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Competent Persons' Report

Bakubung Minerals (Pty) Limited – Bakubung Platinum Mine situated in the North West Province of South Africa

For: Bakubung Minerals (Pty) Limited

Prepared by: Ukwazi Mining Studies (Pty) Ltd

UKWAZI advisory

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Executive summary

SR 1.1(i) / SV T1.2 / JSE 12.10(h)(i) – (xii)

Introduction and background

JSE 12.10(h)(i) – (ii)

Ukwazi Mining Studies (Pty) Ltd ("Ukwazi") was appointed by Bakubung Minerals (Pty) Ltd ("Bakubung"), a wholly-owned subsidiary of Wesizwe Platinum Limited ("Wesizwe") to prepare a Competent Persons' Report for the Bakubung Platinum Mine in the North West Province of South Africa.

This Competent Persons' Report was prepared by a team of professionals and specialists and is based on the guidelines of The South African Code for the Reporting of Exploration Results, Mineral Resources and Mineral Reserves, 2016 Edition ("The SAMREC Code"), The South African Code for the Reporting of Mineral Asset Valuations, 2016 Edition ("The SAMVAL Code") and The South African Guideline for the Reporting of Environmental, Social and Governance Parameters within the Solid Minerals and Oil and Gas Industries ("The SAMESG Guideline", 2017).

Ukwazi is an independent advisory group, with no direct or indirect interests in Bakubung. Neither Ukwazi nor the key personnel responsible for the technical work, has any material interest in the mine, the companies associated with Bakubung, their subsidiaries or their mineral properties. All work completed by Ukwazi for Bakubung is strictly in return for professional fees and payment for the work was not in any way dependent on the outcome of the project. There is no conflict of interest by Ukwazi undertaking this work as contained in this document.

The terms of reference were to prepare the Competent Persons' Report to provide a summary of the material scientific and technical information concerning the mineral exploration, Mineral Resources, Mineral Reserves and associated production activities and Mineral Asset Valuation of the Bakubung Platinum Mine, in accordance with the guidelines of The SAMREC Code and The SAMVAL Code.

The purpose of this Competent Persons' Report is to inform investors and interested parties of material changes regarding the material assets of Bakubung and to comply with the Johannesburg Stock Exchange regulations for listed companies. Based on this requirement, the Competent Persons' Report was developed in line with the guidelines of The SAMREC Code, The SAMVAL Code and Section 12 of the Johannesburg Stock Exchange listing requirements. The effective date of the Competent Persons' Report is 1 June 2021. No material changes have occurred between the effective date and the date of signature of this report.

Location and ownership

JSE 12.10(h)(iii)

The Bakubung Platinum Mine is located approximately 40km northwest of the city of Rustenburg and directly south of the Pilanesberg Alkaline Complex on the Western Limb of the Bushveld Complex. The mine falls within the jurisdiction of Bojanala Platinum District Municipality and Rustenburg and Moses Kotane Local Municipalities.

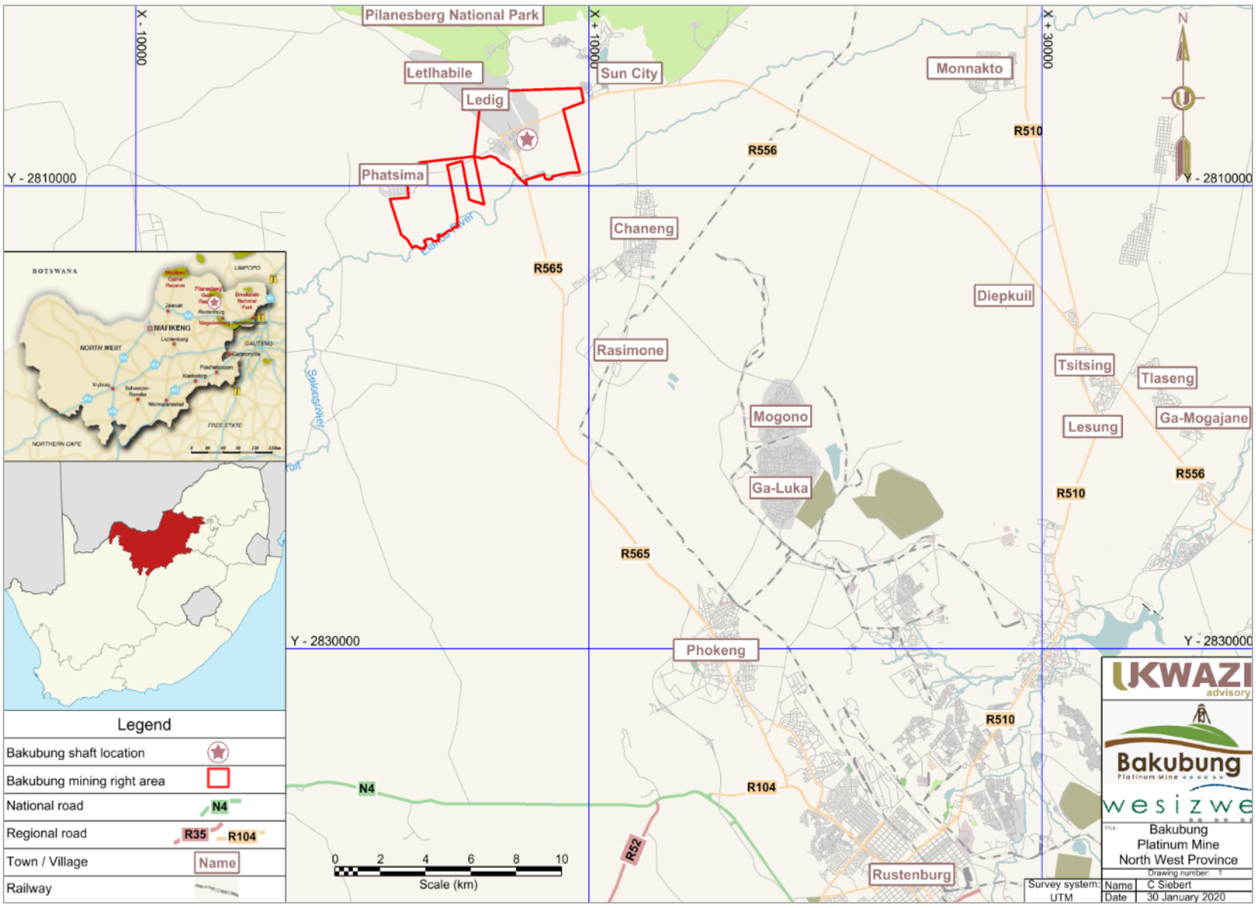
The mine is located on portions of the farms Ledig and Frischgewaagd. The Elands River forms the southern boundary of the approved mining right area. The mine consists of a single underground operation accessed through a twin vertical shafts system and 6m diameter raise bore ventilation holes for ventilation purposes. Planned mining operations include the extraction of both the Merensky reef and Upper Group 2 Chromitite layer. The main shaft has a hoisting capacity of approximately 250 kilo tonnes per month of ore and 15 kilo tonnes per month of waste. Mining operations will be facilitated through semi-mechanised or hybrid methods using conventional mining methods on the stope face and mechanised methods for development and rock-handling operations.

Mining operations adjacent to the approved mining right area include operations owned by Royal Bafokeng Platinum Limited. These comprise the Bafokeng Rasimone Platinum Mine, which consists of a North and South shaft, Styldrift, the concentrator complex and the Maseve concentrator plant. The mine is fully owned by Bakubung with company registration number 2002/017306/07, a wholly-owned subsidiary of Wesizwe with company registration number 2003/020161/06. Wesizwe is a public company incorporated in the Republic of South Africa with its shares listed on the Johannesburg Stock Exchange.

Based on the 2020 Integrated Annual Report published by Wesizwe the beneficial shareholders with a holding greater than 3% of the issued shares included:

- China Africa Jinchuan Investments Ltd: 45.00%
- Rustenburg Platinum Mines Limited: 13.01%
- Micawber 809 (Pty) Ltd: 5.98%
- Africa Continental Resource Venture: 4.52%.

The location of the Bakubung Platinum Mine, referenced to the approved mining right area is indicated in the figure below.



History

In 2003, the group's initial shareholders identified a potentially viable and virgin portion of the Merensky reef and Upper Group 2 Chromitite layer within the Western Limb of the Bushveld Complex of the North West Province. The project was assessed by the Jinchuan Group Co. Limited and the China Africa Development Fund, both joining as shareholders and strategic investors as the China Africa Jinchuan Investments Limited consortium in 2011. This consortium has since invested equity and debt capital into Wesizwe towards the development of the project. In 2011, Wesizwe's core project was relaunched as the Bakubung Platinum Mine.

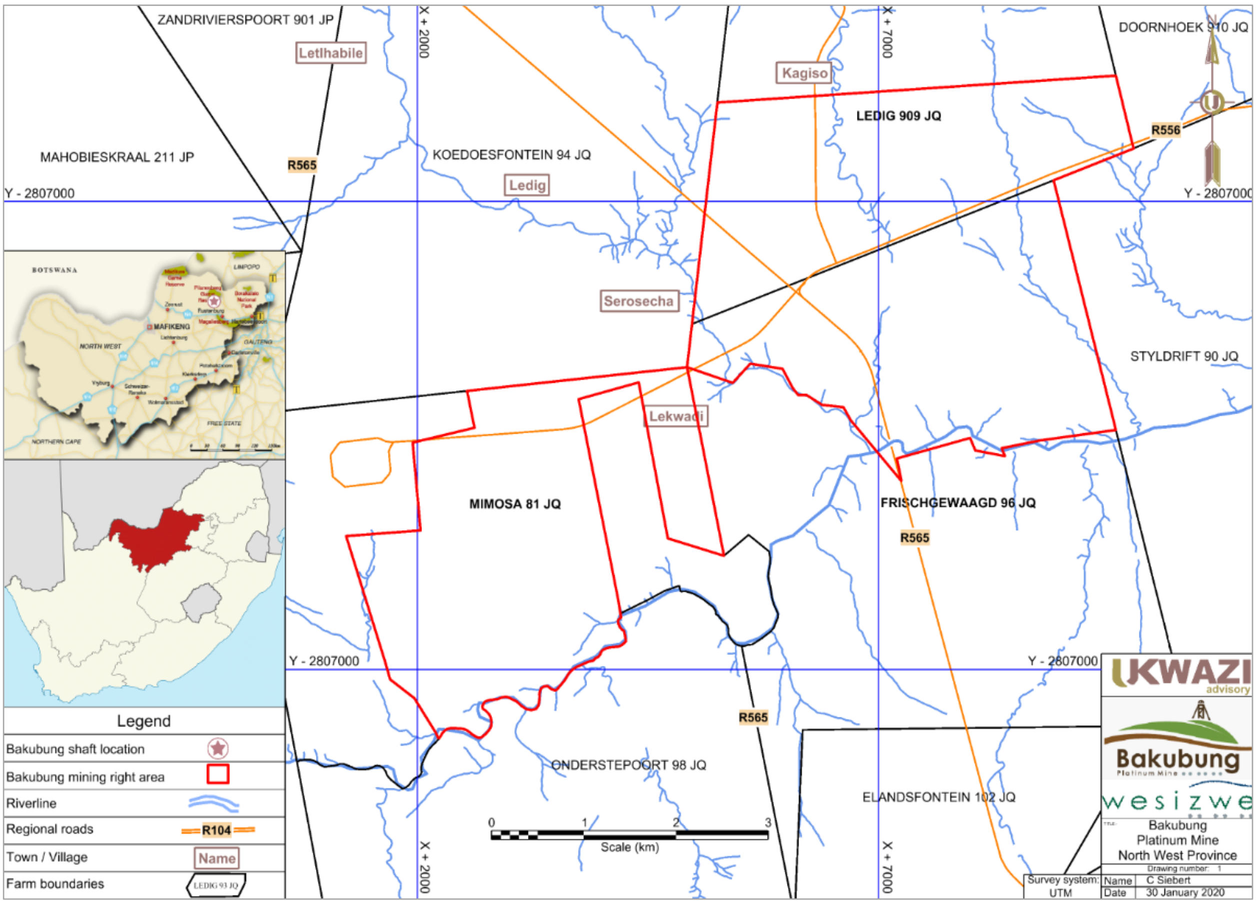
The mining right application was submitted in 2007 and granted in May 2009. Shaft sinking operations commenced in 2012 and by 2017, shaft equipping was completed. In 2018, capital footprint development commenced, and the main shaft was licensed to transport personnel, material and rock. During 2019 the engineering, procurement, construction and building contractors were appointed for the process plant and the Merensky reef was intersected on 69 level. Access and on-reef development continued throughout 2020 with a total of 3 791m total development achieved during the year.

Tenure and legal aspects

JSE 12.10(h)(iv)

A mining right was granted to Bakubung under protocol NW 30/5/1/2/2/339 MR in terms of Section 23(1) of the Mineral and Petroleum Resources Development Act (Act 28 of 2002) for the mining of platinum group metals, gold, silver, nickel, copper, cobalt and chrome. The mining right was granted on 25 May 2009 and unless cancelled or suspended will continue to be in force for 25 years ending 24 May 2034. There are no known legal proceedings that may influence the right to mine.

