to take over the maintenance but not ownership of the pipeline, should the Prieska Zn-Cu Project proceed. Under the proposed arrangement, water supply tariffs in place for existing water users will remain unchanged.
31 May 2018	Northern Cape Department of Education and Siyathemba Municipality's Visit to Altech UEC and Kwa-Mashu Protec Learning Centre	Northern Cape Department of Education and Siyathemba Municipality's representatives undertook a visit to the Altech UEC for a presentation and introduction to EduVOD. EduVOD is a content delivery solution developed by UEC to deliver e-Learning content to schools via satellite or terrestrial broadcast networks. As part of Orions local economic commitments, Orion intends to implement the EduVod learning system into schools within Prieska
18 June 2018	Walk-in visitor to Prieska Office	Assistance provided to a student looking for bursary funds on the Internet.
19 June 2018	Walk-in visitor to Prieska Office	Internship request.
19 June 2018	Walk-in visitor to Prieska Office	Request for Orion Minerals to assist a local SMME with finances for accounting services and new business registration
20 June 2018	Copperton Community Meeting and Braai	To update the residents of Copperton and neighbouring areas on the plans for the Prieska Zn-Cu Project and to engage with the Orion management team in an informal setting.
18 July 2018	Siyathemba – Orion Minerals Collaboration Steering Committee Meeting	Planning and coordinating mutually agreed Projects for collaborative implementation, including those agreed in the SLP.

6.3 SUMMARY OF ISSUES RAISED BY I&APS

Comments and responses to the issues raised during the scoping phase (January to present), are included in Table 6-4.

Most of the comments received relate to concerns with respect to air quality (19%), road and traffic safety (13%), employment and labour (13%) and the proposed dewatering and the impact this may have on groundwater resources (13%). These were followed by comments related to influx, crime and security (10%), impacts to wetlands and watercourses (8%) and housing (6%).

Various parties have commented to date, including government departments such as Transnet, DMR, SARAO, SANRAL and the DWS, operating and proposed solar PV plant owners, surrounding landowners and agricultural organisations. The South African Radio Astronomy Observatory (SARAO) has indicated that further information on potential interference with their radio-astronomy equipment is required before they can support the Project. No clear opposition to the proposed mining project is evident from the comments received to date.

In general, the comments reflect concerns related to the possible direct and indirect impacts of the proposed mining activities on existing land uses in the area, particularly with respect to farming and the solar PV plants.

TABLE 6-4: SUMMARY OF ISSUES

INTERESTED AND AFFECTED PARTIES LIST THE NAMES OF PERSONS CONSULTED IN THIS COLUMN; AND MARK WITH AN X WHERE THOSE WHO MUST BE CONSULTED WERE IN FACT CONSULTED		DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO THE ISSUES RAISED
AFFECTED PARTIES				
Landowner/s (Owners of land included in the Mining Rights Area Boundary and/or owners of land where mine infrastructure is proposed)	**X**			
Hester Meyer (Request Trust) Portion 1 and 25 of Vogelstruisbult 104		1 February 2018 Record of telephonic discussion	Concerned that no direct notification of the EIA Process was sent. The landowner became aware of the EIA Process and Project announcement through the site notices.	Our records indicate that the project announcement letters in English and Afrikaans were sent by email to the landowner on 8 January 2018. The letters were sent again on 1 February 2018.
Hester Meyer (Request Trust) Portion 1 and 25 of Vogelstruisbult 104		1 February 2018 via e-mail	Thank you for the email. I will forward it to my lawyer who will deal with it. May I ask that in future you must forward all correspondence regarding the mining activities directly to Mr Izak Potgieter, but cc us in? The same goes for Mr Henry Tredoux.	Your request is noted - we will forward all future correspondence accordingly.
Izak Potgieter (Representing Request Trust and Henry Tredoux) Portion 1 and 25 of Vogelstruisbult 104		1 February 2018 via email	For the sake of clarity, kindly confirm that the Trustees of the Request Trust as well as Mr Tredoux have both been registered as interested and affected parties. This request is triggered as a result of the Site Notice/ Invitation to Comment dated 10 January 2018	It is confirmed that the Trustees of the Request Trust, namely Mrs. H Meyer and Mr. PM Meyer, have been registered as interested and affected parties. Mr. Tredoux has also been registered as an interested and affected party.

			in respect of the Prieska Zinc Copper Project. In this regard, we kindly also request that you provide a copy of the draft Scoping Report. Please note that all the rights of both our clients are reserved.	The complete Draft Scoping Report can be downloaded from the following link: http://abs-africa.com/project-documents/#1515067943327-633f5cf8-31c7
Hanno Hamman PCML Portion 26 of Vogelstruisbult 104 and Portion 0 of Slimes Dam		No comment received		
Occupiers of the Site (Parties using land within the Mining Rights Area Boundary and/or parties using land where mine infrastructure is proposed)	**X**			
Henry Tredoux		2 February 2018 via telephonic discussion	All correspondence on the MRA and EIA Process must be forwarded directly to Duncan & Rothmann Attorneys with a copy to myself and the land owner.	We confirm our understanding of this request. All the relevant parties you requested to be included are registered on the I&AP database.
Karen Low (Mulilo) Portion 1 of Vogelstruisbult 104		5 February 2018 via email	Section 5.3 (Surrounding land uses): no mention is made of the operating PV facilities. Only the proposed facilities are mentioned.	All known proposed and operating solar PV facilities were included in Appendix C Map 2. Specific mention of the three operating PV facilities has now also been included in the revision to the Scoping Report.
Karen Low (Mulilo) Portion 1 of Vogelstruisbult 104		5 February 2018 via email	Section 6.2.3.1 (construction phase dewatering): The DSR states that various options to deal with the accumulated water in the underground workings are being investigated. a. Option 1 is the discharge of treated water into the nearest watercourse. However, the	If it is determined that discharge into a watercourse is unavoidable, an assessment of the impact of the discharge on the bed, banks and characteristics of the watercourse will be undertaken.

			Scope of Works for the Surface Water Specialist does not include assessing this impact (see bullet point 10).	
Karen Low (Mulilo) Portion 1 of Vogelstruisbult 104		5 February 2018 via email	b. Option 2 is the use of water evaporator technology to accelerate the natural process of evaporation. Is this included in the Scope of Works for the Air Quality Specialist?	The evaporators are not included in the Air Quality Specialist Study at present. The need to ensure that the engineering and operational controls to accommodate the effects of changes in wind direction and wind speed on water droplet formation and fallout is an inherent part of the engineering design study underway. The evaporator technology design will be described in greater detail in the EIR.
Karen Low (Mulilo) Portion 1 of Vogelstruisbult 104		5 February 2018 via email	Section 6.2.12 (borrow pits): please provide the access routes to the borrow pits. Will the access route comply with the 500m buffer around the operating PV facility?	The access routes to the borrow pits will be defined once the number and location of the borrow pits has been confirmed. These roads will be included in the air quality specialist study. Wherever possible, infrastructure, including access roads, is being placed outside of the buffer zones.
Karen Low (Mulilo) Portion 1 of Vogelstruisbult 104		5 February 2018 via email	Section 6.3.7 (main mine access road and internal roads): the DSR states: "An existing tarred road is in place from the R357 which provides direct access to the mine site as well as to Alkantpan and Copperton. The road is tarred up to the T-junction to Alkantpan and Copperton. It is likely that this road will need to be resurfaced as part of the mine development." From a dust management perspective, it is recommended that this road be resurfaced. Please provide clarity on this recommendation.	The recommendation is noted. The design of the road infrastructure, including the need to resurface the existing tarred road will be described in greater detail in the EIR.
Karen Low (Mulilo) Portion 1 of Vogelstruisbult 104		5 February 2018 via email	Table 7-1 Policy and Legislative contact: The Astronomy Geographic Advantage Act, 207 (Act No. 21 of 2007) is identified as an "applicable legislation and guideline used to compile the report". The DSR states "PCM is	Engagement with SARAO has been undertaken and a detailed EMI and RFI assessment will be undertaken as part of the engineering design process.

			located within the Northern Cape Province and the Karoo Central AAA. Restrictions may apply with respect to mine-related radio and electrical activities, if these are deemed to interfere with radio astronomy work." However, the EMI is not identified as an impact to be further assessed. How will mine-related radio and electrical activities be assessed to determine if they interfere with the SKA?	
Karen Low (Mulilo) Portion 1 of Vogelstruisbult 104		5 February 2018 via email	Table 10-1 Environmental Buffer zones: a 500 or 1000m buffer has been allocated to the operating and proposed PV facilities. This is an appropriate buffer zone.	Comment noted.
Karen Low (Mulilo) Portion 1 of Vogelstruisbult 104		5 February 2018 via email	Section 11.5.6.2 (birds): Martial Eagle (red-listed species) is not included in this list	The bird species list presented in the Scoping Report was based on the specialists' review and collation of the species recorded in the online database of the Southern African Bird Atlas Project (SABAP2). Martial eagle was not recorded in the SABAPs Quarter Degree Squares or pentads relevant to the study area and was thus not included in the bird species list. If there are records of sightings available for the Martial eagle in the study area, please can these be provided for review and inclusion in the Biodiversity Specialist Study, which will be made available as part of the EIR.
Karen Low (Mulilo) Portion 1 of Vogelstruisbult 104		5 February 2018 via email	Section 11.11.6 (Housing): the DSR states: "Housing for the expected 450 mine personnel to be employed during the operational phase of the mine development is an important aspect of the project." however, there is no information on where these 450 individuals will be housed and who will be responsible for building these houses. Please confirm that this information will be included in the EIA Report.	Further information on the housing of construction and operational phase personnel will be provided in the EIR.

Karen Low (Mulilo) Portion 1 of Vogelstruisbult 104		5 February 2018 via email	Table 12-4 measures to avoid, reverse, mitigate or manage identified impacts a. Based on our experience in this area, it is recommended that the Environmental Officer / ECO attend a snake handling training course to ensure the safe removal of snakes.	The recommendation is noted and will be included as a control in the EMPr.
Karen Low (Mulilo) Portion 1 of Vogelstruisbult 104		5 February 2018 via email	b. DSR states: "mine operational effluent must be monitored" – for what purpose? Quality? Quantity?	The details on all operational monitoring will be provided as part of the EMPr.
Karen Low (Mulilo) Portion 1 of Vogelstruisbult 104		5 February 2018 via email	c. DSR states: "If discharge becomes necessary, only water which meets the relevant discharge standard for the protection of the environment, may be discharged" – no mention is made of where this water will be discharged to. This information is critical to the surrounding operational PV facilities which have stormwater management systems designed for a specified flood event.	If it is determined that discharge into a watercourse is unavoidable, an assessment of the impact of the discharge on the bed, banks and characteristics of the watercourse will be undertaken.
Karen Low (Mulilo) Portion 1 of Vogelstruisbult 104		5 February 2018 via email	d. Only surface water quality impacts are considered. Should water be discharged to a watercourse, then impacts to the flow need to be investigated as well?	If it is determined that discharge into a watercourse is needed, an assessment of the impact of the discharge on the bed, banks and characteristics of the watercourse will be undertaken.
Karen Low (Mulilo) Portion 1 of Vogelstruisbult 104		5 February 2018 via email	e. DSR states: "As far is as possible, noise generating activities to be limited to day-time hours (considered to be between 06:00 and 22:00)" will noise generating activities be restricted to week days? Or 7 days a	Mining and mineral processing is expected to take place 7 days a week. The noise impact study will consider the impact of these hours on sensitive receptors.
Karen Low (Mulilo) Portion 1 of Vogelstruisbult 104		5 February 2018 via email	Section 13.4.2 (surface water): a. A 1:100 year storm event flood line assessment will be compiled – does this take cognisance of the Mulilo Solar PV Prieska Facility?	The 1:100 year storm event flood-line assessment will be focussed on the historical river diversion. Impacts to structures and infrastructure within the flood-line will be discussed as part of the assessment.

Karen Low (Mulilo) Portion 1 of Vogelstruisbult 104		5 February 2018 via email	b. The scope of works does not include: i. Assessing all watercourse to identify a suitable watercourse to discharge treated effluent ii. Assessing all the pans and wetlands in the area	If it is determined that discharge into a watercourse is unavoidable, an assessment of the impact of the discharge on the bed, banks and characteristics of the watercourse will be undertaken.
Karen Low (Mulilo) Portion 1 of Vogelstruisbult 104		5 February 2018 via email	Section 13.4.6 (social impact assessment): a. The scope of works does not specify the assessment of housing 450 mine personnel within Prieska. Please confirm that this will be assessed.	Further information on the housing of construction and operational phase personnel will be provided in the EIR.
Karen Low (Mulilo) Portion 1 of Vogelstruisbult 104		5 February 2018 via email	Section 13.4.9 (air quality impact assessment): a. The DSR states: "The potential impacts as a result of project related emissions on human health and the environment will be determined." We request that this is expanded to include the impact on operating PV facilities.	The impact on operating PV facilities will be presented in the EIR as a comparison between the pre-mining baseline dust fallout rates (measured), the predicted dust fallout rates from the mining activities (modelled) and the South African legislation applicable to dust fallout. The air quality specialists are not aware of any published national or international standard for ambient dust fallout limits for PV facilities. Accordingly, it is not possible to assess the significance of the dust fallout impact on operating PV facilities.
Karen Low (Mulilo) Portion 1 of Vogelstruisbult 104		23 February 2018 via email	Please inform us when the final Scoping Report is uploaded to your website.	A formal notification will be sent once the report is available in April.
Adjacent Landowners (Owners of land immediately adjacent to the Mining Rights Area Boundary and/or owners of land immediately adjacent	**X**			

to where mine infrastructure is proposed, includes the town of Copperton)				
AJ de Jager (Portion 0 of Smous Pan 105)		13 February 2018 via email	The Farm Smouspan 105 is located approximately 1 kilometre from the intended mining operations listed herein above and in all communications exchanged to the identified Interested Party, hereinafter should be addressed to Ms AJ de Jager, agent to the Executor, Mrs Aletta de Jager, of the Estate of the deceased Cornelius Jansen de Jager. According to the will of late Mr CJ de Jager the property will be transferred to the Aletta de Jager Trust. ABS Africa will be notified of the change in ownership as soon as the property is transferred to the Aletta de Jager Testamentary Trust. The trustees of the trust are Mrs A de Jager, Ms A de Jager, Ms AJ de Jager and Mr FJ Lubbe of Lubbe and Lubbe Chartered Accountants. The Agent of the Executor undertook to inform all beneficiaries and trustees of all communication between Ms AJ de Jager and ABS Africa Sustainability Advisors.	We confirm that the Agent of the Executor, Ms. AJ de Jager, and Ms A. de Jager are separately registered in the database of I&APs and both parties will receive all correspondence and reports distributed through the EIA Process.
AJ de Jager (Portion 0 of Smous Pan 105)		13 February 2018 via email	Permission to access the Farm Smouspan 105 with regard to the conducting of environmental studies on the property can at this stage only granted by Ms Justina de Jager. I Justina will make the necessary arrangements regarding access to the farm.	Comment noted. This has been communicated to the relevant representative of the mining proponent.
AJ de Jager (Portion 0 of Smous Pan 105)		13 February 2018 via email	However, it has been noted that a dust precipitation measuring point has been erected on the farm without any notification to or permission of the executor or her appointing of the said dust precipitation point	This has been communicated to the relevant representative of the mining proponent.

			are obtained by climbing over the fence. These actions are not only disrespectful of private property but are also unlawful and are not conductive to future cooperation between the different parties involved.	
AJ de Jager (Portion 0 of Smous Pan 105)		13 February 2018 via email	Premised on information available to us, our own research and that still to be exchanged by ABS the Trustees hereby wish to receive the following information from ABS: 2. Information required: Copies of: (i) Copy of application for a mineral right submitted to the Department of Mineral Resources. (DMR). (ii) List of interested parties consulted to date; (iii) Any land-use agreement signed with any interest party; (iv) Any EMP compiled or Environmental Impact Assessment done; (v) Any heritage study completed on Smouspan or adjacent farms; (vi) The Prospecting or Mining works Programme defined; (vii) Your geological studies compiled; (viii) Your surveyor plans compiled by an approved DMR surveyor; (ix) Type of Application submitted to the Department of Water and Sanitation for a water permit; (x) The current or intended Social and Labour Plan; (xi) Proof that you have made a Rehabilitation Fee deposit or guarantee to the DMR;	The requested information is being generated as part of the EIA Process and will be made available to all I&APs as part of the Environmental Impact Report (EIR).

			(xii) Impact study of vehicle traffic between Prieska and Copperton that might impact on our livestock at Smouspan. (xiii) Any drilling that might be done near or on our Farm. (xiv) Intention to cross our Farm and fences or gates that will be affected. (xv) Any other information that may have an impact on the farming activities of our Farm.	
AJ de Jager (Portion 0 of Smous Pan 105)		13 February 2018 via email	I will be comfortable if you can avail the above documents and information to us in person or delivered by courier before any meetings will be held.	All I&APs will be notified of the availability of the reports compiled as part of the EIA Process. Your specific request for a hard copy of the report to be made available is noted.
AJ de Jager (Portion 0 of Smous Pan 105)		13 February 2018 via email	No correspondence or communication has been received from Repli Trading or meeting has been conducted by Repli Trading with regard to an Application for Mining rights on the Farm Smouspan 105. According to the Draft Scoping Report the mining area are still to be defined and in the light there off the landowner reserve herewith the right to comment on any proposed activities until the proposed mining activities are defined.	The Mining Right Area for the present Repli Trading application has been revised and is now limited to Portion 25 and 26 of the Farm Vogelstruisbult 104 and Portion 0 of the Farm Slimes Dam. Placement of mining-related infrastructure on Portion 1 of Vogelstruisbult 104 is also under consideration. Future phases of mining may include surrounding properties, but these will be applied for at a later stage. Please refer to the revised Scoping Report for further information.
AJ de Jager (Portion 0 of Smous Pan 105)		13 February 2018 via email	Repli Trading has not informed the land owner of any intentions to use a Smouspan 105 for any mining activities, access tracts, and mining support services such as ventilation shafts, mine residue stockpile facilities and waste stock piling. The land owner reserves the right to comment upon, negotiate and to enter into a Land Use Agreement with Repli Trading.	The Mining Right Area for the present Repli Trading application has been revised and is now limited to Portion 25 and 26 of the Farm Vogelstruisbult 104 and Portion 0 of the Farm Slimes Dam. Placement of mining-related infrastructure on Portion 1 of Vogelstruisbult 104 is also under consideration. Future phases of mining may include surrounding properties, but these will be applied for at a later stage. Please refer to the revised Scoping Report for further information.

AJ de Jager (Portion 0 of Smous Pan 105)		13 February 2018 via email	Access roads between Smouspan and Graspan, 112 (T72470/2002) At present Smouspan and Graspan are farmed as a one farming unit and a road through the proposed mining area are utilized to link the two properties. Repli Trading should enter into consultation with landowner to make provision for road to link the two properties without any additional cost to the landowner. At present the road is used for the movement of stock on land between the two farms, transportation of stock to Graspan and from Graspan, access to Graspan for recreational, hunting, maintenance and general agricultural purposes.	The existing use of this road is noted and will be considered in the EIR as part of the assessment of access road alternatives. It is a principle of the mitigation hierarchy that impacts first be avoided wherever practicable. Where necessary, Repli Trading will discuss mutually-agreeable access arrangements with affected landowners.
AJ de Jager (Portion 0 of Smous Pan 105)		13 February 2018 via email	The dewatering of underground workings The dewatering of underground surfaces and the can have a very negative impact on boreholes. Farming activities are dependable on water pumped out of boreholes. Wild animals are also dependable on the availability of water. The quality of the water in the underground workings is of great concern and might be polluted. The polluted water can pollute the soil and vegetation. Operational phase dewatering Remarks regarding the impact on the operational phase dewatering are dependable on the outcome of the hydrological study and the interpretation of scientific findings. The effect that the dewatering can have on the underground water resources remains a major concern.	The concern regarding the quality of water in the underground workings and the impact of dewatering on the availability of water is noted. A geohydrological specialist study is being undertaken as part of the EIA. The scope of this study includes the assessment of the impact of the proposed mining activities, throughout all development phases of the mine on both water quality and water quantity.
AJ de Jager (Portion 0 of Smous Pan 105)		13 February 2018 via email	The removal of topsoil and the stockpiling thereof could result in a lot of dust especially during windy seasons in August. The dust is	The impact of dust is being assessed as part of the EIA. This impact will be presented in the EIR as a comparison between the pre-mining

			could affect the quality, as well as the retail price of wool, produced on Smouspan distant for the international market.	baseline dust fallout rates (measured), the predicted dust fallout rates from the mining activities (modelled) and the South African legislation applicable to dust fallout.
AJ de Jager (Portion 0 of Smous Pan 105)		13 February 2018 via email	The same concerns should be raised with all other mining activities such as road construction, blasting and transportation	The impact assessment will assess the potential impacts of these mining activities.
AJ de Jager (Portion 0 of Smous Pan 105)		13 February 2018 via email	Concentrate transportation The transportation of zinc and copper concentrate will put a burden on road infrastructure. The increased traffic load is a safety hazard for farm labourers and the movement and transportation of livestock on access roads.	This potential impact will be assessed as part of the EIA.
AJ de Jager (Portion 0 of Smous Pan 105)		13 February 2018 via email	Safety and criminal activities The influx of people into the area will result in increase in criminal activities. Stock theft and game poaching is already a problem in the area and it will increase. The safety of farmworkers and seasonal labourers is a great concern.	This potential impact will be assessed as part of the EIA.
AJ de Jager (Portion 0 of Smous Pan 105)		13 February 2018 via email	As your studies might have revealed Smouspan 105 is a historic merino and wool farming locality, providing annually wool for the international market. Our particular concern herewith registered is the effect on our animals and impact on the quality of their wool, skin and water intake.	The concern regarding the potential impact of dust on the merino and wool farming is noted. The predicted dust emissions from the mining activities will be modelled as part of the air quality specialist study.
AJ de Jager (Portion 0 of Smous Pan 105)		13 February 2018 via email	Secondly, the underground water impact is of critical importance and therefore the need for your information listed herein above.	The concern regarding underground water has been noted and will be assessed in the EIA.
AJ de Jager (Portion 0 of Smous Pan 105)		13 February 2018 via email	The above mentioned concerns are only a few points raised with regard to the proposed mining development. Should we have any further concerns regarding the proposed	I&APs are encouraged to continue to submit their concerns to prieskappp@abs-africa.com so that they can be recorded, and, where relevant, considered in the EIA Process.

			development we will notify ABS Africa accordingly.	
AJ de Jager (Portion 0 of Smous Pan 105)		17 April 2018 Record of telephonic discussion	1. In the EMP for the prospecting right application relating to Portion 0 of Smous Pan, only a small part of Smous Pan was to be affected. Now the whole area for Smouspan is highlighted in the Scoping Report. 2. Ms De Jager will only be able to provide sufficient input and comments on the Scoping Report once a full understanding of what development is planned now and in the future for prospecting / mining on Smous Pan.	1. The Mining Right Area for the present Repli Trading application has been revised and is now limited to Portion 25 and 26 of the Farm Vogelstruisbult 104 and Portion 0 of the Farm Slimes Dam. Placement of mining-related infrastructure on Portion 1 of Vogelstruisbult 104 is also under consideration. Smous Pan is therefore not included in the current Mining Right Application which Repli Trading has lodged. The revised Scoping Report provides all the information on the planned mining activities, as presently understood. Further information will be provided in the Draft Environmental Impact Report as the technical engineering studies are completed. 2. ABS Africa has been appointed to undertake the Environmental Impact Assessment in support of a Mining Right Application for the current proposed development only, which excludes mining on Smous Pan. It is suggested that contact be made with the holders of the prospecting right over Smous Pan in order to obtain clarity on their future intentions for prospecting and/or mining on this property.
Alette de Jager (Portion 0 of Smous Pan 105)		5 February 2018 via email	Smous Pan 105 is part of the Aletta de Jager Trust and I am a beneficiary and trustee of the Trust	Aletta de Jager has been added to the I&AP database.
Aletta de Jager (Portion 0 of Smous Pan 105)		16 February 2018 via email	It is not possible for me to give feedback relating the Environmental Scoping Report. The original scope specifically for Smouspan is different than what is now in your Scoping Report. In the original environmental report	The Mining Right Area for the present Repli Trading application has been revised and is now limited to Portion 25 and 26 of the Farm Vogelstruisbult 104 and Portion 0 of the Farm Slimes Dam. Placement of mining-related

			for prospecting rights, the scope and information that specifically affects Smouspan were just a small part and now the whole area for Smouspan is highlighted. When it is clear to me what the mining plan is for Smouspan and other farms around Smouspan, I will be able to give my feedback relating this Scoping Report. In this document it is stated for Smouspan: Mining area still to be defined. Possible surface and underground. Please forward to me more accurate plans relating Smouspan for me to be able to give you feedback relating the Scoping document.	infrastructure on Portion 1 of Vogelstruisbult 104 is also under consideration. Future phases of mining may include surrounding properties, but these will be applied for at a later stage. Please refer to the revised Scoping Report for further information.
Aletta de Jager (Portion 0 of Smous Pan 105)		16 February 2018 via email	Please attached photos relating unauthorised access of mining personnel onto Smouspan. I am going to open a case of trespassing onto Smouspan and to ensure that unauthorised access would not happen in the future. I do know that the person involved (Johan Wentzel) thinks that he owns the mine and thinks he can do anything he wants. It is also clear that he knew that Smouspan is not part of Vogelstruisbult or Hester Meyer's farm and that he also went into Vogelstruisbult unauthorised. It is important that from the beginning that everybody involved relating this mine, should know that it is better to treat people with respect and even more important to employ people who will treat others with respect. The best part is that people not only climb over the fence, but drove into the farm.	The responsible persons for the dust buckets were notified of this comment.
Aletta de Jager (Portion 0 of Smous Pan 105)		16 February 2018 via email	I do not understand how you could not have my email address or how you could get an email address that was incorrect? Beginning January Paul could phone me on my correct number, but than you read to me an email	The correct e-mail address for Aletta de Jager has been confirmed and the I&AP database updated accordingly.

			address that was incorrect? Please ensure that I get all the relevant information relating the mine and specifically for Smouspan.	
Aletta de Jager (Portion 0 of Smous Pan 105)		17 February 2018 Record of telephonic discussion	To ensure good relations with neighbouring landowners and land users, the mine and its representatives must treat people respectfully and not assume that the local community do not know or understand their rights. Aletta de Jager and Justina de Jager are, at all times, to be consulted with separately with respect to all matters relating to the property. It is advisable that the employment of local community members be done carefully by the mine so as to ensure that this employment improves good community relations.	These comments have been noted. However, since they are not specific to the Scoping Report or the EIA Process, they have been forwarded to the mine proponent for consideration.
Aletta de Jager (Portion 0 of Smous Pan 105)		17 February 2018 Record of telephonic discussion	Water from the underground workings was historically used on Ptn 0 of Smous Pan 105 for the growing of lucern. This could be re-established if the mine has excess water that it needs to discharge.	Parties who are interested in discussing the possible use of the water to be removed from the underground workings should respond to the Expression of Interest notification distributed by Repli Trading. It has been confirmed that a copy of this notification was sent to your e-mail address on 1 February and 19 February 2018.
Aletta de Jager (Portion 0 of Smous Pan 105)		17 February 2018 Record of telephonic discussion	It is unclear from the DSR whether the proposed mine development will affect the existing access road from the junction at the explosives magazine to Ptn 5 of Gras-Pan 112. This road is currently used to access this farm.	The existing use of this road is noted and will be considered in the EIR as part of the assessment of access road alternatives. It is a principle of the mitigation hierarchy that impacts first be avoided wherever practicable. Where necessary, Repli Trading will discuss mutually-agreeable access arrangements with affected landowners.
Aletta de Jager (Portion 0 of Smous Pan 105)		17 February 2018 Record of telephonic discussion	It would be better to have a greenfield mine, incorporating all the prospecting areas of interest than to try and refurbish the existing structures and infrastructure used for the historical mining.	This application for a Mining Right is centred around the remaining underground deposit and related remaining surface deposit at the historical Prieska Copper Mine. There is a good understanding of the extent and economic viability of these deposits. The available structures and infrastructure which are beneficial

				to the extraction of this resource will be optimised as part of the feasibility study currently underway. Significant additional work needs to be undertaken to determine the extent and viability of the mineable resource at the other prospecting areas which Repli Trading has an interest in. It is the intention to investigate these satellite deposits while mining of the deposits at the historical Prieska Copper Mine proceeds.
Aletta de Jager (Portion 0 of Smous Pan 105)		17 February 2018 Record of telephonic discussion	Ptn 0 of Smous Pan 105 is used for sheep grazing. There are no sheep on the property at present because there is no water. If mining were to proceed, the use of the property for sheep farming would no longer be possible because of the impacts from mining, such as dust and vehicle traffic on the roads in and around the farm.	The impact of dust and vehicle traffic is being assessed as part of the EIA.
Adjacent Occupiers of Site (Occupiers and users of land immediately adjacent to the Mining Rights Area Boundary and/or occupiers and users of land immediately adjacent to where mine infrastructure is proposed)	**X**			
Sonia Miszczak Atlantic Energy Partners Portion 0 of Humansrus 147		9 January 2018 via email	Atlantic Renewable Energy Partners is developing 4 solar PV facilities on the Farm Humansrus 147, which is adjacent to Vogelstruis Bult 104. Environmental Authorisation has been received for the facilities. Surface mining could have a detrimental impact on the proposed solar PV Facilities if it creates dust, which would impact	We have noted your concern regarding the impact of dust to the solar PV facilities and confirm that your details have been added to the I&AP Database. You will continue to receive notifications on the progress with the EIA and associated environmental applications.

			the efficiency &yield of the solar panels. The facilities are not yet constructed, and the timing of the construction is not yet determined, however we would like to be kept informed of all proposed activities on the neighbouring farm.	Would it be possible to send us a shape file of the four proposal solar facilities on Humansrus so that we can include these in our mapping for the EIA?
Sonia Miszczak Atlantic Energy Partners Portion 0 of Humansrus 147		10 January 2018 via email	Please find attached kmz showing the areas designated for the four solar facilities. I've also included the proposed grid connection routes, however, if all projects go ahead we would have a collector substation on site and just run one line back to Kronos.	Shapefiles have been received and the relevant maps in the Scoping Report have been updated accordingly.
Sonia Miszczak Atlantic Energy Partners Portion 0 of Humansrus 147		20 April 2018 via email	I'd like to reiterate our comment previously submitted in our registration as an I&AP: "Atlantic Renewable Energy Partners is developing 4 solar PV facilities on the Farm Humansrus 147, which is adjacent to Vogelstruis Bult 104. Environmental Authorisation has been received for the facilities. Surface mining could have a detrimental impact on the proposed solar PV Facilities if it creates dust, which would impact the efficiency & yield of the solar panels. The facilities are not yet constructed, and the timing of the construction is not yet determined, however we would like to be kept informed of all proposed activities on the neighbouring farm." We'd like to reiterate our comment because the response doesn't address how our concerns will be addressed, only that they've been noted and we've been added to the I&AP database	The potential impact of dust from the proposed mining activities on surrounding solar PV facilities will be assessed through the air quality impact assessment as described in the updated Draft Scoping Report. The findings and proposed mitigation measures will be provided in the Draft EIR.

Johannes Wolmarans Atlantic Energy Partners Portion 0 of Humansrus 147		17 January 2018 via email	Thank you for adding us on the I&AP list. We would definitely like to comment on the draft scoping document. In the meanwhile, please add my colleague Wiehann van Zyl to the I&AP list as well.	Wiehann van Zyl has been added to the I&AP database. The project announcement letter provides information with regards to the Project and how to access and send comments on the Draft Scoping Report.
Johannes Wolmarans Atlantic Energy Partners Portion 0 of Humansrus 147		7 February 2018 via email	The following mentioned mining activities as noted in the Draft Scoping Report has a very high likelihood of negatively affecting the air quality by increasing the dust concentration: • Open cast mining (envisioned for 2years on Vogelstruisbult). • Oxide and deep sulphide ore will be processed, stockpiled, crushed and screened, milling, flotation, filtration, tailing and waste rock deposition The Draft Scoping Report confirms that the dust concentration is currently very low and that there is a high probability of increased dust falls due to mining and that this will be detrimental to the surrounding solar farms **Railway upgrades and possible implications** The decommissioned railway line and corresponding servitude over the Humansrus 147 property was handled as decommissioned to date. Should this line however become operational again, it could potentially have implications on our operations and construction timelines should these overlap with the mining timelines. **Blasting and ground-vibration implications** The seismic activities (blasting and mining induced vibrations) could potentially have a	The concern regarding the impact of the mining and associated Project activities on dust generation is noted and will be investigated as part of the EIA. Could you please clarify the following comment from your letter so that we can ensure that we respond appropriately: *"Herewith we further require the management/owners of Repli Trading No 27 (Pty) Ltd. to timeously engage with Humansrus solar facilities and their corresponding owners. Such engagement should occur well in advance and prior to commencement of any mining activities."* As registered I&APs, you will continue to be engaged as the EIA progresses. Does the above refer to a request for engagement with Repli outside of the EIA Process?

			detrimental effect on the operations of the solar farm. The above listed and identified perceived risks should be quantified and communicated to solar farm operators in the surrounding area. This letter therefore provides yourself and Repli Trading No 27 (Pty) Ltd. with the required I&AP response towards possible implications on the surrounding facilities. Herewith we further require the management/owners of Repli Trading No 27 (Pty) Ltd. to timeously engage with Humansrus solar facilities and their corresponding owners. Such engagement should occur well in advance and prior to commencement of any mining activities. Should any mitigation measures be required, these should be implemented to the satisfaction of the stakeholders present on Humansrus 147, prior to any mining operations being implemented.	
Johannes Wolmarans Atlantic Energy Partners Portion 0 of Humansrus 147		14 February 2018 via email	Your previous email below refers. Please see the following points as a response to your enquiry: Context of wording: "The above listed and identified perceived risks should be quantified and communicated to solar farm operators in the surrounding area. This letter therefore provides yourself and Repli Trading No 27 (Pty) Ltd. with the required I&AP response towards possible implications on the surrounding facilities. Herewith we further require the management/owners of Repli Trading No 27 (Pty) Ltd. to timeously engage with Humansrus solar facilities and their corresponding owners.	Clarification noted. The request has been communicated to the relevant representative of Repli Trading.

			Such engagement should occur well in advance and prior to commencement of any mining activities. Should any mitigation measures be required, these should be implemented to the satisfaction of the stakeholders present on Humansrus 147, prior to any mining operations being implemented." Clarification on engagement request: The engagement request was made in the context of the above mentioned wording. Yes, this request is for engagement with Repli Trading no 27 outside of the EIA process. The perceived risks and its associated impact on the surrounding solar farms should be quantified (within the EIA process). Should the EIA find that these risks negatively affect the commercial operations of the solar facilities commercial engagement between Repli trading no 27 and Humansrus solar farms (as well as other solar farms in the area) should be conducted (in addition to the EIA correspondence) and mitigation measures be implemented (as an outcome of the EIA process).	
Competent Authorities	**X**			
Johannes Nematatani Department of Mineral Resources		23 January 2018	The comment that we have relates to the Scoping report template as well as the EIR template. We request that you provide the reports that are aligned to the template.	The Scoping Report has been compiled in the format of the DMR template. The EIR will similarly be compiled in the format of the DMR template.
Municipal Councillor	**X**			
Gloria Speelman		No comments received.		

Siyathemba Local Municipality: Ward 4 Councillor				
Local and District Municipality	**X**			
H Tsume (Mayor) IWJ Stadhouer (Municipal Manager) J Basson (Infrastructure) Siyathemba Local Municipality		No comments received.		
MT Kibi Pixley ka Seme District Municipality		No comments received.		
Organs of State	**X**			
Philani Msimango Department of Water and Sanitation		8 January 2018 via email	Kindly refer to the attached as this is not in my area of operation.	Mr. Msimango has been removed from the I&AP Database and the officials to whom the correspondence was forwarded have been added.
Kgalalelo Marintlhwane Department of Rural Development and Land Reform		10 January 2018 via email	The Provincial Head of the office is Mr. Kgotso Moeketsi. Please direct the relevant correspondence to him on the the email address: Kgotso.Moeketsi@drdlr.gov.za	Kgotso Moeketsi has been added to the I&AP Database and Kgalalelo Marintlhwane has been removed.
South African Radio Astronomy Observatory (SARAO) / Department of Science and Technology		13 February via email	SARAO hereby notify ABS Africa that proposed facility is within declared Karoo Central Astronomy Advantage Areas, which is protected for radio astronomy purpose in terms of the Astronomy Geographic Advantage Act in the Government Gazette number 37434 under notice number 198 of 2014. High level impact assessment does not mean the Astronomy Management Authority	The outcome of the high-level risk assessment, as communicated in the letter has been noted. Compliance to the requirements of the Astronomy Management Authority is a key consideration in the ongoing mining equipment design and selection process. As agreed in the stakeholder meeting with SARAO held on 25 January 2018, the mine design engineers will

			will automatically approve a permit for radio frequency transmissions or electrical emissions when the regulation for the protection of the Karoo Central Astronomy Advantage Areas are promulgated. Compliance assessment will be conducted for each radio transmission or electrical emission. SARAO conducted high level risk assessment based on limited information to determine the potential impact of such activities on the Square Kilometer Array. This letter notes the outcome of high level risk assessment, and recommend additional investigation and, the control plan of interference signals. The following are the observation from high level assessment: i. The location of the proposed activities has been identified from the Draft Scoping Report compiled by ABS Africa sustainability Advisors; ii. One (1) SKA stations was identified to be located within 40km away from the proposed prospecting area; iii. Based on distance to the nearest SKA stations and information currently available on prospecting activities, the proposed location poses a very high risk of detrimental impact on the SKA telescope receiver; iv. iv. Any transmitter to be established, or have been established, at the site for the purposes of voice and data communication will be required to comply with the relevant AGA regulations	continue to engage with SARAO to ensure that the mining equipment does not result in an unacceptable risk to the activities of the SKA Project. The requested detailed EMI and RFI assessment will be undertaken as part of the design process and this will be discussed with SARAO. Please note that the application is for a mining right and not for a prospecting right.

			concerning the restriction and use of the radio frequency spectrum that applies in the area concerned; v. As a result of the very high risk associated with the prospecting activities near Prieska and Carnarvon, the SKA project office recommends a detailed EMI and RFI assessment or measurement to determine the level of interference and mitigation measures to reduce the risk of detrimental impact to an applicable level; vi. The South African SKA Project Office would like to be kept informed of progress with this project, and reserves the right to conduct risk assessments at a later stage. Until such studies are conducted and the control plan is developed to implement necessary measures to reduce the interference levels, SARAO does not support this prospecting application. High level assessment is attached in annexure A.	
		12 June 2018 via e-mail	A high-level risk assessment was conducted for the above-mentioned mining project. The high-level risk assessment was based on the distance to the nearest SKA station and information currently available relating to possible sources of interference. The results of the assessment show that the mining project posed a medium to high detrimental risk to the SKA radio telescope project. SARAO communicated these results to the ABS Africa in a letter dated 13 February 2018. The letter proposed that an Electromagnetic Interference (EMI) study be conducted in order to scientifically validate the impact mining	The special conditions have been noted and included in the relevant sections of the EIR and EMPr.

			project could have on the SKA radio telescope, and also to assist with setting up the required mitigation measures that meet SKA radio emission requirements. During a meeting that was held on the 25 January 2018 between mining project developer, SARAO, Astronomy Management Authority (AMA) and ABS Africa. The mining project developer has in principal committed themselves to conducting the required studies in consultation with SARAO/AMA and to put in place the required mitigation. EMI/RFI studies need to be conducted prior to construction taking place as to inform the detail design of the facility. Although SARAO/AMA have continued to engage with the developer regarding the potential impact this development could have on the SKA radio telescope project. The information currently available is extremely limited to accurately determine the impact of this project could have on the SKA telescope, given the fact that detailed information relating to the detail design is likely to be only available post environmental authorization. In light of the fact that the information that is required would only be available post authorization. If this mining project is to be granted an environmental authorization by the competent authority, the SARAO/AMA recommends that the following special conditions should be include in the Environmental Authorization:	

			• During the detailed design of the facility, the holder of the EA must in consultation with the SARAO/AMA conduct appropriate EMI and RFI studies in order to evaluate the impact the mining project could have on the SKA radio telescope • The EMI/RFI reports together with an appropriate EMC control plans must be submitted to the AMA/SARAO for approval, prior to construction. Proof of SARAO/AMA approval of the EMC control plans must be submitted to the competent authority at least 30 days prior to commencement of con-struction activities • Construction on site may not commence until all the required studies and EMC control plans are ap-proved by SARAO/AMA SARAO/AMA would object to the issuing of an environmental authorization for the mining project if the above mentioned special conditions are not included.	
Department of Water and Sanitation		1 February 2018 Via email	As mentioned in the draft scoping report the department takes note that the proposed activity will include: 1. The establishment of mining operations on Portion 0 of the farm Smous Pan 105, Portion 1 of the Farm Klipgats Pan 117, Portion 1, 25 and 26 of the farm Vogelspruit 104 and Portion 0 of the farm Slimes Dam 154. 2. The establishment of various ore processing and support infrastructure on the property.	The Mining Right Area for the present Repli Trading application has, since the release of the initial Scoping Report, been revised and is now limited to Portion 25 and 26 of the Farm Vogelstruisbult 104 and Portion 0 of the Farm Slimes Dam. Placement of mining-related infrastructure on Portion 1 of Vogelstruisbult 104 is also under consideration. Future phases of mining may include surrounding properties but these will be applied for at a later stage. Please refer to the revised Scoping Report for further information.

			3. The requirement for reliable water supply for the various activities that form part of the mining process.	
Department of Water and Sanitation		1 February 2018 Via email	Please note that our department rates all perennial and non-perennial rivers together with all dry river beds and natural drainage and associated riparian areas extremely sensitive to development. An option of developing furthers away from all water course would be the preferred option.	An environmental sensitivity plan for the Project has been compiled and is described in Section 8 of the Scoping Report. The plan includes, among others, all watercourses, including perennial and non-perennial rivers and wetlands. Legislated buffer zones (such as the 1:100 flood line and/or horizontal distance of 100 m from watercourses and 500 m from wetlands) has been included. Wherever practicable, the design engineers have located all proposed Project infrastructure outside of the buffer zones. The map showing the identified sensitive features and the respective buffer zones is presented in Appendix 3 of the Scoping Report
Department of Water and Sanitation		1 February 2018 Via email	Please note that no development should be done within 100 m or 1:100 year flood line of any water course and 500 m of wetlands without authorisation from our Department. The water courses should be delineated in order to provide appropriate buffer to maintain such water course. The delineation should be done according to the appropriate Department of Water and Sanitation's delineation document.	Wherever practicable, all proposed Project infrastructure has been located outside of the legislated buffer zones.
Department of Water and Sanitation		1 February 2018 Via email	The construction camp shall not be located within the 1:100 year flood line or within 100 meters whatever is the greatest from any watercourse. Operation and storage of equipment within the riparian zone must be limited as far as possible.	Wherever practicable, all proposed Project infrastructure has been located outside of the legislated buffer zones.
Department of Water and Sanitation		1 February 2018 Via email	Vehicles and other machinery must be services well above the 1:100 year flood line or within a	Wherever practicable, all proposed Project infrastructure has been located outside of the legislated buffer zones.

			horizontal distance of 100 meters from any watercourse or estuary.	
Department of Water and Sanitation		1 February 2018 Via email	Oils and other potential pollutants must be disposed of at an appropriate licensed site, with the necessary agreement from the owner of such a site.	All waste is proposed to be managed in accordance with the waste management hierarchy. Further information will be provided in the EIR and EMPr.
Department of Water and Sanitation		1 February 2018 Via email	Any storm water must be diverted from the construction works and roads and must be in such a manner as to disperse runoff and prevent the concentration of storm water flow. Where necessary, works must be constructed to attenuate the velocity of storm water discharge and to protect the banks of the watercourse. Storm water control works must be constructed, operated and maintained in a sustainable manner throughout the project. Increased runoff due to vegetation clearance and /or soil compaction must be managed and steps must be taken to ensure that storm water does not lead to bank instability and excessive levels of silt entering the watercourse. Storm water leaving the construction site must in no way be contaminated by any substance, whether such substance is solid, liquid, vapour or gas or a combination thereof which is produced, used, stored, dumped or spilled on the premises.	The required control measures will be considered in the design of all storm water infrastructure required for the Project as well as in the EMPr.
Department of Water and Sanitation		1 February 2018 Via email	As stated in the basic assessment, vegetation must be monitored an management on and on-going basis during the operation of the power lines. Alien vegetation must not be allowed to further colonise the area, and all new alien vegetation recruitment must be eradicated or	A Scoping and EIR Process is being undertaken for the Project, not a Basic Assessment. No listed activities from the EIA Regulations, 2014 involving power line infrastructure is required for the Project. Control of Alien and Invasive Plants will be included in the EMPr.

			controlled, using standard methods approved by the Department.	
Department of Water and Sanitation		1 February 2018 Via email	A detailed layout plan needs to be submitted to our department showing all the facilities in the proposed development, distance from the any watercourse and bathroom facilities. Details of the finals design must also be supplied as soon as a decision has been made, as the details of this factor may influence the environmental impact both during the construction and operational phase of the project.	This information is provided in Section 6 and Figure 5-2 of the Scoping Report. Updated design details will be made available as the engineering design progresses.
Department of Water and Sanitation		1 February 2018 Via email	Details of the actual construction method must be stated as soon as possible, as it may significantly impact on the type and quantity of the construction waste and impact on the water resources.	This information is provided in Section 6 and Figure 5-2 of the Scoping Report.
Department of Water and Sanitation		1 February 2018 Via email	Material with pollution generating potential must be limited in any construction activities. Any hazardous substances must be handled according to the relevant legislation relating to transport, storage and use of substance.	Requirement noted. Controls for the handling, storage and disposal of hazardous substances will be addressed in the EMPr.
Department of Water and Sanitation		1 February 2018 Via email	Any spillage of hazardous materials including diesel that may occur during construction and operation must be reported immediately to our department.	Requirement noted. Controls for the handling, storage and disposal of hazardous substances will be addressed in the EMPr.
Department of Water and Sanitation		1 February 2018 Via email	Please be informed that construction water may not be obtained from any water resource without the necessary authorisation.	Requirement noted. Repli Trading is submitting an Integrated Water Use Licence Application for all water uses pertaining to the proposed mining activities.
Department of Water and Sanitation		1 February 2018 Via email	Enviro bins and Enviro loose/mobile toilets must be there and enough for the people on site during construction. A letter of consent from a registered waste facility to allow contractor to empty the toilet facility at their	Requirement noted. Controls for the waste management will be addressed in the EMPr.

			sewer system should be submitted to our department.	
Department of Water and Sanitation		1 February 2018 Via email	All sewage, grey and wash water, as well as any waste generated during the construction phase of the facilities will be collected, contained and disposed of at the permitted and / or licensed facilities of the Local Authority and this must please be confirmed in writing by the local authority.	Requirement noted. Controls for the waste management will be addressed in the EMPr.
Department of Water and Sanitation		1 February 2018 Via email	Soils that have become compacted through the activities of the development must be loosened to an appropriate depth to allow seed germination. The necessary erosion prevention mechanisms must be employed to ensure the sustainability of all structures and activities and to prevent in-stream sedimentation.	Requirement noted. Controls for the rehabilitation will be addressed in the EMPr.
Department of Water and Sanitation		1 February 2018 Via email	The department noted that the intention to source water from local municipalities. Please provide proof of such agreements to the department prior to commencement.	Requirement noted. It is recommended that this should be included as a condition of the WUL, should it be granted.
Department of Water and Sanitation		1 February 2018 Via email	Rubbish bins and enviro loose/mobile toilets must be there and enough for the people on site during construction. A letter of consent from a registered waste facility to allow contractor to empty the toilet facility at their sewer system should be submitted to our department.	Requirement noted. It is recommended that this should be included as a condition of the WUL, should it be granted.
Department of Water and Sanitation		1 February 2018 Via email	All sewerage, grey and wash water, as well as any waste generated during the construction phase of the facilities will be collected, contained and disposed of at the permitted and/or licensed facilities of the local authority and this must please be confirmed in writing by the local authority.	Construction-phase sewerage is intended to be managed through a combination of chemical toilets and french drains. It is recommended that the requirement for a letter from the local authority be included as a condition of the WUL, should it be granted.

Department of Water and Sanitation		1 February 2018 Via email	Soils that have become compacted through the activities of the development must be loosened to an appropriate depth to allow seed germination. The necessary erosion prevention mechanisms must be employed to ensure the sustainability of all structures and activities and to prevent in stream sedimentation.	Requirements noted. These will be incorporated into the Closure Plan required to be developed as part of the EIA Process.
Department of Water and Sanitation		1 February 2018 Via email	The department notes that the proposed project will form part of an existing application for water use authorisation for prospecting activities. Please take note that a water use authorisation application will need to be submitted to the department in order to process authorisation for the mining phase.	Repli Trading is submitting an Integrated Water Use Licence Application for all water uses pertaining to the proposed mining activities.
Department of Water and Sanitation		1 February 2018 Via email	Should the above issues be considered and all the requested documentation be submitted, the Department of water and Sanitation has no objection to the proposed development.	Comment noted.
Nicole Abrahams SANRAL		5 February 2018 via email	The South African National Roads Agency SOC Limited (SANRAL) has received an initial notification of your project and would hereby like to request a locality plan one where the nearest national road reflects. We need to determine whether we will be impacted by your proposed project.	An e-mail with the requested locality map was sent on 5 February 2018.
Norman Papenfus Transnet SOC Limited		6 March 2018 via email	This office has no objection to the proposal in principal. From the information provided (see GIS extract below), only Portion 1 of Vogelstruis-Bult No. 104 may affected depending on mining/prospecting proximity. We hereby wish to draw your attention to Section 48 (1) of the Minerals And Petroleum Resources Development Act, 2002 which stipulates as follow:	An environmental sensitivity plan for the Project has been compiled and is described in Section 8 of the Scoping Report. The plan includes the legislated distances for development in relation to railways. No mining or proposed Project infrastructure is within the legislated distances.

			"48. (1) Subject to section 20 of the National Parks Act, 1976 (Act No. 57 of 1976), and subsection (2), no reconnaissance permission, prospecting right, mining right or mining permit may be issued in respect of— (a) land comprising a residential area; (b) any public road, railway or cemetery; (c) any land being used for public or government purposes or reserved in terms of any other law; or (d) areas identified by the Minister by notice in the Gazette in terms of section 49." Please note that under no circumstances will or do Transnet Limited permit, grant permission or consent to any prospecting or mining activities on its properties. As far as the adjacent properties to the railway line is concerned, your attention is drawn to Regulation 17 (6) (a) of the Mine Health and Safety Act, 1996 which determines that no mining operations may be carried out under or within a horizontal distance of 100 metres from buildings, roads, railways, reserves etcetera.	
Communities	**X**			
There are no communities within or immediately adjacent to the Mining Right Application Area. Residents of the nearest town, Copperton, were notified through the site and newspaper notices and a hard copy of the Scoping Report was placed at the Alkantpan Lodge in Copperton.				
Department of Land Affairs	**X**			
Kgotso Moeketsi Provincial Head: NC Department of Agriculture, Land Reform and Rural Development		No comments received.		

Traditional Leaders	**N/A**			
There is no traditional leadership structure applicable to the Mining Right Application Area.				
Department of Environmental Affairs	**X**			
Thulani Mthonbeni Dineo Kgosi NC Department of Environmental Affairs and Nature Conservation		No comments received		
Other Competent Authorities Affected	**N/A**			
No other competent authorities affected identified to date.				
Other Affected Parties	**N/A**			
No other affected parties identified to date.				
Interested Parties	**X**			
Simon Botha		19 January 2018 via email	I herewith request to be registered as an interested and affected party (I&AP) for the environmental authorisation process currently underway for the Prieska Copper Mines development. I am also submitting a request for a copy of the Scoping Report.	Simon Botha has been added to the I&AP Database. The project announcement letter provides information with regards to the Project and how to access and send comments on the Draft Scoping Report.
Simon Botha		13 February 2018 via email	Its noted that no development planning guidelines or objectives have been defined for Copperton or the Mining Right Application surface area. Also, no local or regional plans have been proposed for Copperton. As the Spatial Development Framework (2006)(SDF) of the Siyathemba Local Municipality (SLM) is no longer in use to guide development planning, as per the Integrated Development Plan (IDP) of 2017-2018, means no framework	A Steering Committee has been established between Repli Trading and the Office of the Mayor to manage collaborations on community and social investment initiatives. The specific request for consideration to be given to Repli Trading assisting with the development of an SDF has been forwarded to Repli Trading for discussion in the SteerCom.

			exist to guide development planning in the municipality's area. Are there plans considered by the Repli Trading (the Applicant) to assist the municipality in this regard as part of the Social and Labour Plan (S&LP) interventions to be commissioned for the mining development? Will the draft S&LP and Memorandum of Agreement (MoA) signed between Orion Minerals NL be made available to interested and affected parties (I&APs) for inputs and information respectively	A copy of the Draft SLP and MOA will be included in the EIR.
Simon Botha		13 February 2018 via email	The applicant must be cognisant of the fact that the SLM has historically and still experience a net outflow of skill to larger centres in the Northern Cape Province (NCP) and to other provinces. It is noted that its projected that approximately 450 jobs will be created by the proposed development. Considering that very few to no major large-scale labour absorbing and sustainable economic activities have been undertaken since the closure of the Prieska Copper Mines (PCM) in 1991, what effort will be made to ensure that the employment of persons from the local community will be prioritised, and persons from the local community who work in other areas of the province and the country is lured back to the area? The reported high rate of youth unemployment (30.2%) is particularly noteworthy.	The need for employment in the Prieska region is recognised. Employment will be discussed in more detail in the Draft SLP which will be included as an attachment to the EIR.
Simon Botha		13 February 2018 via email	It is noted that a Social Impact Assessment (SIA) will be commissioned for the proposed development. Will a detailed assessment of the existing available skills base of the community in the area of the SLM be made, to understand skills available in the project area, that can be	The assessment of the available skills base and identification of labour sending areas is included within the scope of the SLP, a draft of which will be made available to all I&APs in the EIR.

			absorbed by the proposed operation. Which labour sending areas are considered for inclusion in the S&LP.	
Simon Botha		13 February 2018 via email	Can the Water Services Development Plan (2017) and Local Economic Development Strategy (2012) of the SLM be made available to I&APs.	These documents are available online as follows: Water Services Development Pan (2017) http://www.siyathemba.gov.za/index.php/documents-2/doc_download/413-siyathemba-nc077-final-idp-2015-2016 Local Economic Development Strategy (2012) http://www.siyathemba.gov.za/index.php/led-mainmenu-30/doc_download/408-siyathemba-nco77-led-strategy
Simon Botha		13 February 2018 via email	The DSR indicates that a public meeting will only be held on request. May I request that a public meeting be held for the community given the fact that the major part of the community, especially the older members of the community, is not conversant in English, but most speak Afrikaans followed by Xhosa as confirmed in the DSR.	The request for a public meeting based on the dominant language preference in the area is understood. If there is sufficient interest in a public meeting, it is proposed that this be arranged later in the EIA Process, once additional information is available to be shared. At this stage, only one request for a public meeting has been received. Specific measures to ensure that the public participation process has been structured in a manner that allows for inclusive participation by the community include: • To date, all project announcements, including letters, site notices and newspaper advertisements have been made available in both English and Afrikaans. • In addition to the placement of notices at the site, notices have also been placed at selected publicly accessible areas in Prieska, Niekerkshoop and Marydale.

				• Telephonic and written comments in English and Afrikaans have been accepted and responded to in the same language. • On phoning the public participation office, I&APs are able to request to speak to either an Afrikaans or English-speaking person to ask questions or record their comments. • To assist with access to the document for persons who do not have Internet access, hard copies of the Scoping Report and Comment Registers have been made available at two locations in Prieska, one location in Copperton and one location both in Marydale and Niekerkshoop. In addition to the above measures, it is useful to note that the Applicant held a public meeting in the town hall during 2017 and continue to engage with the Prieska community through various engagement forums. The Applicant has also established a walk-in office in Prieska at which any person is able to make queries in Afrikaans or English regarding any aspect of the Project, as well as to register their business or themselves for employment opportunities.
Simon Botha		13 February 2018 via email	Notwithstanding the fact that the DSR reports that the significantly lower death rate of the SLM is because of the lower HIV/Aids prevalence rate recorded for the municipality. The DSR reports that HIV/Aids prevalence rates have been expanding faster in the SLM in comparison to the national rate. Have any initiatives been considered for the area to assist in lowering the current expansion observed HIV/Aids prevalence rates?	The impact which the Project may have on HIV/Aids in the area will be considered as part of the SIA and measures to mitigate this impact will be proposed and possibly implemented through the SLP. These could include an HIV/AIDS awareness programme addressing factual health issues as well as behaviour change.

Simon Botha		13 February 2018 via email	It is notes that the municipality requested funding for the construction of 364 houses. It is proposed that, should the applicant approve the funding of the municipal housing construction, the funding must be subjected to clear conditions. Conditions proposed to be considered by the applicant are: fair and transparent housing allocation to eradicate the housing backlog, quality of building materials used and workmanship and the applicant's right of involvement to monitor the value delivered.	This comment has been forwarded to Repli Trading for discussion in the Steering Committee established between Repli Trading and the Office of the Mayor to manage collaborations on community and social investment initiatives.
Simon Botha		13 February 2018 via email	Clarity in terms of the applicant's provision of accommodation for its employees must be clarified. In the absence of an SDF for Copperton and the MRA area, it is proposed that the Department of Mineral Resources' (DMR's) requirements with respect to mining settlements be taken into consideration. It is proposed that accommodation of employees in the town of Prieska be prioritised, given the fact that the opportunity to construct accommodation/housing for employees of the historical PCML operation in Prieska, could not be successfully achieved in the past, notwithstanding the fact that Prieska was preferred at the time. The existing amenities and infrastructure, and opportunity to ensure that a well-defined SDF can be put in place, to guide planning and future development efforts, highlights the Prieska as the preferred location to construct employee accommodation.	Prieska is the preferred location for employee accommodation. The details with regards to this accommodation are however still being determined through the feasibility study. Further information on the housing of construction and operational phase personnel will be provided in the EIR.
Simon Botha		13 February 2018 via email	The fact that the SLM has no fire fighting capacity or a disaster management plan for its area of jurisdiction, is very concerning.	Comment noted.

Simon Botha		13 February 2018 via email	The preliminary projected contribution of R 216 million/annum to the current projected Gross Geographic Product (GGP) of the SLM of R 1.3 billion is very encouraging and highlights the significance and strategic significance of the proposed development. This is very important for the project area given the fact that current available information for the SLM shows that two thirds of the local working population has no formal jobs.	Comment noted.
Simon Botha		13 February 2018 via email	Given the projected mining life of 11 years, what efforts will be made by the applicant to extent the mining life of the proposed development and encourage secondary and tertiary sector opportunities. What will the contribution of the satellite opportunities extend the life of mine projections and my how many years? Are any other opportunities beyond the currently assessed prospecting opportunities considered for the future?	This application for a Mining Right is centred around the remaining underground deposit and related remaining surface deposit at the historical Prieska Copper Mine. There is a good understanding of the extent and economic viability of these deposits. Significant additional work needs to be undertaken to determine the extent and viability of the mineable resource at the other prospecting areas which Repli Trading has an interest in. It is the intention to investigate these satellite deposits while mining of the deposits at the historical Prieska Copper Mine proceeds. The intention is to increase the LOM as far as possible.
Simon Botha		13 February 2018 via email	Will the information pertaining to the MRA, as required by the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)(MPRDA), be made available to the I&APs?	Information which is not confidential to Repli Trading can be made available.
Simon Botha		13 February 2018 via email	As discussed, please find below the contact details for the black business forum in Prieska.	Thank you for these details. We have added the black business forum to the I&AP Database and they will henceforth receive all correspondence regarding the EIA Process.
Piet Papier		1 February 2018 via telephonic discussion	Requested to be registered as an I&AP for the proposed Prieska Project.	A stakeholder letter and confirmation email was sent on 2 February 2018.

Edward Dwyer		13 February 2018 via email	Concerned over safety and the upkeep of the road	Comment noted. This will be assessed as part of the EIA.
Royston Fillis		16 February 2018 via telephonic discussion	To whom should employment enquires be made?	ABS Africa is the appointed independent environmental assessment practitioner responsible for undertaking the environmental authorisation process for the proposed mining activities near Copperton. We cannot unfortunately advise on any possible employment opportunities associated with the mine. Orion Minerals has however opened an office in Prieska, within the GWK Filling Station Complex, where employment enquiries may be made. Ms. Fanie, copied herein, will also be able to assist you further in this regard.
Wynand Human		17 February 2018	**Original Comment as Received** 1. Kommer bestaan oor pad R357. Pad word swak onderhou en toename in verkeer sal gevolg hê dat dit totaal sal verval. 2. Plaasaanvalle is aan die orde van die dag en die inbring van honderde vreemde mense hou n veiligheidsrisiko in. 3. Oopgroef myne hou n gesondheids risiko in weens die generering van stog. **ABS Africa Translation to English** 1. Worried over road R357. Road is poorly maintained and traffic	Dankie vir u registrasie en kommentaar. Dit word genoteer en sal ondersoek word as deel van die impak studie fase. Thank you for your registration and comments. This is noted and will be investigated as part of the impact study phase.

			increases will result in a further decline. 2. Farm attacks are a main concern. The introduction of hundreds of strangers increases a safety risk. 3. Open-cast mines pose a health risk due to the generation of dust.	
Anoreas Frank July		15 February 2018 via comments sheet	We really hope that the company considers local involvement, and radical community employment strategy and empowerment. Also, BMME empowerment.	The need for employment in the Prieska region is recognised. Employment will be discussed in more detail in the SLP which will be included as an attachment to the EIR.
George Msebenzi		12 February 2018 via comments sheet	The service was excellent, thoroughly explained all details. Kind and very patient towards me.	Comment noted.
Reginald Mkosana		13 February 2018 via comments sheet	To employ local community members at the Orion mine, would be a good opportunity to the members. Projects and bursaries to students must be of great concern.	The need for employment in the Prieska region is recognised. Employment will be discussed in more detail in the SLP which will be included as an attachment to the EIR.
Teresa Pietbooi		14 February 2018 via comments sheet	My biggest wish is that Orion mining must give work to our unemployed youth.	The need for employment in the Prieska region is recognised. Employment will be discussed in more detail in the SLP which will be included as an attachment to the EIR.
Corné van der Westhuizen juwi Renewable Energies		16 January 2018 via email	Please send reports for the Repli Trading Mining project either via email or dropbox. The provided link for document download is identified as an unsafe site and thus blocked by our IT security software.	The ABS-Africa domain is safe to access. Our service provider has suggested that security access problems may be due to a security setting on the side of those accessing the website. The documents have been made available to you via Dropbox: https://www.dropbox.com/l/scl/AADhFhji8sSyU9Wy41vR9hnWaVY4bYP8C-c
Justina de Jager		13 February 2018 via email	**Original Comment as Received** Die plase Grootpan 101, gedeelte 1 en 3 grens aan die R357 wat vir die vervoer van koper en sink gebruik gaan word. Hierdie het n negatiewe uitwerking op die boerdery aktiwiteite deurdat:	Dit word noteer dat die plaas Grootpan 101 deel is van die plaas Drielingspan. Laasgenoemde is ongeveer 14 km van die beoogde myngebied geleë. Die kommer rakende die myn se gebruik van die R357 en die impak daarvan op

			• Kriminele bedrywighede kan toeneem as gevolg van verhoogde padvervoe en groot invloei van werkers op die myn; • Veiligheid van plaas bewoners kom in gedrang. • Veediefstal en onwettige jag, wat reeds n probleem is sal verder verhoog; Verhoging van padvervoer sal die R357 onveilig maak. **ABS Africa Translation to English** The farms Grootpan 101, Portions 1 and 3 border the R357 which will be used for the transport of copper and zinc. This has a negative impact on farming activities by: • Criminal activities may increase as a result of increased road transport and large inflow of workers on the mine; • Safety of farm residents is in jeopardy. • Veal theft and illegal hunting, which is already a problem, will increase further; Increased road transport will make the R357 unsafe.	boerderyaktiwiteite word opgemerk en sal verder in die Omgewings Impak Proses oorweeg word. It is noted that the farm Grootpan 101 is part of the Farm Drielingspan. The latter is situated approximately 14 km from the intended mining area. The concerns regarding the mine's use of the R357 and the impact this may have on farming activities are noted and will be further considered in the EIA Process.
Aletta de Jager		13 February 2018 via email	**Original Comment as Received** Die plaas Drielingspan, eiendom van Mev. A de Jager, grens aan die R357 wat vir die vervoer van koper en sink gebruik gaan word. Hierdie het n negatiewe uitwerking op die boerdery aktiwiteite deurdat: • Kriminele bedrywighede kan toeneem as gevolg van verhoogde	Dit word noteer dat die plaas Grootpan 101 deel is van die plaas Drielingspan. Laasgenoemde is ongeveer 14 km van die beoogde myngebied geleë. Die kommer rakende die myn se gebruik van die R357 en die impak daarvan op boerderyaktiwiteite word opgemerk en sal verder in die OIB-Proses oorweeg word.

			padvervoe en groot invloei van werkers op die myn; • Veiligheid van plaas bewoners kom in gedrang. • Veediefstal en onwettige jag, wat reeds n problem is sal verder verhoog; Verhoging van padvervoer sal die R357 onveilig maak. **ABS Africa Translation to English** The farm Drielingspan, owned by Mrs. A de Jager, borders the R357 to be used for the transport of copper and zinc. This has a negative impact on farming activities by: • Criminal activities may increase as a result of increased road transport and large inflow of workers on the mine; • Safety of farm residents is in jeopardy. • Veal theft and illegal hunting, which is already a problem, will increase further; Increased road transport will make the R357 unsafe.	It is noted that the farm Drielingspan is situated approximately 14 km from the intended mining area. The concerns regarding the mine's use of the R357 and the impact this may have on farming activities are noted and will be further considered in the EIA Process.
Sandra de Jager		13 February 2018 via email	**Original Comment as Received** Die Plaas Uitzicht (69) grens aan die R357 wat vir die vervoer van koper en sink gebruik gaan word. Hierdie het n negatiewe uitwerking op die boerdery aktiwiteite deurdat: • Kriminele bedrywighede kan toeneem as gevolg van verhoogde padvervoe en groot invloei van werkers op die myn;	Daar word opgemerk dat die plaas Uitzicht ongeveer 24 km van die beoogde myngebied geleë is. Die moontlike negatiewe impakte word aangeteken en sal in die OIB-proses oorweeg word.

			• Veiligheid van plaas werkers kom in gedrang. • Veediefstal en onwettige jag, wat reeds n problem is sal verder verhoog; Verhoging van padvervoer sal die R357 onveilig maak. **ABS Africa Translation to English** The farm Uitzicht (69) borders the R357 to be used for the transport of copper and zinc. This has a negative impact on farming activities by: • Criminal activities may increase as a result of increased road transport and large inflow of workers on the mine; • Safety of farm residents is in jeopardy. • Veal theft and illegal hunting, which is already a problem, will increase further; Increased road transport will make the R357 unsafe.	It is noted that the farm Uitzicht is situated approximately 24 km from the intended mining area. The possible negative impacts are noted and will be considered in the EIA Process.
David Dean Mainstream Renewable Power		21 January 2018 via email	I would like to register as and I & AP on the Copperton Zinc Mining Project. Please use my details listed below.	David Dean has been added to the I&AP Database. The project announcement letter provides information with regards to the Project and how to access and send comments on the Draft Scoping Report.
Johannes Human		7 May 2018 via email	**Original Comment as Received** Die brief is names Agri Prieska en ons wil die volgene twee punte stel vir kommentaar:	1. Kennis word geneem rakende die kommer oor die kwaliteit van water deur myn werke en die impak van ontwatering op die beskikbaarheid

			Punte is soos volg: 1. Hoe die myn en mynbedrywighede die grondwater gaan beinvloed? Indien grondwater opdroog in die omgewing moet die myn die betrokke plase van water voorsien. 2. Die rehabilitasie na die tyd moet ordelik en goed geskied. Die betrokke boerevereenigings en Agri Prieska moet n sê kry oor hoe die rehabilitasie fonds aangewend moet word. **ABS Africa Translation to English** The letter is on behalf of Agri Prieska and we want to add two points for comment. Points are as follows: 1. How the mining and mining activities will affect groundwater? If groundwater dries up in the area, the mine must provide the relevant farms with water. 2. The rehabilitation must be done properly. The relevant farmers' associations and Agri Prieska must have a say about how the rehabilitation fund should be used.	van water. 'n Hidrogeologiese spesialis studie word onderneem as deel van die OIS. Die studie sal die impak op water kwaliteit en hoeelheid evalueer tydens alle fases van die voorgestelde projek. 2. Rehabilitasie van die mynbedrywighede sal aangespreek word as deel van die myn Sluiting Plan en sal aan alle B&GP'e vir oorsig en kommentaar beskikbaar gemaak word 1. The concern regarding the quality of water in the underground workings and the impact of dewatering on the availability of water is noted. A geohydrological specialist study is being undertaken as part of the EIA. The scope of this study includes the assessment of the impact of the proposed mining activities, throughout all development phases of the mine on both water quality and water quantity. 2. Rehabilitation of the mining activities will be addressed as part of the Closure Plan, which will be made available to all I&APs for review and comment.
Juan Kotze		9 May 2018 via email	We are specifically concerned about the effect on groundwater that mining operations may bring— in relation to potential contamination of existing water resources and groundwater	The concern regarding the quality of water in the underground workings and the impact of dewatering on the availability of water is noted. A geohydrological specialist study is being

			levels that may be affected and how that impacts on farming activities and the habitability of an already marginal region. Water is the region's most valuable resource and requires careful management. However, in principle we welcome the economic boost that successful mining operations may bring to the wider community.	undertaken as part of the EIA. The scope of this study includes the assessment of the impact of the proposed mining activities, throughout all development phases of the mine on both water quality and water quantity.
Juan Kotze		9 May 2018 via email	The proposed mining activities require a water use licence in terms of the National Water Act 36 of 1998 for a number of listed water uses. We await the Integrated Water Use Licence Application (IWULA) being prepared in parallel with the Scoping & Environmental Impact Report (S&EIR) process and shall comment on these when made available to us.	Comment noted.
Juan Kotze		9 May 2018 via email	The geohydrological specialist study to be undertaken in terms of the Environmental Impact Assessment is particular importance to us. We await the opportunity to enjoy therein and comment thereon.	Comment noted.
Juan Kotze		9 May 2018 via email	We have encouraged the local Farmers' Union to engage with the future Board of trustees of the rehabilitation fund and potentially take a seat on it, to ensure successful rehabilitation of the affected area and the responsible application of the funds set aside to do so. To this end, kindly advise as to when the Closure Plan as per the requirements of the National Environmental Management Act 107 of 1998 shall be made available for comment, and in particular the associated report describing the associated financial provisions.	Rehabilitation of the mining activities will be addressed as part of the Closure Plan, which will be made available to all I&APs for review and comment.
Juan Kotze		9 May 2018 via email	We take note that water requirements for the processing of ore shall initially make use of the dewatering of underground workings. We	It has not yet been confirmed whether the water from the underground workings will be suitable for use in the process plant. The impact of

			await with interest the scoping report's predictions as to the affect hereof on groundwater levels, as per e.g. Table 5-4 of the DSR.	dewatering on groundwater levels will be assessed in the geohydrological study.
Juan Kotze		9 May 2018 via email	The estimated 8.5 million cubic meters of seepage water that needs to be removed and the effect thereof on existing groundwater levels, needs to be fully understood. We await the results of the 11 boreholes being drilled within the surface area boundary—if elevated concentrations of sodium, chloride, sulphate, magnesium, iron and boron are already present and not suitable for use as found by the 2012 study the risks of further contamination and / or acid mine drainage are already a cause for concern.	The impact of dewatering on groundwater quality and quantity will be assessed in the geohydrological study.
Juan Kotze		9 May 2018 via email	Kindly advise when the Bankable Feasability Study (BFS) and the Environmental Management Programme (EMPr) will be available for insight and comment.	The BFS is scheduled for completion towards the end of 2018. All relevant aspects of the BFS will be included in the EIR and EMPr, which are scheduled to be available for public review in July 2018. The EIR and EMPr, and appendices thereto, will provide all the relevant information required in terms of the legislation applicable to the environmental licence applications.
Juan Kotze		9 May 2018 via email	We take note that at this stage of the S&EIR process the impact of the project's activities are still being identified. We quote from the Draft Scoping Report: **Groundwater:** *Depending on the technical solution implemented, dewatering of the underground mine workings may result in several direct and indirect impacts to the environment including water pollution, erosion, and storage of water treatment sludge. In addition, the use of explosives as well as solvents, lubricant and fuels on site are*	Comment noted.

			likely to have a significant impact on the local ground water quality, if not mitigated. The potential groundwater impact, in general, is expected to be of high significance, predominantly due to the dewatering. Mitigation will significantly reduce the impact significance. **Surface water**: *Runoff from the WRD, TSF, ore stockpiles, mine services areas and workshops are likely to contain elevated levels of contaminants and can therefore contaminate surface and ground water resources.* [our emphasis] We reserve our rights pending the results of the final report(s).	
Anonymous - as per the request of the I&AP		8 June 2018 via e-mail	While the mine was operating, some of the slime from the slimes dam washed into one of the dams. Animals will rather drink the brackish water from the crib than the water in the polluted dam.	It is understood that the comment relates to an alleged breach of the historical TSF in the 1970s, possibly because of a flood event during historical mining. In response to flood events, various mitigation measures were introduced by the mining proponent at that time, including the establishment of the berm to divert water around the mine. Reestablishment of the berm is part of the activities which Repli will undertake. The historical TSF was issued with a conditional closure certificate in 1995. A rehabilitation trust fund was established in terms of the conditions of the closure certificate. The ongoing maintenance of the historical TSF, including any investigations towards and actual remediation of any contamination arising from the facility, is being undertaken by Repli separately from the EIA in accordance with the conditions of the closure

				certificate issued for the facility. Investigation of the reported water quality concerns in the offsite dam will be included in this assessment to be undertaken by Repli.