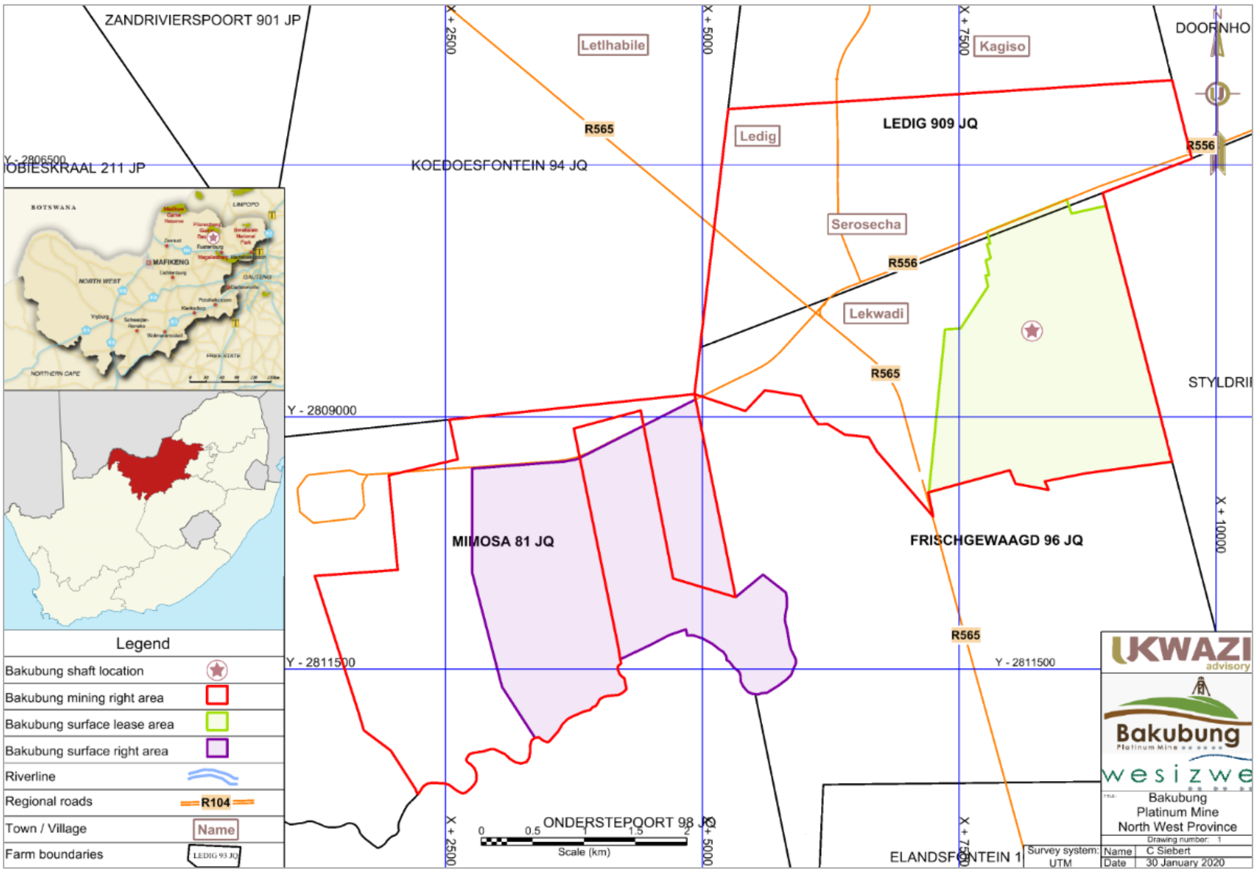
The approved mining right area is indicated in the figure below.



Bakubung signed a surface lease agreement with The Bakubung Ba-Ratheo Community to lease Portion 11 (a portion of Portion 4) of the farm Frischgewaagd 96 JQ held under deed of transfer number T362/1984. The lease agreement commenced on the occupation date of 1 April 2010 and is valid for 40 years. Bakubung is the registered owner of Portion 10 of the farm Mimosa 81 JQ to the extent of approximately 614 hectares. The surface areas related to the approved mining right area are listed in the table below.

Property description	Portion	Registered owner	Title deed number	Traditional authorities
Frischgewaagd 96 JQ	R/1	Voesee Jacobus Paulus	T4996/1906BP	Bakubung Ba-Ratheo Tribe
Frischgewaagd 96 JQ	3	Suid-Afrikaanse Bantoe Trust	T36887/1964BP	Bakubung Ba-Ratheo Tribe
Frischgewaagd 96 JQ	R/4	Republic of Bophuthatswana	T362/1964BP	Bakubung Ba-Ratheo Tribe
Frischgewaagd 96 JQ	21	Republic of Bophuthatswana	S.G no: 3973/2015	Bakubung Ba-Ratheo Tribe
Frischgewaagd 96 JQ	R/11	Republic of Bophuthatswana	T362/1984BP	Bakubung Ba-Ratheo Tribe
Ledig 909 (93) JQ	0 (RE)	National Government of the RSA	T63327/2004	Bakubung Ba-Ratheo Tribe
Mimosa 81 JQ	10	Bakubung Minerals (Pty) Ltd	T60757/2015	Not applicable
Mimosa 81 JQ	RE	Rustenburg Local Municipality	T161187/2003	Not applicable
Mimosa 81 JQ	4	Unknown	S.G no: T31805/2012	Phatsima Township extension
Mimosa 81 JQ	8	Unknown	S.G no: T132728/2006	Phatsima Township extension
Mimosa 81 JQ	9	Rustenburg Local Municipality	T129815/2007	Not applicable

The figure below indicates the surface lease area on the farm Frischgewaagd 96 JQ (highlighted in green) and the Bakubung surface ownership on the farm Mimosa 81 JQ (highlighted in purple), relative to the approved mining right area.



The surface lease and surface right areas are sufficient in size and nature to accommodate the surface infrastructure required to facilitate planned mining and processing operations. Minor surface right acquisitions/ lease agreements are still to be concluded for the tailing disposal pipeline from the processing plant to the tailings storage facility located on the farm Mimosa 81 JQ.

In 2008, the Bakubung Platinum Mine conducted an environmental impact assessment for the development of the project. The mine received environmental authorisation in 2009, in terms of both the National Environmental Management Act (Act 107 of 1998) and the Mineral and Petroleum Resources Development Act (Act 28 of 2002). A water use license was issued in terms of the National Water Act (Act 36 of 1998) in 2010.

In 2014, a basic assessment process was completed for the development of mine housing on site. Authorisation for Phase 1 of the Gabonewe Estate mine housing was received in 2015. In 2016, the mine proposed several changes to the approved mine layout. These changes, authorised by the Department of Mineral Resources in 2017, were required to optimise the layout and operation of the mine, provide additional support infrastructure and to cater for an increase in ore processing capacity. An integrated water use license was issued for the proposed changes in 2017.

A 166-hectare tailings storage facility was approved on the farm Mimosa 81 JQ. An interim phase was proposed with a smaller tailings storage facility on the farm Frischgewaagd 96 JQ. Environmental authorisation in terms of the National Environmental Management Act as amended and National Environmental Management: Waste Act 2008 (Act 59 of 2008) as amended will be required as well as a water use license. The authorisation process has commenced to amend the existing environmental authorisation and waste management license granted in 2017. Approval is currently still pending but a reasonable expectation exist that the required approvals will be granted in due course.

The mine has contractual agreements with various service providers, the following material agreements are applicable:

- Original Bakubung shareholders agreement
- Credit facility agreement
- Black economic empowerment
- Contract mining agreement
- Surface lease agreement
- Recognition agreement
- Bulk electricity supply agreement
- Bulk water supply agreement.

The company monitors complaints and litigation against the company as part of its risk management systems, policies and procedures. There is no material litigation against the company that threatens its mineral rights, tenure or operations. It has the following matters in progress:

- Wesizwe vs Stalker Hutchinson – the company has instituted a claim of ZAR1.3 million against its own short-term insurer, Stalker Hutchinson, for refusal to reimburse the company for the claims it settled with its travel agents. The travel agents claimed compensation from the company due to the fraudulent conduct of a former employee. The matter is proceeding to court and the outcome will depend on the court's interpretation of the insurance contract or policy between the parties
- Wesizwe vs LTS Construction – the company cancelled an agreement with this construction company. The construction company disputed the cancellation and certain deductions made regarding payments to it. The parties proceeded to arbitration. The matter could not be finalised as LTS Construction went into liquidation and the matter is unlikely to proceed
- A Wesizwe subsidiary, Africa-wide Mineral Prospecting and Exploration (Pty) Ltd vs Platinum Group Metals RSA (Pty) Ltd, Royal Bafokeng Platinum Limited and Maseve Investments 11 (Pty) Ltd and others is potentially important
    - Africa-wide Mineral Prospecting and Exploration and Platinum Group Metals entered into a shareholder's agreement with Maseve Investments
    - Maseve Investments owned certain mineral assets, a concentrator plant and surface rights. It used the concentrator to beneficiate Platinum Group Metals products
    - Bafokeng Platinum Limited apparently purchased the concentrator, mineral assets and surface rights from Maseve Investments and subsequently acquired 100% of its shares
    - Africa-wide Mineral Prospecting and Exploration disputed the sale of these assets to Bafokeng Platinum Limited, their disposal by Maseve Investments as a violation of the shareholder's agreement and will attempt to have the transactions set aside and its rights restored.

Geology and mineralisation

JSE 12.10(e); 12.10(h)(v)-(vi)

The mine is located on the Western Limb of the Bushveld Complex immediately south of the Pilanesberg Alkaline Intrusion and is underlain by the Merensky reef and Upper Group 2 Chromitite layer. The Bushveld Complex is the largest and most economically significant layered igneous complex in the world. Situated within the north-central Kaapvaal Craton in South Africa, the Bushveld Complex has a surface area of approximately 66 000km^2. The Bushveld Complex was intruded approximately 2 060 million years ago into rocks of the Transvaal Supergroup, largely along an unconformity between the Magaliesberg quartzite of the Pretoria Group and the overlying Rooiberg felsites.

The Bushveld Complex consists of a layered sequence of igneous rocks known as the Rustenburg Layered Suite which was derived from differential crystallisation of multiple magma injections. The mafic-ultramafic layered rocks of the Rustenburg Layered Suite outcrop in five discrete arcuate compartments or limbs of which, the Western, Northern and Eastern Limbs are the most relevant for exploration and the potential mining of platinum group elements, ferrous and base metals. The layering of the mafic to ultramafic rocks of the Rustenburg Layered Suite is remarkably consistent and can be correlated hundreds of kilometres throughout most of the Bushveld Complex.

The Rustenburg Layered Suite (mafic rocks) can be divided into five zones known as the Marginal, Lower, Critical, Main and Upper Zones from the base upwards. The mafic-rich Critical Zone hosts the multiple Chromitite and platinum group metal layers. The dominant economic platinum group metal mineralisation, the Merensky reef and Upper Group 2 Chromitite layer occur within the multi-layered norite-pyroxenite-anorthosite-chromitite Upper Critical Zone and are continuous over tens of kilometres.

Four facies or types of Merensky reef were identified at the Bakubung Platinum Mine namely, Normal Merensky reef facies, Normal Footwall Merensky reef facies, Single Chromitite Merensky reef facies and Detached Merensky reef facies. The distinction of each facies is a combination of the morphology of the Merensky reef, the grade profile and footwall stratigraphy. Each facie displays a distinct grade profile that required a unique selection process to estimate the appropriate economic resource cut.

Two facies types of the Upper Group 2 Chromitite layer were identified based on the nature and thickness of the footwall stratigraphy: Normal Upper Group 2 Chromitite layer facies and Regional Pothole Upper Group 2 Chromitite layer facies.

A comprehensive structural interpretation of the Bakubung Platinum Mine and the immediate surrounds were completed based on a three-dimensional seismic survey and the drill hole intersections. The Merensky reef and Upper Group 2 Chromitite layer dip at approximately 5° over most of the mining area. Various disruptions to the reef horizons, resulting in geological losses, are associated with faults, dykes, mafic intrusions/ iron-rich ultramafic pegmatites, potholes, variable paleo-topography and structural discontinuities.

Exploration

JSE 12.10(e)(i)-(iii)

The historical exploration consisted of an extensive drilling programme conducted continuously from October 2004 to April 2008 (172 425m from 179 drill holes); a three-dimensional seismic survey undertaken by a joint venture including Wesizwe, Anglo American Platinum and Platinum Group Metals in 2007; and downhole geophysics in 2007/ 2008 for the shaft drill holes.

The drilling campaign was performed professionally and included the necessary supervision and quality control and quality assurance protocols. The samples were submitted to suitably accredited laboratories where appropriate assay techniques were used to determine the concentrations of the platinum group metals, gold and base metals.

The total exploration expenditure incurred to date was approximately ZAR342.9 million. Details regarding the exploration expenditure are not available. No additional exploration activities are currently planned at the Bakubung Platinum Mine.

Mineral Resources

JSE 12.10(h)(vii), (ix)

The critical selection of the respective reef best-cut parameters prior to undertaking the Mineral Resource estimate was based on the grade profiles of the Merensky reef and Upper Group 2 Chromitite layer cuts respectively. The rationale for the average best cuts per facies type is presented in the tables below.

Merensky reef facies and average best-cut	
Normal Merensky reef facies	Cut is from the bottom reef contact upwards to include the whole Merensky reef to a maximum of 1.8m with a minimum cut of 0.9m
Normal Footwall Merensky reef facies	Cut is from the bottom reef contact with a fixed footwall cut of 0.45m and a cut above the bottom reef contact of the recognised Merensky reef unit to a maximum hangingwall cut of 1.35m and a minimum hangingwall cut of 0.45m
Single Chromitite Merensky reef facies	Cut is from the bottom reef contact with a fixed hangingwall cut of 0.25m and a cut below the bottom reef contact of the recognised Merensky reef unit to a maximum footwall cut of 1.55m and a minimum footwall cut of 0.65m
Detached Merensky reef facies	Cut is from the top reef contact with a fixed hangingwall cut of 0.35m and a cut below the top reef contact of the recognised Merensky reef unit to a maximum footwall cut of 1.45m and a minimum footwall cut of 0.55m

Upper Group 2 Chromitite layer	
Normal facies	Minimum cut of 0.90m and maximum cut of 1.85m. The cut was restricted by geotechnical constraints considering the requirement of a minimum beam thickness of 0.5m (pyroxenite) to enable undercutting of the Upper Group 2 leader bands
Regional pothole facies	Minimum cut of 0.90m and maximum cut of 1.85m. The cut was restricted by geotechnical constraints considering the requirement of a minimum beam thickness of 0.5m (pyroxenite) to enable undercutting of the Upper Group 2 leader bands

Statistical analysis was completed on the composite data grouped by facies type. Each intersection was composited for platinum, palladium, rhodium, gold, copper and nickel concentrations by utilising the weighting by thicknesses and densities. An analysis of the unit thickness showed little correlation between the concentration and thickness confirming that the use of concentration was appropriate for the Mineral Resource estimate. An assessment of the high-grade composites was completed, which determined that no high-grade cutting or capping was necessary.

A block size of 125m x 125m was selected. The search criteria included an isotropic search volume of 500m that expanded to 750m and then 1 000m, if the criteria of a minimum of 12 and a maximum of 24 composite data for each block estimate were not met.

A two-dimensional grade estimate was generated for the Merensky reef and Upper Group 2 Chromitite layer. The facies boundaries were treated as soft boundaries as the facies were observed to be transitional. The Mineral Resource estimation was completed using ordinary kriging for each variable. Geological losses were determined for each facies type based on the number of intersections that were available and the number of intersections that were affected by disruptive geological features.

The Mineral Resource estimate is reported in accordance with the guidelines of the SAMREC Code (2016 Edition). The Competent Person responsible for the Mineral Resource estimation and classification is Mr Ken Lomberg (Pr.Sci.Nat.). A summary of the Mineral Resource estimate as at 1 June 2021 is shown in the table below.