7 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE DEVELOPMENT FOOTPRINT ALTERNATIVES

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

PCM is situated in the BWh (mild desert climate) of the Köppen Climate Classification System. Climatic conditions are characterised by warm to hot summers, high evaporation and dry warm winters, a mean annual rainfall of 198 mm and a large degree of variability in the monthly rainfall. Potential evaporation is extremely high. The temperatures are highest in January and coldest month in July.

7.1.1 MEAN ANNUAL RAINFALL

Preliminary investigation of the site hydrological characteristics by Peens & Associates (2017) indicate a Mean Annual Rainfall of 198 mm for the site. Rainfall is strongly seasonal with approximately 60% of the yearly rainfall falling in the summer months (October to January) (Table 7-1).

7.1.2 MEAN ANNUAL EVAPORATION

Regional evaporation data obtained from gauging stations operated by the Department of Water and Sanitation (DWS) was used by Peens & Associates (2017) to calculate a Mean Annual Evaporation (MAE) of 2714 mm for the area (Table 7-1).

TABLE 7-1: MEAN MONTHLY AND ANNUAL RAINFALL AND EVAPORATION

MONTH	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ANNUAL
RAINFALL													
MM	26.6	31.2	41.0	23.3	9.3	4.8	5.2	5.5	5.2	12.2	15.3	18.8	**198**
%	13.4	15.7	20.7	11.8	4.7	2.4	2.6	2.8	2.6	6.1	7.7	9.5	100
EVAPORATION													
MM	283	336	380	373	295	241	158	109	82	100	146	211	**2 714**
%	10.4	12.4	14.0	13.7	10.9	8.9	5.8	4.0	3.0	3.7	5.4	7.8	100

Source: Peens & Associates (2017)

7.1.3 TEMPERATURE

High maximum and very low minimum temperatures characterise the environment. The temperatures are highest in January with an average around 26.9°C. July is the coldest month with 9.8°C on average.

TABLE 7-2: MEAN MONTHLY AND ANNUAL TEMPERATURES

MONTH	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ANNUAL
RAINFALL													
MIN	12.1	15	17.8	19.2	18.5	16	11.3	5.9	1.5	1	3.7	7.5	**10.8**
MAX	29.2	31.3	34.1	34.6	33.8	31	26.8	22.3	18.8	18.6	21.7	25.2	**27.3**
AVE	**20.6**	**23.1**	**25.9**	**26.9**	**26.1**	**23.5**	**19**	**14.1**	**10.1**	**9.8**	**12.7**	**16.3**	

Source: South African Weather Service (Prieska Weather Station)

7.1.4 WIND SPEED AND DIRECTION

Dominant wind directions and wind speed across the site are presented in Figure 7-1. Seasonal and daytime/night-time variation in wind speeds and direction are also shown.

Wind roses comprise 16 spokes, which represent the directions from which the wind blew during a specific period. The colours used in the wind roses reflect the distinct categories of wind speeds; for example, yellow representing winds in between 1.5 and 2 m/s. The dotted circles provide information regarding the frequency of occurrence of wind speed and direction categories. The frequency with which calms occurred, i.e. periods during which the wind speed was below 1 m/s are also indicated.

Annual average wind direction is dominant from the west and west-west-south. Winds from the north, east and east-east-south are also frequent. Wind is a characteristic of the region, with calm conditions (wind speed less than 1m/s) only being present for 1.58% of the time.

There is a distinct seasonal variation between summer and winter wind direction with predominant winds in winter being from the north and north-north-west. In summer, the predominant wind direction is from the west and west-west-south with south-easterly winds also important. Autumn and spring wind direction is similar to that of winter and summer respectively.

Daytime average wind direction is from the south-west and south-east whereas night-time wind direction is predominantly from a westerly direction. Wind speeds are stronger during night-time compared with daytime conditions.

Wind direction and wind speed are important for assessing the potential impact of the mining activities on existing and proposed solar power plant installations adjacent to and surrounding the development.

7.1.5 TOPOGRAPHY

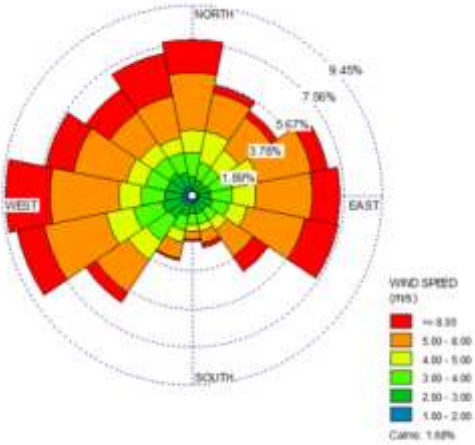
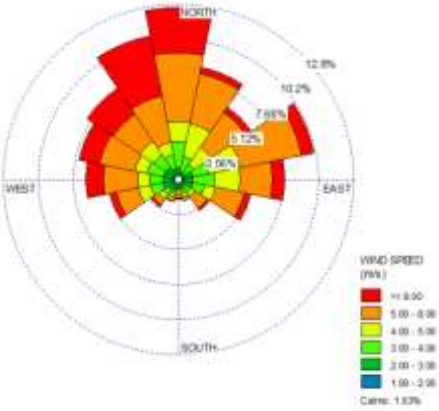
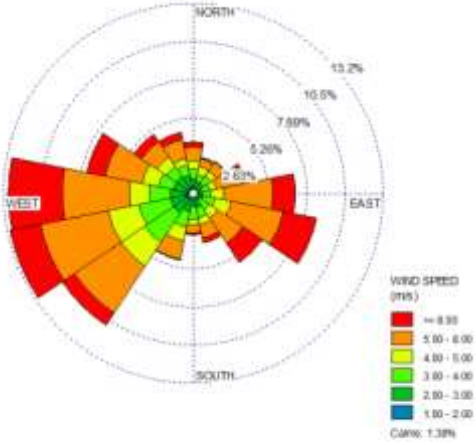
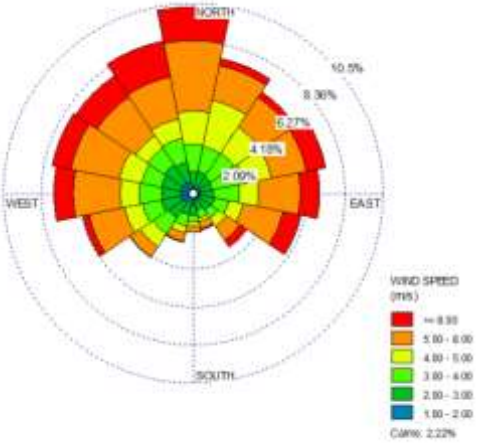
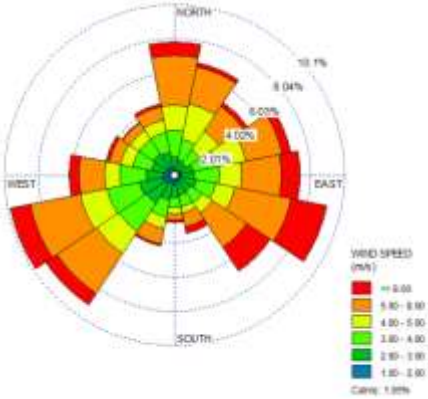
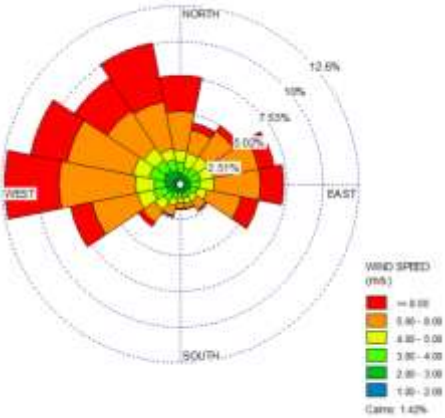
The proposed MRA surface area is flat with no significant natural physiographic features present in the area (Appendix 3 Map 3). The terrain type can be described as slightly irregular plains. Elevation across the site varies from approximately 1042 mamsl (metres above mean sea level) in the east to approximately 1118 mamsl in the west. A similar elevation gradient existing from the north to the south of the MRA surface area, with the north-north-eastern parts being higher lying and gradually declining to the south and south-west. The lowest and highest topographic features within the MRA surface area are the sinkholes and historical TSF respectively.

7.1.6 GEOLOGY

The Prieska Orebody is hosted by highly deformed metamorphic rocks of the Copperton Formation of the Areachap Group, which forms part of the Namaqualand Metamorphic Province.

The copper-zinc orebody forms part of a varied sequence of chemical sediments located at the contact between streaky to banded quartz-feldspar-hornblende gneisses and a sequence of varied banded mafic gneisses and amphibolites. Outcrops in the MRA area are sparse and most of the area is covered by thin sand and scree cover and up to 5m thick calcrete. In the southern corner of the MRA surface area tillite, mudstone and shale of the younger Dwyka Formation unconformably overly the rocks of the Copperton Formation.

Regional geology is shown in Appendix 3 Map 4.

	
Annual Average	**Winter Average**
	
Summer Average	**Autumn Average**
	
Daytime Average	**Night-time Average**

Source: MM5 Data (2014-2016)

FIGURE 7-1. AVERAGE ANNUAL WIND DIRECTION AND SPEED FOR COPPERTON

7.1.7 RADIOACTIVITY

Laboratory assay data from rock samples removed during the prospecting drilling programme show some variation in the concentration of total Uranium (U) and Thorium (Th). The average concentration of total U and total Th in the rock samples is however below the 0.5 Bq/g regulatory limit at which material is considered to be radioactive.

As part of the testwork undertaken on the tailings, a screening investigation on the U-238, U-234, U-235 and Th-232 radionuclide isotopes was undertaken to determine if the concentrations of these isotopes may be enriched during mineral processing and thus result in radioactivity levels in the tailings exceeding the 0.5 Bq/g or 500 Bq.kg-1 (nuclide specific) regulatory limit.

The results of the tests are presneted in the radiological report in Appendix 10. The results indicate that all the nuclides are significantly below the exemption level of 500 Bq.kg-1 (radionuclide specific). This means that the material associated with both samples is not considered as radioactive material *per se*.

7.1.8 SOILS AND AGRICULTURAL LAND CAPABILITY

A baseline soils and agricultural land capability survey has been undertaken for the area by Eco Soil (2017). A summary of the findings of this survey are presented below. The complete report with the baseline information and impact assessment results are provided in Appendix 10 of the EIR.

Red/yellow apedal, freely drained soils with a high base status characterise the largest part of the MRA surface area (Appendix 3 Map 5). The Ah93 soil group occupies a large percentage of land in the south of the site. The soils are shallow (less than 450 mm deep) and of low agricultural potential and have rock, weathered rock or calcrete as underlying material. Clay contents are generally less than 15 % and the soils may therefore be susceptible to wind erosion.

There is no peat or soils with a high potential agricultural value within the MRA surface area. The area can be classed in land capability class III: Soils not suitable for arable agriculture, but suitable for grazing.

Land-use of the areas surrounding the PCM site is restricted to low intensity grazing. The natural grazing capacity of the site is approximately 35-40 hectares per large stock unit. The combination of low rainfall, high potential evaporation, high maximum and low minimum temperatures, as well as low potential shallow soils limits agricultural activities.

7.1.9 TERRESTRIAL ECOLOGY

A baseline terrestrial ecology survey has been undertaken for the area by Ecorex Consulting Ecologists (2017). A summary of the findings of this survey are presented below. The complete report with the baseline information and impact assessment results are provided in Appendix 10 of the EIR.

7.1.9.1 Regional Context - National Vegetation Types

The study area is situated within the Nama-Karoo Biome. The flora of the Nama-Karoo is not as diverse and rich as the adjacent Succulent Karoo and does not contain any centres of plant endemism. Three geographically distinct bioregions are present within this biome, namely the Bushmanland, Upper Karoo and Lower Karoo. The study area is situated within the Bushmanland Bioregion at the junction of two national vegetation types, namely Bushmanland Arid Grassland (NKb3) and Bushmanland Basin Shrubland (NKb6). (Appendix 3 Map 6).

Bushmanland Arid Grassland has a conservation status of Least Threatened although only small areas are officialy conserved in Augrabies National Park and Goegap Nature Reserve. Bushmanland Basin Shrubland is not represented in any official conservation areas, but shows no sign of serious habitat transformation and has a conservation status of Least Threatened.

7.1.9.2 Local Context - Vegetation Assemblages

Three broad-scale vegetation communities have been identified within the study area, based primarily on analysis of high resolution satellite imagery. All the areas that have been cleared of natural habitat, such as buildings and the historical TSF, are classified as Modified Habitat.

7.1.9.3 Natural Habitat (Undisturbed)

A large proportion of the study area still comprises Natural Habitat that appears to be relatively undisturbed and is particularly well represented in the eastern half of the study area. This vegetation varies from open grassland to relatively dense shrubland and is likely to be representative of Bushmanland Basin Shrubland, with elements of Bushmanland Arid Grassland present. This is the vegetation assemblage in which plant species of conservation concern are most likely to be found and is the habitat that is most likely to support populations of fauna species of conservation concern.

The classification of Undisturbed Natural Habitat was refined during fieldwork to include three distinct vegetation communities or assemblages which are described in

TABLE 7-3: UNDISTURBED NATURAL HABITAT

VEGETATION COMMUNITY	DESCRIPTION	PHOTOGRAPH
Aizoaceae dwarf shrubland on calcrete plains	This vegetation community is found on plains throughout the project area, specifically where calcrete is prominent on the soil surface. It is the vegetation community that is most representative of Bushmanland Basin Shrubland in the project area. *Aizoaceae* dwarf shrubland differs from *Rhigozum* dwarf shrubland in having noticeably higher diversity of dwarf shrubs and much lower proportional grass cover.	
Rhigozum trichotomum dwarf shrubland on sandy plains	*Rhigozum* dwarf shrubland is found on the deeper, red to reddish brown sands in the project area, usually with little or no evidence of calcrete on the soil surface. While this vegetation community is still representative of Bushmanland Basin Shrubland, it contains elements of Bushmanland Arid Grassland as well, particularly the relative abundance of grass cover.	
Pans	Several circular to sub-circular ephemeral pans are found in the eastern half of the study area, as well as a few adjacent to the north-eastern boundary. None of the pans held any water during fieldwork and comprised either bare soil or heavily grazed seasonal grassland. Species richness appears to be low, but could not be assessed because of the lack of visible above-ground foliage. Most of the plant species present are likely to be habitat specialists adapted to the extremes of flooding and extended drought, justifying an elevated conservation importance for this vegetation assemblage.	

7.1.9.4 Natural Habitat (Degraded)

This vegetation assemblage refers to areas of Natural Habitat that have not been transformed by construction of infrastructure such as roads, buildings or tailings storage facilities, but have been degraded through human activity such as movement of heavy machinery or dumping of building rubble.

Alien invasive plant thickets were mapped within the Degraded Natural Habitat mapping unit. These thickets are found most often in areas that have previously been degraded or transformed, as well as around edges of pans or livestock watering points. The invasive alien tree species *Prosopis glandulosa* is the dominant, while the closely related *Prosopis velutina* is present in small numbers. Species representative of the original Natural Habitat state are usually present, particularly *Rhigozum trichotomum*, which is an indigenous invader of disturbed habitats.

This degraded Natural Habitat still contains a seedbank of the original flora and some original plant cover and has a significantly higher potential for restoration than Modified Habitat does. Most of the areas of degraded Natural Habitat are situated adjacent to Modified Habitat.

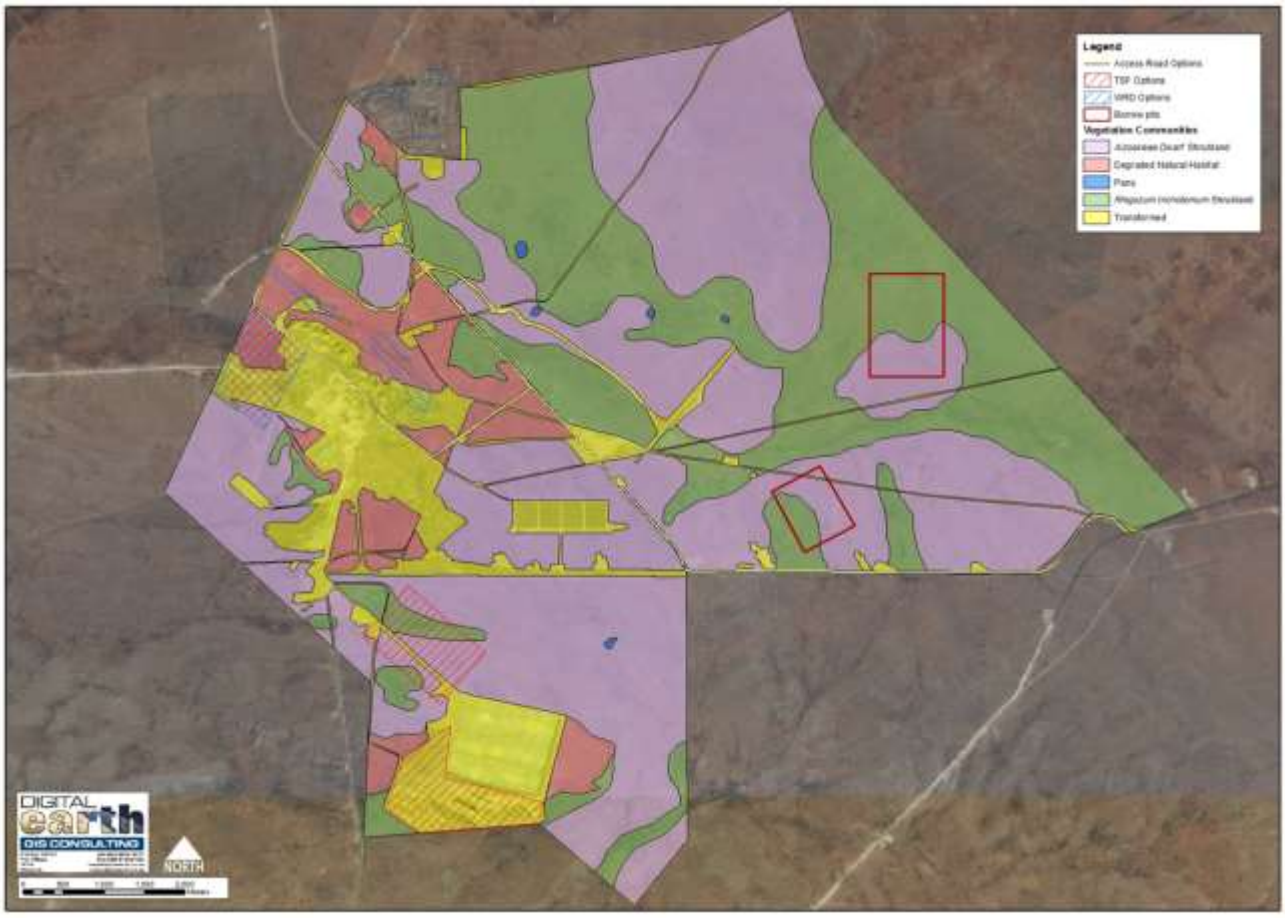


FIGURE 7-2: VEGETATION ASSOCIATIONS IN THE STUDY AREA

7.1.9.5 Species of Conservation Concern

The vast majority of the plant species occurring in the general vicinity of the study area are currently classified as either Least Concern (661 spp) or Not Evaluated (66 spp).

One species, *Listia minima*, is classified as Data Deficient (Taxonomically Problematic) and cannot be assessed until its taxonomy is resolved (Victor, 2006). The following three species of conservation concern have been confirmed to occur in the QDS:

- *Hoodia officinalis* subsp. *officinalis*;
- *Phyllobolus amabilis*; and
- *Aloidendron dichotomum* (Quiver Tree).

None of these species were located during fieldwork.

7.1.9.6 Endemic Plant Species

The Copperton study area is situated at the southern boundary of the Griqualand West Centre of Plant Endemism as defined by Frisby (2016). Five of the 26 endemic or near-endemic GWCPE species have been confirmed to occur in the general vicinity of the study area, namely *Calobota cuspidosa* (Fabaceae*), Justicia thymifolia* (Acanthaceae), *Phyllobolus amabilis* (Aizoaceae), *Putterlickia saxatilis* (Celastraceae) and *Searsia tridactyla* (Anacardiaceae).

Dedicated searches for these and other GWCPE species were conducted in the project area during summer fieldwork but none were located. However, many species were in vegetative state, some without even having leaves present, and it is possible that GWCPE endemics may have been overlooked.

7.1.9.7 Protected Plant Species

Eleven of the plant species confirmed to occur in the project area during fieldwork are protected. One species is protected under Schedule 1 of the Northern Cape Nature Conservation Act (No. 9 of 2009), namely *Hoodia gordonii*, while nine species are protected under Schedule 2 of the same act. A single species, *Boscia albitrunca*, is protected under the National Forest Act (No. 84 of 1998).

7.1.9.8 Alien Invasive Plant Species

Two tree species are of particular concern and are classified as Category 3 invasive species in the Northern Cape under the National Environmental Management: Biodiversity Act (No.10 of 2004): Alien and Invasive Species Regulations, 2014: Honey Mesquite (*Prosopis glandulosa*) and Velvet Mesquite (*P. velutina*). *Prosopis glandulosa* is relatively common in the project area and has invaded degraded areas in the vicinity of the mine and at most of the pans and livestock watering points. *Prosopis velutina* is less common and potentially a lower threat than *P. glandulosa*.

7.1.10 FAUNA

7.1.10.1 Mammals

Numerous small mammal species are endemic to the Namib-Karoo Biome, of which the following have been confirmed to occur within the general vicinity of the study area (Friedman & Daly, 2004): Western Rock Sengi (*Elephantulus rupestris*), Round-eared Elephant Shrew (*Macroscelides proboscideus*), Spectacled Dormouse (*Graphiurus ocularis*), Pygmy Rock Mouse (*Petromyscus collinus*), Brukkaros Pygmy Rock Mouse (*P. monticularis*), Bush Vlei Rat (Otomys unisulcatus), Brants's Whistling Rat (Parotomys brantsii) and Littledale's Whistling Rat (*P. littledalei*).

Two Vulnerable and five Near Threatened mammal species have been recorded in QDSs in the vicinity of the study area according to distribution maps in Friedman & Daly (2004), three of which have a moderate likelihood of occurring because of the presence of suitable habitat, and one of which was confirmed to occur. A carcass of a sub-adult Brown Hyaena (*Parahyaena brunnea*), which is classified as Near Threatened, was recovered from an old Aardvark den in the vicinity of the southern borrow pit option. This species has large home ranges and is unlikely to be confined to the project area, although it could be resident. No threatened mammals are likely to be present within the project area.

7.1.10.2 Birds

Twenty-three species are listed by Barnes (1998) as being endemic to the Namib-Karoo biome i.e. not occurring outside of the biome, of which 15 species (65%) have been recorded within the general vicinity of the study area during the current Southern African Bird Atlas Project (SABAP2).

While only four of these species were located in the project area during fieldwork, it is likely that species such as Karoo Long-billed Lark *Certhilauda subcoronata*, Sickle-winged Chat *Cercomela sinuata* and Tractrac Chat *C. tractrac* also occur. A number of near-endemics such as Rufous-eared Warbler *Malcorus pectoralis*, Namaqua Sandgrouse *Pterocles namaqua* and White-throated Canary *Crithagra albogularis* were also observed during fieldwork. Two species that are endemic to the Kalahari-Highveld biome have also been recorded in the same area, both of which were confirmed to occur during fieldwork

The study area is also situated in a designated secondary Endemic Bird Area, namely the Karoo EBA (s047) (Barnes et al., 2001). There are no Important Bird Areas within the vicinity of the study area, the closest being the Platberg-Karoo Conservancy IBA (ZA037), approximately 130 km to the east (Barnes, 1998).

The quarter-degree grids 2922 CD and 3022 AB, in which the study area falls, currently have a combined list of 158 bird species recorded during the ongoing second Southern African Bird Atlas Project (SABAP2), a total probably approaching true species diversity. However, the small size of the study area, homogenous structure of vegetation, high degree of transformation and the lack of waterbodies make it unlikely that more than 40-50 species occur within the study area.

Six Endangered (EN), five Vulnerable (VU) and five Near Threatened (NT) species have been recorded from the general vicinity of the project area during SABAP2. One of the Endangered species, Ludwig's Bustard *Neotis ludwigii*, was located during fieldwork in shrubland east of Copperton within the project area and is possibly resident in very low numbers. Two Near Threatened species were also located in the project area during fieldwork. Pairs and small groups of Double-banded Courser *Rhinoptilus africanus* were frequently seen in shrubland in the vicinity of TSF option 2 and the southern borrow pit option, while several family groups of Karoo Korhaan *Eupodotis vigorsii* were seen and heard in shrubland between Copperton and the two borrow pit sites. Karoo Korhaan is likely to be a breeding resident in the project area, while Double-banded Courser is more likely to be an irregular breeding visitor. Jenkins (2011) reported regularly active nests of Martial Eagle *Polemaetus bellicosus*, which is classified as Endangered, within 11 km south of the study area (on tower 512 of the HydraKronos 400 kV line), and within 22 km to the south-west (on tower 392 of the AriesKronos 400 kV line). Thus it is likely that this species regularly forages over the study area.

Two Vulnerable species have a moderate likelihood of occurring in the project area, based on assessment of habitat present in the project area and likelihood of occurring in proximity to disturbance, namely Lanner Falcon *Falco biarmicus* and Red Lark *Calendulauda burra*. Limited nesting habitat is present for Lanner Falcon, but it has fairly large foraging home ranges and is potentially a non-breeding visitor. Red Lark is a habitat specialist that prefers shrublands or grasslands on deep, sandy soils and is a potentially resident species in this habitat in the project area. One Near Threatened species has a moderate likelihood of occurring in the project area based on the above criteria, namely Sclater's Lark *Spizocorys sclateri*.

7.1.10.3 Herpetofauna (Reptiles and Amphibians)

The desktop study initially revealed that a total of 48 reptile species could be expected to occur within and surrounding the study area of which three species are endemic and three are considered as near-endemic (Bates et al., 2014). Only seven (15%) of these species were previously observed within the QDS of the study area (ReptileMap, 2017). Refinement of the list of expected species, based on the species and habitats observed within the study area during the field survey, decreased the number of expected reptile species to 31 (probability of occurrence either medium or high). This is mostly due to the lack of extensive rocky or ridge habitats excluding strongly rupiculous species (e.g. *Karusasaurus polyzonus*), while the lack of large tracts of sandy soils and the

complete absence of Camelthorn trees (*Vachellia erioloba*) excluded fossorial (e.g. *Acontias lineatus*) and arboreal (e.g. *Chamaeleo dilepis*) species respectively.

Reptile activity levels were very low during fieldwork, presumably due to very dry veld conditions, low humidity, cold temperatures and strong winds brought about by two consecutive cold fronts. A total of 15 reptile species (76 individuals) were observed during the survey. No species of conservation concern were observed.

For amphibians, an initial eleven species were expected to occur within and surrounding the study area of which only one species is considered endemic (Du Preez & Carruthers, 2009). A single species has been observed within the QDS of the study area (FrogMap, 2017). Refinement of the list of expected species, based on the species and habitats observed within the study area during the field survey, decreased the number of expected amphibian species to nine (probability of occurrence either medium or high). No amphibian species were observed in the project area during fieldwork. Additional fieldwork after the ephemeral pans had received some rain would have resulted in a few species being located, but fieldwork timing did not correspond with good rains.

No herpetofauna species currently designated as species of conservation concern have been observed within the focal QDS of the study area (2922CD) or the surrounding 8 QDS's. However, a single species that potentially occurs in the area is of concern and requires discussion. FrogMAP (2017) lists the Giant Bullfrog (*Pyxicephalus adspersus*) as Near Threatened (NT), while Du Preez & Carruthers (2009) list it as Vulnerable (VU) and NEMBA (2004) lists it as Protected. This species breeds in shallow temporary pans which are present within the study area and surroundings, and consequently have elevated biodiversity value. It has been classified as NT as a result of loss of its breeding habitat to urbanisation and agricultural use, as well as being particularly susceptible to collisions with vehicles on roads and is often targeted as a food source by people.

A recent observation of a skink specimen initially identified as a Thin-tailed Legless Skink (*Acontias gracilicauda*) near Postmasburg is believed to represent an undescribed species (W. Conradie [PEM] pers. comm.). No suitable habitat for this species was observed within the study area and it is therefore not expected to be influenced by the proposed development.

7.1.11 BIODIVERSITY VALUE ASSESSMENT

The Biodiversity Value (BV) of each habitat (modified and natural), determined qualitatively by integrating the Conservation Importance (CI) and Functional Importance (FI) of each community, is indicated in Table 7-4.

TABLE 7-4: BIODIVERSITY VALUE OF HABITATS

VEGETATION ASSEMBLAGES	CONSERVATION IMPORTANCE	FUNCTIONAL IMPORTANCE	BIODIVERSITY VALUE
PANS	High	High	High
***AIZOACEAE* DWARF SHRUBLAND**	Moderate	Moderate	Moderate
***RHIGOZUM TRICHOTOMUM* DWARF SHRUBLAND**	Moderate	Moderate	Moderate
NATURAL HABITAT (DEGRADED)	Low	Low	Low
MODIFIED HABITAT	Very Low	Very Low	Very Low

The Pan vegetation community was as assessed as having High BV on account of high CI score on the basis of a potential for supporting species of conservation concern as well as a high proportion of habitat specialists, and a high FI score. Both *Aizoaceae* dwarf shrubland and *Rhigozum trichotomum* dwarf shrubland were rated as having Moderate BV as a result of moderate CI and FI values.

The Pans and both shrubland vegetation communities represent the untransformed natural habitat in the project area and are key habitats in which negative impacts need to be avoided and in which no infrastructure should be placed wherever possible. The ecologically compromised state of degraded Natural Habitat has resulted in a Low BV, although it is a habitat that still has some of the original vegetation cover and has a higher potential for restoration than Modified Habitat, which has a Very Low BV.

7.1.12 SURFACE WATER

Specialist studies on hydrology [Peens & Associates (2017)] and surface water ecosystems [Enviross (2018)] have been undertaken. The complete reports with the baseline information and impact assessment results are provided in Appendix 10.

The survey area falls within the Orange (D) Primary catchment, the D5 Secondary catchment and the Lower Orange DWS water management area. It falls within the D54D quaternary catchment. The watershed associated with the survey area drains toward the Basterput se Leegte River within the adjacent catchment, which drains northwards into the Hartbees River, which then confluences with the Orange River near the town of Kakamas.

The quaternary sub-catchment's underlying geology consists of tillite, undifferentiated assemblage of compacted sedimentary extrusive and intrusive rocks as well as principally arenaceous strata. The underlying geology is covered with moderate to deep sandy soils with a medium erodibility index and an estimated annual sediment yield of 10 000 tons per annum. The entire catchment area falls with an endoreic area, which is classified as a catchment area that does not contribute to mean annual runoff. Hence, this catchment only produces runoff during major storms.

Several non-perennial rivers traverse the MRA Surface Area. (Appendix 3 Map 8). Drainage across the site is generally from east to west.

Prior to its diversion, the historic alignment of one of the non-perennial rivers passed through the area now occupied by the historical mine surface infrastructure and sinkholes. The non-perennial river is not named; however, it is a tributary of the Hartbeest River, which discharges into the Lower Orange River. This watercourse has an effective catchment area of 259 km^2 and is currently diverted to the north and south of the historical mine surface infrastructure and sinkholes. The diversion consists of an earth channel with a berm on the lower ground side of the channel.

7.1.13 SURFACE WATER ECOSYSTEMS

The specialist report with the baseline information and impact assessment results is provided in Appendix 10.

The study indicated that the region has an arid climate and therefore persistent surface water ecosystems are rare. Poorly-developed watercourses are commonplace, but defined channels are rare due to the generally low volumes of rainfall events. Most watercourses are barely perceptible and convey small volumes of water only during rainfall events, with no permanent aquatic habitat noted throughout the survey site. Watercourses are therefore thought to be limited to stormwater drainage toward more developed watercourses located further downstream of the site.

Few wetland features were observed within the area, which was expected because of the arid climate. A single naturally-occurring wetland unit that supports a surface water ecosystem was identified. The wetland / pan is outside of the proposed mine right surface area but is within 100 m of the proposed main access road to the mine. This is an existing road.

A 30 m buffer around this wetland was recommended by the specialist. Upgrading the mine access road is likely to be limited to resurfacing with no need for expansion of the road reserve.

The location of all the watercourses and the applicable buffers, namely 100 m for non-perennial rivers and 500 m for wetlands (pans), have been included in the environmental sensitivity plan. The placement of the required surface infrastructure has largely avoided these areas such that no wetland or non-perennial rivers are expected to be affected directly by the mining activities.

7.1.14 GROUNDWATER

A groundwater specialist study was undertaken by ILEH (2018). The complete report with the baseline information and impact assessment results is provided in Appendix 10.

From a geohydrological perspective three aquifers are present. The upper 15m of the geological succession comprises unconsolidated sand, calcrete and clay, which is expected to be dry except after a rainfall event. The unconsolidated sediments are underlain by a fractured gneiss aquifer, which is estimated to be approximately 100m thick. Groundwater is associated with fractures and faults. The fieldwork data suggests the transmissivity of the gneiss varies between 0,2 and 32 m2/d. The matrix of this aquifer is expected to have a low transmissivity, probably around 0,2 m2/d or lower. The average depth to groundwater in this aquifer is 18m, but it is dewatered locally around the historical PCM underground workings. This aquifer is regionally important, as it is used for private groundwater abstraction.

A lower fractured rock aquifer is present at depths greater than 100m. There is currently no information available to characterise this aquifer. The monitoring boreholes drilled during the current project extended to depths of between 80 and 150m below surface and target the upper fractured rock aquifer discussed above. Literature-based aquifer characteristics were therefore used to assess impacts associated with the deep fractured rock aquifer.

A hydrocensus was completed in order to identify and characterise private groundwater use in the vicinity of the PCM operations. A total of 32 boreholes were located. These boreholes are drilled to an average depth of 40m. Half of the boreholes identified were dry or not in use. Groundwater is solely used for stock watering and none of the boreholes identified during the hydrocensus are used for potable supply. A borehole on the farm Vogelstruisbult, situated east of the PCM mining area is reported to have a high yield, but on average the yields of boreholes identified are low.

A total of 12 groundwater monitoring boreholes were drilled around the proposed project as well as around the historical TSF. One borehole was drilled to a depth of 15 0m at the historical TSF. The remainder of the boreholes were drilled to 80 m below surface. The depth to groundwater in these boreholes varies between 6 and 35 m below surface, with an average depth of 20 m. Regionally, groundwater flows in a south-westerly direction at a gradient of 1:125. Groundwater flow patterns indicate a lowering in groundwater levels around the historical PCM mine and a mound in groundwater levels around the historical TSF.

The sparse intersection of water-bearing features in the boreholes drilled suggests that the aquifers have been dewatered to a large extent in the immediate vicinity of the mine. The information also confirms that groundwater occurrence is erratic in this arid environment.

Aquifer tests were completed on the five boreholes that intersected groundwater. The results indicate that two boreholes had yields of 4,5 l/s (150 000 lph) and 1,9 l/s (82000 lph). The yields of the remainder of the boreholes are low, on average 0,06 l/s (2500 lph). The results of the aquifer tests were also used to calculate the transmissivity and storage coefficients for the boreholes. These parameters describe the aquifer conditions intersected in each borehole. Higher transmissivity and storage coefficient values are associated with stronger aquifers.

The results indicate that the fractured rock aquifers present are heterogeneous with transmissivities varying between 0,2 and 6,2 m^2/d.

The average calculated storage coefficient from the tests is $1{,}16x10^{-3}$. These values are typical of the rock formations intersected.

The outcome of the chemical analysis of the groundwater samples taken from the hydrocensus boreholes indicate that regionally, groundwater is saline with elevated total dissolved solids, chloride and in some instances sulphate concentrations. The groundwater in private boreholes has also been contaminated with nitrates that are most probably associated with agricultural activities. Elevated selenium and uranium levels are typical for the region, but may result in chronic health risks if ingested over prolonged periods of time.

Groundwater quality in the mining area is characterised by increased sulphate and manganese concentrations. The most significant impact on groundwater quality at the PCM operations is associated with the historical TSF. Sulphate concentrations in this area exceed 2500 mg/l in two of the monitoring boreholes.