Description	Mineral Resource classification	Tonnage [Mt]	3PGE+Au$_{grade}$ [g/t]	3PGE+Au$_{contained}$ [Moz]	Width [m]	Density [t/m^3]
Merensky reef	Measured	6.53	6.52	1.37	1.28	3.20
	Indicated	21.92	5.28	3.72	1.51	3.17
	Inferred	14.10	4.36	1.97	1.67	3.20
	Total	**42.55**	**5.16**	**7.06**	**1.52**	**3.19**
Upper Group 2 Chromitite layer	Measured	0.00	0.00	0.00	0.00	0.00
	Indicated	34.83	4.66	5.21	1.28	3.84
	Inferred	10.14	4.63	1.51	1.31	3.86
	Total	**44.97**	**4.65**	**6.72**	**1.29**	**3.85**
Total	Measured	6.53	6.52	1.37	1.28	3.20
	Indicated	56.75	4.90	8.93	1.37	3.58
	Inferred	24.24	4.47	3.48	1.52	3.48
	Total	**87.52**	**4.90**	**13.79**	**1.40**	**3.53**

Notes:
1) The Mineral Resource estimate is reported in accordance with the guidelines of The SAMREC Code, 2016 Edition
2) The Mineral Resource is reported inclusive of Mineral Reserve
3) The Mineral Resource is reported as in-situ estimates
4) No cut-off grades were applied in the Mineral Resource estimate
5) 3PGE/ 4E (g/t) = Pt grade (g/t) + Pd grade (g/t) + Rh grade (g/t) + Au grade (g/t)
6) Numbers may not add up due to rounding of decimals.

Geotechnical

JSE 12.10(h)(vii)

The geotechnical aspects of the existing and planned mining and mine design were examined to ensure that appropriate practices were followed. Initial designs were derived at a pre-feasibility level of accuracy in 2007 and later updated to a bankable feasibility study in 2009. During the bankable feasibility study, pre-feasibility study geotechnical information was augmented with information from two additional drill holes (the main shaft and ventilation shaft holes). An optimisation study was completed in 2013, which included the geotechnical logging of approximately 52 drill holes across the mining area. Design methods included empirical, analytical and numerical approaches, which were validated, benchmarked and optimised against information from in-situ observational assessments. The design approaches used at the mine are aligned to general industry practice as tabulated below.

Design aspect	Parameter	Methodology
Shaft design	Stability	Elastic modelling of vertical stress in the pillar centre and vertical strain in the shaft barrel
		Benchmarking of pillar dimensions against neighbouring operations
	Support	Empirical guidelines and analytical equations based on the Q Index
Service level tunnels/ horizontal development	Spacing	Elastic modelling of average pillar stress at the centre of pillars between adjacent excavations
	Placement	Elastic modelling using Hoek-Brown failure criteria for fracture initiation.
	Support	Empirical rules of thumb, analytical equations based on Q Index and Rockwall condition factor
		Deterministic modelling of wedge stability
Large chambers (workshops, conveyor drives)	Support	Empirical guidelines and analytical equations based on the Q Index and rock mass rating data
Regional pillars	Spacing	Empirical guidelines and industry practice
		Analytical equations for tensile zone height
	Stability	Elastic modelling using Hoek-Brown failure criteria for fracture initiation

Design aspect	Parameter	Methodology
		Elastic modelling to determine average pillar stress which should not exceed foundation failure criteria (average pillar stress ≤ 2.5 x uniaxial compressive strength of the foundation rock)
Stoping	Span	Unsupported span analysis using Q Index and stability number
	In stope pillar	Empirical guidelines for width: height and factor of safety
	Support	Analytical equations to determine support requirement based on the depth of the weakest parting in the hangingwall

The major perceived geotechnical engineering related risks are summarised as follows:

- Inadequate multi reef stoping strategy for narrow middlings
  - Merensky to Upper Group 2 interburden distances range from 20m to 50m with an average of 38m. The multi reef layout comprises the same panel layouts, pillar dimensions and support strategy across both reefs. No analysis was performed to ascertain the spatial distribution of changes in interburden. These changes would be critical for stope span and support design. Extensive elastic modelling was completed and the stress profile is well understood. Inelastic modelling and/ or further modelling and a middling analysis is suggested
- Inappropriate use of uniaxial compressive strength and absence of elastic rock mass properties
  - The confidence in the laboratory uniaxial compressive strength test results is low as there is no understanding of rock strength spatial variability or whether the samples tested were representative of the mining area. Verify or validate the uniaxial compressive strength results conducted on the in-situ rock samples by augmenting the database with additional tests that are representative of the entire mining area. Additional properties such as density, elastic modulus and Poisson's ratio should be tested or measured
- Ineffective delineation of ground control districts
  - The bankable feasibility optimisation geotechnical study based the delineation of ground control districts on the depth of potential planes in the hangingwall. Redefine geotechnical ground control districts taking cognisance of spatial variation in rock strength, critical middling distances and potential planes of weakness.

Geohydrology and hydrology

Based on the results of the hydrocensus, the aquifer underlying the study area can be classified as a minor aquifer system. Although these aquifers seldom produce large quantities of water, they are important for local supplies and in supplying base flow for rivers. Groundwater is important for the baseflow component of the Elands River. Groundwater users were identified within the study area. Water is mainly used for domestic purposes, while irrigation from boreholes takes place on farms south of the Elands River. Groundwater quality in the area is generally good with most of the water samples fit for human consumption. Isolated instances of nitrate concentrations exceeding drinking water standards were reported, likely attributed to pollution caused by pit latrines (in villages where poor sanitation facilities exist). Elevated fluoride concentrations were reported in some samples, but this is a known problem of groundwater present in the occurring geological formations.

The zone of influence identified from a hydrogeological perspective includes a dewatering zone of approximately 700m from the shaft area that will experience a decline in water levels greater than 6m and a 300m operational plume migrating from the tailings storage facility in the direction of the Elands River. It must be noted that no sensitive receptors are located within the hydrogeological zone of influence of the Mimosa or Frischgewaagd tailings storage facilities. The mine commenced with a groundwater monitoring programme, in accordance with the water use license conditions. A baseline was established against which future impacts can be monitored and the efficiency of mitigation measures determined.

Current hydrological impacts are mostly associated with catchment-wide impacts due to farming activities and rural settlements in the area. Mine related impacts are not considered of high significance due to the modified nature of the surface drainage system in the area and the implementation of mitigation measures, which includes a system of diversion berms, trenches and containment facilities. The stormwater measures were implemented according to the approved stormwater management plan, to prevent clean surface water runoff from the catchments upstream of the mining areas from entering the dirty water management areas. The diverted clean runoff is then returned to the non-perennial drainage lines. The mine has implemented a surface water monitoring programme. A baseline was established against which future mining activities will be monitored and the effectiveness of mitigation measures determined. It is recommended that a dynamic water and salt balance be developed for the mine to assess on-site water management and associated impacts on an ongoing basis.

Mining engineering

JSE 12.10(h)(vii)

The mining engineering related work was conducted at a life of mine level of accuracy and based on a techno-economic study with the appropriate application of mining related modifying factors to declare a Mineral Reserve estimate. A structured process was followed:

- Mining model
- Mining cut definition
- Mine design and planning criteria
- Mine design
- Life of mine schedules
- Mining related equipment
- Mineral Reserve estimation.

The initial bankable feasibility study was completed in 2009 by TWP Projects with subsequent mine optimisation studies by WorleyParsons in 2014. The basis of the current mine design is primarily based on the bankable feasibility study and subsequent optimisation studies and some local and regional design updates completed by Ukwazi in 2020 and 2021.

A two-dimensional geological model as the basis for the Mineral Resource estimate was constructed in Datamine™. This model, with the application of mining related modifying factors, was used as basis for the life of mine schedules and Mineral Reserve estimate.

Various facies types were identified for the Merensky reef and Upper Group 2 Chromitite layer based on distinct geological aspects and mineralisation profiles. The selection of the respective reef best-cut parameters was based on the grade profiles of the Merensky reef and Upper Group 2 Chromitite layer cuts, respectively. The planned mining cut per facies type was based on the defined resource best-cut as contained in the geological model with the addition of appropriate hangingwall and footwall overbreak allowances.

The critical factor in the Upper Group 2 Chromitite layer cut selection was the consideration of geotechnical constraints. The main Upper Group 2 Chromitite layer is consistently overlain by three Chromitite layers that can vary in their parting distance to the Upper Group 2 Chromitite layer. Based on numerical modelling conducted that considered the current mine design criteria and site-specific rock mass properties a parting width of at least 0.5m is required between the main Upper Group 2 Chromitite layer and the overlain Chromitite layers to facilitate safe mining practices.

Access to the main ore body is gained through a vertical shaft system that comprises:

- An 8.5m diameter lined main shaft (depth 825m) equipped with men, material and rock handling facilities
- A 7.5m diameter lined service shaft for men and material (depth 825m).

These shafts were positioned within the constraints of the mining right area to effectively access each of the two reef horizons. The main shaft can hoist up to 250 kilo tonnes per month of ore and up to 15 kilo tonnes per month of waste during steady-state production.

The primary haulage development consists of on-reef twin access drives and inclined raises, intended primarily for the movement of personnel, logistics and as intake airways. Underground development of integrated shaft infrastructure includes the workshops, tips, ore passes, silos, belt level, skip tipping arrangements, dams, main chambers and shaft bottom.

The twin reef access drives were designed for reef access orientated on strike across the mine. During initial production operations, rock is transported directly to the main shaft until construction of the conveyor system is completed. All development activities are completed by trackless mechanised mining equipment. The initial stope production activities commence with ledging of the raise and the establishment of a series of breast panels located on both sides of the ledged raise. The advance strike drives are developed from the reef raise and maintained marginally ahead of the advancing stope panel to facilitate a free breaking face and the movement of rock, men and material. Stoping activities are based on conventional methods - blasted rock is scraped from the stoping panel to the advanced strike drive by 37 kilowatt face winches using two 0.9 tonne effective scraper shovels connected in tandem. Load-haul-dumpers transport the rock from the advanced strike drive to the truck loading point located in the raise. Low profile, 30 tonne capacity trucks tram rock to the internal conveyor transfer tip or directly to the station.

A detailed mine design for the respective Merensky and Upper Group 2 horizons was completed in Datamine™ Studio 5D planner based on defined geotechnical parameters. Appropriate mining related modifying factors were applied to convert the Mineral Resource contained within the mine design to a Mineral Reserve. A summary of the mining related modifying factors is shown in the table below.

Parameter	Description	Unit	Amount
Geological and mining related loss	Normal Merensky reef facies	%	13
	Normal FW Merensky reef facies	%	40
	Single Chromitite Merensky reef facies	%	25
	Detached Merensky reef facies	%	15
	Normal Upper Group 2 facies	%	10
	Regional Pothole Upper Group 2 facies	%	20
Dilution	Hangingwall overbreak	cm	5
	Footwall overbreak	cm	15
	Re-development/ winch beds/ fall of ground etc.	%	10.8
Quality mining	Reef in foot and reef in hang loss	%	1
	Off-reef mining allowance	%	0.1
Mine Call factor	Merensky reef	%	96
	Upper Group 2 Chromitite layer	%	96

The mine production scheduling was completed in Datamine™ Earthworks Production Scheduler software version number 3.1.32.10209. Production scheduling drivers', constraints and practical mining requirements were identified prior to commencing the scheduling processes. During this process, the targeted monthly rates were scheduled with Merensky reef being the focus of the production ramp-up:

- An initial run of mine ramp-up to one million tonnes per annum
- A subsequent run of mine ramp-up to a targeted three million tonnes per annum
- Target Merensky reef ratio of approximately 90% of the total run of mine
- Achieve a steady balance of run of mine tonnes to the plant throughout the life of mine
- Maintain a minable area of 18 to 24 months ahead of stoping operations throughout the life of mine
- As the Merensky reef depletes focus on strategic changeover to Upper Group 2 Chromitite layer production.

The aim was to ramp-up initial production to one million tonne per annum run of mine (with a secondary production ramp-up delivering three million tonnes per annum run of mine by 2027), considering practical mining aspects, the processing plant construction status and processing strategy. During the initial 15 years of the life of mine, the mining strategy targeted the majority of the run of mine production from the Merensky reef. The table below provides a summary of the life of mine scheduling results.

Reef type	Description	Unit	Financial year				
			*2021	2022	2023	2024	2025
Total waste	Waste hoisted	Mt	0.08	0.17	0.08	0.11	0.07
Merensky reef	Ore hoisted	Mt	0.13	0.59	0.79	0.91	0.93
	Ore content hoisted (3PGE+Au)	Million g	0.39	2.23	2.98	3.74	3.58
	Shaft head grade (3PGE+Au)	g/t	2.93	3.78	3.77	4.10	3.86
	Hoisted troy ounces (3PGE+Au)	Moz	0.01	0.07	0.10	0.12	0.12
Upper Group 2 Chromitite layer	Ore hoisted	Mt	0.03	0.13	0.16	0.17	0.18
	Ore content hoisted (3PGE+Au)	Million g	0.06	0.27	0.32	0.33	0.32
	Shaft head grade (3PGE+Au)	g/t	2.19	2.10	2.03	1.88	1.84
	Hoisted troy ounces (3PGE+Au)	Moz	0.00	0.01	0.01	0.01	0.01
Total	Ore hoisted	Mt	0.16	0.72	0.95	1.08	1.10
	Ore content hoisted (3PGE+Au)	Million g	0.45	2.50	3.30	4.06	3.90
	Average shaft head grade (3PGE+Au)	g/t	2.80	3.48	3.48	3.75	3.53
	Hoisted troy ounces (3PGE+Au)	Moz	0.01	0.08	0.11	0.13	0.13
Reef type	**Description**	**Unit**	**2026 to 2030**	**2031 to 2035**	**2036 to 2040**	**2041 to 2054**	**Total**
Total waste	Waste hoisted	Mt	0.37	0.60	0.32	0.45	2.23
Merensky reef	Ore hoisted	Mt	12.70	13.65	10.80	3.27	43.76
	Ore content hoisted (3PG+ Au)	Million g	50.12	50.98	37.19	13.45	164.65
	Shaft head grade (3PGE+Au)	g/t	3.95	3.74	3.44	4.11	3.76
	Hoisted troy ounces (3PG+ Au)	Moz	1.61	1.64	1.20	0.43	5.29
Upper Group 2 Chromitite layer	Ore hoisted	Mt	1.33	1.38	4.21	35.79	43.45
	Ore content hoisted (3PGE+Au)	Million g	3.38	3.23	12.80	125.69	146.62
	Shaft head grade (3PGE+Au)	g/t	2.54	2.33	3.04	3.51	3.37
	Hoisted troy ounces (3PGE+Au)	Moz	0.11	0.10	0.41	4.04	4.71
Total	Ore hoisted	Mt	14.03	15.03	15.02	39.06	87.21
	Ore content hoisted (3PGE+Au)	Million g	53.50	54.20	49.99	139.15	311.27
	Average shaft head grade (3PGE+Au)	g/t	3.81	3.61	3.33	3.56	3.57
	Hoisted troy ounces (3PGE+Au)	Moz	1.72	1.74	1.61	4.47	10.01

Notes: 2021 production figures for period between June 2021 to December 2021 only

Various phases were developed to ensure that sufficient ventilation is supplied during each operational phase to meet development and production requirements before the required ventilation infrastructure is available. The initial phase will be maintained until the service shaft is temporarily equipped as an up-cast shaft through the installation of the fan station consisting of three fans each with a duty of 250 kilograms per second operating at six kilopascals. During this phase only equipping and main development will be conducted.

An interim up-cast facility phase will be established once the service shaft is equipped with the fan station and the booster fans on 69 level, 72 level, 77 level and 81 level are removed. The total volume circulated during this phase is 650m³ per second and only main development and initial mining will be conducted. The interim phase will be maintained until both the return ventilation shafts are established and equipped with permanent fan stations.

The service shaft can be converted back into a downcast facility once both return ventilation shafts are established and equipped with permanent fan stations. Approximately 1 000m³ per second will be circulated through the mine with both ventilation shafts equipped and commissioned as up-cast facilities. This will satisfy main development and planned mechanised mining operations.

Both the production ramp-up and steady-state mining models indicated adequate ventilation infrastructure and conditions, based on the current mine design. The production ramp-up model indicated a required ventilation factor of

5.1 kilograms per second per kilo tonne mined while the steady-state model indicated a ventilation factor of 4 kilograms per second per kilo tonne mined. This is in line with industry excepted norms.

Metallurgy and processing

A concentrator plant is proposed in two modules processing one million tonnes per annum and two million tonnes per annum in Module 1 and Module 2, respectively. This strategy was adopted to meet the ramp-up of the mining production, maximise cash flow and reduce the capital expenditure exposure, with the construction of the main tailings storage facility delayed by five years. The two modules share the crusher plant infrastructure with the requisite equipment being added once Module 2 is commissioned. Infrastructure and ancillary equipment will be shared between the two standalone milling and flotation plants. Tailings from Module 1 will be filtered and mechanically deposited on the tailings storage facility located close to the concentrator plant. The tailings storage facility for Module 2 will be a conventional facility with thickened slurry pumped approximately 5km from the plant location.

Composite samples of drill cores and individual drill cores were used in the metallurgical test work to characterise both the Merensky and Upper Group 2 ore bodies. The variability within the two ore bodies was considered from a comminution and flotation perspective. Five major zones were identified with the assistance of the geological team in generating the composite samples. Cognisance was taken of the location of the anomalies within the ore bodies in determining the effect of the degree of alteration on the flotation response.

Extensive mineralogical analysis was conducted on the composite samples and on a bulk sample that was submitted for pilot plant test work. The mineralogical analysis revealed that the majority of the platinum group metals and gold in the Merensky ore occurs as sulphides, semi-metal compounds or alloys. These predominant species were classified as fast floating. The analysis was conducted at a grind of 60% passing 75 microns (an industry benchmark for Merensky), a significant proportion of the platinum group metals and gold was locked in siliceous gangue. This implies that a finer grind will be required for Merensky ore.

The Upper Group 2 ore contains predominantly platinum group metals and gold sulphides species, with a lesser amount of semi-metal compounds. The semi-metal compounds, that include tellurium and tin, are slower floating than the sulphides and will require longer residence times.

The mineralogical observations were confirmed in the laboratory test work and a grind of 80% passing 75 micron was selected as the target grind for both ores. Multiple rougher and cleaner laboratory flotations tests were conducted to determine the optimum flotation circuit and it was determined that a MF2 circuit will yield improved metal recoveries for both the Merensky and Upper Group 2 ores. The variability in the milling and flotation response was determined.

Comminution test work indicated the potential for a size build-up in the primary mill. In addition, the variability of the ore hardness across the ore body required a more in-depth study of the comminution circuit design. This included a study conducted by the MPTech group of the University of Cape Town, that recommended a three-stage crusher circuit and grate discharge primary ball mill.

Bulk samples of Merensky and Upper Group 2 ores were extracted from the workings exposed by the recently sunk shafts and sent to Mintek for pilot plant test work. The samples were mined to include waste rock at a dilution rate expected from the mining operation. The pilot plant results confirmed the findings of the laboratory tests and provided valuable design information. A 3 element platinum group metals and gold recovery of 91% and 76% was achieved for the Merensky and Upper Group 2 ores, respectively. Two blends of Merensky and Upper Group 2 ore were tested at 10% Upper Group 2 and 20% Upper Group 2, resulting in a 3 element platinum group metals and gold recovery of 89% and 88% respectively. A concentrate grade for the Merensky ore in excess of 100 gramme per tonne was produced and a comprehensive concentrate analysis revealed that the levels of the deleterious elements were within acceptable limits.

The plant design took cognisance of the findings of the test work and the major findings pertinent to this ore body, were incorporated in the design. The plant design criteria captured the findings of the test work and included best practice design principles. The plant can produce a saleable concentrate of circa 100 gramme per tonne at a recovery of 89% 3 element platinum group metals and gold, for a 10% Upper Group 2 blend, using a three-stage crusher plant and a MF2 milling and flotation circuit. The lack of a formal off-take agreement with a toll smelter is a major risk as the operating window for the concentrator plant was not defined. The test work demonstrated that a more stringent concentrate grade specification will result in a loss in metal recovery.

Infrastructure

The assessment was based on information obtained during site visits and from previous technical study work completed during the bankable feasibility study and subsequent optimisation studies. The general surface and mining related infrastructure requirements were assessed based on:

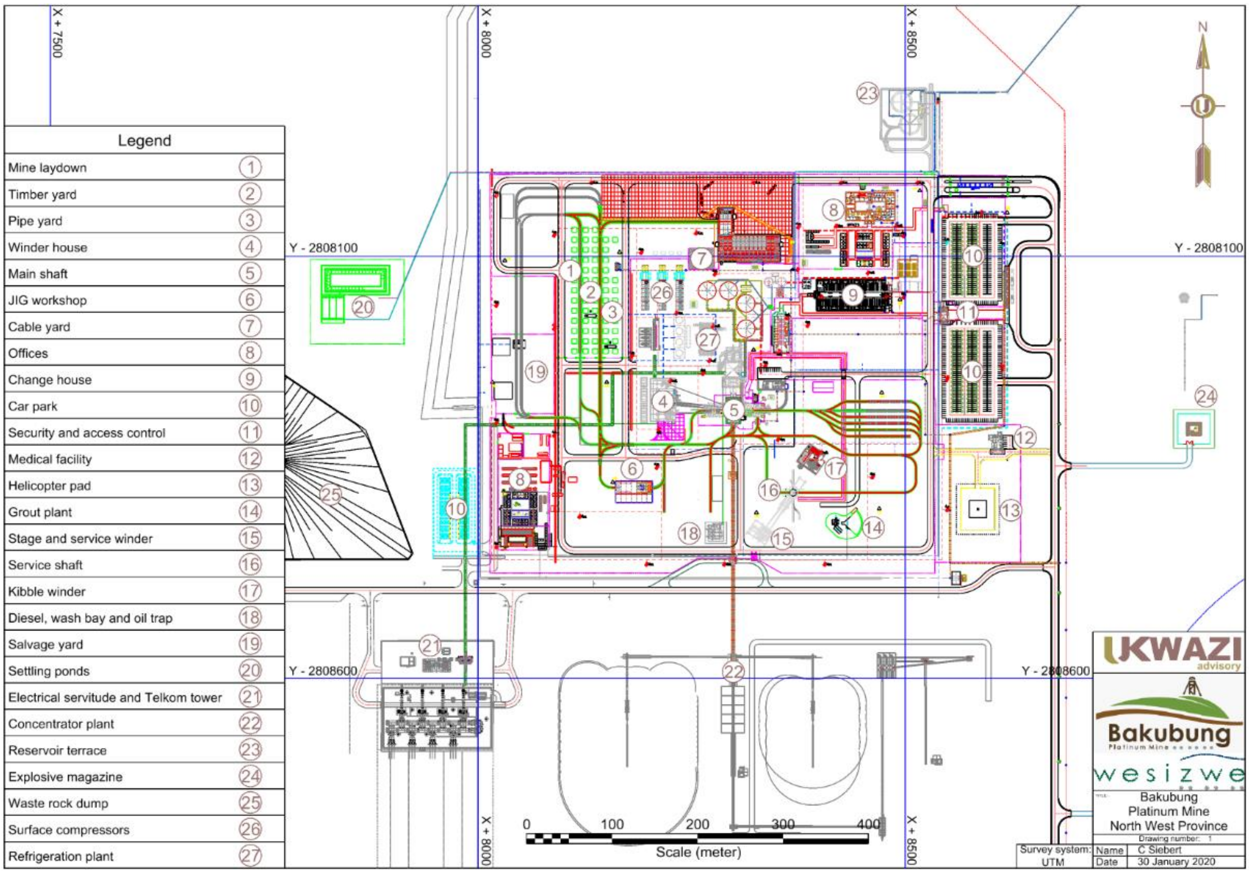
- Surface facilities

- Shaft configuration
- Winding systems
- People transportation
- Rock handling
- Underground services
- Underground facilities.

Access to the mine is restricted by security fencing, security guards, booms and lockable gates at the main entrance. An appropriate communication system and access control system monitors personnel entering and leaving the mine property, in addition to the installation of physical barriers, such as fencing and gates. The main operational office site consists of a mobile office camp located to the west of the main shaft, which provides office space for all operational personnel. There are appropriate ablution and change-house facilities available. The major infrastructural components of the mine are listed below:

- Access and service roads
- Bulk electricity supply and distribution
- Bulk water supply and distribution
- Vertical shaft system consisting of the main shaft, service shaft and related underground infrastructure and rock handling systems
- Winder house
- Compressor house
- Refrigeration plant
- Surface workshops
- Car park, administration offices and change houses
- Explosive magazine
- Planned concentrator plant and related infrastructure.

The permanent surface infrastructure of the mine is shown below.



Bulk electrical supply to the mine was established by Eskom in 2013. Eskom provided three equipped bays of 40 megavolt amperes (88/33 kilovolts) transformers to supply the mine, which includes a premium supply of 40 megavolt amperes at all times. The 33 kilovolts, three-phase, 50 hertz supply is derived from an Eskom yard adjacent to the mine.

The mine is located in an area where water is, generally, in short supply. Storage of make-up water is provided by two, three megalitre capacity reservoirs. Approximately six megalitres per day of municipal makeup water is required. A water agreement with Magalies Water is currently in place for 2 190 megalitres per annum with an estimated maximum seven-day design requirement of 52.5 megalitres. The daily provision of Magalies Water from 2017 onwards was six megalitres per day.

The ore body is accessed with four station levels out of the main and ventilation shafts, namely 69, 72, 77 and 81 levels. Underground development of integrated shaft infrastructure included the workshops, tips, ore passes, silos, belt level, skip tipping arrangements, dams, main chambers and shaft bottom. An overview of the shaft design criteria is indicated in the table below.

Detail	Description	Unit	Value/ description
Level naming and elevations	Surface	Name	Shaft bank (1 046m above mean sea level)
	69 level	Name	693m below collar elevation (353m above mean sea level)
	72 level	Name	723m below collar elevation (323m above mean sea level)
	77 level (loading)	Name	771m below collar elevation (275m above mean sea level)
	81 level (pump chamber)	Name	813m below collar elevation (233m above mean sea level)
	82 level (shaft bottom)	Name	825m below collar elevation
Production (dry tonnes)	Ore tonnes – Merensky	Kilo tonne	230
	Ore tonnes – Upper Group 2	Kilo tonne	20
	Note: When production from the Merensky reef is no longer able to provide 230 kilo tonnes per month it will be mined to depletion and the Upper Group 2 Chromitite layer will be mined to make up a total production target of 250 kilo tonnes per month.		
	Waste (worst case)	Kilo tonne	15
	Total	Kilo tonne	265
Winders	Main shaft: men and material	Type	Double drum
	Main shaft: rock	Type	Koepe
	Main shaft: service	Type	Single drum
	Ventilation shaft: service	Type	Single drum
	Service shaft: men and material	Type	Double drum, single drum used
Shaft details	Main shaft	Description	8.5m diameter, concrete-lined steel buntons and guides Men, material and rock Down-cast ventilation
	Ventilation shafts	Description	6m diameter Not equipped Up-cast/ down-cast ventilation
	Service shaft	Description	7.5m diameter concrete-lined Rope guides Men and material Down-cast ventilation

Two major underground workshops for all equipment servicing requirements were developed. These workshops are situated on 69 and 81 levels where all weekly major servicing and rebuild work can be performed. The workshops are equipped with service bays and overhead cranes. The current surface and mining related infrastructure are generally in good condition with most of the major infrastructural components already developed or in the process of being developed, to achieve the planned production profile.

Environmental

JSE 12.10(h)(viii)

Environmental baseline impacts and associated mitigation, management and monitoring were assessed in detail in the 2008, 2016 and 2021 environmental impact assessment processes. Sensitive areas were identified and the zone of influence of the mining development and associated infrastructure determined. Sensitive receptors mainly include the town of Ledig and the Phatsima community. Other sensitive areas identified are the seasonal wetland area that occurs to the south-western area of the Mimosa site, the Elands River, the Sandspruit and the unnamed tributary of the Elands River. The surface water features are in a largely modified condition with the surface water that is not suitable for human consumption.

The project area falls within a critical biodiversity area and some of the areas host protected species. The mine cumulatively has the potential to impact biodiversity through both physical destruction (mainly during infrastructure establishment) and general disturbance during all project phases. Graves and potential grave sites were identified. Sites of significance include the sites that occur within the return water dam area, the tailings storage facility pipeline route and the phase 1 housing area (fenced off previously). These sites are important in terms of emotional, religious and historical significance and are protected by national legislation. Any disturbance of these sites requires the necessary permits and further assessment work.

Indicative waste profiling considering the total and leachable concentrations of inorganic contaminants was undertaken based on the national norms and standards for the assessment of waste for landfill disposal (Government Notice Regulation 635 of 2013). The data indicated that the total concentrations of barium, copper and nickel classify the tailings deposited on the farm Mimosa 81 JQ as a type 3 waste, although both copper and barium were only marginally over threshold limits. However, none of the parameters of concern, leached at concentrations greater than the Leachable Concentration Threshold 0 levels in terms of Government Notice Regulation 635 of 23 August 2013, which is equal to the South African drinking water standard.

The tailings to be deposited on the farm Frischgewaagd 96 JQ was also classified as a type 3 waste since the total concentration threshold was exceeded for cobalt, copper, manganese, nickel and vanadium. The leachable concentrations were also below the Leachable Concentration Threshold 0 levels.

The design report for the Frischgewaagd tailings storage facility proposed a 1.5mm high-density polyethylene (double textured) geomembrane to serve as the liner for the Mimosa tailings storage facility. The design also proposed that the Frischgewaagd tailings storage facility and the pollution control dams should be lined with an approved Class C or general large landfill liner.

The air quality specialist study indicated a possibility of exceedances of the national ambient air quality standard outside the project boundary and at sensitive receptors due to possible elevated concentrations from current and future sources at the mine. With mitigation measures in place, which may include water sprays on unpaved roads and at materials handling points, and enclosure of crushers and screens with fabric filters, ambient pollutant concentrations will reduce significantly although cumulative particulate matter (“$PM_{2.5}$“) concentrations are still likely to be in exceedance at the mine housing site.