The potential sources to groundwater contamination identified from the available dataset includes the following:

- The historical TSF. Groundwater monitoring information indicates that this facility is already impacting on groundwater quality;
- The proposed new TSF. It is noted that the new TSF will be lined, thus reducing the impact on groundwater quality associated with the facility significantly;
- The underground workings; and
- The effluent dam, which will contain poor quality water pumped to surface from the underground workings. This dam will also be lined, thus significantly reducing the risk of groundwater contamination.

Contamination from these sources may reach the aquifers vertically through the unsaturated soil horizon and the weathered aquifer from surface sources of contamination like the historical TSF. Once the potential contamination reaches the fractured rock aquifer, the preferential flow paths would be the faults and fractures present. Groundwater will also flow through the rock matrix, but at much lower rates compared to the preferential pathways.

The receptors to groundwater contamination includes the following:

- Existing private groundwater users.
- Non-perennial streams near the mining area. It is however noted that these streams are dry and this impact is therefore not anticipated to be of significance.

7.1.15 AIR QUALITY

There are no ambient air quality monitoring stations near PCM. The ambient air quality in the area is however expected to be within the acceptable range of all the pollutants specified in the National Ambient Air Quality Standards, Government Notice 1210, promulgated in terms of the National Environmental Management: Air Quality Act 39 of 2004. This is attributed to the remoteness of the site and the absence of any significant atmospheric emission sources in the region.

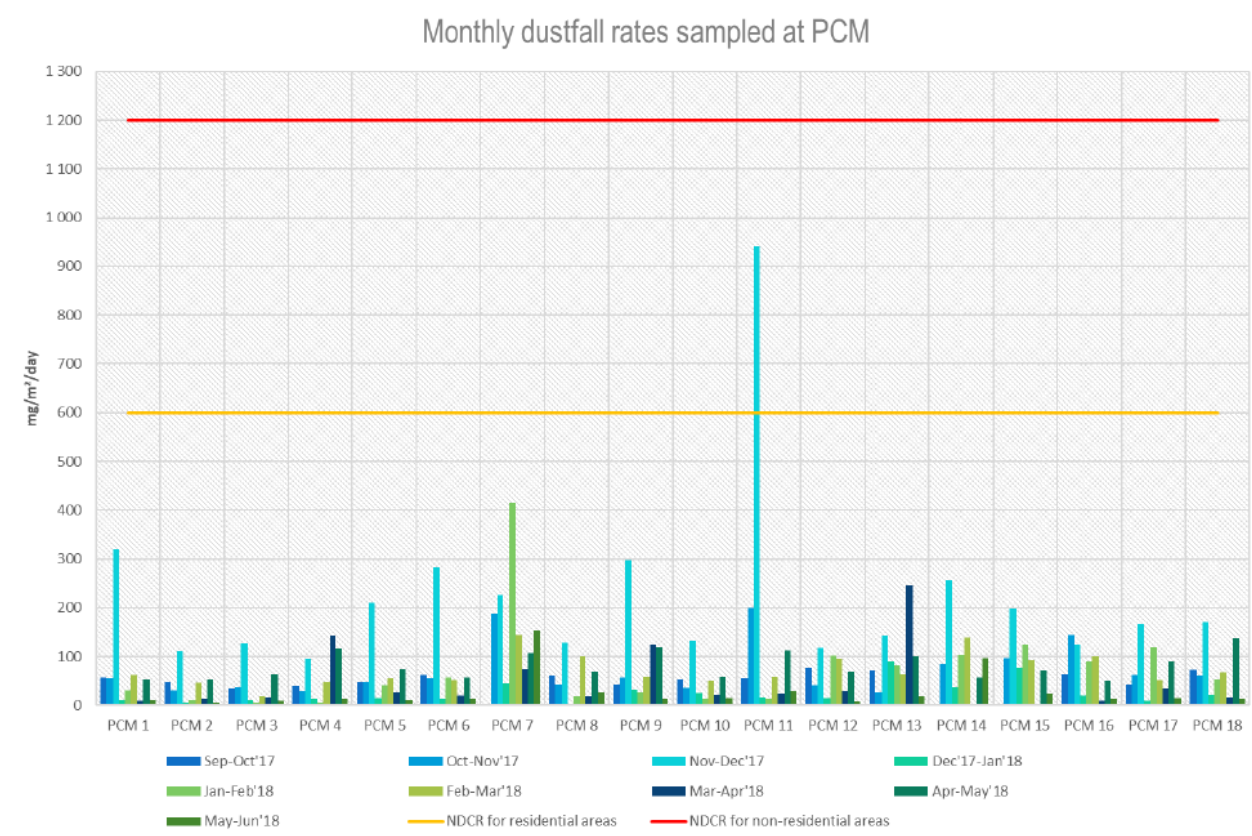
Existing sources of emissions to the local airshed are expected to be from the following activities:

- Dust entrainment from vehicles using unsurfaced roads and tracks;
- Burning of biomass;
- Windblown dust and particulate emissions from exposed areas, including historical mining structures such as the TSF and WRD; and

- Alkantpan activities.

The potential impact of dustfall from mining activities on the solar power plant developments is an important aspect of the S&EIR Process. Accordingly, a dustfall network has been established by the applicant to develop a pre-mining record of dustfall. The network comprises of 18 dust buckets, positioned in relation to prevailing wind direction, planned prospecting and mining activities and site-specific conditions (Appendix 3 Map 11).

Acceptable dustfall rates in terms of the National Dust Control Regulations, 2013 Government Notice 827, promulgated in terms of the National Environmental Management: Air Quality Act 39 of 2004 for residential areas is less than 600 mg/m^2/day and for non-residential areas less than 1200 mg/m^2/day. Results from 9 months of monitoring indicate that the pre-mining dustfall levels are low (Figure 7-3).



Source: Airshed Planning Professionals (2018)

FIGURE 7-3: DUSTFALL RATES

Dustfall rates increased from the Sep/Oct 2017 sampling period to Nov/Dec 2017 sampling period but decreased significantly between the Nov/Dec 2017 and Dec 2017/Jan 2018 sampling period. This may be attributed to the decline in on-site activities over the December holiday period, also resulting in less traffic on the roads. There was a slight increase in the dustfall rates for the period Jan/Feb 2018 and again in Feb/Mar 2018, with a decrease in Mar/Apr 2018. The Apr/May 2018 results show a slight increase again, but with a lower maximum dustfall rate and a higher minimum dustfall rate than the previous sampling period. For the period May/Jun 2018 the dustfall rates decreased to similar levels recorded during Dec 2017/Jan 2018.

7.1.16 ENVIRONMENTAL NOISE

A baseline environmental noise survey has been undertaken for the area by Airshed Planning Professionals (2017). A summary of the findings of this survey are presented below. The complete noise specialist study report with the baseline information and noise impact predictive model results will be included in the Draft EIR.

7.1.16.1 Noise Sensitive Receptors

Noise sensitive receptors generally include places of residence and areas where members of the public may be affected by noise generated by mining, processing, and transport activities. Office workers and employees, and any on-site accommodation structures may also be affected.

The following noise sensitive receptors have been identified:

- General public:
  - Residents of Copperton; and
  - The Nelspoortjie farmstead (situated along R357), which may be affected by additional traffic noise associated with the future mine activities.
- Industrial and commercial activities within the area:
  - Offices at the Alkantpan Test Range, approximately 4 km west of the current PCM site office; and
  - Offices at existing and proposed solar PV facilities and the Copperton Wind Farms. The closest include the Struisbult PV2 and Mulilo Solar PV plants. Other facilities are unlikely to be affected.
- Receptors located on Portion 25 of Vogelstruisbult (on-site receptors):
  - PCM Copperton Project site office.
- Farmhouse (contractor accommodation) approximately 1.5 km east of the current PCM site office.

7.1.16.2 Baseline Noise Survey Sites

Survey sites were selected after careful consideration of future activities, accessibility, potential noise sensitive receptors, and safety restrictions. A total of five (5) survey sites was selected Table 7-5.

TABLE 7-5: NOISE SURVEY SITES

SITE	DESCRIPTION	MOTIVATION FOR INCLUSION
1	Near project site office	To determine on-site baseline noise levels, site office considered potential noise sensitive receptor
2	Copperton, at town entrance roundabout	Noise sensitive receptor
3	Farmhouse (contractor accommodation)	On-site noise sensitive receptor
4	Entrance to Mulilo Solar PV Plant	Noise sensitive receptor, considered a "light industrial" receptor
5	Nelspoortjie farmstead, 250 m south of R357	Residential noise sensitive receptor, affected by traffic noise

Source: Airshed Planning Professionals (2018)

7.1.16.3 Environmental Noise Propagation and Attenuation Potential

Site conditions which may influence noise propagation and attenuation potential include the following:

- At wind speeds of more than 5 m/s, ambient noise levels are mostly dominated by wind generated noise;
- There are no natural terrain features between potential sources of noise and the closest noise sensitive receptors that would provide acoustic shielding; and
- Based on observations made during the visit to site, ground cover is acoustically hard, that is, not conducive to noise attenuation.

7.1.16.4 Baseline Noise Survey Results

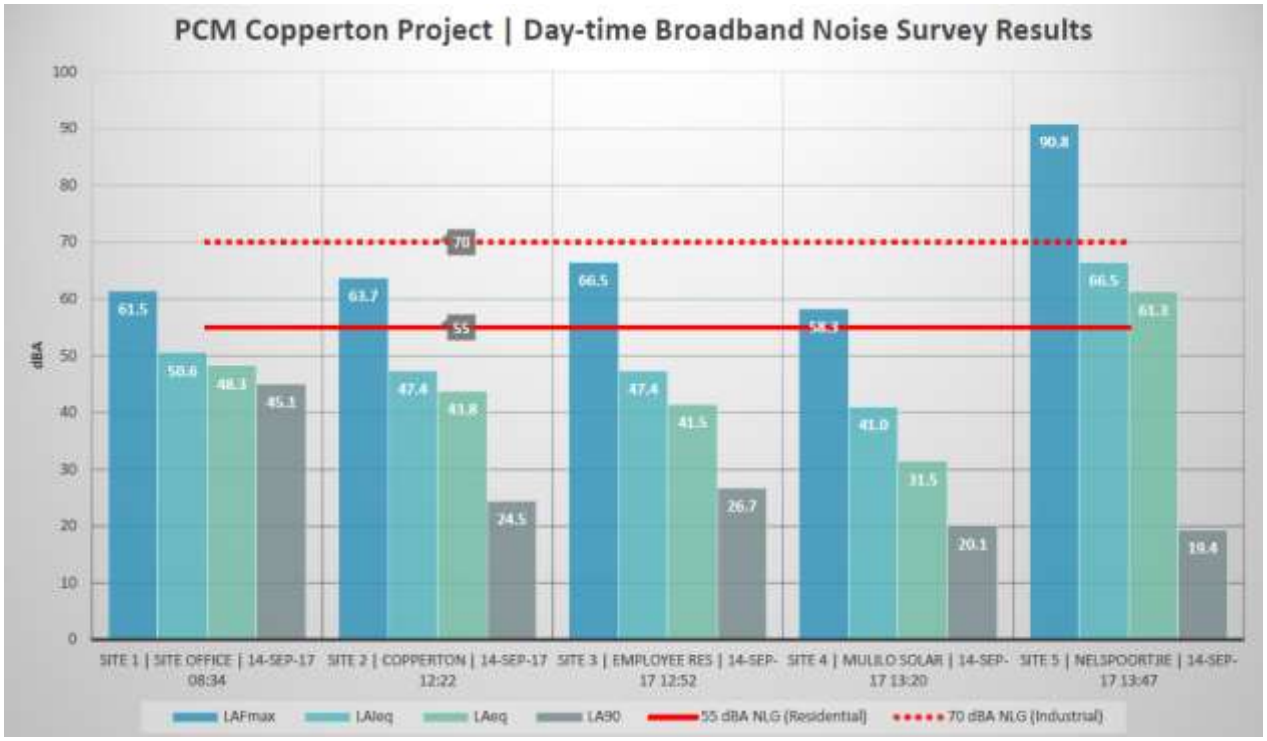
The baseline noise survey results for daytime and night-time are presented in Figure 7-4.

The following can be noted with respect to the daytime noise measurement results:

- Measurements indicate day-time ambient noise levels that are comparatively quite but influenced by occasional noisy incidents such as vehicle pass-bys;
- On-site drilling (prospecting) activities were clearly audible at on-site survey sites (Site 1, Site 3, and Site 4);
- The measured noise levels are considered typical of rural and suburban areas according to SANS 10103;
- Recorded on-site LAeq's ranged between 31.5 dBA and 48.3 dBA and are therefore in compliance with IFC guidelines for industrial receptors (70 dBA) and residential, institutional and educational receptors (55 dBA);
- At Copperton, LAIeq, LAeq, and LA90 of 47.4 dBA, 43.8 dBA, and 24.5 dBA were recorded respectively. Levels correspond to what is typically expected in rural areas and are currently compliant with the IFC guideline for residential, institutional and educational receptors (55 dBA); and
- At the Nelspoortjie farmstead entrance, next to the R357, LAIeq, LAeq, and LA90 of 66.5 dBA, 61.3 dBA, and 19.4 dBA were recorded respectively. The large difference in recorded LAIeq, LAeq, and LA90 is attributed to vehicle pass-bys. Levels correspond to what is typically expected in urban areas with main roads and are currently not compliant with the IFC guideline for residential, institutional and educational receptors (55 dBA).

The following can be noted with respect to the night-time noise measurement results:

- Measurements indicate night-time ambient noise levels that are quiet but influenced by occasional noisy incidents such as vehicle pass-bys;
- On-site drilling (prospecting) activities were audible at all survey sites;
- On-site LAIeq's ranged between 38.4 dBA and 42 dBA which is considered typical of rural and suburban areas according to SANS 10103;
- Recorded on-site LAeq's ranged between 30.3 dBA and 41 dBA and are therefore in compliance with IFC guidelines for industrial receptors (70 dBA) and residential, institutional and educational receptors (45 dBA); and
- At Copperton, LAIeq, LAeq, and LA90 of 36.3 dBA, 31.8 dBA, and 28.7 dBA were recorded respectively. Levels were very low and comparable to what is typically expected in rural areas. They are currently also compliant with the night-time IFC guideline for residential, institutional and educational receptors (45 dBA).
- At the Nelspoortjie entrance, next to the R357, LAIeq, LAeq, and LA90 of 38.4 dBA, 27.6 dBA, and 19.4 dBA were recorded respectively. Levels correspond to what is typically expected in rural areas and are compliant with the night-time IFC guideline for residential, institutional and educational receptors (55 dBA).



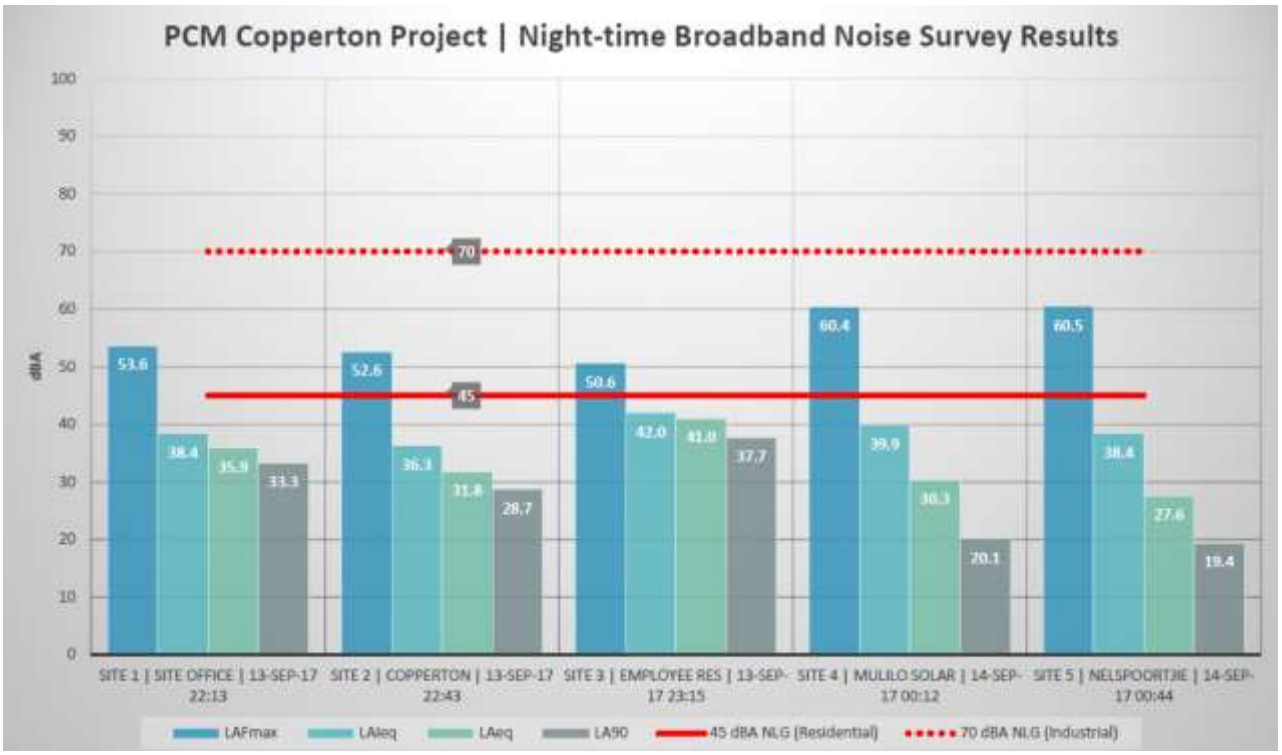


FIGURE 7-4: DAY AND NIGHT-TIME BASELINE NOISE SURVEY RESULTS

7.1.17 HERITAGE

A heritage and paleontological survey has been undertaken for the area by Heritage Contracts and Archaeological Consulting (2017). The complete report with the baseline information and impact assessment results is provided in Appendix 10.

The entire site has been transformed by mining activities from the 1970's onwards however several Middle Stone Age artefacts were found scattered over the area in varying densities. According to Beaumont *et al* (1995) "thousands of square kilometres of Bushmanland are covered by a low density lithic scatter". These artefacts are referred to as background scatter (Orton 2016) and of low heritage significance. The paleontological component was independently assessed (Rossouw 2017) who concluded that the study area consists of non-fossiliferous metamorphic rocks and superficial deposits (aeolian sand) of low to very low palaeontological sensitivity.

In terms of the built environment, although the remains of previous mining infrastructure do exist in the study area, none of these are older than 60 years and the structures are not protected under the Heritage Act and are therefore of no significance.

No burial sites were recorded. If any graves are located in future they should ideally be preserved in-situ or alternatively relocated according to existing legislation. No public monuments are located within or close to the study area.

The graveyard in Copperton will not be affected in anyway by the proposed development.

7.1.18 SOCIO-ECONOMIC ENVIRONMENT[9]

7.1.18.1 Siyathemba Local Municipality

PCM is located within Ward 4 of the Siyathemba Local Municipality (SLM), which is managed by the Pixley Ka Seme District Municipality, within the Northern Cape Province of South Africa. The towns of Brakbos, Brulpoort, Draghoender, Koegas, Marydale, Niekerkshoop, Prieska, Shamley's Farm, Uitvlug, and Westerberg fall within the boundaries of the SLM (Figure 7-5).

[9] There is a general lack of recent published demographic and other socio-economic data for the SLM. Except where noted, the information in this section has been summarised from Statistics South Africa Census Data (2011) and the SLM Local Economic Development Strategy (2012)

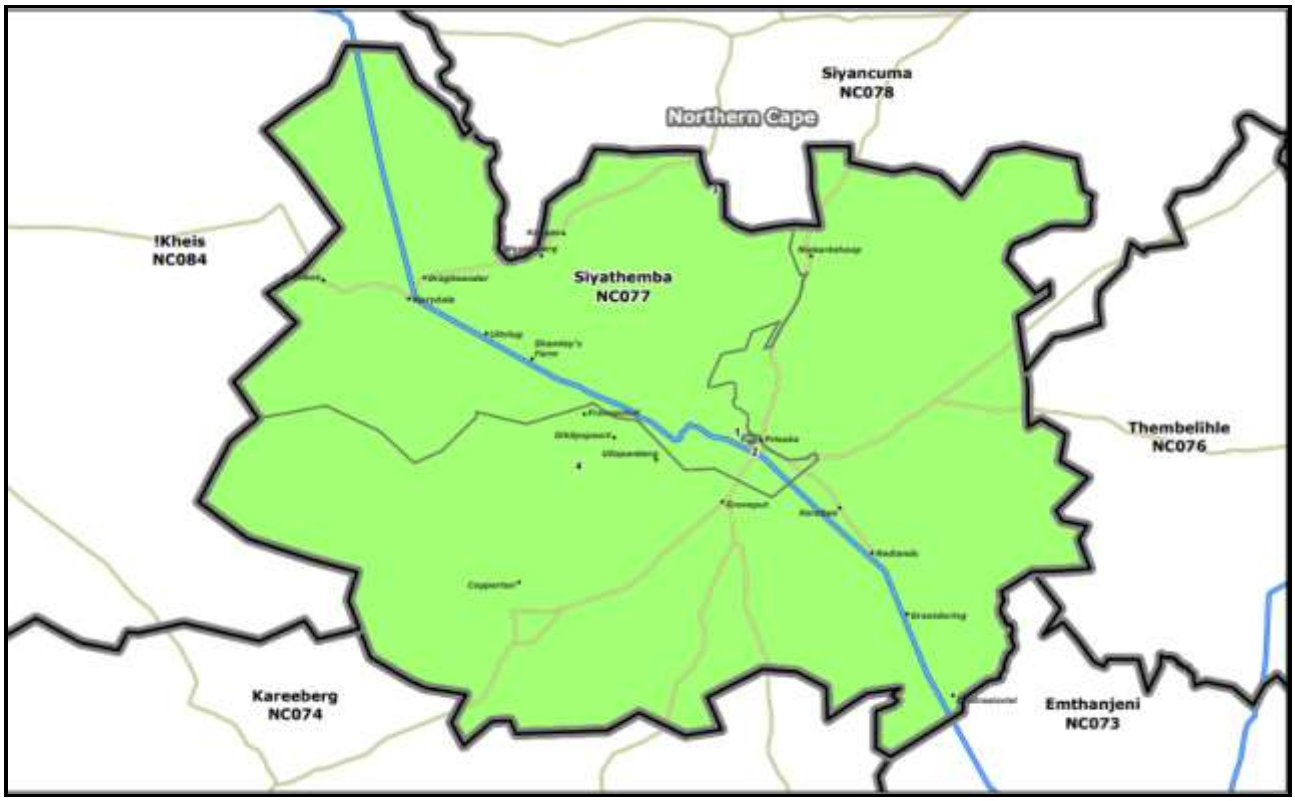


FIGURE 7-5: GEOGRAPHICAL BOUNDARY OF THE SLM

SLM was established in 2001 and is a category B municipality. It is located within the central easterly parts of the Northern Cape Province along the Orange River. It Is approximately 220 km away from the nearest business center of Kimberley. The surface area of the municipality is approximately 8 200 km^2, accounting for 8% of the total district surface area and approximately 3% of the provincial area. A summary of the key statistics of the municipality is provided in Table 7-6.

7.1.18.2 Spatial and Regional Development Planning

The SLM Spatial Development Framework (SDF) was compiled in 2006 and, according to the SLM IDP (2017-2018), is no longer used for guiding for development planning in the municipality. No development planning guidelines or objectives have therefore been defined for Copperton or the proposed MRA surface area.

Similarly, no local or regional development plans for the Copperton area have been proposed.

7.1.18.3 Population

There are approximately 22 000 people residing in the municipality. This represents approximately 1.9% of the total population in the Northern Cape. The population of Siyathemba contracted by 0.4% on average per annum between 2000 and 2010. The decline of the Siyathemba population was mainly driven by lower fertility rates.

The death rate (the number of deaths per 1,000 people in a year) increased from 11.2 deaths per 1,000 people in 1995 to 11.6 during 2010.

This is significantly lower than the death rates recorded over the same period for the Northern Cape and South Africa. The reason for the lower death rate in the study area was mainly the result of lower HIV/AIDS prevalence rates when compared with South African averages.

The most dominant population group in the SLM are Coloured individuals, who represent more than 75% of the total population in the municipal area. Black African and White population groups comprise around 12% and 8% of the population respectively. The dominant languages in the SLM are Xhosa and Afrikaans. Afrikaans is the most widely spoken language (78%).

TABLE 7-6: KEY STATISTICS OF SIYATHEMBA LOCAL MUNICIPALITY

KEY STATISTICS	NUMERICAL VALUE
Total population	21,591
Young (0-14)	30,8%
Working age	63,2%
Elderly (65+)	6%
Dependency Ratio	58,2%
Gender Ratio	99.3%
Growth Rate	1.57% (2001 - 2011)
Population density	1 person/km^2
Unemployment rate	24.3%
Youth unemployment rate	30.2%
No schooling aged 20+	11.5%
Higher education aged 20+	5.3%
Matric aged 20+	18%
Number of Households	5.831%
Number of Agricultural Households	1.334%
Average Household size (person)	3.6
Female headed households	36.1%
Formal dwellings	88.6%
Housing owned/paying off	54.3%
Flush toilet connected to sewerage	64.9%
Weekly refuse removal	73.9%
Piped water inside dwelling	43.1%
Electricity for lighting	86.2%

Source: Statistics South Africa (2011)

7.1.18.4 Educational Facilities and Education

There is a total of 10 schools (3 combined, 6 primary and 1 secondary) within the SLM (SLM IDP 2017-2018).

4.2% of the municipal population has not attended any type of a schooling system, while 48.5% have primary school education. A little over 1700 individuals (4%) have graduated from a University / Technikon.

In Siyathemba, around 14% of adults have a matric certificate compared to 24.7% in the Northern Cape. The percentage of the population with a tertiary education in Siyathemba (5.1%) is also lower than that for the Northern Cape (7.3%).

7.1.18.5 Public Safety and Security

There are three police stations within the SLM, situated in Marydale, Niekerkshoop, and Prieska respectively. There is no municipal fire-fighting capability in the SLM and no disaster manager plan for the municipality.

7.1.18.6 Access to Water, Sewage and Solid Waste Services

SLM is the Water Services Authority (WSA) and Water Services Provider (WSP) for the 3 towns within their area of authority. Piped water is accessed by about 98% of the SLM population and about 90% of the municipal population have access to flush toilets[10].

Siyathemba has three water supply schemes. For PCM, water is provided from the Water Treatment Works in Prieska. Water abstraction is from the Orange River. Waterborne sanitation is only available in the urban areas of Prieska.

About 75% of the population have access to a weekly refuse collection service[11]. There is an existing licensed waste disposal site in Prieska. This facility is a G:C:B$^-$ licensed facility and can only accept general waste. According to the SLM IDP (2017-2018), the site has a remaining airspace of 20 years. SLM has indicated that the site is not well managed at present due to financial and personnel constraints[6]. A new incinerator is proposed to be installed at the facility, the timing of which is unclear.

No facilities for the treatment and disposal of medical waste are available within SLM. Medical waste from the health facilities is transported by a contractor to a license treatment facility in the Free State Province.

7.1.18.7 Housing

Within the Pixley Ka Seme District Municipality, 87.2% of households live in formal units, while 12.8% are found in informal housing units.

A variety of residential components are available within the municipal boundaries. More than 81% of household dwellings found in Siyathemba can be classified as houses or brick structures on separate stands. The average for the Northern Cape is 77.4%. Some 8.6% of local dwellings can be described as shacks.

The average household size in the larger Pixley Ka Seme District Municipality is about 3.7, female headed households is about 36.90%, formal dwellings at 86.30% and the housing owned is at 52.00%.

The SLM IDP (2017-2018) has identified the need for proper and realistic information with regards to the housing need in the municipality. The SDF indicated the need for an additional 33 ha for residential housing purposes. A housing development area has been demarcated by SLM within Prieska and funding for the construction of 364 houses in this area has been requested (Figure 7-6).

The demarcated sites for the housing have apparently been serviced and the funding, when granted, will be used for completion of the top structures.

[10] SLM Water Services Development Plan, 2017

[11] SLM IDP (2017-2018)

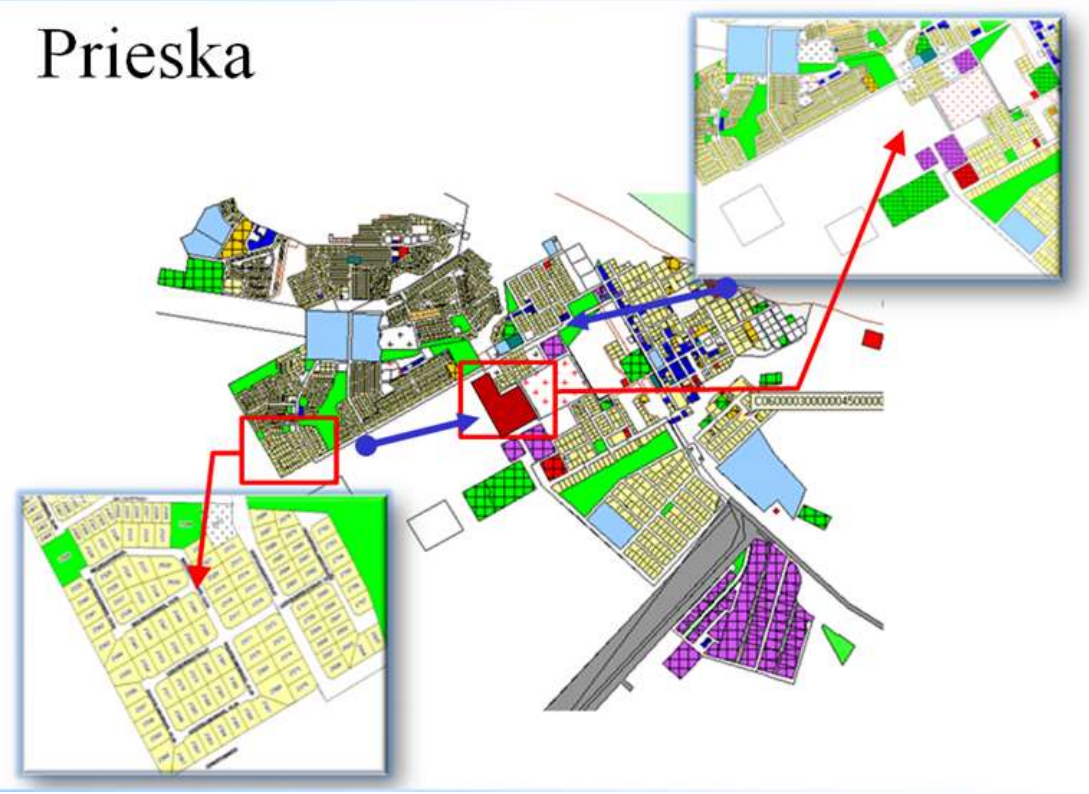


FIGURE 7-6: LOCATION OF THE PRIESKA HOUSING DEVELOPMENT AREA

7.1.18.8 Community Health and Health Facilities

There is a total of 4 health facilities within the SLM, namely Niekerkshoop Clinic, E'Thembeni Clinic, Marydale PHCC, and Prieska Clinic.

The 2010 HIV/AIDS prevalence rate of the Siyathemba population was 6%. This is lower than the prevalence rates in the Northern Cape (8%) and South Africa (13%). However, since 2000, the number of people living with HIV/AIDS in the Siyathemba municipal area more than doubled from about 400 to just over 1,200 people in 2010. The prevalence rate is expanding faster in Siyathemba (at 11% p.a.) when compared with South Africa (at 6% on average p.a. since 2000).

SLM manages 3 cemeteries in Prieska, and 2 cemeteries in Niekerkshoop and Marydale. Expansion of the cemeteries in each of these towns is planned.

7.1.18.9 Electricity and Energy

Around 86% of household dwellings found in Siyathemba have access to electricity. This indicator is on par with the provincial average.

Between 2006 and 2011, there was a general increase in the use of electricity as a primary source of energy. This is due to local electrical infrastructure improvements across the province (SLM IDP, 2016).

As shown in the graph below, the majority of the population have access to electricity, which is used primarily for cooking, heating and lighting. The proportion of households within the municipality that use electricity for lighting has increased from 57% in 1996 to approximately 84% in 2011.

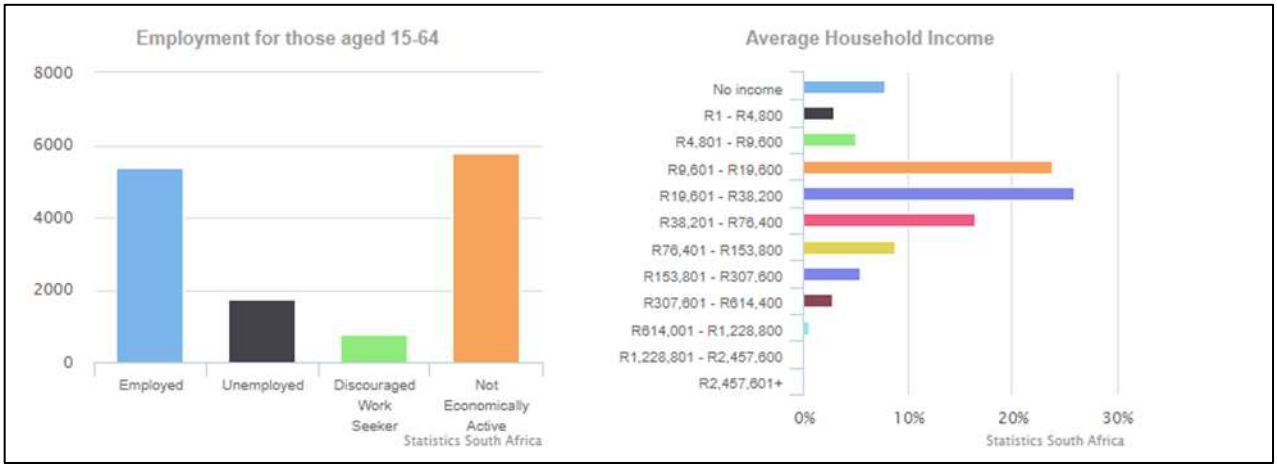
Although relatively expensive, paraffin and gas are used for cooking and heating in some places. Households using electricity as a source of energy for cooking increased from 48% in 1993 to 74% in 2011.

7.1.18.10 Employment[12]

Between 2001 and 2011, there has been a decrease in the number of people employed and a concomitant increase in the number of unemployed people across the Pixley Ka Seme District Municipality.

For Siyathemba, 5 787 individuals remain as being economically inactive, while 5 370 are employed. The unemployment rate in SLM in 2011 was 24.3%.

The average household income is approximately R9 000 – R19 500. Obtaining any form of income generating employment within the municipality has become increasingly difficult in recent years. This is attributed to the lack of education, resulting in the uneducated experiencing the highest incidences of poverty.



Source: Statistics South Africa (2011)

FIGURE 7-7: SUMMARY OF EMPLOYMENT AND INCOME IN SLM

7.1.18.11 Labour

The labour participation rate across the Pixley Ka Seme District Municipality is 50%. The labour dependency ratio for Siyathemba is estimated at 2 (An additional two persons are supported by every person in the labour force).

Other significant labour ratio statistics for SLM are provided in Table 7-7.

TABLE 7-7 LABOUR RATIOS FOR SLM

LABOUR PARTICIPATION RATE	LABOUR DEPENDENCY RATIO	LABOUR YOUTH DEPENDENCY RATIO	LABOUR AGED DEPENDENCY RATIO
48	2	0.4	84

Source: SLM IDP (2017-2018)

7.1.18.12 Social Services

From the Statistics South Africa Community Survey 2016 on community perception of a range of social aspects, the Repli Trading No. 27 Social and Labour Plan 2018 concluded the following:

- Residents of SLM are less concerned about safe and reliable water compared to the average citizen in South Africa. This can be ascribed to the abundance of water from the Orange River;

[12] SLM IDP (2017-2018)

- Residents of SLM had a much bigger concern with respect to the lack of jobs in their municipality as opposed to the national average. This is not surprising given the lack of job opportunities in the municipality; and
- On the whole, the Community Survey of 2016 gives a picture of a local area that seems far more content than the average South African regarding social expectations.

7.1.18.13 Economy

The SLM Local Economic Development (LED) Vision is "Ensuring long term economic sustainability through local value addition and social upliftment, as well as integrated community development. We strive towards an economy owned by local people."

The regional and local economy is poorly diversified with a reliance on, in the case of SLM, the government and agriculture sectors. The mining and manufacturing sectors provide very few of the employment opportunities in the SLM.

The mining sector is identified within the SLM IDP (2017-2018) as a sector with development potential.