The following authorisations were obtained for the mine and infrastructure development:

- Approval of the Environmental Management Programme Report in terms of section 39 (4) of the Mineral and Petroleum Resources Development Act, (Act 28 of 2002) with reference number NW 30/5/1/2/3/2/2/(339)EM
- Amended integrated environmental authorisation in terms of the National Environmental Management Act, (Act 107 of 1998) as amended and the National Environmental Management Waste Act (Act 59 of 2008) as amended for the construction and expansion of the tailings storage facility, return water dam, pollution control dams, relocation of crusher, reprocessing of the waste rock dump, erosion control measures, noise reduction berm, roads, ventilation shaft, storage of general and hazardous waste, construction of phase 1A housing, solar power plant, stockpiles, pipelines and other associated infrastructure
- Environmental authorisation in terms of the National Environmental Management (Act 107 of 1998) as amended for the development of phase 1 of the Gabonewe Estate mine on-site housing
- South African Heritage Resources Agency – Case identification number 8148 final comments in terms of section 38(8) of the National Heritage Resources Act (Act 25 of 1999)
- An integrated water use license issued in terms of the National Water Act (Act 36 of 1998) in 2010 - License number 26064730
- An additional water use license was approved in 2017 in terms of the National Water Act (Act 36 of 1998) - License number 07/A22F/CGI/5132
- The waste facilities were approved as part of the amended integrated environmental authorisation with reference number NW 30/5/1/2/3/2/1/(339) EM.

The mine has a good understanding of the environmental and social aspects through baseline and specialist studies previously conducted. Risk management and mitigation measures were adequately addressed in the environmental management plans and will be effective to mitigate risks and impacts to acceptable levels should the measures be implemented according to the specialists' recommendations.

Most of the required environmental authorisations are in place for the infrastructure detailed in the optimisation study. There is a requirement for an interim tailings storage facility and environmental authorisation will be required for the facility and associated infrastructure. The authorisation process has commenced to amend the existing environmental authorisation and waste management license granted in 2017. The final Environmental Management Programme Report amendment was submitted to the Department of Mineral Resources and Energy on 19 May 2021. Approval is currently pending.

The water use license application for the tailings storage facility were submitted on 31 May 2021. At the time of writing this report, the next phase of this process had not yet commenced. During this phase, the Department of Human Settlements, Water and Sanitation will determine whether a site visit is required and will confirm the technical documents that must be submitted as part of the application.

Social aspects

The mine has committed to investment projects within the local community in accordance with the approved social and labour plan. The benefit to the local economy will be positive and direct via employment and training and indirect via contractor employment and induced employment in the local areas.

The social and labour plan approved for the period 2019 to 2023, allowed for a financial provision of ZAR235 million. There is a high level of unemployment and a skills shortage in nearby communities and the expectation for work opportunities can lead to the influx of job seekers to the area. This can then result in added pressure on existing communities and possibly the development of informal settlements.

The social risks were adequately captured during the authorisation processes and appropriate mitigation measures were presented in the environmental management plan, the social and labour plan and through governance structures implemented by the mine.

Marketing and logistics

The underground mining operation, with a shaft hoisting design capacity of approximately 250 kilo tonnes of ore per month, will feed run of mine material to a mill-flotation-mill-flotation beneficiation facility on surface for the recovery of platinum group metals, comprising of platinum, palladium, rhodium, gold, iridium, ruthenium and copper and nickel base metals. Platinum group metal concentrate will be transported via road and sold as filter cake to third party platinum group metal smelters within South Africa for platinum group metal and base metal extraction. The mine does not intend to market its refined platinum group metal itself, thus will not be negotiating any toll smelting or refining agreements.

A formal concentrate offtake agreement is yet to be negotiated with a downstream platinum group metal smelter, introducing an element of risk to the Bakubung Platinum Mine operations which are set to commence merchant production output during 2022.

Anglo American Platinum's Waterval smelter in Rustenburg is 55km via road, south of the Bakubung Platinum Mine and their Mortimer smelter, 75km to the north near the town of Northam. Impala Platinum's smelter north of Rustenburg is the closest to the Bakubung Platinum Mine (at less than 30km), while Anglo American Platinum's smelting complex at Polokwane is the furthest at 350km via road and 420km via rail. The smelters of Northam Platinum at Northam and Sibanye-Stillwater at Marikana near Rustenburg are respectively located 85km and 70km from the mine.

The basket price received for merchant platinum group metal concentrates sold to third-party smelters depends on a number of factors such as the Merensky: Upper Group 2 ratio of the concentrate, contractual offtake duration, the tonnage of concentrate treated and the prevailing market prices and market dynamics.

The Bakubung Platinum Mine concentrate is forecast to have an average net payability of approximately 81% for its cumulative platinum group metals and base metals. The table below summarises the average 2020 market-related precious and base metals commodity prices and indicates the anticipated, payable smelter price for the Bakubung Platinum Mine concentrates. For the sake of completeness, the chromite price is listed in the table below, although it was not included in the platinum group metal concentrate sales revenue.

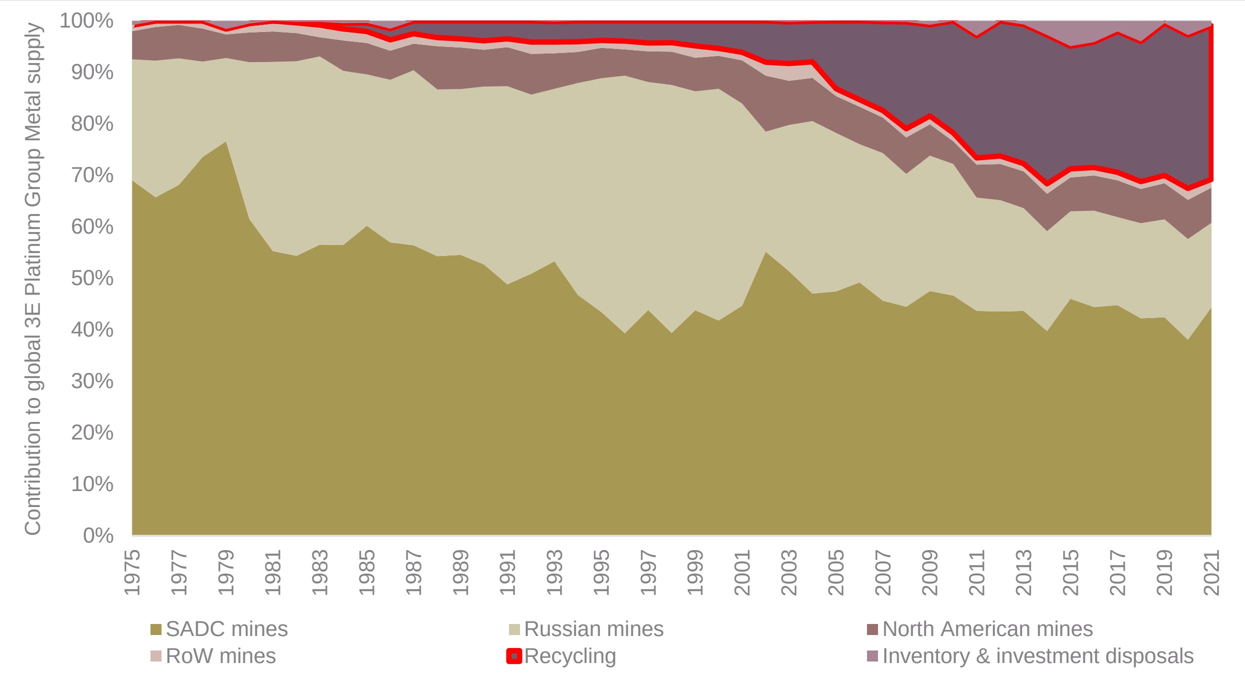
Metal	Symbol	Unit	Market price	Concentrate price	Estimated payable [%]
Platinum	Pt	USD/oz	893	750	84
Palladium	Pd	USD/oz	2 214	1 860	84
Rhodium	Rh	USD/oz	11 621	9 762	84
Gold	Au	USD/oz	1 777	1 493	84
Ruthenium	Ru	USD/oz	288	158	50
Iridium	Ir	USD/oz	1 651	826	55
Nickel	Ni	USD/t	14 250	10 688	75
Copper	Cu	USD/t	6 181	4 327	70
Chromite (future)	Cr_2O_3	*USD/t*	*107*	*54*	*50*

The Bushveld Complex in South Africa contains an estimated cumulative 72 200 tonnes of platinum group metals (platinum, palladium, rhodium, ruthenium, iridium and osmium) and gold contained within 21 700 million tonnes of platinum group metals Mineral Resources. This represents approximately 73% of the known global platinum group metal resources.

In 2020, a total of 11.7 million troy ounces primary 3 Element platinum group metals were supplied to the market, comprising 4.94 million troy ounces platinum, 6.16 million troy ounces palladium and 609 thousand troy ounces rhodium. This represents a cumulative reduction of 15.6%, attributable to the negative impact of the global COVID-19 pandemic and excessive production outages at South Africa operations. On average, over the five years (from 2017 to 2021 forecast), South African mines produced approximately 54.5% of the total primary 3 Element platinum group metal supply, with Southern African refinery output (which includes platinum group metals from Zimbabwe) accounting for 61.3% of global primary supply.

Whereas global primary platinum group metal production remained fairly constant over the past 25 years at 13 to 14 million troy ounces per annum, the cumulative market demand maintained a steady growth trajectory and reached a record 22.6 million troy ounces in 2019. The 2020 market demand decreased to 20.05 million troy ounces due to the COVID-19 pandemic but is set to rebound to 21.17 million troy ounces in 2021. Increased market demand was predominantly serviced by growth in secondary platinum group metal production arising from primarily recycled automotive catalysts.

The figure below shows how secondary platinum group metal supply gained market share over primary platinum group metal supply over the past 45 years, reaching approximately 30% in 2021. This trend is expected to continue as the global inventory of recyclable platinum group metals increases and represents a risk to the long-term primary platinum group metal demand.



Several factors have contributed to a positive year-on-year economic outlook for platinum group metals at the end of 2020 as the world emerged from the economic restrictions associated with COVID-19 lockdowns. An increase in the 6 Element USD basket price was attained by primary platinum group metals producers, driven primarily by higher palladium and rhodium prices.

Despite the COVID-19 pandemic and the ensuing global economic activity restrictions impacting both supply and demand markets, supply deficits of 669 thousand troy ounces platinum, 728 thousand troy ounces palladium and 72 thousand troy ounces rhodium occurred in 2020.

Strong medium-term industrial demand growth is forecasted for platinum, driven by nascent hydrogen and fuel cell technology adoption, whilst tightening in the markets for palladium and rhodium is expected to support the higher pricing in the short to medium-term.

South Africa has four primary platinum group metal producers with operational smelters capable of producing precious- and base metal matte for downstream refining: Anglo American Platinum, Impala Platinum, Sibanye-Stillwater and Northam Platinum.

The platinum group metals mining landscape in South Africa looks significantly more complex, given the Mineral Resource size and clustered configuration of the Bushveld Complex, with around 50 individual mining operations in various stages of their life cycles.

Within this highly competitive mining environment, Bakubung Platinum Mine and Ivanhoe's Platreef Mine are the only large greenfield concentrate projects currently in execution in South Africa and are amongst the few operations that are not captured for concentrate supply to a specific primary platinum group metal producer.

The competitive quality of the concentrate and the mine's proximity to major existing smelting operations hold substantial market penetration potential when compared to existing deeper regional mines and emerging or potential concentrates-only platinum group metal projects.

In the longer term, the high platinum group metal and low sulphur grades of the Upper Group 2-dominant concentrate that will be produced by the mine, as its Merensky resources are depleted, will form an ideal blend with the sulphide-rich Platreef concentrate arising from the Northern Limb.

Capital and operating expenditure

The capital expenditure estimate was scheduled in detail and captured items for production and development capital, stay in business capital and other capital. ZAR5.6 billion was spent to the valuation date on developing the project, with a further ZAR7.2 billion on capitalised costs. An additional ZAR11.4 billion was estimated over the remaining life of mine (ZAR5.4 billion on development capital and ZAR5.9 billion on stay-in-business (sustaining) capital). A summary of the total life of mine capital expenditure estimate is shown below.

Description	Capital cost spend to 31 May 2021 [ZAR million - Real 2021]	Capital cost estimate after 31 May 2021 [ZAR million - Real 2021]	Total capital cost estimate [ZAR million - Real 2021]
Total direct project cost	5 583	4 903	10 486
Other capital expenditure	381	514	895
Stay in business capital	0	5 938	5 938
Capitalised costs	7 199	0	7 199
Total	**13 162**	**11 355**	**24 571**

The operating expenditure estimate was developed in sufficient detail and accuracy to be used in the financial valuation. Where applicable, input costs were linked to an appropriate production driver and determined from first principles. All operating expenditure mining activities were associated with owner mining operations. The mining costs for rock extraction and hauling were based on the first principles costing per mining method and process. The total operating expenditure over the life of the operation and on a unit cost basis, is shown in the table below.

Description	Total life of mine [ZAR million]	Contribution [%]	Life of mine average unit cost [ZAR/ROMt]	Steady-state average unit cost [ZAR/ROMt]
Mining	61 751	66.5	708.05	675.04
Processing	15 002	16.2	172.02	165.60
Logistics	265	0.3	3.04	2.90
Rehabilitation fund	271	0.3	3.11	2.66
Overheads	15 550	16.7	178.30	158.96
Total	**92 839**	**100.0**	**1 064.51**	**1 005.15**

Notes: Mining cost excludes depreciation and amortization.

Financial valuation

JSE 12.10 (a)(h)(xii)

The financial valuation of the Bakubung Platinum Mine was conducted using two methods, namely the income and market approaches. The income approach can be applied based on a sufficient body of technical/ economic studies and/ or historical operational information to forecast production, sales, capital expenditure and operating expenditure costs for the asset, allowing the determination of the present value of asset cash flows to estimate asset value.

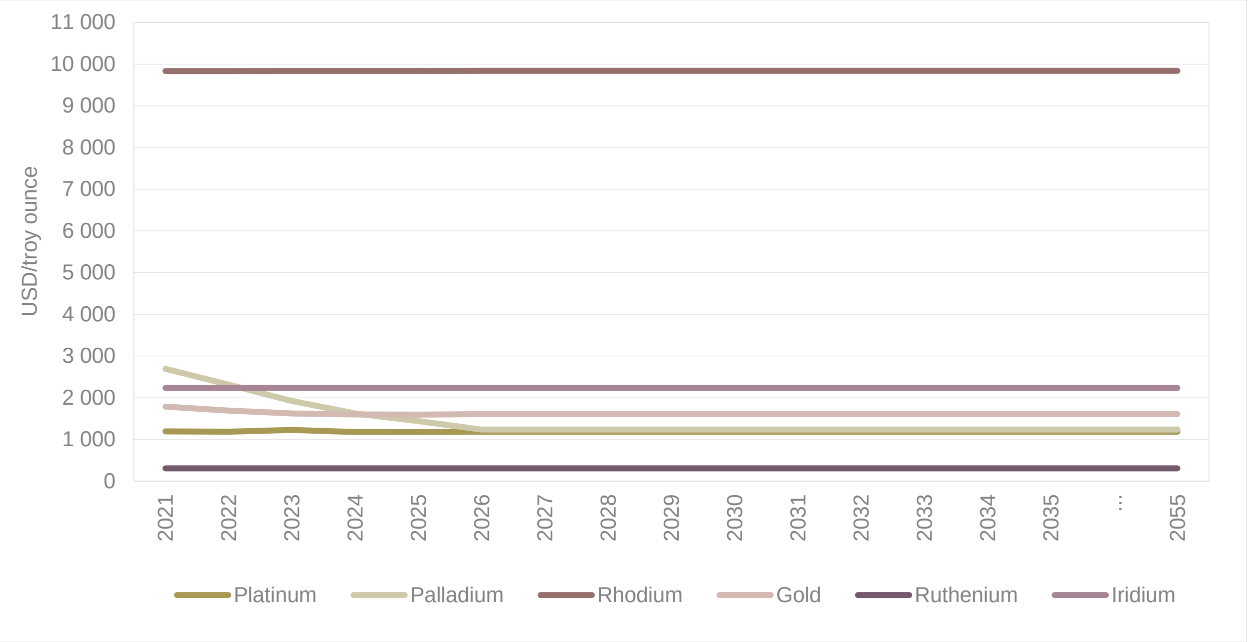
The market approach uses price and information from historical transactions for comparable mineral assets on the market to determine a range of values per resource tonne and applies this, sometimes modified for its attributes, to the Mineral Resources of the asset under valuation to estimate its value.

The income approach valuation was done by building a discounted cash flow financial model, that used planned production volumes based on the life of mine plan and technical studies to drive revenue and operating costs, supported by capital expenditure (both establishment and sustaining) required to maintain those production forecasts.

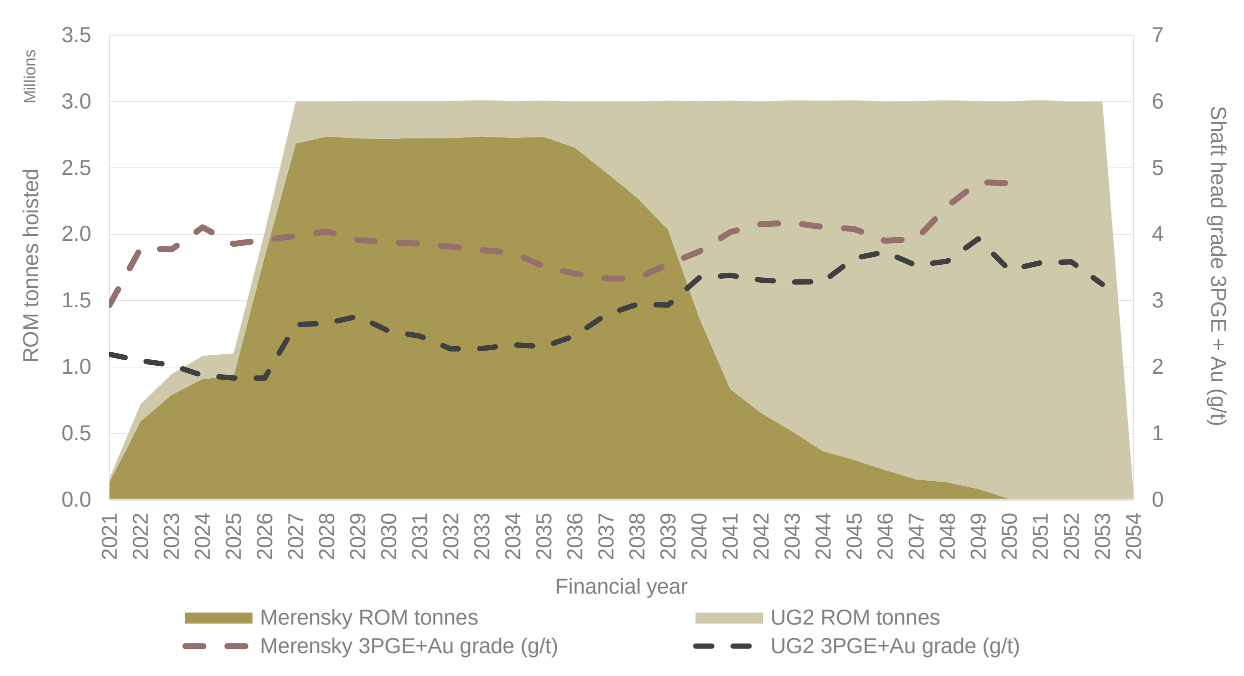
The model calculated further cash flow items such as taxation (corporate taxation and mineral royalties) and working capital requirements, resulting in the free cash flows that were discounted to the valuation date to provide the net present value of the Mineral Asset. The model was built in ZAR, in real terms base dated 1 June 2021, to the projected end of the life of mine in 2054. The model was based on the life of mine plan produced by Ukwazi for this Competent Persons' Report and the detailed capital and operating budgets and supporting information produced by the Bakubung Platinum Mine.

Key macroeconomic assumptions applied included USD inflation of 2%, ZAR inflation of 4.5% and a long-term real exchange rate of ZAR15.30/ USD. On the basis that the true cost of money was sustainably eroded by central bank policy over an extended period and the further recent related fiscal and corporate stimulus in response to the COVID-19 impact globally, the project specific, risk adjusted real discount rate applied to the base case model was 8%.

The prices for platinum, palladium, rhodium, gold, copper and nickel applied in this Competent Persons' Report were obtained from the June 2021 Energy and Metals Consensus Forecasts, provided by Consensus Economics. Forecasts for rhodium, ruthenium and iridium are not widely available and prices for these metals were derived by calculating the three-year average prices. The forecast prices for precious metals are shown in the following graph. The long-term forecast for copper was USD7 819 per tonne and for nickel USD17 036 per tonne.



Ore production and grades used in the financial model are shown in the graph below. The life of mine profile was designed to keep the mine operating at approximately three million tonnes per annum of run of mine ore during steady-state production. Mining initially ramps up to one million tonnes per annum, followed by a steep ramp-up to three million tonnes per annum by 2027. This rate is maintained until 2053 from where production ramps down to the final year in 2054. The total ore mined is shown by the shaded areas in the graph. Over the life of mine, approximately 87.2 million ore tonnes are mined, containing approximately 311 million grams of three Platinum Group Elements and gold.



Metal recovery by the concentrator from milled ore is as follows:

Metal recovery	Merensky reef [%]	Upper Group 2 Chromitite layer [%]
Platinum	92.5	82.0
Palladium	93.0	80.0
Rhodium	91.0	81.0
Gold	68.5	80.0
Ruthenium	81.0	79.0
Iridium	78.0	67.0
Copper	86.0	80.0
Nickel	55.0	50.0

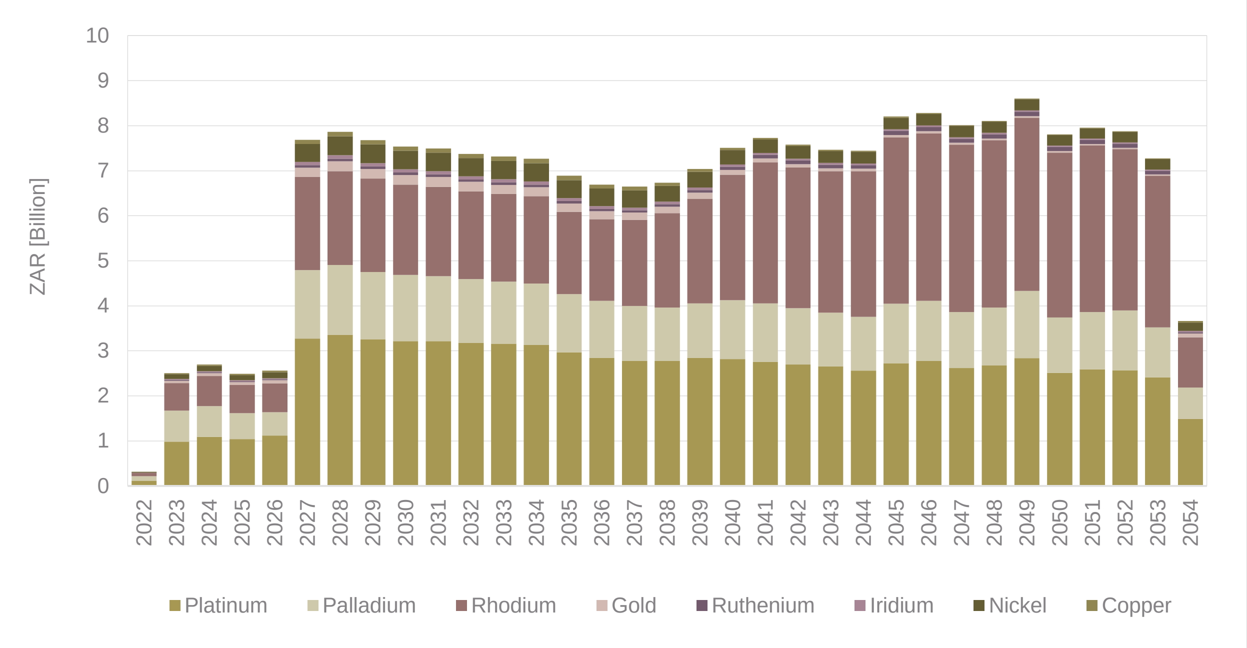
Over the life of mine, a total of 9.3 million troy ounces of precious metals will be recovered. The steady-state yearly average is 332 thousand troy ounces (5 Platinum Group Elements and gold), with a peak of 374 thousand troy ounces in 2028 and a minimum of 294 thousand troy ounces in 2053. Metal production is at its highest initially, gradually declining as the lower-grade Upper Group 2 ore starts coming on stream.

The recovery of nickel to concentrate ranges between 1.2 kilo tonnes and 2.2 kilo tonnes per annum, with a total of 48.5 kilo tonnes produced over the life of mine. During the Merensky steady-state, copper recovery to concentrate averages 812 tonnes per annum, tapering off as Merensky production declines. A total of 19.6 kilo tonnes of copper is produced over the life of mine with low levels of copper recovery from the Upper Group 2. The smelter payabilities for each metal applied in the financial model are shown in the table below.

Smelter payability	% of Metal value
Platinum	84
Palladium	84
Rhodium	84
Gold	84
Ruthenium	50

Smelter payability	% of Metal value
Iridium	55
Copper	70
Nickel	75

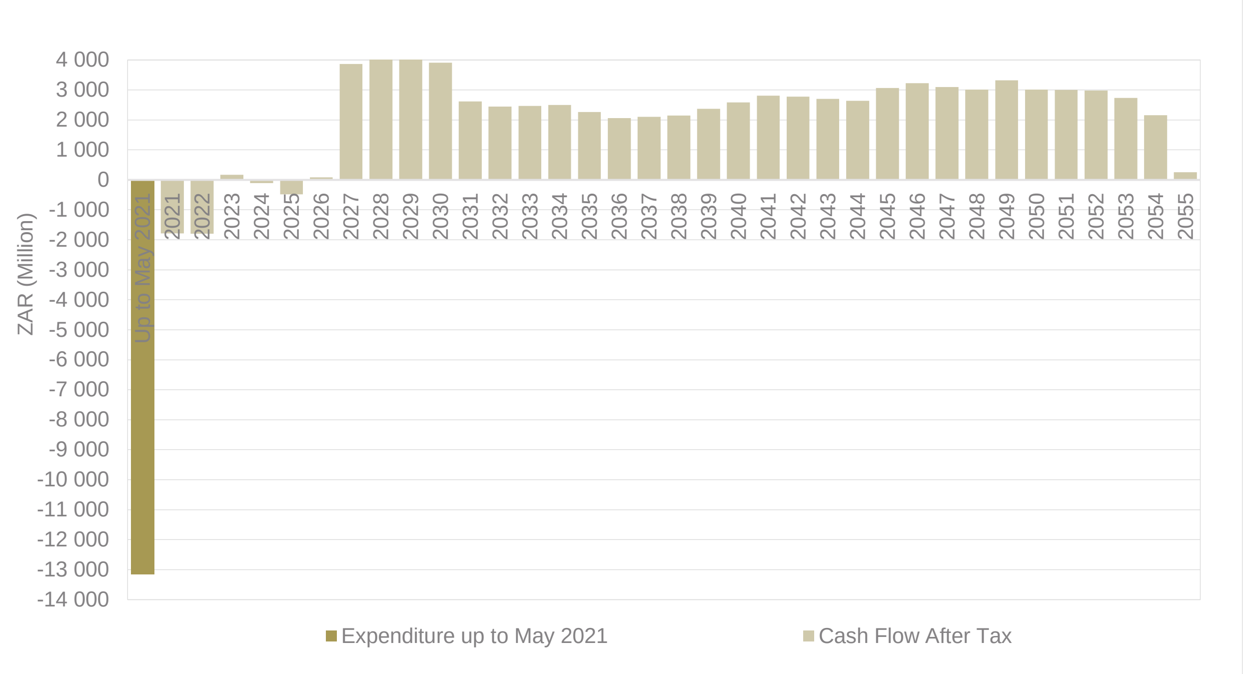
Applying the payability to the metal content and the metal pricing assumptions gives the projected revenue, shown in the graph below. The estimated life of mine revenue is ZAR218 billion, with platinum, rhodium and palladium contributing 91.7% of revenue. Average steady-state (2027 to 2053) revenue was estimated at ZAR7.6 billion per annum, with a maximum of ZAR8.6 billion in 2049 and a minimum of ZAR6.7 billion in 2037.



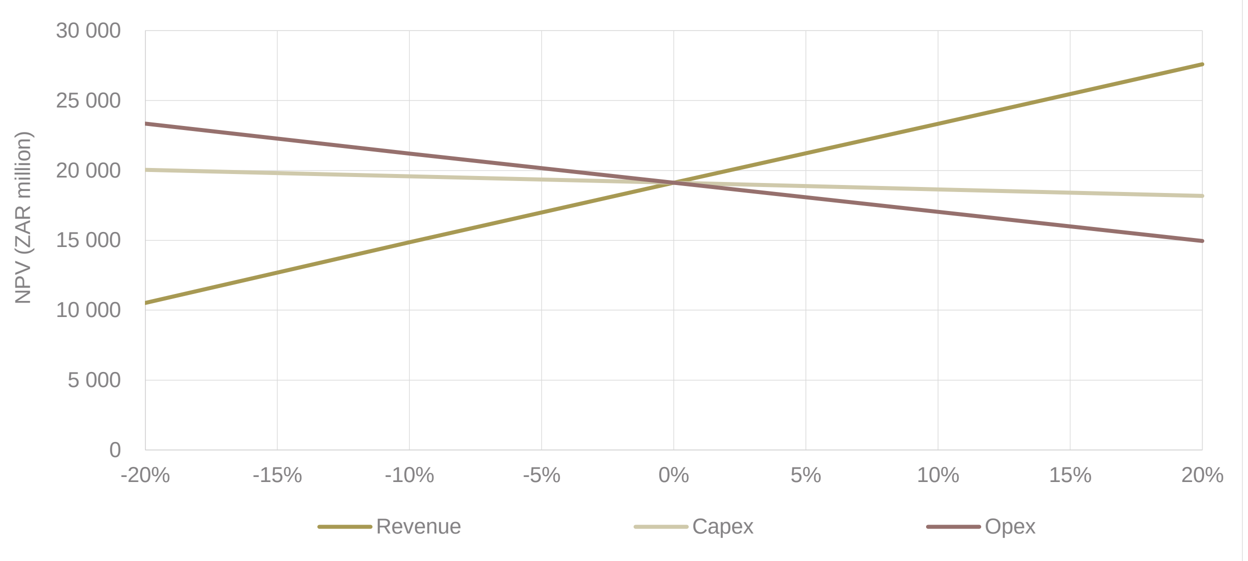
Operating expenditure, as discussed above, was applied in the financial model at an average cost of ZAR1 064 per run of mine tonne.