The Draft Social and Labour Plan for the Project, notes the following with respect to the economy of the SLM and the potential economic influence of the proposed mine development:

- SLM is a small economy. Larger rural municipalities in South Africa have a Gross Geographic Product (GGP) of between R5bn and R10bn. By contrast, SLM has an estimated GGP of R1.3bn. A GGP is simply the sum of all salaries and wages, depreciation and operating profits in an economy. This means the new mine, with 450 employees, could add an annual GGP of R216 million per annum, or 16,6% of GGP to the local economy. This is significantly high. Another perspective is that the average salaries and wages in mining is R120 000 per annum and hence 450 new employees in the SLM has a purchasing power of R54 million per annum;
- The small economy in SML is a result of two factors, one the lack of rainfall that results in less than productive land (thus demand for land is low), and two, as a result, its low population. In addition, there is no innovation in the local economy;
- Furthermore, the average income per capita in SLM is half of that of the average income in South Africa, which furthermore reduces the economic quality of life of the SLM population because they have less disposable income, in a remote area where the prices of goods are more than the average South Africa prices due to high transport costs;
- The quality of social services is rated much higher by the SLM population than the average South African because the demand for services is much less locally; and
- The lack of adequate employment opportunities is the most significant concern for the SLM population. There are almost 14 000 people in the workforce in Siyathemba and just over 4 000 formal jobs. Thus two-thirds of the working population does not have formal jobs.

7.2 DESCRIPTION OF THE CURRENT LAND USES

Current land uses within the proposed MRA surface area are as follows:

- Grazing of livestock;
- Remnants of various structures demolished as part of the closure obligations of the historical mine; and
- Registered servitude between the historical mineral processing area and the historical TSF.

Land uses on immediately adjacent properties include the following:

- Grazing of livestock;

- Small-scale aggregate crushing plant;
- Road to Copperton and Alkantpan from the R357;
- Disused rail siding;
- Residential town of Copperton;
- An operating 20 MW solar power plant is situated towards the east of the MRA surface area boundary. Several other proposed renewable energy (wind and solar) projects are situated towards the east and south of the MRA surface area boundary;
- Eskom Cuprum Substation; and
- Alkantpan Test Range.

7.2.1 EXISTING SURFACE LAND USES

Most of the buildings and related infrastructure associated with the historical PCM were demolished when the mine closed in 1991.

THE WESTERN SECTION OF THE REPLI PORTION OF THE MINING RIGHTS APPLICATION (MRA) SURFACE AREA IS CHARACTERISED BY REMNANTS OF THE DEMOLISHED INFRASTRUCTURE AND STRUCTURES REMAINING FROM THE HISTORICAL MINING BETWEEN 1971 AND 1991. REMAINING SURFACE INFRASTRUCTURE INCLUDES THE HUTCHING SHAFT COLUMN, CRUSHER BINS, FLOTATION DAMS (2 X 40 M IN DIAMETER AND 8 X 20 M IN DIAMETER) AND A CONCENTRATE DRYING SLAB (300 M BY 180 M)[13] (

Figure 7-8).

The tailings storage facility containing the residues from the historical mining is situated towards the south-west.

An operating 20 MW solar power plant is situated towards the middle of the MRA surface area boundary. Other existing infrastructure within the MRA surface area includes partially intact stormwater diversion berms constructed by PCML in the 1970s, the access road to Copperton and PCM from the R357, a disused rail spur and several mine houses used, at present, by contractors involved with the prospecting activities.

The remainder of the MRA surface area is largely undisturbed scrubland used for grazing of small livestock.

There are no registered land claims applicable to the properties under consideration (Appendix 4).

[13] Orion Gold NL Scoping Study Report (2017)

Hutchings Shaft Column

Decline Ramp Portal

Other historical mining infrastructure remaining onsite includes the Crusher Bins, (left), Flotation Dams (middle foreground) and Concrete Drying Beds (right background)

FIGURE 7-8: EXAMPLES OF EXISTING SITE INFRASTRUCTURE ON PORTION 25 OF VOGELSTRUISBULT 104

7.2.2 SURROUNDING LAND USES

Copperton is the nearest residential area to the MRA surface area. The town is still in use, though only 40 of the original 300 houses now remain. The full extent of the town is excluded from the MRA surface area. Similarly, although contained within the MRA surface area land parcel, Portions 5 and 6 of the Farm Vogelstruisbult, are excluded from the MRA. The Eskom Cuprum Substation is located on these properties.

The farming service town of Prieska, with a population of 14,000, lies 80km north-east of the MRA surface area. A tarred road, the R357, connects Copperton with Prieska.

Immediately surrounding landowners and land users comprise of private landowners and the Alkantpan Test Range (to the west and north). Several proposed renewable energy (wind and solar) projects are situated towards the east and south of the MRA surface area boundary. (Appendix 3 Map 3).

In 1987, Armaments Corporation of South Africa Society Limited ("Armscor"), a State-owned enterprise for acquiring defence capabilities for the South African Defence Force and other State agencies, established the Alkantpan ballistic test range on ground neighbouring the Project Area ("Alkantpan"), through subsidiary Armscor Business (Pty) Ltd. Alkantpan conducts armaments testing for a variety of artillery pieces, as well as aircraft and naval weapon systems.

Alkantpan now uses some of the infrastructure that serviced the mine including water reservoirs, access roads, power supply infrastructure and some of the housing in the Copperton mine town. Alkantpan has various servitude rights that allow them access and the ability to run services and amenities on the Project Area and surrounding properties.

7.2.3 EXISTING UNDERGROUND INFRASTRUCTURE[14]

PCM was one of South Africa's first mines to have a decline shaft from surface, using trackless mining methods. Access to the underground via the decline ramp and vertical shafts has been sealed off since the closure of the mine in January 1991. Almost all the underground development took place in a competent footwall unit.

PCM was serviced by four vertical shafts, two incline shafts and the decline ramp. The Hutchings Shaft is an 8.8 m diameter vertical shaft sunk down to approximately 1 km below surface. The decline ramp has a length of approximately 7.1 km. When the mine closed approximately 200 m of the decline ramp was backfilled with waste rock to seal it off. The latter was recently opened as part of the prospecting activities being undertaken.

Five underground workshops were established to maintain the large mining fleet in use. A crusher chamber was established to house primary crushing of ore underground. Substation chambers were established on each haulage level.

Approximately 37 km of underground roadways (6.5 m wide x 3.8 m high) are underground and various pump stations are still in place from the historical dewatering activities.

[14] Orion Gold NL Scoping Study Report (2017)

7.3 DESCRIPTION OF SPECIFIC ENVIRONMENTAL FEATURES AND INFRASTRUCTURE ON THE SITE

7.3.1 SURFACE WATER FEATURES AND WETLANDS

Several non-perennial rivers traverse the proposed Mining Rights Application Surface Area. A single natural wetland/pan is situated outside of the proposed mining rights application surface area but within 100 m of the proposed main mine access road.

These are described in greater detail in Section 7.1 of this report and the specialist studies in surface water and surface water ecosystems.

With mitigation measures in place, the potential impact of these structures on these features has been assessed to be insignificant.

7.3.2 PROTECTED AREAS

There are no protected areas in close proximity (within 10 km) of PCM. The nearest protected area is the Witsand Provincial Nature Reserve, located approximately 150 km to the north of the MRA surface area boundary (Appendix 3 Map 12).

7.3.3 CRITICAL BIODIVERSITY AREA AND ECOLOGICAL SUPPORT AREA

The Northern Cape spatial biodiversity plan identifies a Critical Biodiversity Area (CBA) across a portion of the MRA. This CBA follows the pre-diversion alignment of a non-perennial watercourse which was diverted as part of the historical mining activities undertaken by PCM.

The pans to the north and east of the MRA are designated as Ecological Support Areas.

The terrestrial ecology specialist study indicated that Holness & Oosthuysen (2016) identified Critical Biodiversity Areas (CBAs) in the Northern Cape province using available data on biodiversity features, their current ecological condition, Protected Areas and Conservation Areas, and opportunities and constraints for effective conservation. One of the features that was used in demarcating CBAs was prioritised reaches of rivers identified within the National Freshwater Ecosystem Priority Areas (NFEPA). The target that was set for this feature was for all FEPA prioritized reaches to be designated as CBA1 unless they were non-natural or unavailable for conservation.

The study area is situated within one of these prioritised reaches (CBA1). This reach has no visible wetland or riparian flora and no discernible channel or valley bottom and is only evident as a broad drainage system when seen on satellite imagery. A significant portion of this CBA has been bisected by mine infrastructure and the open pits of the mine, and cannot be considered "natural habitat". Under the above mapping rules, this part of the reach should not have been classified as CBA1 as it comprises non-natural habitat. This is the only part of the prioritised reach where new mine infrastructure has been proposed and should not have any ecological significance.

7.3.4 DECLARED KAROO CENTRAL ASTRONOMY ADVANTAGE AREA

7.3.4.1 Background

PCM is situated within two declared Astronomy Advantage Areas (AAA), namely as follows:

- The Northern Cape Province; and
- The Karoo Central AAA.

Specifically, PCM is located within Advantage Area 3 of the Karoo Central AAA (Appendix 3 Map 14).

The AAAs are established in terms of the Astronomy Geographic Advantage Act 21 of 2007.

The purpose of establishing the AAAs is to protect the radio astronomy work associated with the Square Kilometre Array (SKA) Project in Carnarvon. The cosmic rays which the SKA radio telescopes receive and interpret are extremely faint and are thus sensitive to interference from other radio devices as well as electromagnetic interference from electrical equipment. The radio interference protection philosophy associated with the AAAs is as follows[15]:

- Maximise the radio frequency spectrum available for the SKA so that the scientific work is not significantly compromised;
- Minimise the impact on local people and residual radio interference, and facilitate access to alternative radio communications;
- Restrictions on sources of radio frequency interference, for where there are no alternative options, will be highest close to the SKA Virtual Centre (or core) but decrease with distance.

7.3.4.2 Possible Sources of Radio Interference

On 8 September 2017, the Applicant informed the Department of Science and Technology of various devices and activities which were identified as possibly have an interference impact. A summary of these activities is provided in Table 7-8.

TABLE 7-8: MINE ACTIVITIES WITH A POSSIBLE RADIO INTERFERENCE IMPACT

DEVICE / ACTIVITY	DESCRIPTION
Two-way radios	➲ Use of two-way hand-held radios, without repeaters, with a frequency range of 66-68 MHz. ➲ The 'Effective Radiated Power' (ERP) of the hand-held radios is 5 milliwatt and for mobile radios (vehicle mounted) is 25 milliwatt. ➲ The envisaged mining operations may require installation of repeaters to ensure communications coverage.
Internet	➲ Ubiquiti 5GHz AirMax Grid 27dBi CPE. Connected to an Ubiquiti 5Ghz Airmax MIMO Rocket with a 17dBi 90° Sector. ➲ Frequency is: 5180 MHz ➲ Calculations indicate an 'Effective Radiated Power' (ERP) of zero.
Electromagnetic (EM) Geophysical Surveys	➲ Short duration EM surveys undertaken as part of prospecting activities and for the identification of important geological structures for the geohydrological study.
Underground 'Leaky Feeder' communication system	➲ Specifications are subject to further scoping. VHF frequencies are expected to be in the range 156 to 174 MHz or UHF frequencies in the range 440 to 460 MHz. ➲ The 'Effective Radiated Power' (ERP) of the possible frequency ranges for the system are 1 milliwatt (VHF) and 10 milliwatt (UHF) respectively.
Mine Electrical Reticulation system	➲ Scoping studies indicate a power reticulation requirement to supply 28 MVA around site, including: ➢ 11KV Switchgear ➢ 11Kv/525v Transformers ➢ 11KV/380v Transformers ➢ 525v/400v Minisubs ➢ Telemetry control and communications

[15] http://www.ska.ac.za/wp-content/uploads/2016/07/ska_sa_gaa_eng.pdf

Open Pit Explosive Initiation system	➲ Possible use of a wireless remote blast initiation system, with digitally secured, spread spectrum technology; likely to use 128 Bit AES, and rolling code linking to ensure that only the linked pair ever communicates. ➲ The system will also comprise: Non-electric detonators; Electronic detonators; Blasting activity.

Several engagements have been held with the South African Radio Astronomy Observatory (SARAO) and Department of Science and Technology to ensure that the mine activities will not have an impact on the SKA. This engagement is ongoing. Copies of the engagements undertaken to date are provided in Appendix 7.

7.3.5 PREVIOUSLY DISTURBED AREAS

Remaining structures associated with the historical mining activities are evident throughout the eastern (predominantly Portion 25 of Vogelstruisbult 104) and southern (Slimes Dam 154) sections of the MRA surface area (Appendix 3 Map 15).

Together with the various above ground concrete structures such as the Hutchings Shaft, drying beds, flotation dams and crusher bins, there are substantial concrete foundations and mineral waste stockpiles (in addition to the historical WRD and TSF) remaining on the site, most of this associated with demolished buildings. Disturbed areas also include the stormwater diversion berm to the north of the sinkholes and the associated stormwater retention dam on Portion 1 of Vogelstruisbult 104.

Soil samples taken alongside the concrete drying beds on Portion 26 of Vogelstruisbult 104 and east of the historical TSF show signs of contamination from ore and tailings material respectively although the extent of the contamination is not known.

Samples from the existing WRD and the existing TSF were taken as part of the geochemical characterisation and waste classification. The WRD material was assessed to be relatively inert with no significant environmental risk. The historical TSF material is however a high-risk material.

It is important to note that the current state of the site, including the remaining structures, mineral waste stockpiles, sinkholes, historical WRD and historical TSF, is in accordance with the closure certificate issued by the Department of Minerals and Energy.

PCM closed in 1991 and received a conditional closure certificate in 1995. The closure certificate was issued under the Minerals Act 50 of 1991 and remains in force and is valid under the provisions of the Interpretation Act of 1957. All mine closure obligations were discharged with the issuance of this certificate.

The closure certificate states that the measures taken by PCML on the PCM adequately comply with the relevant provisions of the Act. The cover letter to the closure certificate states that the certificate is issued subject to the Prieska Copper Mines Nature Conservation Trust's ("the Trust") acceptance of the financing of any post-closure environmental management or maintenance obligation which might arise in the future. PCML established the Trust in order to hold funds to discharge the environmental liabilities relating to the closure of the mine.

The post-closure environmental management or maintenance obligations includes:

- The tailings dam, inclusive of evaporation dams, diversion systems, solution trenches, catchment paddocks and fencing;
- Fencing around the area of subsidence (sinkholes) adjacent to the waste rock dump;
- The waste rock dump; and
- The warning light on the shaft headgear.

Of the above items, the historical TSF poses the greatest financial obligation due to practical difficulties of controlling dust and water borne erosion over the long term.

In view of this fact, construction work was carried out in 1991 on closure of the dam so that dispersion of the tailings through air and water borne erosion would be minimised. Measures implemented at the time included:

- Spraying of the crests of the tailings dam and the division walls with bitumen over a 3 m width;
- Construction of a diversion trench up-contour of the dam to lead uncontaminated surface water away from the tailings dam into the nearest water course;
- Sealing delivery pipes and points of structural weakness on the tailings dam and evaporation dams;
- Construction of berm penstocks and re-grading of the berms to slope inwards and towards the berm penstocks.
- Over time, due to the high percentage of pyrites in the tailings dam, oxidation has taken place, resulting in a hard, protective coating forming over the whole surface area of the dam. Erosion of the top surface has thus not occurred, except in a limited area of failure on the south side of the tailings dam. In addition, the hard, protective coating has resulted in the mitigation of windblown dust off the facility.

The Applicant does not, through this Project, intend to alter the historical closure obligations in anyway by, for example, demolition and removal of remaining concrete structures or to remediate any disturbed land associated with the historical mining activities.

The mine closure plan addresses the closure liabilities arising from the proposed mining activities. Ongoing maintenance and rehabilitation of the existing TSF, WRD and other structure associated with the historical mining is being undertaken by the Applicant in accordance with the conditions of the closure certificate and is therefore not addressed in this assessment.

7.4 ENVIRONMENTAL AND CURRENT LAND USE MAP

The following dominant current land use categories are recognised:

- Agriculture – grazing;
- Residential;
- Historical mining and related infrastructure; and
- Power infrastructure.

The environmental and current land use map is provided in (Appendix 3 Map 15).

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

The impacts and risks identified for the proposed mine development are summarised in Table 15-1. The impact matrix is provided in Appendix 8.

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

9.1 OVERVIEW

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

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

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

All impacts were assessed in the following phases:

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

9.2 APPLICATION OF IMPACT RATING CRITERIA

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

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

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

The significance of the impact is then assessed by rating each variable numerically, according to defined criteria as provided in Table 9-1. The purpose of the significance rating of the identified impacts is to develop a clear understanding of the influences and processes associated with each impact.

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

The values for likelihood and consequence of the impact are then read from a significance rating matrix as shown in Table 9-1 and Table 9-2.

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

TABLE 9-1: CRITERIA FOR ASSESSING THE SIGNIFICANCE OF IMPACTS

SEVERITY OF IMPACT	RATING
Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful	5
SPATIAL SCOPE OF IMPACT	**RATING**
Activity specific	1
Area specific	2
Whole project site / local area	3
Regional	4
National/International	5
DURATION OF IMPACT	**RATING**
One day to one month	1
One month to one year	2
One year to ten years	3
Life of operation	4
Post closure / permanent	5
FREQUENCY OF ACTIVITY / DURATION OF ASPECT	**RATING**
Annually or less / low	1
6 monthly / temporary	2
Monthly / infrequent	3
Weekly / life of operation / regularly / likely	4
Daily / permanent / high	5
FREQUENCY OF IMPACT	**RATING**
Almost never / almost impossible	1
Very seldom / highly unlikely	2
Infrequent / unlikely / seldom	3
Often / regularly / likely / possible	4
Daily / highly likely / definitely	5

CONSEQUENCE

LIKELIHOOD

***Activity**: a distinct process or task undertaken by an organisation for which a responsibility can be assigned.*

***Environmental aspect**: an element of an organisation's activities, products or services which can interact with the environment.*

***Environmental impacts**: consequences of these aspects on environmental resources or receptors.*

***Receptors**: comprise, but are not limited to people or man-made structures.*

***Resources**: include components of the biophysical environment.*

***Frequency of activity**: refers to how often the proposed activity will take place.*

***Frequency of impact**: refers to the frequency with which a stressor will impact on the receptor.*

***Severity**: refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.*

***Spatial scope**: refers to the geographical scale of the impact.*

***Duration**: refers to the length of time over which the stressor will cause a change in the resource or receptor.*

TABLE 9-2: SIGNIFICANCE RATING MATRIX

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

TABLE 9-3: POSITIVE/NEGATIVE MITIGATION RATINGS

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

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

The positive and negative impacts are presented in the stipulated format in Table 15-1.

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

The mitigation hierarchy was applied throughout the S&EIR Process.

The mitigation hierarchy is an approach to mitigation planning and can be summarised into the following steps:

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

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

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

The mitigation measures are fully described in the EMPr (Part B of the EIR).

With the mitigation measures applied, the residual risk significance for the assessed impacts and risks is generally low or medium. A single impact, namely removal of natural habitat for the new TSF, remains high post-mitigation. This is attributed to avoidance being the only mitigation measure for this impact. The terrestrial specialist study however concluded that none of the habitat within which the infrastructure options are located is potential Critical Habitat and none of the infrastructure options are considered to be fatally flawed from an ecological perspective. Vast areas of similar habitat are present on adjacent properties and the impact footprint according to current plans will be relatively limited.

12 MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED

Alternative site locations for various surface infrastructure, including the TSF, WRD and main mine access road were identified and considered in the impact assessment.

13 STATEMENT MOTIVATING THE ALTERNATIVE DEVELOPMENT LOCATION WITHIN THE OVERALL SITE

The project site has been selected based on the presence of a mineable resource. The project plan and site layout has been based on limiting the project area footprint, avoiding sterilisation of resources and avoiding sensitive areas, where possible, from an environmental and social perspective, while still considering engineering feasibility and financial considerations.

14 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

The impact assessment methodology is described in Section 9 of this report.

15 ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK

The assessment is presented in the required format in Table 15-1.

The impact matrix is provided in Appendix 8.

TABLE 15-1: ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK

ACTIVITY **whether listed or not listed.** (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.)	**POTENTIAL IMPACT** (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc….etc…)	**ASPECTS AFFECTED**	**PHASE** In which impact is anticipated	**SIGNIFICANCE** if not mitigated	**MITIGATION TYPE**[16] (modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc) E.g. Modify through alternative method. Control through noise control Control through management and monitoring through rehabilitation	**SIGNIFICANCE** if mitigated
Summary of Socio-Economic Impacts and Risks						
All activities involving employment and procurement of goods and services	The development will create around 790 and 1092 direct employment opportunities in the construction and operational phase respectively. Many more indirect employment opportunities will also be created. Implementation of the commitment to maximise local employment wherever	Socio-Economic Environment	All Phases	Medium-High '+'	Enhance through implementation of the SLP	High '+'

[16] Please refer to the EMPr for details of the mitigation measures

	practicable will increase the significance of this positive impact					
All activities involving employment and procurement of goods and services	Procurement of local goods and services by the mine, employees and contractors will stimulate local business and create opportunities for entrepreneurship. In addition, implementation of the seven agreed LED projects committed to in the SLP will have a significant positive impact for the broader community	Socio-Economic Environment	All Phases	Medium-High '+'	Enhance through implementation of the SLP	Medium-High '+'
All activities involving employment and procurement of goods and services	Implementation of the HRD programme, as described in the SLP is expected to result in skills transfer, career progression, re-skilling and improved levels of literacy in the community as a whole	Socio-Economic Environment	All Phases	Medium-High '+'	Enhance through implementation of the SLP	High '+'
All activities involving employment and procurement of goods and services	The development of housing and direct and indirect mine investment in new/upgraded community infrastructure such as roads and potable water will have a positive impact for residents in Prieska and Copperton	Socio-Economic Environment	All Phases	Low-Medium '+'	Enhance through implementation of the SLP	Medium-High '+'
All activities involving employment and procurement of goods and services	The procurement of goods and services by the mine, employees and contractors will result in an increased demand for various goods	Socio-Economic Environment	All Phases	Low-Medium '-'	Control through planning	Low-Medium '-'

	and services in Copperton and Prieska. This may result in conditions of hyperinflation. The impact is expected to be temporary as market forces respond and the gap between supply and demand narrows. The planned phasing in of housing in Prieska will also mitigate this impact					
All activities involving employment and procurement of goods and services	An influx of people seeking employment can be expected during the construction phase especially. This will place additional demand on municipal services in Prieska and Copperton such as public safety, health care, water, sanitation, and housing. The impact can be mitigated through cooperative planning with the SLM	Socio-Economic Environment	All Phases	Low-Medium '-'	Control through planning. See detailed mitigation measures	Low-Medium '-'
All activities involving employment and procurement of goods and services	Disruption of social patterns within the Prieska and Copperton communities may occur, especially during the construction phase. This may be amplified if there is tension between locals and foreign nationals and/or racial or cultural differences. Human health impacts from diseases like HIV/AIDS can also occur as a result of a change in social dynamics. The impact can be mitigated through the	Socio-Economic Environment	All Phases	Medium-High '-'	Control through planning. See detailed mitigation measures	Low - Medium '-'

	housing strategy cooperative planning with the SLM and community leaders					
All mine-related activities	Minor, major and fatal injuries from potential mine health and safety incidents. There are multiple health and safety risks associated with surface and underground mining, ore processing and movement of man and materials. In addition, the mine will store and handle various hazardous substances including explosives. Implementation of a comprehensive health and safety management programme and adherence to legislation governing mine health and safety requirements will mitigate this impact	Socio-Economic Environment	All Phases	High '-'	Control through planning design and operational controls	Low - Medium '-'
All mine-related activities	Increased levels of crime may be experienced in the area as a result of the influx of people seeking employment. Contact crimes may result in injuries and in severe cases, fatalities	Socio-Economic Environment	All Phases	Medium-High'-'	Control through planning, design and operational controls	Low - Medium '-'
All mine-related activities	The mining will generate royalties in accordance with the MPRDA, payable to the national government. Furthermore, the development of the site and connection to municipal services will result in the	Socio-Economic Environment	Construction and Operational	Low-Medium '+'	No mitigation identified	Low-Medium '+''

	payment of rates and taxes to the SLM					
All mine-related activities	Minor, major and fatal injuries to community members from health and safety incidents like vehicle collisions, fire and other incidents. The pre-mitigation impact significance rating is High because of the potential human health and property damage consequences of a community safety incident, which may include loss of life. The post-mitigation impact significance rating is Low due to the ability to prevent these impacts through adherence to the relevant legal requirements on mine health and safety and the mitigation measures in the EMPr	Socio-Economic Environment	All Phases	High '-'	Control through planning design and operational controls	Low '-'
All mine-related activities	Decommissioning and closure of the mine will have a negative impact on those employed, the families they support and the businesses which provide services to the mine. The impact of closure can be mitigated through the implementation of the measures in the SLP, including regular, consultative review of closure strategies and the portable skills / re-skilling programme	Socio-Economic Environment	Decommissioning and Closure	Medium-High'-'	Control through planning and implementation of the SLP. See detailed mitigation measures	Low - Medium '-'

Summary of Groundwater Impacts and Risks						
Mine dewatering	Lowering of groundwater levels in private boreholes, thus affecting the performance of the boreholes that fall within the dewatering cone	Groundwater	Construction and Operational	Medium-High'-'	Monitor through groundwater monitoring programme Replace boreholes affected by dewatering	Low - Medium '-'
Underground and open cast mining	Contamination of groundwater in private boreholes, making the groundwater unfit for use	Groundwater	Operational	Medium-High'-'	Control through design and operational controls Monitor through groundwater monitoring programme	Low - Medium '-'
New TSF	Contamination of groundwater in private boreholes, making the groundwater unfit for use	Groundwater	Operational	Low - Medium '-'	Control through design and operational controls Monitor through groundwater monitoring programme	Very Low '-'
Underground and open cast mining	Contamination of groundwater in private boreholes, making the groundwater unfit for use	Groundwater	Closure and Decommissioning	Low '-'	Control through design and operational controls Monitor through groundwater monitoring programme	Very Low '-'
New TSF	Contamination of groundwater in private boreholes, making the groundwater unfit for use	Groundwater	Closure and Decommissioning	Low - Medium '-'	Control through design and operational controls Monitor through groundwater monitoring programme	Very Low '-'
Summary of Air Quality Impacts and Risks						

All construction-phase activities which generate particulate emissions	Elevated PM10 and PM2.5 Concentrations	Air quality	Construction	Medium-High'-'	Control through design and operational controls	Low - Medium '-'
Excavations, Site Clearance and Transportation	Elevated dust fall levels	Air quality	Construction	Low - Medium '-'	Control through design and operational controls	Low - Medium '-'
All operational-phase activities which generate particulate emissions	Elevated PM10 and PM2.5 Concentrations	Air quality	Operational	Medium-High'-'	Control through design and operational controls	Low - Medium '-'
Mining, Material Handling and Transportation	Elevated dust fall levels	Air quality	Operational	Medium-High'-'	Control through design and operational controls	Low - Medium '-'
Summary of Terrestrial Ecology Impacts and Risks						
Clearing of Vegetation for Site Access, Infrastructure Siting and Mining of Open Pit	Loss of Natural Habitat of High or Moderate Biodiversity Value	Terrestrial flora	Construction and Operational	High '-'	Avoid / minimise through design and operational controls	High '-'
Clearing of Vegetation for Site Access, Infrastructure Siting and Mining of Open Pit	Loss of Conservation Important Plant Species	Terrestrial flora	Construction and Operational	High '-'	Avoid / minimise through design and operational controls	Low - Medium '-'
Clearing of Vegetation for Site Access, Infrastructure Siting and Mining of Open Pit	Introduction/proliferation of alien invasive species	Terrestrial flora	Construction and Operational	High '-'	Avoid / minimise through design and operational controls	Low - Medium '-'
All staff activities that take place outdoors	Increased utilisation of plant and animal resources as a result of an influx of people into the study area	Terrestrial flora / fauna	Construction and Operational	Medium-High'-'	Avoid / minimise through design and operational controls	Low '-'
Construction/ Operation activities (Disturbances, vegetation Clearing, Accidents, Access Roads)	Disturbance/Loss of Fauna Species	Terrestrial fauna	All phases	Medium-High'-'	Avoid / minimise through design and operational controls	Low - Medium '-'
Construction/ Operation activities (Disturbances, vegetation Clearing, Accidents, Access Roads)	Loss of Faunal Habitat	Terrestrial fauna	All phases	Medium-High'-'	Avoid / minimise through design and operational controls	Low - Medium '-'

Construction/ Operation activities (Disturbances, vegetation Clearing, Accidents, Access Roads)	Introduction/Invasion of Alien Fauna and Spread of Diseases	Terrestrial fauna	All phases	Low - Medium '-'	Avoid / minimise through design and operational controls	Low '-'
Summary of Surface Water Ecosystems Impacts and Risks						
All construction-phase activities	Destruction of habitat	Surface water ecosystems (non-perennial watercourses and wetlands/pans)	Construction	Low - Medium '-'	Avoid / control through design and operational controls	Very Low '-'
All construction and operational phase activities	Fragmentation of interconnected habitat	Surface water ecosystems (non-perennial watercourses and wetlands/pans)	Construction and Operational	Low - Medium '-'	Avoid / control through design and operational controls	Very Low '-'
All site activities	Vegetation disturbance that induces invasion of exotic flora	Surface water ecosystems (non-perennial watercourses and wetlands/pans)	All phases	Low - Medium '-'	Avoid / control through design and operational controls	Very Low '-'
All site activities	Soil erosion	Surface water ecosystems (non-perennial watercourses and wetlands/pans)	All phases	Low - Medium '-'	Avoid / control through design and operational controls	Very Low '-'

All site activities	Contamination of surface water resources	Surface water ecosystems (non-perennial watercourses and wetlands/pans)	All phases	Low - Medium '-'	Avoid / control through design and operational controls	Very Low '-'
Summary of Soils and Land Use Impacts and Risks						
All construction phase activities	Disturbance/Loss of soil resources as a result of construction activities	Soils	Construction	Medium-High '-'	Avoid / minimise through design and operational controls	Low - Medium '-'
All construction and operational phase activities	Ineffective housekeeping and management of stockpiles and exposed soils resulting in additional disturbances/ losses of soil due to erosion as well as contamination	Soils	All phases	Medium-High '-'	Avoid / minimise through design and operational controls	Low '-'
Continued Activities Including Mining and Transportation	Increased/ decreased sediment loads on downstream systems	Soils	All phases	Medium-High '-'	Avoid / minimise through design and operational controls	Low - Medium '-'
Stripping of Soils, Clearing of Vegetation and Stockpiling of Materials	Disturbance/Loss/Sterilisation of inherent land capability and land use	Land Capability / Land Use	All phases	Medium-High '-'	Avoid / minimise through design and operational controls	Low '-'
Continuous Clearing, Disturbance, Laydown, Stockpiling and Transportation	Loss of land services, ecosystem support and services	Land Capability / Land Use	All phases	Medium-High '-'	Avoid / minimise through design and operational controls	Low '-'
Summary of Noise Impacts and Risks						
Blasting, mining operations, construction of surface	Noise impacts generated may impact on the social environment, especially	Noise	All phases	Low-Medium '-'	No communities are expected to be affected by the noise from	Low '-'

infrastructure, haulage and decommissioning	communities adjacent to the mining area				construction and operational phase activities. Avoid / minimise through design and operational controls	
Summary of Traffic and Road Safety Impacts and Risks						
Movement of Man and Materials	Heavy vehicles may cause damage to the road surface	Traffic and Road Safety	Construction and Operational	High'-'	Avoid / minimise through planning, design and operational controls Limiting the number of heavy vehicles and heavy vehicle weight Road maintenance plan needs to be prepared in conjunction with the relevant road authority	Medium-High'-'
Movement of Man and Materials	Need for additional lanes due to road capacity	Traffic and Road Safety	Construction and Operational	Low '-'	No mitigation required in terms of road capacity	Low '-'
Movement of Man and Materials	Vehicles making right-turn movements at intersections	Traffic and Road Safety	Construction and Operational	Medium-High'-'	Avoid / minimise through design and operational controls Dedicated turning lanes will neutralise the impact of turning vehicles	Low '-'
Movement of Man and Materials	Vehicles may reduce road safety due to reduced speed of the heavy vehicles entering fast flowing traffic	Traffic and Road Safety	Construction and Operational	Medium-High'-'	Avoid / minimise through design and operational controls	Low '-'

					Acceleration lanes will neutralise the impact of heavy vehicles	
Movement of Man and Materials	Slow vehicles on the R357 may cause other road users to speed up to overtake these vehicles. Speeding vehicles will reduce road safety	Traffic and Road Safety	Construction and Operational	Low - Medium '-'	Investigation by road authority should be conducted to determine requirements	Low - Medium '-'
Movement of Man and Materials	Loading and offloading of workers along roads at the mine access intersection may reduce road safety	Traffic and Road Safety	Construction and Operational	High '-'	Avoid / minimise through planning, design and operational controls Public transport loading and offloading bays to be provided on site	Low '-'
Summary of Blasting Impacts and Risks						
Blasting	Blast-induced ground vibration damage to buildings closer than 500 m from blasting resulting in minor damage to buildings (real or perceived by building owners) in the form of cracks in walls	Structural damage	Operational	Low - Medium '-'	Avoid / minimise through design and operational controls	Low - Medium '-'
Blasting	Blast Induced Damage to Boreholes resulting in a loss of water perceived to be caused by blasting induced vibration	Structural damage / loss of access to a water resource	Operational	Low '-'	Avoid / minimise through design and operational controls	Low '-'
Blasting	Damage to structures or injury to people closer than 1000 m from fly rock resulting in serious to fatal injury or damage to property and infrastructure caused by uncontrolled fly rock	Structural damage / health and safety	Operational	Medium-High'-'	Avoid / minimise through design and operational controls	Low '-'

Blasting	Complaints or minor damage to buildings and structures caused by high air blast levels.	Structural damage / health and safety	Operational	Medium-High'-'	Avoid / minimise through design and operational controls	Low '-'
Blasting	Accumulation of dissolved nitrates in the water system causing an increase in algal and weed growth in waterways	Ground and surface water quality	Operational	High '-'	Avoid / minimise through design and operational controls	Low '-'
Summary of Heritage Impacts and Risks						
Construction & Operation (Clearing, Mining, Stockpiling, Transportation)	Disturbance/Loss of Significant Archaeological or Cultural Heritage Sites/Remains	Archaeology, palaeontology, and cultural heritage	All phases	Low '-'	Maintain / monitor through implementation of chance-find procedure	Very Low '-'
Summary of Impacts to Geology						
Clearing of Areas for Site Access, Infrastructure Siting, Mining of Open Pit and Development of the TSF and WRD	Sterilisation of mineral resources	Geology and Mineral Resources	All phases	Medium-High'-'	Avoid / minimise through design and operational controls	Low '-'
Summary of Impacts to Topography						
Clearing of Areas for Site Access, Infrastructure Siting, Mining of Open Pit and Development of the TSF and WRD	Permanent, localised change in topography due to the development of the open pit and mine residue deposits	Geology and Mineral Resources	All phases	Low - Medium '-'	Avoid / minimise through design and operational controls	Low '-'

16 SUMMARY OF SPECIALIST REPORTS

Several specialist studies were undertaken to inform the impact assessment. The findings of these studies are summarised in Table 16-1.

The complete specialist reports are provided in Appendix 10.