The capital expenditure up to 31 May 2021 was ZAR13.2 billion, with a further ZAR5.4 billion remaining in the capital budget estimate. Stay in business capital over the life of mine is ZAR5.9 billion, with an average of ZAR180 million in each year of operation. Stay in business capital is variable, ranging between ZAR10.9 million to ZAR352 million per year.

The standard rate for corporate income tax in South Africa of 28% was applied. Due to the substantial capital expenditure to date, future capital expenditure and operating costs incurred before production, Bakubung Platinum Mine is only expected to start paying tax in 2031. The average annual tax payable is ZAR1.04 billion from that point onwards. Over the life of mine, ZAR24.8 billion is paid in tax. Mineral royalties were estimated based on the formula for unrefined mineral resources. Over the life of mine, ZAR12.3 billion is paid in royalties, an average royalty rate of 5.6% of revenue. The resulting cash flow is shown in the following graph.



At a real discount rate of 8%, the net present value of the projected cash flows is ZAR19.1 billion, with a 31.0% internal rate of return. This net present value excludes sunk costs of ZAR13.2 billion up to 31 May 2021. The sensitivity of net present value to changes in revenue, capital expenditure and operating expenditure is shown in the graph below.



This valuation must be interpreted with some caution, as it includes Inferred mineralised material. The Bakubung Platinum Mine intends to mine this Inferred mineralised material which forms an integral part of the mine plan due to the tabular nature of the Merensky reef and Upper Group 2 Chromitite layer.

For Inferred Mineral Resources, the geological evidence is sufficient to imply but not verify geological and grade or quality continuity. An Inferred Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. While it would be reasonable to expect that the majority of Inferred Mineral Resources would upgrade to Indicated Mineral Resources with continued exploration, due to the uncertainty of Inferred Mineral Resources, it should not be assumed that such upgrading will always occur.

Inferred mineralised material contributes ZAR3.8 billion to the net present value, or 19.9% (17.8% of the revenue). This was based on the hypothetical exclusion of Inferred mineralised material from the targeted three million tonnes per annum run of mine production profile, therefore, significantly devaluing the 'Mineral Reserve only' case and overvaluing the contribution from Inferred mineralised material.

The alternative approach of excluding the Inferred mineralised material and to reschedule the run of mine production profile (and ramp up the Upper Group 2 Chromitite layer earlier) to maintain the three million tonnes per annum production profile, is equally hypothetical and practically flawed. Most of the capital expenditure and a large proportion of the operating expenditure are fixed and would not reduce if the Inferred mineralised material were (hypothetically) not mined, as these costs are fully incurred in the 'Mineral Reserve only' case. This alternative approach of valuing the contribution from Inferred Mineral Resources was not considered.

Given that there would be no significant variance in the cost of mining a tonne of Inferred or Measured/ Indicated Mineral Resources, the "real" contribution of Inferred Mineral Resources to net present value is more accurately captured by the revenue contribution. The contribution of Inferred Mineral Resources to net present value is 17.8%, or ZAR3.4 billion and Proved and Probable Mineral Reserve is ZAR15.7 billion.

Due to the uncertainty associated with Inferred Mineral Resources, it is prudent to apply a discount to their contribution to the valuation. In the opinion of the Valuator, a discount of 25% is reasonable in this case. This reduces the value by ZAR0.8 billion to ZAR2.5 billion. Retaining the value of Proved and Probable Mineral Reserves of ZAR15.7 billion gives a revised valuation of ZAR18.3 billion with an internal rate of return of 30.7%.

For the market approach, transactions involving other platinum group metal assets were researched. Two suitable transactions were the April 2019 acquisition of Lonmin by Sibanye Stillwater for 226 million British pound sterling (ZAR4.3 billion) and the 2015 acquisition of Anglo American Platinum Rustenburg Mines by Sibanye Gold for ZAR4.5 billion. The purchase prices were divided by the metal contained in the Mineral Resources and Mineral Reserve of the target companies to provide a value per contained ounce. These values were applied to Bakubung Platinum Mine's Mineral Resources and Mineral Reserve to provide a range of values.

Project capital and capitalised costs of ZAR13.2 billion to date were funded by ZAR3.4 billion from the Wesizwe shareholders and a loan from the China Development Bank with the carrying amount of ZAR9.4 billion as at 31 December 2020. The results of the valuation are shown in the following table:

Approach	Valuation [ZAR million]			Basis
	Low	Base	High	
Discounted cash flow net present value model	16 121	18 266	24 486	69.5 million tonnes Mineral Reserve, 17.6 million tonnes Inferred Mineral Resources, 35-year life of mine, discount rates applied 8%
Comparable transactions	2 130	2 662	3 195	Mineral Resource and Mineral Reserve valuations per troy ounce of contained metal, 13.8 million troy ounces contained in Mineral Resources

The market approach naturally undervalues the Bakubung Platinum Mine, given that the comparable transactions were effectively sales by Anglo American Platinum and Lonmin, wanting to dispose of late-life non-core assets and demonstrates within the differential value of the income approach applied to Bakubung Platinum Mine and true value accrued to the shareholders of the Sibanye-Stillwater, in not having overpaid for the assets.

Such market valuations can be comparatively misleading in the context as it values the developed Mineral Resources and Mineral Reserve but take no account of the carrying value on the balance sheets of the related exploitation infrastructure acquired by Sibanye-Stillwater for an effective zero cash consideration.

From a valuation perspective and final valuator opinion with respect to Bakubung Platinum Mine is that the demonstrated income approach base case result is taken as final in this instance, i.e. ZAR18.3 billion.

By way of statement of comparative observation only, the results of this specific valuation assessment are in stark contrast to the current market capitalisation of Wesizwe Platinum Ltd, the Bakubung Project owner, which at the close of trading on 22 July 2021 held a listed share price of ZAR0.47 per share, which with 1 627 827 058 shares in issue, was ZAR765 million, a discount of approximately 96% to the project net present value.

Currently, all the metal commodity explorers, developers, emerging producers and producers' share prices are still depressed to varying degrees based upon the uncertain future supply/ demand drivers from emerging energy generation and storage technologies. Wesizwe peers in the upper junior and low mid-tier rankings all depict similar deep discounts to both net present value and/or net asset value of their assets.

Mineral Reserve

JSE 12.10(h)(ix)

A detailed life of mine plan was completed to declare the Mineral Reserve estimate for the underground operations, based on the geological model used as basis for the Mineral Resource estimate. Various technical aspects were considered in the mine design and schedule, including the geotechnical parameters, mining methodology, mining sequence, production rates and practical mining considerations. The mining-related modifying factors applied included various mining recovery factors that are considered appropriate to declare a Mineral Reserve.

The Mineral Resources reported, are inclusive of the Mineral Reserve. The Mineral Reserve estimate was derived from the Measured and Indicated Mineral Resources contained within the life of mine plan. The basis of the Mineral Reserve estimate was the delivery of run of mine ore to the shaft head bin, respective processing plant or related run of mine stockpile.

The consolidated Mineral Reserve, as at 1 June 2021 for the underground operations, was estimated at 69.5 million tonnes at 3.66g/t (3PGE+Au). The Proved Mineral Reserve was estimated at 7.7 million tonnes at 4.51g/t (3PGE+Au) and the Probable Mineral Reserve was estimated at 61.8 million tonnes at 3.56g/t (3PGE+Au). The consolidated Mineral Reserve estimate is shown below.

Reef type	Mineral Reserve classification	Tonnage [Mt]	$3PGE+Au_{grade}$ [g/t]	Pt_{grade} [g/t]	Pd_{grade} [g/t]	Rh_{grade} [g/t]	Au_{grade} [g/t]	Cu_{grade} [%]	Ni_{grade} [%]
Merensky reef	Proved	7.7	4.51	2.90	1.22	0.20	0.19	0.06	0.16
	Probable	23.5	3.81	2.45	1.03	0.17	0.16	0.05	0.13
	Total	**31.2**	**3.98**	**2.56**	**1.08**	**0.18**	**0.17**	**0.05**	**0.14**
Upper Group 2 Chromitite layer	Proved	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Probable	38.3	3.40	2.04	0.99	0.36	0.02	0.01	0.08
	Total	**38.3**	**3.40**	**2.04**	**0.99**	**0.36**	**0.02**	**0.01**	**0.08**
Total	**Proved**	**7.7**	**4.51**	**2.90**	**1.22**	**0.20**	**0.19**	**0.06**	**0.16**
	Probable	**61.8**	**3.56**	**2.19**	**1.00**	**0.29**	**0.07**	**0.02**	**0.10**
	Total	**69.5**	**3.66**	**2.27**	**1.03**	**0.28**	**0.09**	**0.03**	**0.11**

Notes:
1) The Mineral Reserve estimate was reported in accordance with the guidelines of The SAMREC Code 2016
2) Mineral Resources were reported inclusive of Mineral Reserve
3) The basis of the Mineral Reserve estimate was the delivery of run of mine material to the shaft head bin, respective processing plant or related run of mine stockpile
4) No cut-off grades were applied in the Mineral Reserve estimate
5) Tonnage estimates were reported in metric units and reported as million tonnes
6) 3PGE/ 4E (g/t) = Pt grade (g/t) + Pd grade (g/t) + Rh grade (g/t) + Au grade (g/t)
7) Numbers may not add up due to rounding.

Risks

JSE 12.10(h)(x)

A summary of the perceived risks is indicated in the table below. A comprehensive discussion of the identified risks is contained in Chapter 22 of this report.

Risk description	Likelihood	Level	Overall risk
Geology and Mineral Resources			
Significant variance in Mineral Resource tonnage estimate	Unlikely	Minor	Low
Mineral Resource grade variation	Unlikely	Minor	Low
Significant variance in geological losses	Unlikely	Minor	Low
Significant change in the geological model/ structure on mining	Unlikely	Minor	Low
Geotechnical engineering			
Inadequate multi reef stoping strategy for narrow middlings	Likely	Moderate	High
Inappropriate use of UCS and absence of elastic rock mass properties	Possible	Minor	Low
Ineffective delineation of ground control districts	Likely	Moderate	High
Mining engineering and Mineral Reserve			
Inability to achieve planned production targets	Possible	Moderate	Medium
Variation in Mineral Reserve tonnage estimate	Possible	Minor	Low
Mineral Reserve grade variation	Possible	Minor	Low
Additional losses due to the intersection of geological features	Possible	Moderate	Medium
Metallurgy and processing			
Poor understanding of degree of alteration in ore body resulting in poor recovery	Likely	Moderate	Medium
Excessive dilution resulting in reduced precious metal production	Likely	Moderate	Medium
Inadequate water storage capacity on plant	Likely	Minor	Low
Future concentrate grade restrictions resulting in recovery losses	Possible	Moderate	Medium
Infrastructural			
Emergency pack-up electrical supply	Possible	Moderate	Medium
Winder earthing standard	Possible	Moderate	Medium
Substation fire detection system	Possible	Moderate	Medium
Environmental			
Scheduling delays due to the tailings storage facility licensing and authorisation processes	Likely	Moderate	High
Social/ community unrest	Likely	Minor	Medium
Increase in closure liability	Possible	Moderate	Medium
Marketing and logistics			
Lack of an offtake agreement might affect product sales	Unlikely	Moderate	Low
COVID-19 impact	Possible	Major	High
Disruptions or shortfalls in primary platinum group metal supply	Possible	Minor	Low
Domestic concentrate oversupply	Possible	Moderate	Medium
Substitute products to platinum group metals	Likely	Major	High
Market penetration of electric vehicles and hydrogen fuel cells	Possible	Major	High
Costs and financial valuation			
Change in operating expenditure	Likely	Moderate	Medium
Process recovery and payability	Likely	Moderate	Medium
Change in capital expenditure	Possible	Minor	Low
ZAR/USD exchange rate	Likely	Major	High
Market and price considerations	Likely	Major	High
Changes in fiscal regime	Unlikely	Major	Medium
Contingency allowances	Likely	Moderate	Medium

Lead Competent Persons statement

JSE 12.10(h)(xi)

I, Jacobus Johannes Lotheringen, a professional mining engineer and Lead Competent Person hereby state that according to my knowledge, information and belief this executive summary presents a true and accurate reflection of the full Competent Persons' Report.

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1. Introduction

Ukwazi Mining Studies (Pty) Ltd ("Ukwazi") was appointed by Bakubung Minerals (Pty) Ltd ("Bakubung"), a wholly-owned subsidiary of Wesizwe Platinum Ltd ("Wesizwe"), to prepare a Competent Persons' Report ("CPR") for the Bakubung Platinum Mine ("BPM"), situated approximately 40km north of the city of Rustenburg in the North West Province of South Africa ("SA").

This CPR was prepared by a team of experienced professionals, based on the guidelines of The South African Code for the Reporting of Exploration Results, Mineral Resources and Mineral Reserves ("The SAMREC Code") 2016 Edition; The South African Code for the Reporting of Mineral Asset Valuations ("The SAMVAL Code") 2016 Edition, as published by the South African Mineral Asset Valuation Committee working group under the auspices of the South African Institute of Mining and Metallurgy ("SAIMM"); and the Geological Society of SA through the SAMREC/ SAMVAL Committee and The South African Guideline for the Reporting of Environmental, Social and Governance Parameters within the Solid Minerals and Oil and Gas Industries ("The SAMESG Guideline", 2017), as prepared by the South African Environmental, Social and Governance Committee.

1.1. Terms of reference and scope of work

SR 1.1(i)/ SV T1.3; T1.4; T1.10; T1.13/ JSE 12.10(a); 12.10(d); 12.10(e), 12.10(h)(i)

Ukwazi was tasked to prepare a CPR, providing a summary of the material scientific and technical information concerning the mineral exploration, Mineral Resources, Mineral Reserves and associated production activities and mineral asset valuation of the BPM, in accordance with the guidelines of The SAMREC Code and The SAMVAL Code.