TABLE 16-1: SUMMARY OF SPECIALIST REPORTS

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (MARK WITH AN X WHERE APPLICABLE)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
Terrestrial Ecology	**Loss of untransformed Natural Habitat and indigenous plant species resulting from clearing of vegetation for site access, infrastructure siting and mining of open pits** Arid zone shrublands can be extremely difficult habitats to restore after degradation has taken place, and it is highly unlikely that measures such as topsoil storage and relocation of dominant plant species will result in successful habitat restoration in the closure and decommissioning phases of the project. Avoidance is thus the preferred mitigation option as follows: Avoid TSF Option 2 by selecting either TSF Option 1 or 3, which are already in degraded or modified habitat. Minimum vegetation clearance should be ensured by clearing only those areas that are utilised for infrastructure construction, mining areas and entries and waste dumping activities. A "permit to clear" procedure should be established in order to control and monitor vegetation clearance. Close monitoring of all movements of equipment, site personnel and workers should be carried out so as to minimize unauthorised activities in any part of the project area. **Loss of plant species of conservation importance** The footprints of the proposed TSF Option 2 and both Borrow Pit options need to be carefully surveyed by an experienced botanist at an optimal time of the year and the location of all significant protected species need to be marked and recorded on a GPS;	X	Section 7 Section 18 Section 19 Section 20 Section 21 Section 22 Part B-EMPr

	Those species that can be removed, e.g. succulents such as *Hoodia*, *Anacampseros* or *Euphorbia* species, should be removed under the supervision of a botanist with horticultural experience and relocated to representative habitat as close to the original location as possible. **Introduction/proliferation of alien invasive species due to construction and operational activities at the mine** An invasive alien plant management program will need to be set up as part of the mine's Environmental Management Plan (EMP). The objective of this program should be the continuous eradication of existing invasive populations and the detection of new populations, particularly in newly or constantly disturbed areas such as roadsides. A small team of labourers should be trained in the identification of the key invasive alien plant species, as well as the safe and effective use of relevant herbicides on these species. The team should be equipped with adequate equipment such as knapsack sprayers, which should be stored in a safe location with the herbicides. Careful records should be kept of areas cleared of invasive aliens and the success of follow-up operations, so that the program can be audited as part of the overall EMP audit. **Illegal utilisation of plant and animal resources** Staff should be accommodated off-site as much as possible, reducing the risk of illegal harvesting taking place after hours. Labour supervisors and SHE officials should monitor the activities of labourers when working away from infrastructure in natural habitat. Part of staff induction should be awareness of the consequences of being caught harvesting plant / animal resources. **Disturbance/loss of fauna species due to construction and operational activities** Continuous Environmental Awareness raising and training to employees and surrounding communities will be crucial; this should involve an induction training program, where appropriate conservation principles, safety procedures, snake bite avoidance and		

	first aid treatment are taught through the use of easy-to-understand study material. Designated staff must be trained to be able to safely capture and relocate potentially dangerous snake species. Strict measures for speed control should be instituted on all roads within the lease area. The measures should include erection of speed control humps in respective areas, installation of traffic signs in selected areas warning drivers of road humps, pedestrian crossings, sharp bends and other accident-prone areas, with regular training and awareness raising of all drivers on site on speed control and enforcing a maximum speed limit of 50 km/h on all mine roads. All staff operating motor vehicles must undergo an environmental induction training course that includes instruction on the need to comply with speed limits, to respect all forms of wildlife and to prevent accidental road kills of fauna. Road mortalities should be monitored by both vehicle operators (for personal incidents only) and an Environmental Control Officer (all road kill on periodic monitoring basis as well as specific incidents) with trends being monitored and subject to review as part of the monthly reporting. Monitoring should occur via a logbook system where staff members take note of the date, time and location of the sighting/ incident. This will allow determination of the locations where the greatest likelihood exists of causing a road mortality and to develop mitigations for these areas. Excavations must be left open for as short a time as possible to avoid trapping herpetofauna and causing habitat fragmentation (open trenches preventing migration/dispersal). All open excavations especially linear trenches must have at least one of the long sides constructed in such a way that it slopes with an angle of less than 45° to allow for animals to crawl out. If not possible, then periodic (< 10 m apart) places for herpetofauna to crawl out (soil slopes < 45°) should be provided temporarily until the excavation is filled in.		

	Any trapped herpetofauna unable to escape an excavation should be captured by a trained person and safely relocated to suitable nearby habitat. Design, construction and operation of all facilities should focus on the lowest levels of disturbance, i.e. using non-reflective paints in tones that will blend in with the surrounds, low wattage/coloured lighting pointing away from wildlife habitat and using natural vegetation as buffers around mining activities. All noise generating activities should be mitigated to be within legal noise limits as part of Noise Control Action Plan; this plan should detail monitoring protocols, corrective and preventative measures such as silencers and enclosure of high-noise facilities/infrastructure, as well as the continuous monitoring of these measures to ensure they are effective in minimising disturbance to the surrounding fauna. All contaminated water storage facilities, e.g., TSF, storm water collection ponds in areas with potential for contamination, sedimentation ponds and others should be fenced to keep the fauna out. Minimum vegetation clearance should be ensured by clearing only those areas that are utilised for infrastructure construction, mining areas and entries and waste dumping activities. A "permit to clear" procedure should be established in order to control and monitor vegetation clearance. Close monitoring of all movements of equipment, site personnel and workers should be carried out so as to minimize unauthorised activities in any part of the project area. **Introduction and invasion of alien fauna** This impact can largely be avoided by adherence to standard waste management principles; a comprehensive waste management programme, which should deal with issues such as location of landfills, methods of waste disposal, etc, should be compiled as part of the EMP.		

	Conclusion None of the habitat within which the infrastructure options are located is potential Critical Habitat and none of the infrastructure options are considered to be fatally flawed from an ecological perspective. However, the significance of several impacts described in section 6 can only be well mitigated through avoiding the least favourable infrastructure options, particularly TSF Option 2 and the Northern Borrow Pit option. If these two options are the ones that are chosen for development, then the impact significance will remain High. We cannot find a basis for objecting to the project being authorised, particularly since vast areas of similar habitat are present on adjacent properties and the impact footprint according to current plans will be relatively limited		
Groundwater	**Seepage** Even though the deeper rock formations in the immediate vicinity of the underground workings and the shallow aquifers around the sinkholes are dewatered, groundwater seepage may still take place during opencast mining, especially during the wet season. Model simulations suggest that seepage to the pits may vary between 0,2 and 12,6 l/s, but would be around 2 l/s on average. Underground mining to the +105 Level may also experience groundwater seepage. As these rock formations are expected to be weathered and fractured, the rate of groundwater seepage may be higher compared to deeper mining areas. The high seepage rate of 378l/s obtained for the higher literature-based permeability values is not considered realistic. It is thought that groundwater seepage at this mining depth would be closer to the average 8 – 9l/s, but may be lower, closer to the minimum value, considering the impact of historical mine dewatering. The rate of groundwater seepage to the deep mining areas is expected to be very low, as these rock formations are most probably tight, thus not transmitting significant volumes of groundwater. Model simulations suggest that the rate of seepage may vary between 1 and 114 l/s. As discussed above, the high seepage rate, based on literature-based rock permeability values, is thought to be	X	Section 7 Section 18 Section 19 Section 20 Section 21 Section 22 Part B-EMPr

	unrealistic and should be disregarded. The rate of groundwater seepage will probably be closer to the average value of 5 l/s. **Dewatering** The cone of depression in the upper fractured rock aquifer is expected to be fault controlled. The drawdown cone may therefore extend up to 1200m from the underground mining area in a southeasterly direction. West and east of the mining area, the cone of depression is not expected to extend further than 600m from the mining area. Seven boreholes fall within the zone of impact. Private boreholes 124BH8 and 103 as well as monitoring boreholes OCOW084 and 94 are located close to the edge of the simulated cone of depression. It is possible that the impact of mine dewatering could affect these boreholes during mining and it would therefore be prudent to include these in the monitoring programme to ensure that adverse impacts are picked up early. **Impact on Groundwater Quality – Historical TSF** The impact of the historical TSF is not well understood at present. Two of the three boreholes (OCOW82 and 83) drilled down gradient of the facility yielded groundwater quality with elevated sulphate concentrations. The impact of the toe paddocks present down gradient of the historical TSF is most probably reflected in the groundwater quality of OCOW081, which yielded lower sulphate concentrations compared to the other two boreholes. Analysis of water ponding in the toe paddocks yielded very high sulphate concentrations. How this water impacts on groundwater quality is therefore not clearly understood. Based on the available dataset, the Sulphate concentrations exceeding 500 mg/l are not expected to migrate more than 600 m from this facility during the operational phase due to the low permeabilities of the unfractured gneiss. The fractures mapped underneath the facility may however act as preferential flow paths to groundwater, as indicated. Simulations based on the available dataset suggest that the cone of depression as a result of mine dewatering is not expected to extend to the historical TSF during the operational phase of mining. For this		

	reason, it is unlikely that contaminated groundwater associated with the historical TSF would be reversed towards the underground mine and would flow into the working. It is unlikely the groundwater quality will be affected in any of the private boreholes identified during the operational phase of mining. **Impact on Groundwater Quality – Proposed New TSF** The new TSF, effluent dam and the PCD will be lined with HDPE and will be designed to meet the requirements of GN704. As such, these facilities are not expected to leak or spill during the operational phase, which should eliminate contamination of the underlying aquifers. Model simulations indicate that if the liner at TSF 2 leaks, that sulphate concentrations would not increase to above 500 mg/l in the upper fractured rock aquifer during the operational phase of mining. This is due to the low rate at which the liner is expected to leak and the significant vertical distance (~18m) over which contamination must travel from surface to reach this aquifer. None of the private boreholes will be impacted by groundwater contamination originating from the PCM operations during the operational phase for the new TSF. **Impact on Groundwater Quality - Void Stabilisation / Backfilling** The effect of backfilling the mining voids with various combinations of waste rock, tailings and cement would be a reduction in permeability of the formations in the mining area. There is currently no information available to quantify the modified permeability of the backfilled areas, as backfilling options have not yet been finalised and the affected areas are not delineated. As such, it is not possible to include this impact to any level of confidence in the groundwater modelling. It is noted that this backfilling will reduce the seepage of groundwater to the opencast and shallow mining areas. This activity is not expected to adversely impact on underground water quality, as the water that will drain from backfilled areas will be removed to surface.		

	Should additional information become available once this option is finalised, it is recommended that the modelling is updated and the report amended accordingly. **Groundwater Level Recovery Following Mine Closure** It is estimated that groundwater levels would take up to 100 years to fully recover. During this time, groundwater levels will be reversed towards the mine, thus preventing significant contamination of the aquifers around the underground workings. It is unlikely that groundwater levels would fully recover, based on the current level of flooding and the low permeabilities of the rock formations intersected. **Long-Term Impact on Groundwater Quality – New TSF and Mining** If the new TSF is lined and the liner remains intact, no groundwater contamination is anticipated. Groundwater contamination associated with the historical underground workings are also not expected to migrate significantly post closure, as groundwater levels will remain reversed towards the mine as groundwater levels rebound after mine closure. No private boreholes fall within the delineated long-term zone of influence on groundwater quality associated with TSF2 and the PCM mining area. **Long-Term Impact on Groundwater Quality – Historical TSF** The impact of the historical TSF will most probably result in the most significant long-term impacts. The fault present underneath the facility is expected to act as a preferential flow path to groundwater. The sulphate plume may migrate up to 1 km along the fault from the facility during the simulation period. Contamination may also migrate up gradient of the historical TSF in a southeasterly direction along this fault due to the mound in groundwater that forms as a result of recharge from the facility. No private boreholes fall in the zone of influence, but it is possible that BH10 and 116BH9 may be impacted on, as these boreholes may fall on the fault structure mapped in this area.		

	Risk of Decant Decant from mining areas refers to the day lighting of mine void water on surface, most often in the long-term. At mine closure, active mine dewatering ceases and groundwater levels start to recover. The available dataset suggests that groundwater levels will most probably not recover to surface in the long-term and decant from the mining area is therefore not expected. **Groundwater Monitoring Programme** ➲ Implement a management plan aimed at reducing and/or eliminating adverse impacts on the receptors identified. These include existing private groundwater users. ➲ Track and record the progress of implementation of all groundwater management measures. ➲ Implement sufficient monitoring procedures to measure the effectiveness of groundwater management measures in both mine monitoring and private boreholes located within the delineated zones of influence. ➲ Analyse the information obtained from all monitoring programmes against compliance targets to establish trends. ➲ Should the trends indicate adverse impacts on groundwater levels and/or quality, implement suitable measures within the shortest possible time to remediate and/or eliminate such adverse impacts identified.		
Soils, Land Capability and Land Use	Most soils are highly disturbed and only small patches are relatively undisturbed in the areas of the old tailings and at the retaining dam. Properties like clay content and erosion susceptibility to erosion is highly dependent on the parent material. In the case of this site the tillite/mudstone can give rise to soils susceptible to erosion when exposed. Exposed surfaces should therefore be limited or prevented. It should be covered with any crop or rock, even for short periods. Red/yellow apedal, freely drained soils with a high base status is present in the largest part of the PCM Project area. The Ah93 soil	X	Section 7 Section 18 Section 19 Section 20 Section 21 Section 22 Part B-EMPr

	group occupies a large percentage of land in the south of the site. The soils are shallow (less than 450mm deep) and of low agricultural potential and have rock, weathered rock or calcrete as underlying material. Clay contents are generally less than 15 % and may therefore be susceptible to wind erosion. Soils should always be kept covered with plants or crops to prevent erosion. The profile (plant) available water content of 0 and 40 mm also indicates soils of low potential in the entire Project area. The area can be classed in land capability class III: Soils not suitable for arable agriculture, but suitable for grazing. Soil samples at the historical concentrate drying pads have very low pH values giving rise to elevated Cu, Zn and Fe values. An application of 2 ton/ha lime is recommended in the indicated areas to avoid further built-up of micro-elements. The presence of the underlying calcrete will fortunately restrict the acid mine drainage. Without the presence of the calcrete, acid mine drainage can give rise to pollution of groundwater especially in this area with low clay contents. According to the desktop study, there is no peat or soils with a high potential agricultural value within the PCM Project area. Contamination of presently undisturbed top soils should be prevented as far as possible. All waste products should be dumped on previously disturbed sites. The number of roads should be restricted in order to prevent wind and/or water erosion. Position of access roads is therefore not restricted by soil properties, as long as disturbance regarding roads are kept to a minimum. From the soil properties encountered in the area it can therefore be concluded that the soils do not have high agricultural value. The negative properties of the soil are manageable.		
Geochemical Characterisation and Waste Classification	**Samples** A total of 36 samples were analysed. These consisted of six waste rock samples, sourced from existing dumps. A sample of high grade ore, from the crusher, was provided, along with calcrete from a surface trench. A surface and subsurface sample from the historical	X	Section 18 Section 19 Section 20 Section 21 Section 22

	tailings impoundment was provided. In addition, 23 drill core samples were received, covering saprolite (3 samples), Mafic Gneiss (5 samples), Felsic Gneiss (5 samples), Pegmatite (5 samples) and Amphibolite (5 samples) and 3 tailings samples (Cu rich; Zn-rich and Supergene). **Acid Base Accounting, Net Acid Generation Potential** The Mafic Gneiss, Felsic Gneiss, Pegmatite and Amphibolite material can be considered benign. The calcrete sample has a very high acid neutralising capacity, so has potential value in terms of co-disposal with material with a higher risk of acid generation. In addition, the whole rock analysis did not reveal significant enrichment with metals or metalloids that pose an environmental risk. Therefore, the dissolution of this material will not result in the liberation of hazardous metals. There is significant variability in the composition across the three saprolite samples. The liberation of elements such as copper, iron, zinc and aluminium during the water leach was significantly greater for the Sap 1 sample, but was still relatively low. As such, the environmental risk associated with the saprolite material is low. The ore sample had a particularly high sulphur grade, predominantly in the form of iron sulphides, but also copper and zinc. There was little evidence of oxidative weathering, based on the neutral pH and relatively low EC of the leachate in the deionised water leach test. This implies that despite the very high acid generating potential, this type of ore could be temporarily stockpiled on the surface without significant risk of acid release. The tailings samples generate soluble oxidation products, including iron, copper and zinc sulphates. The dissolution of these products also releases acidity, leading to the low pH and the dissolution of certain acid labile minerals, accounting for the elevated concentrations of calcium, magnesium and aluminium. The saprolite and waste rock material are generating leachate that is near-neutral or slightly alkaline, with relatively low concentrations of metals and anions. The two columns packed with low grade ore have generated fairly similar data to date.		Part B-EMPr

	Waste Classification The tailings material is considered Type 0 waste as the LCT concentrations for CN is above the LCT3 limit. The CN concentration has been set at 50ppm, as per the requirements of the Cyanide Code, in the absence of actual CN values measured in the tails samples. Further test work is underway which will include CN destruction. Once the test results become available, the classification will be updated. The waste rock material is considered Type 3 waste, due to elevated levels of Barium, Copper, Lead and Zinc in the whole rock analysis. The ore sample is considered Type 1 waste, due to elevated levels of Ba, Co, Cu, Mo, Pb and Zn. **Risk Assessment** From the above it is anticipated that the proposed mitigation measures for the disposal of the TSF material are considered adequate and that no additional measures will be required for the lining of the TSF facility. The WRD material does not pose a significant risk to the environment or neighbouring water users and a liner is not required for the disposal of the material.		
Air Quality	**Sampling** Ambient air pollutant levels in the project area are currently affected by the following emission sources: PCM exploration activities; the Alkantpan Test Range, livestock farming and existing solar PV plant facilities. AQSRs around the project site include the town of Copperton, several surrounding farmsteads, Alkantpan Test Range and existing and proposed solar PV plants. A dustfall monitoring network comprising of 18 single dustfall units has been operational since September 2017. Dustfall rates were low overall, in comparison with the NDCR, with higher dustfall rates measured during the 13 Nov to 12 Dec'17 sampling period. The average dustfall over the nine months is 77 mg/m^2/day with a highest of 942 mg/m^2/day collected.	X	Section 7 Section 18 Section 19 Section 20 Section 21 Section 22 Part B-EMPr

	Fingerprinting of dust fallout was done though ICP analysis (43 elements) from nearby exposed farmland, unpaved road, the existing TSF and the drill rigs (ore dust), as well as collected dust fallout for one month (period 13 Nov to 12 Dec'17) from the 18 dustfall locations. This was done to try and determine the origin of the dust collected in the fallout units. All samples analysed reflected similar elemental composition and it was difficult to distinguish specific source contributions to the dustfall collected. **Construction Phase Emissions - Predictive Modelling Results** The main source of emissions for PM2.5 (94%); PM10 (83%) and TSP (82%) was windblown dust from the historical TSF, the historical WRD and the topsoil stockpile followed by vehicle entrained dust from the unpaved roads (between 3% and 15%). PM2.5 daily Ground Level Concentrations (GLCs), with no mitigation in place, are likely to be in non-compliance with the current and 2030 National Ambient Air Quality Standards (NAAQSs) for a small area to the north-east and south of the proposed mining right area. Windblown dust and materials handling activities at the historical TSF would likely result in non-compliance for up to 1.6 km to the south-east of the TSF, in the direction of two of the proposed solar PV plants. With mitigation in place, the impacts reduced only slightly since the main source of impact is windblown dust from the historical TSF. Over an annual average, the GLCs were low and well within the standard. PM10 daily GLCs had similar impacting areas, with daily GLCs exceeding for a small area outside of the proposed mining right area and to the south of the historical TSF (about 1 km). There was a slight reduction in the overall non-compliance footprint due to mitigation measures. Modelled results indicated compliance with the NAAQSs for both daily and annual averages at all the AQSRs, but there is the potential for single exceedances to occur during the year at the nearest AQSR (AQSR#1). Dustfall rates due to unmitigated and mitigated construction operations were low and well below 1 200 mg/m^2/day (non-residential limit) outside the mine areas. Even when dustfall rates are		

	compared to the more stringent residential limit of 600 mg/m^2/day, compliance is achieved at all AQSRs. **Construction and Closure Phase Mitigation** Air quality impacts during construction would be reduced through basic control measures such as limiting the speed of haul trucks; limit unnecessary travelling of vehicles on untreated roads; and to apply water sprays on regularly travelled, unpaved sections and at the crushing of waste rock. When haul trucks need to use public roads, the vehicles need to be cleaned of all mud and the haul material must be covered to minimise any fly-off dust. The access road to the Project also needs to be kept clean to minimise carry-through of mud on to public roads. **Operational Phase Emissions - Predictive Modelling Results** Windblown dust from the two TSFs (historical and new) were found to be the main contributing sources to PM2.5 (88% and 97%); PM10 (66% and 94%) and TSP (55% and 92%) for both operational phases (open pit and underground mining). For both open pit and underground operations, simulated PM2.5 concentrations were similar to the construction operations but with a larger non-compliance footprint for the 24-hour (daily) SA NAAQS to the south-east of the TSFs – this is due to estimated windblown dust from both the historical and the new TSFs. Exceedances (less than 4 days in a year) are likely to occur at four of the Air Quality Sensitive Receptors [AQSRs #1 (mine contractor house); 5 (operating solar PV plant); 6 (proposed solar PV plant) & 7 (proposed solar PV plant)], with the potential for non-compliance (4 days or more in a year) at the nearest AQSR after 2030. Simulated impacts are reduced when mitigation is applied. Annual average simulated GLCs are in compliance. Unmitigated simulated PM10 concentrations were in non-compliance with the daily SA NAAQS only for a small area to the south of the proposed mining right area for the open pit mining but within compliance outside the proposed mining right area for		

	underground mining. The area to the south-east of the two TSFs (about 2.5 km) were in non-compliance for both mining phases, but within compliance at all AQSRs. Exceedances (4 days in a year) are likely to occur at the two AQSRs located south-east of the TSFs due to windblown dust. Annual averages were low and within compliance. With mitigation, impacts were reduced, with non-compliance areas restricted to the south-east of the TSFs. Single exceedances are possible at the nearby AQSRs with mitigation in place. The simulated maximum daily dustfall rates due to unmitigated and mitigated scenarios were within compliance outside the mine area but exceed the NDCR for residential areas (600 mg/m^2/day) around the two TSFs (to the south-west and south-east). No mitigation was applied to the historical and new TSFs, so the impacts remain the same for the unmitigated and mitigated scenarios. The dustfall simulations resulted in no exceedances of the NDCRs at any other AQSRs. **Operational Phase Mitigation [the control efficiencies are from (NPI, 2012)]** For the control of vehicle entrained dust it is recommended that water (at an application rate >2 litre/m2/hour), be applied. In controlling dust from crushing and screening operations, it is recommended that dust extraction be fitted to secondary and tertiary crushers, to achieve a control efficiency of up to 75%. In mitigating air quality impacts due to conveyors, it is recommended that the conveyor be fitted with a roof and covering on one of its sides. A mitigation efficiency of 65% is anticipated. (NPI, 2012). Mitigation of materials transfer points could be done using water sprays at the tip points. This should result in a 50% CE. In minimizing windblown dust from stockpile areas, water sprays should be used to keep surface material moist and wind breaks installed to reduce wind speeds over the area. A mitigation efficiency of 50 % is anticipated. (NPI, 2012). Windblown dust from the TSFs should be controlled though:		

	Vegetation on side slopes. The long-term effectiveness of suitable vegetation selected for the site will be dependent on (a) the nature of the cover, and (b) the availability of aftercare. Screens could be installed on the crest of the tailings dam walls mainly to act as wind-breaks and to reduce the potential for dust deposition on the vegetated side walls, hence curbing the growth of the grass. Rock cladding or armouring of the sides of tailings dams has been shown in various international studies to be effective in various instances in reducing wind erosion of slopes. **Ambient Air Quality Monitoring** It is recommended that the existing dustfall monitoring network as remain in place with monthly dustfall collection throughout the life of mine. **Periodic Inspections and Audits** Periodic inspections and external audits are essential for progress measurement, evaluation and reporting purposes. It is recommended that site inspections and progress reporting be undertaken at regular intervals (at least quarterly), with annual environmental audits being conducted. **Liaison Strategy for Communication with I&APs** Given the close proximity of PCM to the town of Copperton and to the surrounding Solar Plants, it is recommended that stakeholder meetings be scheduled and held at least on a bi-annual basis. A complaints register must be kept at all times. **Financial Provision** The budget should provide a clear indication of the capital and annual maintenance costs associated with dust control measures and dust monitoring plans. It may be necessary to make assumptions about the duration of aftercare prior to obtaining closure. This assumption must be made explicit so that the financial plan can be assessed within this framework.		

	Conclusion The proposed operations are likely to result in ground level PM concentrations which will exceed the daily SA NAAQS at the nearby receptors, specifically the proposed solar PV plant downwind of the two TSFs even with design mitigation measures in place. With additional mitigation measures in place (chemical suppressants on unpaved roads and controlling wind erosion through wind breaks and vegetation cover), the impacts are likely to be limited to the proposed mining right area. From an air quality perspective, the proposed project can be authorised provided that the recommended mitigation measures are applied.		
Noise	Construction and closure phase impacts are expected to be similar or slightly lower than simulated noise impacts of the operational phase. The noise levels from the project operations exceed the selected noise criteria at two sensitive noise receptors (mine contractor house and nearest operating solar PV plant) for night-time conditions with change in noise from baseline conditions expected to be 8.1 dBA and 8.4 dBA respectively during the day and 7.9 dBA and 8.6 dBA respectively during the night. According to SANS 10103 (2008); 'little' reaction with 'sporadic complaints' may be expected from the community for increased noise levels up to 10 dBA. A management and mitigation plan are recommended to minimise noise impacts from the project on the surrounding area Based on the findings of the assessment and provided the measures planned and recommended are in place, it is the specialist opinion that the project may be authorised	X	Section 7 Section 18 Section 19 Section 20 Section 21 Section 22 Part B-EMPr
Heritage	T The entire site has been transformed by mining activities from the 1970's onwards however several Middle Stone Age artefacts were found scattered over the area in varying densities. The paleontological component was independently assessed (Rossouw 2017) who concluded that the study area consist of non-	X	Section 7 Section 18 Section 19 Section 20 Section 21

	fossiliferous metamorphic rocks and superficial deposits (aeolian sand) of low to very low palaeontological sensitivity. The impact of the proposed project on heritage resources is considered low and it is recommended that the proposed project can commence on the condition that the following recommendations are implemented as part of the EMPr and based on approval from SAHRA. A condition of authorisation is that any substantial change to the layout as represented in the heritage report must be subjected to a field survey.		Section 22 Part B-EMPr
Socio-Economic	Various parties have commented to date, including government departments such as Transnet, DMR, SARAO, SANRAL and the DWS, operating and proposed solar PV plant owners, surrounding landowners and agricultural organisations. Most of the comments relate to concerns with respect to air quality (19%), road and traffic safety (13%), employment and labour (13%) and the proposed dewatering and the impact this may have on groundwater resources (13%). These were followed by comments related to Influx, crime and security (10%), impacts to wetlands and watercourses (8%) and housing (6%). Several impacts to the social environment have been assessed by the relevant technical specialists. Of most importance in this regard are the potential impacts noted with respect to dewatering of the mine on several boreholes nearest the mine site which are currently used for livestock watering, possible contamination of boreholes downgradient of the historical TSF, and the possible economic impact to solar PV plants should dust levels from mining activities result in an increased soiling potential of the solar panels. Regular review of the mitigation measures recommended for these impacts, informed by the required monitoring to be undertaken, should be undertaken to ensure that these impacts remain carefully managed. The Applicant has compiled a Social and Labour Plan (SLP) in accordance with the requirements of the Minerals and Petroleum Resources Development Act 28 of 2002 and Mining Charter II.	X	Section 7 Section 18 Section 19 Section 20 Section 21 Section 22 Part B-EMPr

	The SLP addresses the Applicant's plans for ensuring that it achieves commercial success whilst also developing its employees and community for the better and in compliance with transformation targets as stipulated in the Mining Charter II, as it may be amended and developed from time to time (Repli Trading No. 27, 2018). The proposed development has the potential to create significant employment and economic development opportunities for local communities during the construction and operational phases of the Project The mine social and labour plan has provided costed plans for optimising local employment, skills development and a commitment to implementing seven local economic development projects, identified in collaboration with the SLM. Several negative social impacts have been identified. These impacts have been assessed to be reversible and can be satisfactorily mitigated. Provided that the mitigation measures in this report and the measures in the mine social and labour plan are implemented, it is the opinion of the EAP that the authorisation may be granted. Compliance with the mitigation measures in this report should be included as conditions of the environmental authorisation.		
Traffic	No additional geometric upgrading would be required due to the proposed mining development from a capacity perspective (as long as the required road network improvements as recommended in terms of road safety are implemented), apart from the construction of the proposed access intersection (Point C) along Local Road if access option 2 is utilised for access to and from the proposed mining development. Detailed investigations should be conducted in conjunction with the relevant road authority in terms of the existing quality and potential life span of the existing road surface layers of the roads where consumables, mined product and workers will be transported. A road maintenance plan needs to be prepared in conjunction with the relevant road authority on public roads where trucks will operate	X	Section 7 Section 18 Section 19 Section 20 Section 21 Section 22 Part B-EMPr

	as soon as the project has been approved in order to ensure that the consumables, mined product and workers can be transported at all times. In conclusion of the findings as part of the investigations, Siyazi Limpopo Consulting Services (Pty) Ltd is of the opinion that the proposed mining development would have a manageable impact on the relevant roads network as long as the mitigating measures are implemented as recommended and should thus be granted authorisation.		
Surface Water / Hydrology	The Nett Mean Annual Runoff (MAR) of the non-perennial watercourse is 0.0 mil m^3.; This is due to the entire catchment area falling with an endoreic area, which is classified as a catchment area that does not contribute to mean annual runoff. Hence, this catchment only produces runoff during major storms. The existing diversion dam attenuate incoming floods significantly to ensure the 100 year flood can pass safely through the existing northern and southern diversion channels passed the mining works. The reinstatement of the existing berms and cleaning of existing channels and culverts is required to provide the necessary capacity to accommodate the 100 year flood event. The maintenance of the diversion berms / channels is necessary to maintain safe operations during flood events. For the smaller streams close to proposed TSF Option 1 and Option 2 the catchments are less than 3% of the catchment area for the northern and southern diversions combined. Hence it is expected that the floodlines of these minor streams would not exceed the width of the buffer zones.		Section 7 Section 18 Section 19 Section 20 Section 21 Section 22 Part B-EMPr
Surface Water Ecosystems (Wetlands/Pans)	The survey area includes a series of watercourses that are regarded as being barely perceptible and are regarded as mere drainage conduits that transport stormwater across the landscape during rainfall events. Few wetland features were observed within the area, which was expected because of the arid climate.	X	Section 7 Section 18 Section 19 Section 20 Section 21 Section 22

	The proposed development does have an association with a single wetland habitat unit and therefore conservation buffer zones are applicable. The wetland habitat unit associated with the proposed development area perform vital functions within the landscape and should be regarded as being ecologically sensitive features. Conservation of this habitat unit forms an integral part of the conservation of the surface water resources throughout the catchment area. The wetland associated with the site have been designated a 30 m buffer zone, which is in accordance to the industry norms.		Part B-EMPr
Blasting and Vibration	**<u>Vibration</u>** There will be a Medium Low to Medium High significance for vibration for buildings located closer than 500 m. No mitigation measures have been provided for, except that blast designs must provide for a maximum PPV level of 5.0 mm/s for privately owned structures. Air blast control will be critical to maintain the goodwill of neighbours around the mine. Without mitigation, air blast can generate serious and continuous complaints and therefore the Significance has been rated Medium High. If further air blast mitigation is necessary because of complaints from Copperton it may be necessary to delay blasting when the wind blows towards the town. **<u>Fly Rock</u>** The risk rating at the sensitive receptors has been rated as High. Fly rock is extremely dangerous and must be controlled through adequate quality stemming in each blasthole and control needs to be applied to prevent the occurrence of over-charged holes. The risk of fly rock being generated from under-burdened or structurally weak free bench faces is high, and controls must be formulated to ensure that under-burdening of free faces does not occur.	X	Section 7 Section 18 Section 19 Section 20 Section 21 Section 22 Part B-EMPr

	For safety, it will be necessary to remove all people and animals to a minimum distance of 1000 m from each blast when blasting. This will impact the staff working in the management offices on the mine. **Dust and fumes** The measures provided for air blast control also apply to dust control. Should any nitrous oxide fumes be observed during a blast, further blasting activity should be halted, and the cause of the fumes identified and corrected. Causes include poor charging practices, incorrect explosives formulation or holes that are too close together in softer formations. Excessive dust from blasting can be controlled by effective stemming application. **Water pollution** Water pollution occurs from dissolved explosives salts. To prevent this occurring, the following measures should be applied: Use water-proof explosives in the blastholes.. Provide effective bunding to contain spillages of explosives from storage silos and when transferring explosives materials to and from the silos.		
Visual	Due to the fact that there is historical mining activities there is already a visual impact on the area that has been in place for many years. This has also affected the sense of place to a more mining and industrial type of feel. The proposed mine infrastructure visual exposure is actually smaller than the existing mine. In other words the "new" visual exposure fits inside the existing visual exposure. In that sense there is no additional impact. When the existing mine infrastructure was built years ago it would have had a significant impact on the landscape integrity as the area would have been largely undeveloped. With the proposed new mine infrastructure the impact rating is adjusted downward because of the already diminished landscape integrity.	X	Section 7 Section 18 Section 19 Section 20 Section 21 Section 22 Part B-EMPr

Closure Plan	**<u>Post Closure Landuse Objectives</u>** Repli's objective for the rehabilitation and closure of the mine is to ensure that the site is left in a condition that is safe and stable where long-term environmental impacts are minimised and any future liability to the community and future land use restrictions are minimised. The final post-mining land use will be determined in consultation with the local communities, national, provincial and local spheres of government, including the Department of Mineral Resources, Department of Environmental Affairs, Department of Water & Sanitation as well as the Department of Agriculture. The likely land uses to be identified during this process are likely to Include: ➲ Areas for agriculture; ➲ Areas livestock grazing; ➲ Wilderness; and ➲ Wildlife habitat. For health and safety reasons as well as the protection of specific rehabilitations works, specific areas within the mine lease may be designated as exclusion zones. Natural soil cover and vegetation will as far as possible be re-established over these areas but access by humans and / or livestock will be prohibited. The following closure objectives form part of the conceptual closure plan: ➲ All structures not desirable or usable post closure will be demolished and building material removed or disposed of ➲ Hazardous material, equipment and contaminated soils and steel structures will be disposed of safely and in an environmentally acceptable manner ➲ The process plant and other areas used for the handling and storage of hazardous materials will be decontaminated ➲ Rehabilitation of disturbed areas to a final land use capability that is practical and best suited for the final landform, taking into	X	Section 7 Section 18 Section 19 Section 20 Section 21 Section 22 Part B-EMPr

	consideration the socio-economic activities of the receiving communities ➲ At the end of the mine life, the residual facilities will include open pits, waste rock dumps, a TSF, storm water diversion structures and supporting infrastructure **Rehabilitation and Closure Completion Criteria** The objective of the rehabilitation closure process is to restore as much as possible of the area disturbed during the operation of the development and mine to a land use as close as possible to that previously practiced before mining operations. The objective would be to maintain the balance of land use and return as much of the area disturbed to productive use **Conceptual Rehabilitation and Closure Plan** As various facilities reach the end of their period of use, the applicant will initiate rehabilitation activities concurrent with on-going mining operations. Rehabilitation activities will be undertaken during all phases of the project in order to restore the land back to a sustainable and stable condition The estimated costs of rehabilitation and closure have been structured to distinguish between concurrent rehabilitation of the mine and the works required during the decommissioning phase, closure and post closure phase. It is assumed that the rehabilitation of the mine will be carried out in conjunction with the operation of the mine and related activities by the staff employed on the mine		

17 ENVIRONMENTAL IMPACT STATEMENT

17.1 SUMMARY OF THE KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

Key findings of the impact assessment for the proposed mine development are as follows:

- Sufficient and appropriate information on the proposed development and the receiving environment was available for conducting the impact assessment;
- With mitigation measures applied, the proposed development is compatible with surrounding land uses;
- The proposed development has the potential to create significant employment and economic development opportunities for local communities during the construction and operational phases of the project;
- The mine social and labour plan has provided costed plans for optimising local employment, skills development and a commitment to implementing seven local economic development projects, identified in collaboration with the SLM;
- Several negative impacts have been identified. These impacts have been assessed to be reversible and can be satisfactorily mitigated.; and
- It is noted that the modelled impacts to groundwater and air quality demonstrate a significant impact contribution from existing structures and facilities, predominantly the historical TSF. Maintenance of this structure, as per the requirements of the existing closure certificate, will greatly assist in reducing the LOM and long-term impacts from mining.

17.2 FINAL SITE MAP

The final site map, showing the position of key infrastructure is provided in Appendix 3, Map 2.

17.3 SUMMARY OF THE POSITIVE AND NEGATIVE IMPLICATIONS AND RISKS OF THE PROPOSED ACTIVITY AND IDENTIFIED ALTERNATIVES

A summary of the positive and negative impacts and risks associated with the proposed development are provided below:

17.3.1 POSITIVE IMPACTS

Several positive socio-economic impacts have been identified:

- The development will create around 790 and 1092 direct employment opportunities in the construction and operational phase respectively. Many more indirect employment opportunities will also be created. Implementation of the commitment to maximise local employment wherever practicable will increase the significance of this positive impact;
- Procurement of local goods and services by the mine, employees and contractors will stimulate local business and create opportunities for entrepreneurship. In addition, implementation of the seven agreed LED projects committed to in the SLP will have a significant positive impact for the broader community;
- Implementation of the HRD programme, as described in the SLP is expected to result in skills transfer, career progression, re-skilling and improved levels of literacy in the community as a whole;
- The development of housing and direct and indirect mine investment in new/upgraded community infrastructure such as roads and potable water will have a positive impact for residents in Prieska and Copperton; and

- The mining will generate royalties in accordance with the MPRDA, payable to the national government. Furthermore, the development of the site and connection to municipal services will result in the payment of rates and taxes to the SLM.

Opportunities to maximise the benefits of the positive impacts should be identified throughout the LOM.

17.3.2 NEGATIVE IMPACTS

The potentially negative impacts of the development which were assessed to be of most importance[17] were as follows:

17.3.2.1 Socio-Economic

- The procurement of goods and services by the mine, employees and contractors will result in an increased demand for various goods and services in Copperton and Prieska. This may result in conditions of temporary hyperinflation;
- An influx of people seeking employment can be expected. This will place additional demand on municipal services in Prieska and Copperton such as public safety, health care, water, sanitation, and housing;
- Disruption of social patterns within the Prieska and Copperton communities may occur, especially during the construction phase;
- Minor, major and fatal injuries from potential mine health and safety incidents;
- Increased levels of crime may be experienced in the area as a result of the influx of people seeking employment;
- Minor, major and fatal injuries to community members from health and safety incidents like vehicle collisions, fire and other incidents;
- Decommissioning and closure of the mine will have a negative impact on those employed, the families they support and the businesses which provide services to the mine;

17.3.2.2 Groundwater

- Lowering of groundwater levels in private boreholes, thus affecting the performance of the boreholes that fall within the dewatering cone;
- Contamination of groundwater in private boreholes, making the groundwater unfit for use;

17.3.2.3 Air Quality

- Elevated PM10 and PM2.5 Concentrations over the LOM;
- Elevated dust fall levels over the LOM;

17.3.2.4 Terrestrial Ecology

- Loss of natural habitat of High or Moderate biodiversity value;
- Disturbance / loss of conservation important plant and animal species;
- Loss of faunal habitat;
- Introduction/proliferation of alien invasive plant and animal species;
- Increased utilisation of plant and animal resources as a result of an influx of people into the study area;

[17] Impacts with a Low-Medium, Medium-High, and High post-mitigation impact significance rating

17.3.2.5 Soils and Land Capability

- Disturbance/loss of soil resources;
- Increased/ decreased sediment loads on downstream systems;

17.3.2.6 Blasting

- Blast-induced ground vibration damage to buildings closer than 500 m from blasting;

17.3.2.7 Traffic

- Heavy vehicles may cause damage to the road surface;
- Slow vehicles on the R357 may cause other road users to speed up to overtake these vehicles. Speeding vehicles will reduce road safety; and
- Loading and offloading of workers along roads at the mine access intersection may reduce road safety.

The negative impacts were assessed to have an acceptable residual risk after mitigation measures were implemented.

In conclusion, the impact assessment has indicated that the potential negative impacts can be avoided or reduced to acceptable levels through implementation of the management measures in the EMPr.

18 PROPOSED IMPACT MANAGEMENT OBJECTIVES AND THE IMPACT MANAGEMENT OUTCOMES FOR INCLUSION IN THE EMPR

The key objectives of an EMPr are to set out the management and monitoring measures required to both minimise any potentially adverse environmental impacts and enhance the environmental benefits of the Project, and to ensure that responsibilities and appropriate resources are efficiently allocated to implement the plan.

The aspects which are considered to be of most importance to the development, including the respective management objectives and outcomes for the impacts associated with these aspects are provided in Table 18-1.

The management objectives and outcomes will be achieved through the implementation of the management actions in the EMPr.

TABLE 18-1: IMPACT MANAGEMENT OBJECTIVES AND OUTCOMES

ASPECT	MANAGEMENT OBJECTIVE	MANAGEMENT OUTCOME
Soil	➲ Manage suitable onsite soil resources for rehabilitation activities. ➲ Prevent the contamination of soil resources. ➲ Managed response to the clean-up of accidental spillages and leaks.	➲ Soil resources protected from contamination. ➲ Accidental leaks and spillages responded to rapidly and all contamination remediated in accordance with legal requirements.
Air	➲ Surrounding land users minimally affected by mine activities. ➲ Control and minimise particulate and dust emissions to air. ➲ Monitor dust fall over the LOM to ensure that any changes in dust fall rates are identified and investigated	➲ Good stakeholder relations with community members. ➲ Air emissions from the development managed in accordance with legal requirements.
Groundwater	➲ Surrounding land users unaffected by dewatering and other mine activities. ➲ Prevent the contamination of groundwater resources. ➲ Managed response to the clean-up of accidental spillages and leaks. ➲ Monitor groundwater to ensure that any changes in groundwater quality and quantity are identified and investigated	➲ Good stakeholder relations with community members. ➲ Groundwater resources protected from contamination. ➲ Accidental leaks and spillages responded to rapidly and all contamination remediated in accordance with legal requirements.
Surface water	➲ Control the flow of storm water across the site. ➲ Capture and treat dirty stormwater onsite prior to discharge. ➲ Allow for clean and dirty stormwater separation. ➲ Remain outside of the 30 m wetland buffer.	➲ Managed storm water flow. ➲ Uncontrolled release of dirty stormwater or effluent from onsite activities prevented. ➲ Wetland feature not impacted upon by mine activities.
Health and Safety	➲ Prevent criminal activities onsite.	➲ Secure and safe site.

	➲ Prevent occupational and community health and safety incidents.	
Noise	➲ Prevent noise impacts from development activities at sensitive noise receptors. ➲ Complaints which are received are properly investigated and responded to appropriately.	➲ Good stakeholder relations with community members and authorities.
Heritage	➲ Protection of heritage resources.	➲ No heritage resources damaged or destroyed during construction activities.
Traffic and Road Safety	➲ Prevent road safety incidents and limit disruptions to traffic flow. ➲ Complaints which are received are properly investigated and responded to appropriately.	➲ Damage to road surfaces minimised. ➲ Good stakeholder relations with community members and authorities.
Socio-Economic	➲ Influx is managed in a planned and peaceful manner. ➲ Support for the development by the local community is enhanced. ➲ Maximise the local economic development potential of the development.	➲ Community conflict avoided. ➲ Employment from community. ➲ Local procurement. ➲ Good stakeholder relations with community members and authorities.

19 FINAL PROPOSED ALTERNATIVES

No additional alternatives to those identified and assessed through the impact assessment process are proposed for the mine development.

20 ASPECTS FOR INCLUSION AS CONDITIONS OF AUTHORISATION

The following conditions should be included in the authorisation:

- The Applicant must continue to reassess the risks and impacts of the development throughout its operational life. Should any change in the risk and impact profile of the development be determined, additional management controls and mitigation measures must be implemented and the EMPr amended to reflect these changes;
- Any substantial change to the infrastructure site layout as represented in the heritage report must be subjected to a field survey;
- Several specialist studies have recommended the constitution of a community or stakeholder forum as a means to facilitate engagement over the LOM and provide a formal structure for the mine to share information regarding compliance, investigation of reported grievances from the community and monitoring data. The establishment of this structure should be included as a condition of the authorisation;
- The EMPr, including all management and monitoring measures must be implemented;
- An emergency preparedness and response plan must be developed by the Applicant for the site; and

- The special conditions stipulated by SARAO in their letter of 121 June 2018, which must be complied with prior to the construction phase commencing.

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

Advisory on Business and Sustainability Africa (Pty) Ltd. (ABS Africa) has prepared this report specifically for Repli Trading No. 27 (Pty) Ltd. (Repli). The contents of this report:

- Are based on the legal requirements for undertaking an Environmental Impact Assessment, as defined in the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the scope of services as defined within the contractual undertakings between Repli and ABS Africa;
- Are specific to the intended development at the proposed site. The report shall not be used nor relied upon neither by any other party nor for any other purpose without the written consent of ABS Africa. ABS Africa accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report;
- Reflect the best judgement of ABS Africa in light of the information available at the time of preparation. The analyses contained in this report has been developed from information provided by Repli and other parties. This information is not within the control of ABS Africa and ABS Africa has not audited such information and makes no representations as to the validity or accuracy thereof;
- The assessment has been based on the project description provided by the Applicant. Changes to this project description may influence the assessment and the mitigation measures in the EMPr;
- Where relevant, the impact assessment has placed reliance on the information and recommendations in the specialist studies completed for the Project. The assumptions, uncertainties and gaps applicable to each specialist study are provided in the respective specialist reports;
- It has been assumed that the respective specialists have ensured that the relevant quality control standards were applied with respect to sample collection, preparation and laboratory testing protocols, including equipment calibration; and
- The post-mitigation impact is based on the understanding that the Applicant will establish the financial and administrative framework necessary for the complete implementation of the mitigation measures outlined in the EMPr over the Life of Mine (LOM).

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

22.1 REASONS WHY THE ACTIVITY SHOULD BE AUTHORISED OR NOT

The need and desirability for the Project has been established and although several negative impacts have been identified, none of these impacts are deemed to be significant to the extent that the development cannot be regarded as consistent with the principles for sustainable development, as described in the National Environmental Management Act 107 of 1998.

Accordingly, based on the findings of the impact assessment, and with the understanding that the mitigation measures will be implemented, and the conditions of the environmental authorisation enforced by the relevant authorities, the EAP is of the opinion that an environmental authorisation for the development may be granted.

22.2 CONDITIONS THAT MUST BE INCLUDED IN THE AUTHORISATION

22.2.1 SPECIFIC CONDITIONS TO BE INCLUDED INTO THE COMPILATION AND APPROVAL OF EMPR

The Applicant must continue to reassess the risks and impacts of the development throughout its operational life. Should any change in the risk and impact profile of the development be determined, additional management controls and mitigation measures must be implemented and the EMPr amended to reflect these changes.

Any engineering and operational control measures stipulated by SARAO as necessary in terms of the SKA Project, as recorded in the letter dated 12 June 2018, are also to be included as conditions of the authorisation.

22.2.2 REHABILITATION REQUIREMENTS

The rehabilitation requirements are conceptually described in the Closure Plan, attached in Appendix 10.

23 PERIOD FOR WHICH ENVIRONMENTAL AUTHORISATION IS REQUIRED

In terms of the MPRDA, the maximum period a mining right may be issued for is 30 years, with the option to renew for another 30 years.

The planned Life of Mine (LOM) for the Prieska Zinc Copper Project based on identified mineral resources and expected extensional exploration targets is estimated at 25 years.

24 UNDERTAKING

It is hereby confirmed that the financial provisioning requirements described in the Closure Plan are applicable to the Environmental Impact Report and EMPr.

25 FINANCIAL PROVISION

25.1 EXPLAIN HOW THE AFORESAID AMOUNT WAS DERIVED

The financial provisioning was based on information currently available relating to the project layout, dimensions of the key facilities, as well as the present understanding of the post closure environmental risks associated with the project, as assessed by the various specialists.

The assessment is thus based on a conceptual closure plan, which is considered adequate for the purposes of the mining right application and associated environmental authorisation. Once the project is commissioned, the right holder is required to review and update the closure plan and associated closure cost.

The assessment has been based on the following phases that will in all likelihood apply to the project:

- Concurrent Rehabilitation: This is rehabilitation work that can be undertaken during the LOM;
- Decommissioning: Activities to be undertaken during the decommissioning phase of the project;
- Rehabilitation: Activities to be undertaken following the completion of the decommissioning phase; and
- Aftercare and Maintenance: Minor maintenance and monitoring work that may be required for 3-5 years following the completion of the closure phase of the project.

25.2 CONFIRM THAT THIS AMOUNT CAN BE DERIVED FROM THE OPERATING EXPENDITURE

In compiling and submitting their Mine Work Programme, the Applicant has confirmed that the required amount for financial provision for rehabilitation and closure can be derived from operating expenditure over the LOM.

26 DEVIATIONS FROM APPROVED SCOPING REPORT AND PLAN OF STUDY

26.1 DEVIATIONS FROM THE METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF POTENTIAL ENVIRONMENTAL IMPACTS AND RISKS

No deviations from the impact assessment methodology outlined in the Scoping Report and Plan of Study are applicable.

26.2 MOTIVATION FOR THE DEVIATION

No motivation applicable.

27 OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

In compliance with the provisions of sections 24(4) (a) and (b) read with section 24 (3) (a) and (7) of the National Environmental Management Act (Act 107 of 1998), the EIA report must include the:

(1) Impact on the socio-economic conditions of any directly affected person.

The specialist socio-economic impact assessment report is provided in Appendix 10 (2.19.1). Several positive and negative socio-economic impacts were identified. Mitigation measures have been recommended and included in the EMPr.

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

The specialist heritage impact assessment report is provided in Appendix 10 (2.19.2).

No significant heritage sites were identified by the specialist investigation. A chance find procedure is included as a mitigation measure in the EMPr.

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

All reasonable and feasible alternatives in terms of site layout, location, public participation, potential impacts and mitigation have been addressed throughout the EIR.

PART B
ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

28 DRAFT ENVIRONMENTAL PROGRAMME

28.1 DETAILS OF THE EAP

The details of the EAP are provided in Part A, Section 1 of the EIR.

28.2 DESCRIPTION OF THE ASPECTS OF THE ACTIVITY

The description of the aspects of the activity are provided in Part A, Section 1(h) of the EIR

29 COMPOSITE MAP

The broad placement of the surface infrastructure was informed by an environmental sensitivity plan which considered the location of all known sensitive physical, social and environmental features within the Mine Rights Application surface area.

The placement of the proposed site infrastructure options in relation to the identified sensitive areas is shown in Appendix 3 Map 17.

The Final Site Layout Map showing the proposed location of the mine structures and infrastructure is shown in Appendix 3 Map 2.

30 DESCRIPTION OF IMPACT MANAGEMENT OBJECTIVES INCLUDING MANAGEMENT STATEMENTS

30.1 DETERMINATION OF CLOSURE OBJECTIVES

Rehabilitation and closure of areas disturbed in mining and related operations will be considered to be complete when:

- All structures, equipment and infrastructure not consistent with the post closure land use have been decommissioned, demolished and removed from site;
- Ownership of all remaining infrastructure and services required to support the proposed post closure land use have been formally transferred to the local authority responsible for the administration of the area;
- The area has been made safe for all post closure land users and livestock;
- All surface disturbances and remaining landforms are structurally and ecologically stable and have sustainable soil and vegetation covers where applicable;
- Surface water management structures are in place and are free of damage due to erosion; and
- All surface and groundwater discharges from the site satisfy agreed target water quality objectives.

The Closure Plan for the Project (Appendix 10) indicates that in the planning and implementation stages of the Project, the focus of closure planning is to ensure that:

- The proposed post-closure land use(s) for the site are defined and agreed with the regulatory authorities and local communities;

- The cost of the works required to return the site to a condition consistent with the requirements of the post-closure land use(s) are defined and understood;
- The necessary financial provisions are made for closure in the prescribed manner and that these are included in the assessment of the project's economic viability;
- A plan is developed for the implementation of the rehabilitation and closure works to ensure that rehabilitation and restoration proceeds concurrently with mining operations wherever possible; and
- The accrual in reclamation and closure liabilities over the life of mine is limited through appropriate mine planning and concurrent rehabilitation to mitigate as far as possible the impacts of premature or unplanned closure.

30.2 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

All management actions and controls identified through the impact assessment, including the specialist studies undertaken, have been included in Table 30-1, Table 30-2 and Table 31-1.

30.3 POTENTIAL RISK OF ACID MINE DRAINAGE

A geochemical characterisation of waste rock, ore and tailings material was undertaken. The findings of this assessment are described in the Waste Classification Study Report (Appendix 10).

The study concluded that the tailings material was acid generating and would require containment. The TSF has therefore been designed with an HDPE liner.

30.4 STEPS TAKEN TO INVESTIGATE, ASSESS, AND EVALUATE THE IMPACT OF ACID MINE DRAINAGE

A geochemical and waste classification assessment as well as a detailed geohydrological assessment was undertaken for the proposed development. The assessment included an assessment of the TSF facility and the likelihood of the facility resulting in a significant impact on the groundwater quality in the area as well as impacting on groundwater users in the area.

The geochemical assessment noted the following:

- The Mafic Gneiss, Felsic Gneiss, Pegmatite and Amphibolite material can be considered benign;
- The calcrete sample has a very high acid neutralising capacity, so has potential value in terms of co-disposal with material with a higher risk of acid generation. In addition, the whole rock analysis did not reveal significant enrichment with metals or metalloids that pose an environmental risk. Therefore, the dissolution of this material will not result in the liberation of hazardous metals;
- There is significant variability in the composition across the three saprolite samples. The liberation of elements such as copper, iron, zinc and aluminium during the water leach was significantly greater for the Sap 1 sample, but was still relatively low. As such, the environmental risk associated with the saprolite material is low;
- The ore sample had a particularly high sulphur grade, predominantly in the form of iron sulphides, but also copper and zinc. There was little evidence of oxidative weathering, based on the neutral pH and relatively low EC of the leachate in the deionised water leach test. This implies that despite the very high acid generating potential, this type of ore could be temporarily stockpiled on the surface without significant risk of acid release;
- The tailings samples generate soluble oxidation products, including iron, copper and zinc sulphates. The dissolution of these products also releases acidity, leading to the low pH and the dissolution of certain

acid labile minerals, accounting for the elevated concentrations of calcium, magnesium and aluminium; and

- The saprolite and waste rock material are generating leachate that is near-neutral or slightly alkaline, with relatively low concentrations of metals and anions. The two columns packed with low grade ore have generated fairly similar data to date.

The geohydrological assessment provided for the undertaking of a hydrocensus as well as the identification of aquifer pathways that could lead to groundwater contamination associated with the establishment of the structures that may result in contamination, including the TSF and WRD facilities. The pathways include:

- Vertical flow through the unsaturated soil horizon from surface sources of contamination like the historical TSF and the effluent dam. It is noted that the new TSF, and the effluent dam will be HDPE lined and as such should not impact on groundwater quality unless they overflow or if the liners leak. The rate at which the vertical flow can take place is governed by the permeability of the soils;
- Vertical and horizontal flow through the weathered aquifer from surface sources of contamination as well as mining areas that intersect this aquifer; and
- Once the possible contamination reaches the fractured rock aquifer, the preferential flow paths would be the mapped faults. Groundwater will also flow through the rock matrix, but at much lower rates compared to the preferential pathways.

The following receptors were identified:

- Existing private groundwater users; and
- Non-perennial streams near the mining area. It is however noted that these streams are dry and this impact is therefore not anticipated to be of significance.

The geohydrological model simulations indicated that if the liner at the new TSF leaks, that sulphate concentrations would not increase to above 500 mg/l in the upper fractured rock aquifer during the operational phase of mining. This is due to the low rate at which the liner is expected to leak and the significant vertical distance (~18m) over which contamination must travel from surface to reach this aquifer.

None of the private boreholes will be impacted by groundwater contamination originating from the PCM operations during the operational phase for the new TSF.

30.5 ENGINEERING OR MINE DESIGN SOLUTIONS TO BE IMPLEMENTED TO AVOID OR REMEDY ACID MINE DRAINAGE

The geohydrological assessment provided for the lining of the TSF facility with an HDPE geomembrane as well as the establishment of a Return Water Dam (RWD) that will also be lined with the same geomembrane. The results of simulations to estimate the long-term impact of the mining operations for the preferred TSF shows that if the TSF is lined and the liner remains intact, that no groundwater contamination is anticipated in this area. No private boreholes fall within the delineated long-term zone of influence on groundwater quality associated with the new TSF and the PCM mining area. No private boreholes fall within the delineated long-term zone of influence on groundwater quality associated with the new TSF and the PCM mining area.

The model also provided for the failure of the TSF liner and assessed the impact on the geohydrology of the area. The assessment found that contaminated leachate will reach the upper fractured rock aquifer in the long-term. Sulphate concentrations may increase to above 1500mg/l immediately underneath TSF and the plume may migrate around 400 m down gradient of the facility towards the RWD. No private boreholes fall within this zone of influence.

From the above it is anticipated that the proposed mitigation measures for the disposal of the TSF material are considered adequate and that no additional measures will be required for the lining of the TSF facility. The WRD

material does not pose a significant risk to the environmental or neighbouring water users and that a liner is not required for the disposal of the material.

The ore will be stockpiled on an impermeable surface and is therefore highly unlikely to affect the surface or ground water resources of the area.

30.6 MEASURES THAT WILL BE PUT IN PLACE TO REMEDY ANY RESIDUAL OR CUMULATIVE IMPACT THAT MAY RESULT FROM ACID MINE DRAINAGE

No residual or cumulative impacts from acid mine drainage from the proposed mining activities are anticipated. The tailings material will be contained in an HDPE-lined, engineered facility and a groundwater monitoring programme will be implemented to detect any changes in groundwater quality.

30.7 VOLUMES AND RATES OF WATER USE REQUIRED FOR THE MINING, TRENCHING OR BULK SAMPLING OPERATION

The water requirements for the proposed mine development and operations are described in Section 3.3.3 and 3.3.5 of the EIR.
The conceptual mine water balance is presented Table 3-8 of Part A.

30.8 HAS A WATER USE LICENCE BEEN APPLIED FOR?

Repli Trading has submitted an Integrated Water Use Licence Application (IWULA) for all water uses pertaining to the proposed mining activities. This is discussed in Part A, Section 4 of the EIR. Further information on the various water uses is provided in the Integrated Waste and Water Management Plan (IWWMP), submitted in support of the IWULA.

30.9 IMPACTS TO BE MITIGATED IN THEIR RESPECTIVE PHASES

The mitigation measures to be implemented are summarised in the required DMR format in Table 30-1.

30.10 IMPACT MANAGEMENT OUTCOMES

The impact management outcomes are summarized in the required DMR format in Table 30-2.

30.11 IMPACT MANAGEMENT ACTIONS

The impact management actions are summarised in the required DMR format in Table 30-3.

TABLE 30-1: IMPACTS TO BE MANAGED IN THEIR RESPECTIVE PHASES

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
ADMINISTRATIVE CONTROLS					
All mining and associated activities	All phases	➲ The total surface area footprint of all proposed activities is approximately 300 ha. ➲ Around 121 ha of this is on land previously disturbed by historical mining activities.	➲ The EMPr shall be incorporated into any Environmental Management System (EMS) applicable to the site ➲ All resources required to ensure compliance with the EMPr, including budgetary, personnel and equipment shall be in place for the duration of the LOM ➲ A signed commitment to ensure compliance with the EMPr shall be obtained from Contractors appointed to undertake any of the activities on behalf of the applicant ➲ An appropriately qualified, trained and experienced person shall be designated to fulfil the compliance monitoring requirements in the EMPr ➲ The following records shall be maintained on Site: ➢ Environmental Authorisation ➢ Approved EMPr ➢ Emergency preparedness and response plan ➢ Documentation concerning compliance monitoring, environmental performance and EMPr implementation	Implementation of the mitigation measures will ensure compliance with NEMA, NEMAQA, NEMWA, MPRDA and the regulations, norms and standards promulgated in terms of these Acts	Mitigation measures are required to be implemented from the commencement of site preparation activities throughout the LOM

			➢ Record of all individuals receiving job-specific and SHE training ➢ Compliance monitoring and auditing data/reports and results of inspections conducted ➢ Approved SHE method statements ➢ Waste management records ➢ Equipment maintenance records ➢ Maintenance and inspection of all safety equipment e.g. fire extinguishers ➢ A completed and signed environmental incident/non-conformance report in respect of each reported environmental incident or nonconformity ➢ A completed and signed environmental incident/non-conformance register ➢ A completed and up-to-date external complaints and grievances form and register in respect of each external complaint received ➢ Emergency contact register ➢ A hazardous substance register		
SOCIO-ECONOMIC					
All activities involving employment and procurement of goods and services	All phases	As above	➲ Enhance positive impacts through implementation of the SLP ➲ Continue to reassess the risks and impacts of the development throughout its operational life. Should any change in the risk and impact profile of the development be determined, additional management controls and	SLP Mining Charter MPRDA IFC Performance Standards	Throughout the LOM

			mitigation measures must be implemented and the EMPr amended to reflect these changes ➲ The SLP and EMPr, including all management and monitoring measures must be implemented and compliance thereto audited by a competent independent person on an annual basis ➲ The following social management plans and procedures must be developed by the Applicant prior to construction commencing: ➲ An emergency preparedness and response plan ➲ A comprehensive mine health and safety management plan, incorporating controls for ensuring community health and safety ➲ An influx management plan developed in collaboration with the Siyathemba Local Municipality. The plan must identify responsibilities between the Applicant and the SLM for ensuring that access to municipal services such as public health, public safety, water, sanitation, power and affordable housing are available in Prieska and Copperton; ➲ A construction camp management plan which outlines access to services (water, sanitation and power) as well as policies with respect to conduct, including substance abuse ➲ A compensation policy and framework outlining the procedure to be followed for		

			the compensation of any losses confirmed to be as a result of the activities of the mine ➲ A written complaints and grievance procedure. ➲ Establish a community engagement forum for Copperton comprising of representatives of, among others, the mine management, surrounding landowners / land users, community members, authorities, and local business ➲ All relevant monitoring data with respect to air quality and groundwater must be made available to the community engagement forum ➲ An annual report on the progress of implementation of the programmes and commitments made by the Applicant in the mine social and labour plan should be provided to the community engagement forum, steering committee and all other relevant stakeholders. It is recommended that the report include feedback on relevant socio-economic indicators, to be agreed by the forum		
All mine-related activities	All phases	As above	➲ Implementation of a comprehensive mine health and safety programme ➲ Petrochemicals, oils, solvents, paints and other identified hazardous substances shall only be stored under controlled conditions. ➲ All hazardous materials will be stored in a secured, appointed area that is fenced and has restricted entry	Mine Health and Safety Act, 1996 MPRDA National Road Traffic Act SLP Mining Charter	Throughout the LOM

			➲ All applicable emergency contact details shall be confirmed and displayed at various locations across the site ➲ Speed limits for mine vehicles and personnel established ➲ Notification of relevant stakeholders when large loads are required, or road closures are to occur		
All mine-related activities	Decommissioning and Closure	As above	➲ The impact of closure can be mitigated through the implementation of the measures in the SLP, including regular, consultative review of closure strategies and the portable skills / re-skilling programme	SLP Mining Charter MPRDA IFC Performance Standards	Throughout the LOM, increasing in detail as mine closure approaches
GROUNDWATER					
Mine dewatering	Construction and Operational	As above	➲ Private boreholes that fall within the zones of impact identified for both the mine dewatering scenarios and long-term sulphate plume simulations must be included in the groundwater monitoring programme. Should monitoring information indicate adverse impacts, the Applicant must enter into negotiations with the affected landowners to negotiate alternative water supply options ➲ Modelling scenarios suggest that borehole 105 will not be affected by mine dewatering. As this is a strong borehole on which the landowner is reliant, it may however be prudent to complete a pumping test on the borehole prior to the commencement of mining to ensure that the safe yield of the borehole is confirmed for future reference. This borehole should further be included in the mine's monitoring programme as a precautionary measure	MPRDA and NEMA principles Water management measures in compliance with NWA and IWUL IWWMP NWA NEMA	Throughout the LOM in accordance with the groundwater monitoring programme

			➲ Feedback must be provided to owners of boreholes within the affected zones regarding progress made with mining activities, concurrent rehabilitation and the outcome of monitoring programmes on a quarterly basis, when groundwater monitoring will take place, to ensure that they are informed of aspects of mining that may be of significance ➲ Private boreholes destroyed during mining must be replaced by the Applicant or alternative water supply options must be negotiated with the affected landowners ➲ The numerical model used in the assessment should be updated, verified and re-calibrated on a regular basis as monitoring information becomes available in order to increase the level of confidence in modelling outcome		
Underground and open cast mining New TSF	Operational, Closure and Decommissioning	As above	➲ If preferential flow paths to groundwater are identified during mining, it is recommended that these features are characterised and quantified. Such geological structures include water-bearing fractures, faults and contact zones ➲ The conceptual model for the project area should be updated and numerical model simulations revised to include the impact of preferential flow paths on groundwater and potential pollution movement ➲ All construction vehicles, equipment and machinery shall be equipped with drip trays and spill response kits		Throughout the LOM in accordance with the groundwater monitoring programme

			➲ Hydrocarbon spillages shall be cleaned as soon as possible and no longer than one day after the spillage event ➲ Polluted soils are to be treated with appropriate absorbents or be removed from areas where incidents have occurred. This soil shall be properly contained before being disposed of at appropriately licensed waste management facilities ➲ Secondary containment e.g. drip trays appropriate to the hazardous substance shall be provided for all hazardous materials containers, at connection points and at other possible overflow points ➲ Final mine closure modelling must be prepared at least five years prior to mine closure to ensure that predictions of long-term impacts are undertaken with the highest possible level of confidence		
AIR QUALITY					
All construction-phase activities which generate particulate emissions Excavations, Site Clearance and Transportation	Construction	As above	➲ Air quality impacts during construction would be reduced through basic control measures such as limiting the speed of haul trucks; limit unnecessary travelling of vehicles on untreated roads; and to apply water sprays on regularly travelled, unpaved sections ➲ When haul trucks need to use public roads, the vehicles need to be cleaned of all mud and the haul material must be covered to minimise any fly-off dust	NEM:AQA Dust Control Regulation GNR 827 of 2013 Ambient Air Quality Standards	Throughout the LOM in accordance with the ambient air quality monitoring programme

			➲ The access road to the Project needs to be kept clean to minimise carry-through of mud on to public roads		
All operational-phase activities which generate particulate emissions Mining, Material Handling and Transportation	Operational	As above	➲ For the control of vehicle entrained dust it is recommended that water (at an application rate >2 litre/m^2/hour), be applied. Literature reports an emissions reduction efficiency of 50% ➲ Applying chemical suppressants on the unpaved haul roads a control efficiency of more than 90% is possible ➲ The concentrate drying beds should be contained inside walls or with wind shields around the area, and the tip-height of the material should be kept to a minimum ➲ In mitigating air quality impacts due to conveyors, it is recommended that the conveyor be fitted with a roof and covering on one of its sides. A mitigation efficiency of 65% is anticipated. (NPI, 2012) ➲ In controlling dust from crushing and screening operations, it is recommended that dust extraction be fitted to secondary and tertiary crushers, to achieve a control efficiency of up to 75% ➲ Mitigation of materials transfer points could be done using water sprays at the tip points. This should result in a 50% CE ➲ In minimizing windblown dust from stockpile areas, water sprays should be used to keep surface material moist. A mitigation efficiency of 50 % is anticipated (NPI, 2012)		Throughout the LOM in accordance with the ambient air quality monitoring programme

			➲ Windblown dust from the TSFs should be controlled though: ➲ Vegetation on side slopes. The long-term effectiveness of suitable vegetation selected for the site will be dependent on (a) the nature of the cover, and (b) the availability of aftercare. Multi-layer covers are frequently being used to ensure the best results (Dixon, 1997; Jewell & Newson, 1997; Ritcey, 1989). Erosion losses from grassed slopes measured by Blight (1989) was found to be in the order of 80% less compared to uncontrolled slopes ➲ Screens could be installed on the crest of the tailings dam walls mainly to act as wind-breaks and to reduce the potential for dust deposition on the vegetated side walls, hence curbing the growth of the grass ➲ Rock cladding or armouring of the sides of tailings dams has been shown in various international studies to be effective in various instances in reducing wind erosion of slopes. Cases in which rock cladding has been found to be effective in this regard generally involve rock covers of greater than 0.5 m in depth. The application of a 300 mm layer of fine rock was found to be the most successful of the non-vegetative measures, resulting in an erosion control efficiency of 90% if the base is levelled and compacted – wind erosion is considered to reduce by 100% through the addition of		

			such a rock cover (Ritcey, 1989; Jewell and Newson, 1997)		
FLORA AND FAUNA					
Clearing of Vegetation for Site Access, Infrastructure Siting and Mining of Open Pit	Construction and Operational	As above	➲ Minimum vegetation clearance should be ensured by clearing only those areas that are utilised for infrastructure construction, mining areas and entries and waste dumping activities ➲ A "permit to clear" procedure should be established in order to control and monitor vegetation clearance ➲ Close monitoring of all movement of equipment, site personnel and workers to minimize unauthorised activities in any part of the project area ➲ Those species that can be removed, e.g. succulents such as Hoodia, Anacampseros or Euphorbia species, should be removed under the supervision of a botanist with horticultural experience and relocated to representative habitat as close to the original location as possible ➲ Staff should be accommodated off-site as much as possible, reducing the risk of illegal harvesting taking place after hours. ➲ Labour supervisors and SHE officials should monitor the activities of labourers when working away from infrastructure in natural habitat. ➲ Part of staff induction should be awareness of the consequences of being caught harvesting plant resources	MPRDA NEMA NEMWA NEMBA	Throughout the LOM

Construction/ Operation activities (Disturbances, vegetation Clearing, Accidents, Access Roads)	All phases	As above	➲ Continuous Environmental Awareness raising and training to employees and surrounding communities will be crucial; this should involve an induction training program, where appropriate conservation principles, safety procedures, snake bite avoidance and first aid treatment are taught through the use of easy-to-understand study material. Designated staff must be trained to be able to safely capture and relocate potentially dangerous snake species. ➲ Strict measures for speed control should be instituted on all roads within the lease area. The measures should include erection of speed control humps in respective areas, installation of traffic signs in selected areas warning drivers of road humps, pedestrian crossings, sharp bends and other accident-prone areas, with regular training and awareness raising of all drivers on site on speed control and enforcing a maximum speed limit of 50 km/h on all mine roads. ➲ All staff operating motor vehicles must undergo an environmental induction training course that includes instruction on the need to comply with speed limits, to respect all forms of wildlife and to prevent accidental road kills of fauna. ➲ Road mortalities should be monitored by both vehicle operators (for personal incidents only) and an Environmental Control Officer (all road kill on periodic monitoring basis as well as specific incidents) with trends being monitored and subject to review as part of the monthly reporting. Monitoring should occur via a logbook system where staff members take note		Throughout the LOM

			of the date, time and location of the sighting/ incident. This will allow determination of the locations where the greatest likelihood exists of causing a road mortality and to develop mitigations for these areas. ➲ Excavations must be left open for as short a time as possible to avoid trapping herpetofauna and causing habitat fragmentation (open trenches preventing migration/dispersal). ➲ All open excavations especially linear trenches must have at least one of the long sides constructed in such a way that it slopes with an angle of less than 45° to allow for animals to crawl out. If not possible, then periodic (< 10 m apart) places for herpetofauna to crawl out (soil slopes < 45°) should be provided temporarily until the excavation is filled in. ➲ Any trapped herpetofauna unable to escape an excavation should be captured by a trained person and safely relocated to suitable nearby habitat. ➲ Design, construction and operation of all facilities should focus on the lowest levels of disturbance, i.e. using non-reflective paints in tones that will blend in with the surrounds, low wattage/coloured lighting pointing away from wildlife habitat and using natural vegetation as buffers around mining activities. ➲ All noise generating activities should be mitigated to be within legal noise limits as part of Noise Control Action Plan; this plan should detail monitoring protocols, corrective and preventative measures such as silencers and		

			enclosure of high-noise facilities/infrastructure, as well as the continuous monitoring of these measures to ensure they are effective in minimising disturbance to the surrounding fauna. ➲ All contaminated water storage facilities, e.g., TSF, storm water collection ponds in areas with potential for contamination, sedimentation ponds and others should be fenced to keep the fauna out.		
SURFACE WATER ECOSYSTEMS					
All construction- and operational phase activities	All phases	As above	➲ Any soil that is removed for trenching purposes must be stored in their respective layers and returned to the excavation in reverse order ➲ The soils must be stored outside of the wetland and buffer zones in order not to smother established wetland vegetation. Adequate site reinstatement must be implemented in order to abate the formation of erosion through modification of the surface water hydrology ➲ Silt traps and fencing should be used in areas of steeper topography (if applicable) ➲ The movement of heavy machinery within wetland zones should be limited to only single access roadways. Upon completion of the construction phase, this roadway should be ripped and/or disk ploughed to loosen the compacted soils and to allow for the establishment of vegetation within the affected areas, which should be a mixture of veld grasses typical of the surrounding area within similar habitat units	IWWMP MPRDA NEMA NEMBA GN704 CARA	Throughout the LOM

			➲ Indiscriminate habitat destruction should be avoided and the construction footprint, including service and support areas should be kept to a minimum		
SOILS, LAND CAPABILITY AND LAND USE					
All construction phase activities	Construction	As above	➲ Soils that are suitable for agricultural purposes; must be stripped and separated from the underlying plinthic material ➲ The soil depths range from 30-70 cm, but are generally shallower than 70 cm. If soil stripping is necessary, it is recommended to strip only 40-60cm of the soil. These estimates take into consideration a possible 10% topsoil loss through compaction and allow the rehabilitated areas to be returned to the pre-mining land capability, i.e. arable cropping land ➲ During the construction phase it is recommended that the topsoil be stripped and stockpiled in advance of construction activities that might contaminate the soil ➲ The stripped soils should be stockpiled upslope of areas of disturbance to prevent contamination of stockpiled soils by dirty runoff or seepage ➲ All stockpiles should also be protected by a bund wall to prevent erosion of stockpiled material and deflect water runoff	IWWMP MPRDA NEMA NEMBA GN704 CARA	Throughout the LOM
Continued Activities Including Mining and Transportation Stripping of Soils, Clearing of Vegetation and	All phases	As above	➲ Stockpiles can be used as a barrier to screen operational activities. If stockpiles are used as screens, the same preventative measures described above should be implemented to prevent loss or contamination of soil ➲ The stockpiles should not exceed a maximum height of 6m and it is recommended that the		

Stockpiling of Materials Continuous Clearing, Disturbance, Laydown, Stockpiling and Transportation			side slopes and surface areas be vegetated in order to prevent water and wind erosion and to keep the soils biologically active ➲ If used to screen operations, the surface of the stockpile should not be used as roadway as this will result in excessive soil compaction		
	Decommissioning and closure	As above	The following issues need to be taken into consideration before, during mining operations, with closure and rehabilitation: ➲ Strip all usable soil and stockpile. ➲ Vegetate long-term soil stockpiles ➲ Prevent contamination of topsoil and stockpiled soil ➲ Site all soil stockpiles upslope from any mining / development activities ➲ Position stockpiles upslope of mining areas, or as screens to restrict visibility of the mining operation provided that in doing so, the stockpile is not exposed to the risk of seepage or dirty water contamination ➲ Ensure that all stockpiles have a storm water diversion berm for protection against erosion and contamination by dirty water		
NOISE					
Blasting, mining operations, construction of surface infrastructure, haulage and decommissioning	All phases	Not Applicable	➲ All diesel-powered equipment and plant vehicles should be kept at a high level of maintenance. This should particularly include the regular inspection and, if necessary, replacement of intake and exhaust silencers ➲ Any change in the noise emission characteristics of equipment should serve as a trigger for withdrawing it for maintenance	SANS Environmental Noise Standards IFC Performance Standards	Throughout the LOM

			➲ Equipment with lower sound power levels must be selected. Vendors should be required to guarantee optimised equipment design noise levels ➲ In managing noise specifically related to truck and vehicle traffic, efforts should be directed at: ➲ Minimising individual vehicle engine, transmission, and body noise/vibration. This is achieved through the implementation of an equipment maintenance program ➲ Maintain road surface regularly to avoid corrugations, potholes etc ➲ Avoid unnecessary idling times ➲ Minimising the need for trucks/equipment to reverse. This will reduce the frequency at which disturbing but necessary reverse warnings will occur. Alternatives to the traditional reverse 'beeper' alarm such as a 'self-adjusting' or 'smart' alarm could be considered. These alarms include a mechanism to detect the local noise level and automatically adjust the output of the alarm is so that it is 5 to 10 dB above the noise level near the moving equipment. The promotional material for some smart alarms does state that the ability to adjust the level of the alarm is of advantage to those sites 'with low ambient noise level' (Burgess & McCarty, 2009) ➲ Limiting traffic to hours to between 06:00 and 18:00 ➲ Limiting activities at the rail siding, including train movement, rail car loading etc., to hours between 06:00 and 18:00		

			➲ Where possible, other non-routine noisy activities such as construction, decommissioning, start-up and maintenance, should be limited to day-time hours ➲ A noise complaints register must be kept		
TRAFFIC ROAD AND SAFETY					
Movement of Man and Materials	Construction and Operational	As above	➲ Avoid / minimise through planning, design and operational controls ➲ Limiting the number of heavy vehicles and heavy vehicle weight ➲ Road maintenance plan needs to be prepared in conjunction with the relevant road authority ➲ No mitigation required in terms of road capacity ➲ Dedicated turning lanes will neutralise the impact of turning vehicles ➲ Acceleration lanes will neutralise the impact of heavy vehicles ➲ Investigation by road authority should be conducted to determine requirements for any measures on the R357 ➲ Public transport loading and offloading bays to be provided on site	National Road Traffic Act IFC Performance Standards	Throughout the LOM
GEOLOGY					
Clearing of Areas for Site Access, Infrastructure Siting, Mining of Open Pit and Development of the TSF and WRD	Construction and Operational	As above	Avoid / minimise through design and operational controls	MPRDA	Operational
TOPOGRAPHY					

Clearing of Areas for Site Access, Infrastructure Siting, Mining of Open Pit and Development of the TSF and WRD	All Phases	As above	Minimise through design and operational controls	IWWMP MPRDA NEMA NEMBA GN704 CARA	
BLASTING					
Blasting	Operational	As above	➲ Conduct pre-blast surveys to minimise false claims and facilitate rapid resolution of situations ➲ Good public relations by ensuring both production personnel and the local community have an understanding of the nature of airblast and ground vibration. ➲ Monitor the first blasts taken to determine the site constants for the various blasting domains, to enable accurate vibration prediction. ➲ Good blast design that minimises the generation of high amplitude, low frequency air and ground waves. ➲ Correct use and emplacement of equipment to monitor and measure disturbance, with impartial analysis and archiving of records	Blast Design Specification IFC Performance Standards Mine Health and Safety Act Explosives Act	Throughout the LOM
CULTURAL HERITAGE					
Construction & Operation (Clearing, Mining, Stockpiling, Transportation)	All Phases	As above	➲ The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped and a qualified archaeologist must be contacted for an assessment of the find	SAHRA	Throughout the LOM

			➲ Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds ➲ If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager ➲ It is the responsibility of the senior on-site manager to make an initial assessment of the extent of the find, and confirm the extent of the work stoppage in that area ➲ The senior on-site manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA		
REHABILITATION AND CLOSURE					
Rehabilitation of mining area	All Phases	As above	➲ As various facilities reach the end of their period of use, rehabilitation activities must be initiated concurrent with on-going mining operations in accordance with the Closure Plan ➲ Rehabilitation activities must be undertaken during all phases of the project in order to restore the land back to a sustainable and stable condition ➲ The implementation stages of the project must focus on minimising the current and life of mine rehabilitation and closure liabilities by	IWWMP MPRDA NEMA NEMBA GN704 CARA	Throughout the LOM

			minimising the footprint of mining and related activities in order to reduce the amount of work required at closure. It is envisaged that this would be achieved by: ➲ Concurrent rehabilitation of the WRD and TSF ➲ On-going removal of waste steel and other salvageable materials from the site during operations ➲ On-going clearing of areas affected by spillages ➲ The creation of designated waste disposal areas and salvage yards ➲ Confirmation and monitoring of the geochemistry of the tailings and waste rock materials to be left on surface at the cessation of mining activities ➲ Confirmation of the geohydrology of the mined areas and also the likely quality and direction of flow of water in the workings subsequent to closure ➲ Ensuring that the necessary environmental monitoring data is collected in order to enable assessment of the extent of rehabilitation works required and the design of those works ➲ Ensuring that financial provision is made both for the concurrent rehabilitation of the site and also for the final rehabilitation and closure process. The provision will be made in the prescribed manner after consultation with the DMR and other relevant authorities		

VISUAL					
Construction of infrastructure and mine residue facilities	Construction and Operational	As above	➲ Structures that are required to be built from steel or concrete can be painted in a natural tone fitting with the surrounding environment ➲ Light faded green and tans can be used at the base of buildings, fading to lighter colours, with the top section of the buildings painted a light grey to merge with the skyline. Tall structures' roofs should be painted a 'dirty' grey or light blue. A principle to note is that lighter tones advance toward the viewer while darker tones recede from the viewer. Pure whites, blacks and bright colours should be avoided ➲ To reduce the potential of glare external surfaces of buildings and structures should be articulated or textured to create interplay of light and shade. Avoid shiny or bare metal where possible ➲ During construction of the project development, access roads will require an effective dust suppression management program, such as regular wetting and/or the use of non-polluting chemicals that will retain moisture in the road surface. Where a paved surface is required use dark paving materials that complement the natural brown colours and textures of the soil and rock in the area rather than light coloured materials i.e. concrete colours should be avoided ➲ A registered landscape architect should be consulted to advise on the use of indigenous plants to enhance biodiversity and to screen structures and break stark contrasting lines if carefully planned and positioned. Where structures are silhouetted when viewed from	NEMA MPRDA	Throughout the LOM

			public roads, the harsh lines can be broken by planting fast growing large trees ➲ Shielding of night lights can greatly reduce the sky glow by ensuring that lights have proper shielding		
SURFACE WATER					
Dewatering Mining Dirty stormwater management Ore Stockpiles Material Handling	All Phases	As above	➲ The transport, storage, use and disposal of chemicals and hydrocarbons must be carefully controlled ➲ Secondary containment facilities and pollution control structures to be provided ➲ Mine dirty stormwater must be contained in pollution control dams ➲ Stormwater management structures (i.e. berms) must be constructed to separate dirty water from clean water ➲ Water balance must be updated annually ➲ The area of surface disturbance must be minimised to that which is necessary for the mine infrastructure ➲ Monitor and maintain all clean and dirty water structures to ensure the separation of clean and dirty storm water ➲ Re-use and recycle dirty water from the pollution control dams where practical ➲ Implement an early warning system for ensuring that the pollution control dams remain compliant with the capacity, freeboard and other controls specified in GN704 ➲ All water containment structures on the site designed and maintained to accommodate a 1 in 50 year storm event.	MPRDA NEMA NEMBA GN704 CARA	Throughout the LOM

TABLE 30-2: IMPACT MANAGEMENT OUTCOMES

ACTIVITIES	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
SOCIO-ECONOMIC					
All activities involving employment and procurement of goods and services	Local employment	Socio-Economic Environment	All Phases	Enhance through implementation of the SLP	SLP Mining Charter MPRDA IFC Performance Standards
	Local economic development				
	Training and development				
	Community infrastructure development				
	Local inflation			Control through planning	SLP Mining Charter MPRDA IFC Performance Standards
	Influx of job seekers - demand on municipal services				
	Influx of job seekers - disruption in community dynamics				
All mine-related activities	Mine health and safety		All Phases	Control through planning design and operational controls	Mine Health and Safety Act, 1996 MPRDA
All mine-related activities	Security risk				SLP IFC Performance Standards
	Contribution of royalties, rates and taxes		Construction and Operational	No mitigation identified	SLP Mining Charter MPRDA IFC Performance Standards
	Community health and safety		All Phases	Control through planning design and operational controls	National Road Traffic Act SLP Mining Charter

					MPRDA IFC Performance Standards
	Mine closure and associated effects on the local economy		Decommissioning and Closure	Control through planning and implementation of the SLP	SLP Mining Charter MPRDA IFC Performance Standards
GROUNDWATER					
Mine dewatering	Lowering of groundwater levels in private boreholes, thus affecting the performance of the boreholes that fall within the dewatering cone	Groundwater	Construction and Operational	➲ Monitor through groundwater monitoring programme ➲ Replace boreholes affected by dewatering	MPRDA and NEMA principles Water management measures in compliance with NWA and IWUL IWWMP NWA NEMA
Underground and open cast mining	Contamination of groundwater in private boreholes, making the groundwater unfit for use	Groundwater	Operational	➲ Control through design and operational controls ➲ Monitor through groundwater monitoring programme	
New TSF	Contamination of groundwater in private boreholes, making the groundwater unfit for use	Groundwater	Operational		
Underground and open cast mining	Contamination of groundwater in private boreholes, making the groundwater unfit for use	Groundwater	Closure and Decommissioning		
New TSF	Contamination of groundwater in private boreholes, making the groundwater unfit for use	Groundwater	Closure and Decommissioning		
AIR QUALITY					
All construction-phase activities which generate particulate emissions	Elevated PM10 and PM2.5 Concentrations	Air quality	Construction	Control through design and operational controls	NEM:AQA

Excavations, Site Clearance and Transportation	Elevated dust fall levels	Air quality	Construction		Dust Control Regulation GNR 827 of 2013 Ambient Air Quality Standards
All operational-phase activities which generate particulate emissions	Elevated PM10 and PM2.5 Concentrations	Air quality	Operational		
Mining, Material Handling and Transportation	Elevated dust fall levels	Air quality	Operational		
FLORA AND FAUNA					
Clearing of Vegetation for Site Access, Infrastructure Siting and Mining of Open Pit	Loss of Natural Habitat of High or Moderate Biodiversity Value	Terrestrial flora	Construction and Operational	Avoid / minimise through design and operational controls	MPRDA NEMA NEMWA NEMBA
Clearing of Vegetation for Site Access, Infrastructure Siting and Mining of Open Pit	Loss of Conservation Important Plant Species	Terrestrial flora	Construction and Operational		
Clearing of Vegetation for Site Access, Infrastructure Siting and Mining of Open Pit	Introduction/proliferation of alien invasive species	Terrestrial flora	Construction and Operational		
All staff activities that take place outdoors	Increased utilisation of plant and animal resources as a result of an influx of people into the study area	Terrestrial flora / fauna	Construction and Operational		
Construction/ Operation activities (Disturbances, vegetation Clearing,	Disturbance/Loss of Fauna Species	Terrestrial fauna	All phases		

Accidents, Access Roads)					
Construction/ Operation activities (Disturbances, vegetation Clearing, Accidents, Access Roads)	Loss of Faunal Habitat	Terrestrial fauna	All phases		
Construction/ Operation activities (Disturbances, vegetation Clearing, Accidents, Access Roads)	Introduction/Invasion of Alien Fauna and Spread of Diseases	Terrestrial fauna	All phases		
SURFACE WATER ECOSYSTEMS					
All construction-phase activities	Destruction of habitat	Surface water ecosystems (non-perennial watercourses and wetlands/pans)	Construction	Avoid / control through design and operational controls	IWWMP MPRDA NEMA NEMBA GN704 CARA
All construction and operational phase activities	Fragmentation of interconnected habitat	Surface water ecosystems (non-perennial watercourses and wetlands/pans)	Construction and Operational		
All site activities	Vegetation disturbance that induces invasion of exotic flora	Surface water ecosystems (non-perennial watercourses and wetlands/pans)	All phases		
All site activities	Soil erosion	Surface water ecosystems (non-perennial	All phases		

		watercourses and wetlands/pans)			
All site activities	Contamination of surface water resources	Surface water ecosystems (non-perennial watercourses and wetlands/pans)	All phases		
SOILS, LAND CAPABILITY AND LAND USE					
All construction phase activities	Disturbance/Loss of soil resources as a result of construction activities	Soils	Construction	Avoid / minimise through design and operational controls	IWWMP MPRDA NEMA NEMBA GN704 CARA
All construction and operational phase activities	Ineffective housekeeping and management of stockpiles and exposed soils resulting in additional disturbances/ losses of soil due to erosion as well as contamination		All phases		
Continued Activities Including Mining and Transportation	Increased/ decreased sediment loads on downstream systems		All phases		
Stripping of Soils, Clearing of Vegetation and Stockpiling of Materials	Disturbance/Loss/Sterilisation of inherent land capability and land use	Land Capability / Land Use	All phases		
Continuous Clearing, Disturbance, Laydown, Stockpiling and Transportation	Loss of land services, ecosystem support and services		All phases		
NOISE					
Blasting, mining operations, construction of surface infrastructure, haulage and decommissioning	Noise impacts generated may impact on the social environment, especially communities adjacent to the mining area	Noise	All phases	➲ No communities are expected to be affected by the noise from construction and operational phase activities ➲ Minimise through design and operational controls	SANS Environmental Noise Standards IFC Performance Standards

TRAFFIC AND ROAD SAFETY					
Movement of Man and Materials	Heavy vehicles may cause damage to the road surface	Traffic and Road Safety	Construction and Operational	➲ Avoid / minimise through planning, design and operational controls ➲ Limiting the number of heavy vehicles and heavy vehicle weight ➲ Road maintenance plan needs to be prepared in conjunction with the relevant road authority	National Road Traffic Act IFC Performance Standards
	Need for additional lanes due to road capacity		Construction and Operational	No mitigation required in terms of road capacity	
	Vehicles making right-turn movements at intersections		Construction and Operational	➲ Avoid / minimise through design and operational controls ➲ Dedicated turning lanes will neutralise the impact of turning vehicles	
	Vehicles may reduce road safety due to reduced speed of the heavy vehicles entering fast flowing traffic		Construction and Operational	➲ Avoid / minimise through design and operational controls ➲ Acceleration lanes will neutralise the impact of heavy vehicles	
	Slow vehicles on the R357 may cause other road users to speed up to overtake these vehicles. Speeding vehicles will reduce road safety		Construction and Operational	Investigation by road authority should be conducted to determine requirements	
	Loading and offloading of workers along roads at the mine access intersection may reduce road safety		Construction and Operational	➲ Avoid / minimise through planning, design and operational controls ➲ Public transport loading and offloading bays to be provided on site	

GEOLOGY					
Clearing of Areas for Site Access, Infrastructure Siting, Mining of Open Pit and Development of the TSF and WRD	Sterilisation of mineral resources	Geology / mineral resource	Construction and Operational	Avoid / minimise through design and operational controls	MPRDA
TOPOGRAPHY					
Clearing of Areas for Site Access, Infrastructure Siting, Mining of Open Pit and Development of the TSF and WRD	Permanent, localised change in topography due to the development of the open pit and mine residue deposits	Topography	All Phases	Minimise through design and operational controls	IWWMP MPRDA NEMA NEMBA GN704 CARA
BLASTING					
Blasting	Blast-induced ground vibration damage to buildings closer than 500 m from blasting resulting in minor damage to buildings (real or perceived by building owners) in the form of cracks in walls	Structural damage	Operational	Avoid / minimise through design and operational controls	Blast Design Specification IFC Performance Standards Mine Health and Safety Act
	Blast Induced Damage to Boreholes resulting in a loss of water perceived to be caused by blasting induced vibration	Structural damage / loss of access to a water resource			
	Damage to structures or injury to people closer than 1000 m from fly rock resulting in serious to fatal injury or damage to property and infrastructure caused by uncontrolled fly rock	Structural damage / health and safety			
	Complaints or minor damage to buildings and structures caused by high air blast levels	Structural damage / health and safety			

	Accumulation of dissolved nitrates in the water system causing an increase in algal and weed growth in waterways	Ground and surface water quality			NWA
CULTURAL HERITAGE					
Construction & Operation (Clearing, Mining, Stockpiling, Transportation)	Disturbance/Loss of Significant Archaeological or Cultural Heritage Sites/Remains	Archaeology, palaeontology, and cultural heritage	All phases	Maintain / monitor through implementation of chance-find procedure	SAHRA
GEOLOGY					
Clearing of Areas for Site Access, Infrastructure Siting, Mining of Open Pit and Development of the TSF and WRD	Sterilisation of mineral resources	Geology and Mineral Resources	All phases	Avoid / minimise through design and operational controls	MPRDA
TOPOGRAPHY					
Clearing of Areas for Site Access, Infrastructure Siting, Mining of Open Pit and Development of the TSF and WRD	Permanent, localised change in topography due to the development of the open pit and mine residue deposits	Geology and Mineral Resources	All phases	Avoid / minimise through design and operational controls	NEMA CARA

TABLE 30-3: IMPACT MANAGEMENT ACTIONS

ACTIVITIES	POTENTIAL IMPACT	MITIGATION TYPE	TIMEFRAME FOR IMPLEMENTATION	STANDARD TO BE ACHIEVED
SOCIO-ECONOMIC				
All activities involving employment and procurement of goods and services	Local employment	Enhance through implementation of the SLP	Mitigation measures are required to be implemented from the commencement of site preparation activities throughout the LOM	SLP Mining Charter MPRDA IFC Performance Standards
	Local economic development			
	Training and development			
	Community infrastructure development			
	Local inflation	Control through planning	As above	SLP Mining Charter MPRDA IFC Performance Standards
	Influx of job seekers - demand on municipal services			
	Influx of job seekers - disruption in community dynamics			
All mine-related activities	Mine health and safety	Control through planning design and operational controls	As above	Mine Health and Safety Act, 1996 MPRDA
	Security risk			SLP IFC Performance Standards
	Contribution of royalties, rates and taxes	No mitigation identified	As above	SLP Mining Charter MPRDA IFC Performance Standards
	Community health and safety	Control through planning design and operational controls	As above	National Road Traffic Act SLP Mining Charter MPRDA IFC Performance Standards

	Mine closure and associated effects on the local economy	Control through planning and implementation of the SLP	As above	SLP Mining Charter MPRDA IFC Performance Standards
GROUNDWATER				
Mine dewatering	Lowering of groundwater levels in private boreholes, thus affecting the performance of the boreholes that fall within the dewatering cone	➲ Control through design and operational controls ➲ Monitor through groundwater monitoring programme	As above	MPRDA and NEMA principles Water management measures in compliance with NWA and IWUL IWWMP NWA NEMA
Underground and open cast mining, New TSF	Contamination of groundwater in private boreholes, making the groundwater unfit for use	➲ Control through design and operational controls ➲ Monitor through groundwater monitoring programme	As above	
AIR QUALITY				
All construction-phase activities which generate particulate emissions	Elevated PM10 and PM2.5 Concentrations	Control through design and operational controls	As above	NEM:AQA Dust Control Regulation GNR 827 of 2013 Ambient Air Quality Standards
Excavations, Site Clearance and Transportation	Elevated dust fall levels			
All operational-phase activities which generate particulate emissions	Elevated PM10 and PM2.5 Concentrations			
Mining, Material Handling and Transportation	Elevated dust fall levels			

FLORA AND FAUNA				
Clearing of Vegetation for Site Access, Infrastructure Siting and Mining of Open Pit	Loss of Natural Habitat of High or Moderate Biodiversity Value	Avoid / minimise through design and operational controls	As above	MPRDA NEMA NEMWA NEMBA
	Loss of Conservation Important Plant Species			
	Introduction/proliferation of alien invasive species			
All staff activities that take place outdoors	Increased utilisation of plant and animal resources as a result of an influx of people into the study area			
Construction/ Operation activities (Disturbances, vegetation Clearing, Accidents, Access Roads)	Disturbance/Loss of Fauna Species			
	Loss of Faunal Habitat			
	Introduction/Invasion of Alien Fauna and Spread of Diseases			
SURFACE WATER ECOSYSTEMS				
All construction and operational phase activities	Destruction of habitat	Avoid / minimise through design and operational controls	As above	IWWMP MPRDA NEMA NEMBA GN704 CARA
	Fragmentation of interconnected habitat			
	Vegetation disturbance that induces invasion of exotic flora			
	Soil erosion			
	Contamination of surface water resources			
SOILS, LAND CAPABILITY AND LAND USE				
All construction phase activities	Disturbance/Loss of soil resources as a result of construction activities	Avoid / minimise through design and operational controls	As above	IWWMP MPRDA NEMA NEMBA GN704
All construction and operational phase activities	Ineffective housekeeping and management of stockpiles and exposed soils resulting in additional disturbances/ losses of soil due to erosion as well as contamination			

Continued Activities Including Mining and Transportation	Increased/ decreased sediment loads on downstream systems			CARA
Stripping of Soils, Clearing of Vegetation and Stockpiling of Materials	Disturbance/Loss/Sterilisation of inherent land capability and land use			
Continuous Clearing, Disturbance, Laydown, Stockpiling and Transportation	Loss of land services, ecosystem support and services			
NOISE				
Blasting, mining operations, construction of surface infrastructure, haulage and decommissioning	Noise impacts generated may impact on the social environment, especially communities adjacent to the mining area	Minimise through design and operational controls	As above	SANS Environmental Noise Standards IFC Performance Standards
TRAFFIC AND ROAD SAFETY				
Movement of Man and Materials	Heavy vehicles may cause damage to the road surface	Avoid / minimise through planning, design and operational controls	As above	National Road Traffic Act IFC Performance Standards
	Need for additional lanes due to road capacity	No mitigation required in terms of road capacity		
	Vehicles making right-turn movements at intersections	Avoid / minimise through design and operational controls		
	Vehicles may reduce road safety due to reduced speed of the heavy vehicles entering fast flowing traffic	Avoid / minimise through design and operational controls		
	Slow vehicles on the R357 may cause other road users to speed up to overtake these vehicles. Speeding vehicles will reduce road safety	Investigation by road authority should be conducted to determine requirements		

	Loading and offloading of workers along roads at the mine access intersection may reduce road safety	Avoid / minimise through planning, design and operational controls		
BLASTING				
Blasting	Blast-induced ground vibration damage to buildings closer than 500 m from blasting resulting in minor damage to buildings (real or perceived by building owners) in the form of cracks in walls	Avoid / minimise through design and operational controls	As above	Blast Design Specification IFC Performance Standards
	Blast Induced Damage to Boreholes resulting in a loss of water perceived to be caused by blasting induced vibration			
	Damage to structures or injury to people closer than 1000 m from fly rock resulting in serious to fatal injury or damage to property and infrastructure caused by uncontrolled fly rock			
	Complaints or minor damage to buildings and structures caused by high air blast levels			
	Accumulation of dissolved nitrates in the water system causing an increase in algal and weed growth in waterways			NWA
CULTURAL HERITAGE				
Construction & Operation (Clearing, Mining, Stockpiling, Transportation)	Disturbance/Loss of Significant Archaeological or Cultural Heritage Sites/Remains	Maintain / monitor through implementation of chance-find procedure	As above	SAHRA
GEOLOGY AND TOPOGRAPHY				
Clearing of Areas for Site Access, Infrastructure Siting, Mining of Open Pit and Development of the TSF and WRD	Sterilisation of mineral resources	Avoid / minimise through design and operational controls	As above	MPRDA
	Permanent, localised change in topography due to the development of the open pit and mine residue deposits			NEMA CARA

31 FINANCIAL PROVISION

31.1 DETERMINATION OF THE AMOUNT OF FINANCIAL PROVISION

The conceptual closure plan, including the financial provision, is included in Appendix 10.

The liabilities were calculated and amounts to R 218, 225, 473.

The liability will be funded through the purchase of an appropriate bank guarantee. The annual cost of servicing the guarantee will be budgeted for in the operational budget of the mine.

31.1.1 CONFIRM SPECIFICALLY THAT THE ENVIRONMENTAL OBJECTIVES IN RELATION TO CLOSURE HAVE BEEN CONSULTED WITH LANDOWNER AND INTERESTED AND AFFECTED PARTIES

All aspects of the conceptual closure planning undertaken to date, including the applicable specialist studies and the closure plan itself is made available for review and comment as part of the public participation process described in the EIR.

Throughout the LOM, the applicant should, through appropriate engagement mechanisms such as the Future Forum, established in terms of the SLP, continue to engage with interested and affected parties in order to refine and further develop the closure plan for the operation.

31.1.2 PROVIDE A REHABILITATION PLAN THAT DESCRIBES AND SHOWS THE SCALE AERIAL EXTENT OF THE MAIN MINING ACTIVITIES, INCLUDING THE ANTICIPATED MINING AREA AT THE TIMES OF CLOSURE

The Closure Plan in Appendix 10 details the conceptual rehabilitation measures to be implemented at the time of closure. The plan details the proposed closure measures to be implemented for the following:

- General reclamation and closure activities;
- Reclamation and closure activities applicable to specific infrastructure areas; and
- Rehabilitation monitoring, aftercare and maintenance.

31.1.3 EXPLAIN WHY IT CAN BE CONFIRMED THAT THE REHABILITATION PLAN IS COMPATIBLE WITH THE CLOSURE OBJECTIVES

The conceptual rehabilitation and closure plan and associated estimate of closure costs for the mine is based on ensuring that the conceptual completion criteria are achieved.

The estimate allows for:

- Decommissioning, demolition and removal from site of all infrastructure not required or aligned with the proposed post closure land use;
- Transfer of the ownership of all remaining infrastructure and services required to support the proposed post closure land use to the local authorities responsible for the administration of the area;
- Making the area safe for all post closure land users and livestock;
- Ensuring that the remaining landforms are structurally and ecologically stable;
- The placement of sub soil and topsoil covers to the remaining landforms and areas of disturbance in preparation for vegetation establishment where the establishment of vegetated covers is considered necessary; and
- Establishment and maintenance of vegetated areas to ensure a well-established cover that is stable and sustainable.
- No backfilling or rehabilitation of the open pit is planned other than the construction of a perimeter access control fence and berm;

- Rehabilitation of the WRD and TSF would be carried out concurrently with operations to reduce the financial liabilities at closure and in the event of premature or unplanned closure;
- No post closure water treatment is required; and
- All surface and groundwater discharges from the site would satisfy agreed target water quality objectives and would not require additional treatment.

The estimated costs of rehabilitation and closure have been structured so as to distinguish between concurrent rehabilitation of the mine and the works required during the decommissioning phase, closure and post closure phase. It is assumed that the rehabilitation of the mine will be carried out in conjunction with the operation of the mine and related activities by the staff employed on the mine.

The rates used in the estimates of costs have been sourced from rates for similar works carried out on other projects and are similar to those used in the estimates of capital expenditure on the Project.

The rehabilitation and closure costs have been based on estimates of the surface disturbance and hence the scale of the closure obligations at specified points in time during the life of the mine and includes provisions for:

- Unmeasured works and variations in the scale of the works, expressed as a percentage (7.5%) of the value of the measured works;
- Contractors Preliminary and General Costs / Owners Costs expressed as a percentage (25%) of the value of the measured works and contingency; and
- Design and Project Management of the closure process, expressed as a percentage (5%) of the value of the measured works, contingencies and Contractors Preliminary and General Costs.

31.1.4 Calculate And State The Quantum Of The Financial Provisions Required To Manage And Rehabilitate The Environment In Accordance With The Applicable Guideline

The financial provision required for rehabilitation and closure is included as part of the Closure Plan in Appendix 10.

The liabilities were calculated and amounts to R 218, 225, 473.

31.1.5 Confirm That The Financial Provision Will Be Approved As Determined

The financial provision has been issued to the applicant as part of the feasibility study and the amount will be incorporated into the financial model of the mine. The applicant is also committed to ensuring that the financial provision is updated annually as required by legislation.

TABLE 31-1: MECHANISMS FOR MONITORING COMPLIANCE WITH AND PERFORMANCE ASSESSMENT AGAINST THE ENVIRONMENTAL MANAGEMENT PROGRAMME AND REPORTING THEREON

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
All mining and associated activities	General site management and compliance monitoring	➲ Inspections and compliance audits (internal and external) ➲ Performance assessment reporting	➲ Mine Manager – accountable for ensuring that EMPr is implemented by all mine personnel and that that there is overall compliance with EMPr ➲ Environmental Manager – responsible for monitoring compliance with the implementation of the EMPr ➲ ECO / SHE Representatives – day to day inspections, compliance monitoring and sampling as may be required ➲ External Auditor – responsible for performance assessment reporting, and auditing compliance with conditions of the EA and IWULA ➲ Independent specialists – responsible for undertaking specialist work as required over the LOM	➲ Daily and weekly inspections ➲ Quarterly compliance audits ➲ Annual performance assessment reporting
All construction-phase activities which generate particulate emissions Excavations, Site Clearance and Transportation All operational-phase activities which generate particulate emissions Mining, Material Handling and Transportation	➲ Elevated dust fallout levels ➲ Elevated PM10 and PM2.5 emissions	➲ Continuation of the monthly dust fallout monitoring programme and associated reporting as described in Section 6.3 of the Air Quality Report ➲ Regular communication of monitoring results to stakeholders		➲ Monthly dust fallout reporting ➲ Mitigation measures implemented from construction and throughout the LOM as applicable to the emission sources
Mining dewatering Underground and open cast mining New TSF	➲ Lowering of groundwater levels in private boreholes ➲ Contamination of groundwater in private boreholes, making the groundwater unfit for use	➲ Implementation of the groundwater monitoring programme described in Section 10 of the Geohydrological Report ➲ Regular communication of monitoring results to stakeholders		Quarterly groundwater sampling, analysis and reporting Mitigation measures implemented from construction and throughout the LOM as applicable to the emission sources
Movement of man and materials	Wildlife road mortalities	➲ Logbook maintained on employee sightings / incidents		Ongoing throughout the LOM Mitigation measures implemented from construction and throughout the

				LOM as applicable to the emission sources
Blasting Mining operations, construction of surface infrastructure, haulage and decommissioning	Elevated noise levels	➲ Implementation of the noise monitoring campain described in Section 5.2 of the Noise Report		➲ Annual noise monitoring campaign ➲ *Ad hoc* monitoring in response to complaints ➲ Mitigation measures implemented from construction and throughout the LOM as applicable to the emission sources
Construction/ Operation activities (Disturbances, vegetation Clearing, Accidents, Access Roads) All staff activities that take place outdoors	➲ Loss of untransformed natural habitat and indigenous plant species ➲ Illegal utilisation of plant and animal resources	➲ Monitoring of movement of equipment, site personnel and workers should be carried out to minimise unauthorized activities in any part of the project area		Mitigation measures implemented from construction and throughout the LOM as applicable to the emission sources

31.1.6 INDICATE THE FREQUENCY OF THE SUBMISSION OF THE PERFORMANCE REPORT

The frequency of mine performance assessment reporting shall be at least annually or as otherwise determined by legislation.

In addition to the performance assessment, inspections and audits must also be undertaken as described below. A key objective of the performance assessment reviews, inspections and audits must be to identify the effectiveness of the management measures. Any gaps should be addressed, and if necessary, the EMPr updated to ensure the site requirements and management of risks and impacts are effective and practicable.

31.1.6.1 Inspections

SHE inspections of all parts of the operation shall be conducted daily on an *ad hoc* basis and formally at least once a week.

31.1.6.2 Internal Auditing

Internal SHE compliance audits shall be conducted on a quarterly basis. The purpose of the internal compliance audits shall be to confirm that all management actions outlined in the EMPr have been implemented. The mine manager will be responsible for the implementation of corrective measures that may result from the findings of such audits, which will investigate at least the following:

- Completeness of SHE documentation, including planning documents and inspection records;
- Compliance with monitoring requirements;
- Suitability of EMPr and IWWMP in addressing general environmental performance at the Site;
- Efficacy of management controls to address any non-compliance with monitoring requirements; and
- Training activities and record keeping.

31.1.6.3 External Auditing

External audits shall be completed in the manner and frequency determined in the conditions of the EA, IWUL and EMPr and the prevailing legislation.

31.1.7 ENVIRONMENTAL INCIDENTS AND NON-COMPLIANCES

The reporting of an environmental incident and or non-compliance shall be as follows:

- Site personnel shall, as soon as possible, inform the Contractor or Operator (as relevant) of the incident and/or non-compliance, the severity thereof and the corrective actions taken;
- The incident and/or non-compliance details shall be recorded on a register maintained on site;
- Depending on the level of the incident, the Contractor / Operator shall inform the Owner and the relevant authorities of the incident / non-compliance; and
- Any corrective actions required following the incident and / or non-compliance, including any rehabilitation requirements, shall be implemented by the Contractor / Operator.

31.1.8 ENVIRONMENTAL AWARENESS PLAN

31.1.8.1 Manner in which the Applicant Intends to Inform his or her Employees of any Environmental Risk which may result from their Work

The following environmental awareness activities shall be undertaken throughout the LOM, as relevant to the mine development phases (construction, operation and closure) and activities to be undertaken by specific contractors and/or employees:

- Induction training shall be provided to all personnel and visitors accessing the site. The induction training shall include information on at least the following:
  - All SHE hazards and risks on the site;
  - Emergency procedures to be followed in the event of an incident;
  - Heritage chance-find procedure;
  - Measures to prevent accidents, injuries and impacts to the environment;
  - No-go areas, including sensitive environmental features like wetlands and watercourses; and
  - Overview of the EMPr.
- Specific training programmes for all employee groups (management, supervisor, new hire, and refresher) relative to the type of work to be conducted shall be developed and implemented. These programmes shall, as a minimum, address the following:
  - Training of employees in all aspects of their work environment, hazard recognition, first aid, personal hygiene, electrical safety, rigging and lifting, vehicle safety, fire safety, safety practices for working around machinery with moving parts and other topics that may relate specifically to a job assignment or physical location at the Site;
  - Procedures for responding to fires, explosions, spills and leaks, injuries, vehicle accidents, property damage, bomb threats and robberies and attempted robberies;
  - Hazardous substances training summarising the requirements for the handling of hazardous substances on the site and how to respond to emergency situations shall be included in site induction and refresher training programmes;
  - Toolbox talks shall be presented daily with the objective of creating awareness of the Site SHE risks and hazards and how to effectively prevent accidents, injuries and impacts to the environment; and
  - All employees shall undergo initial and refresher training on spillage prevention and response, including the use of the onsite spill response equipment.

31.1.8.2 Manner in which Risk will be Dealt with in Order to Avoid Pollution or the Degradation of the Environment

The mine must continue to reassess the risks and impacts of the development throughout its operational life. Should any change in the risk and impact profile of the development be determined, additional management controls and mitigation measures must be implemented and the EMPr amended to reflect these changes.

31.1.9 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

No specific information has been requested by the competent authority for the proposed mine development.

The financial provisions for closure and rehabilitation will be confirmed annually and all audits and associated statutory reporting requirements will be adhered to throughout the Life of Mine.

31.2 UNDERTAKING

The EAP herewith confirms:

(a) The correctness of the information provided in this report

(b) The inclusion of comments and inputs from stakeholders and I&APs

(c) The inclusion of inputs and recommendations from the specialist reports where relevant, and

(d) The acceptability of the project in relation to the finding of the assessment and the level of mitigation proposed.

ABS Africa (Pty) Ltd.

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DISCLAIMER

Advisory on Business and Sustainability Africa (Pty) Ltd. (ABS Africa) has prepared this report specifically for Repli Trading No. 27 (Pty) Ltd. (Repli).

The contents of this report:

- Are based on the legal requirements for undertaking an Environmental Impact Assessment, as defined in the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the scope of services as defined within the contractual undertakings between Repli and ABS Africa.
- Are specific to the intended development at the proposed site. The report shall not be used nor relied upon neither by any other party nor for any other purpose without the written consent of ABS Africa. ABS Africa accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.
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