The purpose of this CPR is to inform investors and interested parties of material changes regarding the material assets of the BPM and to comply with the Johannesburg Stock Exchange's ("JSE") regulations for listed companies. In compliance with paragraph 12.10 (d) of the JSE listings requirements, the appropriate sections in SAMREC Table 1, SAMVAL Table 1 and the JSE listings requirements are referenced as SR, SV and JSE 12.10 respectively, below each relevant section heading.

This CPR expresses individual, professional opinions based on the information available at the time of preparation. The quality of information, conclusions and estimates contained within the report, are consistent with the intended level of accuracy, including the circumstances and constraints under which the mandate was performed and was based on:

- Data available to the team during the compilation of the CPR
- Data supplied by Bakubung and third-party consultants
- The assumptions, conditions and qualifications set forth in this report.

This CPR has an effective date of 1 June 2021 and it is important to note that no material changes occurred between the effective date and the date of signature on this report.

1.2. Independence

SR 9.1(ii)/ SV T1.0; T1.3/ JSE 12.10(c)

Ukwazi is an independent advisory group, with no direct or indirect interests in the BPM. Neither Ukwazi, nor the key personnel responsible for the technical work, has any material interest in the mine, the companies associated with the BPM, their subsidiaries, or their mineral properties. All work completed by Ukwazi for Bakubung is strictly in return for professional fees and payment for the work is not in any way dependent on the outcome thereof. There is no conflict of interest by Ukwazi undertaking this work as contained in this document.

1.3. Competent Persons and site inspections

SR 1.1(iii); 9.1(i)/ SV T1.0

1.3.1. Competent Persons

Each Competent Person ("CP") and Competent Mineral Asset Valuator ("CV") was responsible for specific sections of this CPR, which each expert personally authored, supervised or reviewed. The details of the CPs and the CV as well as their respective CPR responsibilities are outlined in Table 1-1 below:

Table 1-1: Competent Persons list and CPR responsibilities

Name of person	Role and responsibilities	Qualifications	Affiliations	Company	Responsible chapters
Kenneth Lomberg	CP – Mineral Resources	B. Sc (Geology and Geochemistry), B. Sc (Honours) Geology, BCom. (Economics and Statistics), M Eng. (Mining Eng.) Pr. Sci. Nat.	SACNASP – Member (Reg no: 400038/01)	Pivot Mining Consultants (Pty) Ltd – SA	4.1, 4.2, 5, 6, 7, 8, 22, 23, 24, 25.2, 26.1.2, 26.1.3, 26.1.4, 26.1.7, 26.1.9, 26.5.1
Jacobus Johannes Lotheringen	CP – Mineral Reserve and principal author (Lead CP)	Pr. Eng. (Mining Eng.)	SAIMM – Member (Reg no: 701237). ECSA (Reg no: 20030022).	Ukwazi Mining Studies (Pty) Ltd – SA	1, 2, 3, 4.3, 4.4, 9, 10, 11, 12, 13, 14, 15, 16, 17, 21, 22, 23, 24, 25.3, 26.1.1, 26.1.5, 26.1.6, 26.1.7, 26.1.8, 26.1.9, 26.3, 26.4, 26.5.2
Alan Mitchell Clegg	CV	Pr. Eng. (Mining Eng.)	SAIMM – Fellow (Reg no: 701825) ECSA – (Reg no: 20050117)	Ukwazi Mining Studies (Pty) Ltd – SA	18, 19, 20, 22, 23, 24, 25.4, 26.2, 26.5.3

These individuals are defined as CPs and CV as set out in The SAMREC Code and The SAMVAL Code and are certified mineral industry professionals, with relevant sector experience, educational qualifications and industry association affiliations or memberships. Their certificates of competence and signed declarations are attached as Appendix E.

1.3.2. Site inspections

Site inspections were conducted by various technical experts as part of the process of compiling this CPR. Table 1-2 provides a summary of the site inspections completed.

Table 1-2: Site inspections

Name	Specialist	Project role	Date
K. Lomberg	Senior resource geologist	CP Mineral Resource	Not conducted
J. Lotheringen	Principal mining engineer	CP Mineral Reserve	Not conducted
A. Clegg	Minerals industry professional	CV	Not conducted
H. Dippenaar	Senior mining engineer	Mining engineering and planning	Various occasions
J. du Plessis	Senior engineer	Infrastructure	February 2020
G. Mane	Senior engineer	Infrastructure	February 2020
M. van Rooyen	Senior engineer	Infrastructure	February 2020
M. Valenta	Metallurgist	Metallurgy and processing	February 2020/ July 2021
T. Rangasamy/ Y. Rajpal	Geotechnical engineer	Geotechnical	February 2020
H. Gildenhuys	Geohydrologist	Geohydrology and hydrology	February 2020
C. Vivier	Environmental specialist	Social and environmental	February 2020
R. Kruger	Environmental specialist	Social and environmental	February 2020

Ukwazi has been actively involved in the strategic planning activities of the BPM since 2015. Due to the current global health crisis, the respective Mineral Resource and Mineral Reserve CPs and CV did not conduct a site visit to the mine. Other technical experts did conduct site visits prior to the global health crisis and subsequent lockdown of the South African economy. The CPs and CV considered the information provided by the mine and other technical experts to be of sufficient nature due to their knowledge and associated background of the mine and local platinum mining industry. This is considered a non-material aspect to the outcome of the CPR.

1.4. Sources of information

SR 3.1(iii) / SV T1.19

Source information was provided by Bakubung through the establishment of an appropriate data room. Additional information was obtained through Bakubung appointed representatives during site inspections, management interviews and ongoing consultations. Additional technical studies and related investigations were completed by specialists as part of the scope of work associated with this CPR. Refer to Chapter 24 for a detailed list of references used during the compilation of this CPR.

1.5. Units and currency

SR 5.6(iii)

All units outlined are based on the metric system, also known as the International System of Units ("SI"), unless otherwise stated or indicated. Monetary values are based on South African Rand ("ZAR") or the United States Dollar ("USD"), and in line with the International Organisation for Standardisation ("ISO") 4217 code, unless otherwise stated or indicated.

1.6. Reliance on other experts

SR 4.5(viii); 9.1(i) / SV T1.0; T1.19

Further to section 1.1, in the preparation of this CPR, the principal author relied entirely on information provided by various parties relating specifically to mining rights, surface rights, contractual agreements, historical operating expenditures, community relations and other matters. The work conducted by technical experts was completed under the supervision and direction of the respective CPs and CV. The technical experts who assisted the principal author, CPs and CV are listed in Table 1-3 below:

Table 1-3: Other technical experts

Name	Specialist	Project role	Association
Y. Huang	Deputy general manager	Project lead	BPM
M. Blignaut	Technical services manager	Geology and Mineral Resource data	BPM
D. Makou	Rock engineer	Geotechnical data	BPM
G. Mosesane	Chief engineer	Engineering and infrastructure data	BPM
L. Nyandeni	Process plant manager	Processing related data	BPM
K. Mntambo	Environmental specialist	Hydrological and environmental data	BPM
H. Morule	Executive: Corporate affairs	Social, legal and regulatory data	BPM
A. Pereira	General manager finance	Financial data	BPM
J. Molokoane	Survey manager	Survey and production-related data	BPM
W. Nel	Lead mining engineer	Mining engineering	Ukwazi
P. Mans	Lead mining engineer	Mining engineering and mine planning	Ukwazi
S. Nothnagel	Senior mining engineer	Mine design and scheduling	Ukwazi
T. Rangasamy	Geotechnical engineer	Geotechnical	Ukwazi associate
Y. Rajpal	Geotechnical engineer	Geotechnical	Ukwazi associate
H. Gildenhuys	Geohydrologist	Geohydrology and hydrology	Ukwazi
C. Vivier	Environmental specialist	Social and environmental	Ukwazi
J. du Plessis	Senior engineer	Infrastructure	Ukwazi
G. Mane	Senior engineer	Infrastructure	Ukwazi associate
M. van Rooyen	Senior engineer	Infrastructure	Ukwazi associate
R. Kruger	Environmental specialist	Environmental	Ukwazi associate
H. Fourie	Technical specialist	Marketing	Ukwazi associate
S. Eckstein	Legal specialist	Legal and regulatory aspects	Ukwazi
R. Marais-Loader	Techno-economic specialist	Cost modelling	Ukwazi
M. Valenta	Processing specialist	Metallurgy and processing	Ukwazi associate
K. Johnstone	Financial specialist	Cost estimation and financial modelling	Ukwazi associate
C. Siebert	Mine planner	Draughtsperson/ Planner	Ukwazi

1.7. Disclaimer

SV T1.15

This report was prepared by CPs and CV or associated consulting professionals (under the supervision of respective CPs and CV), in accordance with The SAMREC and SAMVAL Codes (2016 Editions). The assumptions, opinions, conclusions and valuations disclosed herein, are expressed in good faith and were prepared with reasonable care and skill in accordance with prevailing industry standards. No representation is given, nor is any warranty provided, whether expressed or implied, as to the accuracy of the contents hereof.

The team does not accept any liability for any harm, loss or damages - including special or consequential damages, which may result from its use - except if used by the project owners hereof for legislative purposes, including securities legislation and/or stock exchange or listing rules. Any other use by third parties is at that party's sole risk.

This CPR contains statements of a forward-looking nature, which are subject to several known and unknown risks, uncertainties and other factors. These may cause the results to differ materially from those set out in this report. Consequently, the ability to achieve these projections is neither assured nor guaranteed as they are based on economic assumptions, many of which, are beyond the control of Bakubung and/or Ukwazi. Future cash flows and values derived from such projections are inherently uncertain and actual results may be significantly more or less favourable.

2. Project outline

SV T1.5 / JSE 12.10(h)(i)(ii)

2.1. Property location

SR 1.1(ii); 1.2(i); 1.2(iii)

The BPM is located approximately 40km northwest of the city of Rustenburg and directly south of the Pilanesberg Alkaline Complex. The mine falls within the jurisdiction of the Bojanala Platinum District Municipality and the Rustenburg and Moses Kotane Local Municipalities. The location of the BPM is indicated in Figure 2-1 below:

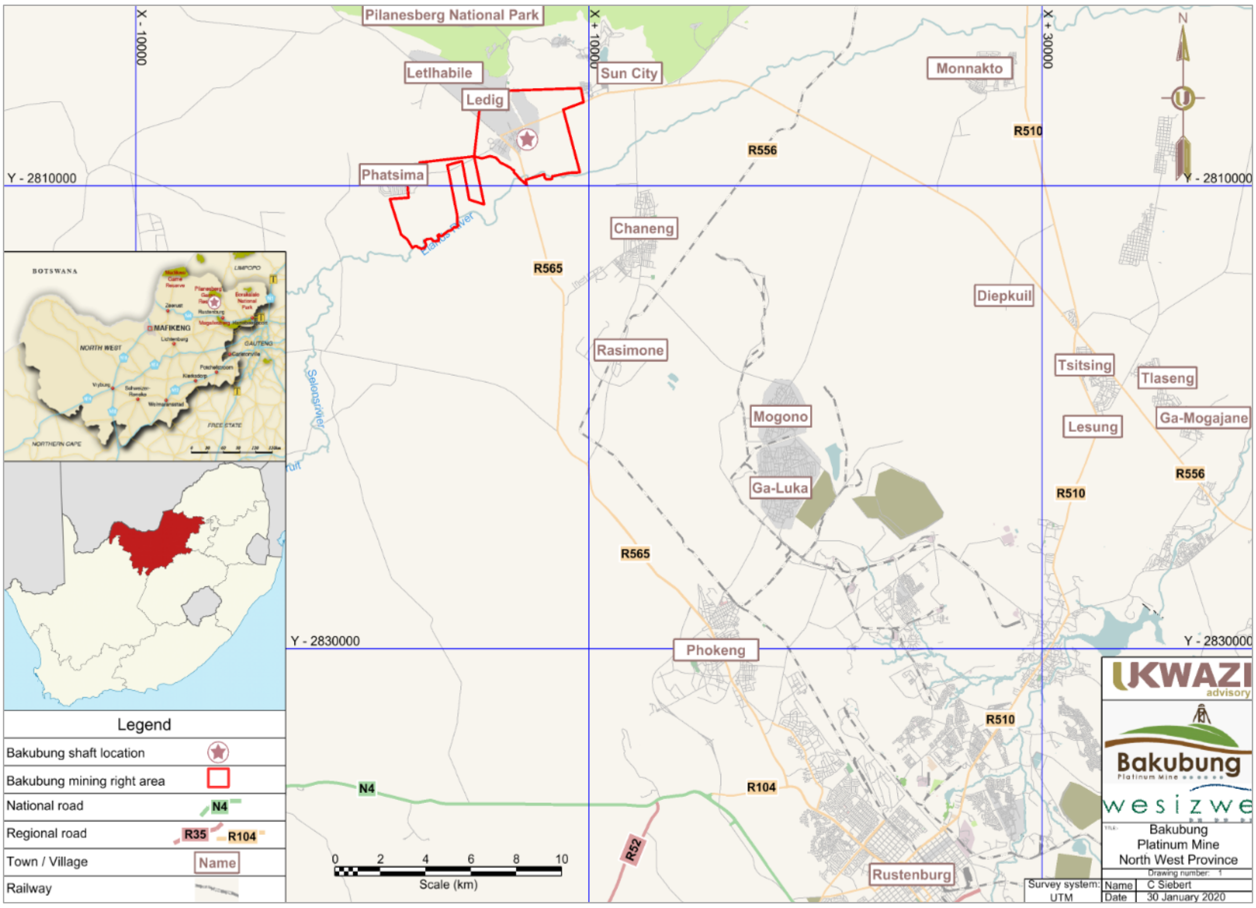

Figure 2-1: Locality plan

The closest population centre to the mine is the town of Ledig. Other areas close to the mine include residential, tourism, farming and the proposed housing facilities for mine employees.

2.2. Property description

SR 1.1(ii)

The BPM is located on the Western Limb of the Bushveld Complex ("BC"), on portions of the Ledig, Frischgewaagd and Mimosa farms. The Elands River forms the southern boundary of the approved mining right area.

The BPM consists of a single underground operation accessed through a twin vertical shafts system as well as 6m diameter raise bore ventilation shafts for ventilation purposes. Planned mining operations include the extraction of both the Merensky and Upper Group 2 ("UG2") Chromitite layer. The main shaft has a hoisting capacity of approximately 250 kilo tonnes per month ("ktpm") of ore and 15ktpm waste. The mining operations will be based on a semi-mechanised hybrid mining method using conventional mining methods for stoping activities and mechanised methods for development and rock-handling.

The BPM is fully owned by Bakubung and was established in 2002 with company registration number: 2002/017306/07. Bakubung is a wholly-owned subsidiary of Wesizwe with company registration number: 2003/020161/06. Wesizwe is a publicly listed JSE company, incorporated in the Republic of SA. The BPM shareholding structure is outlined in Figure 2-2 below:

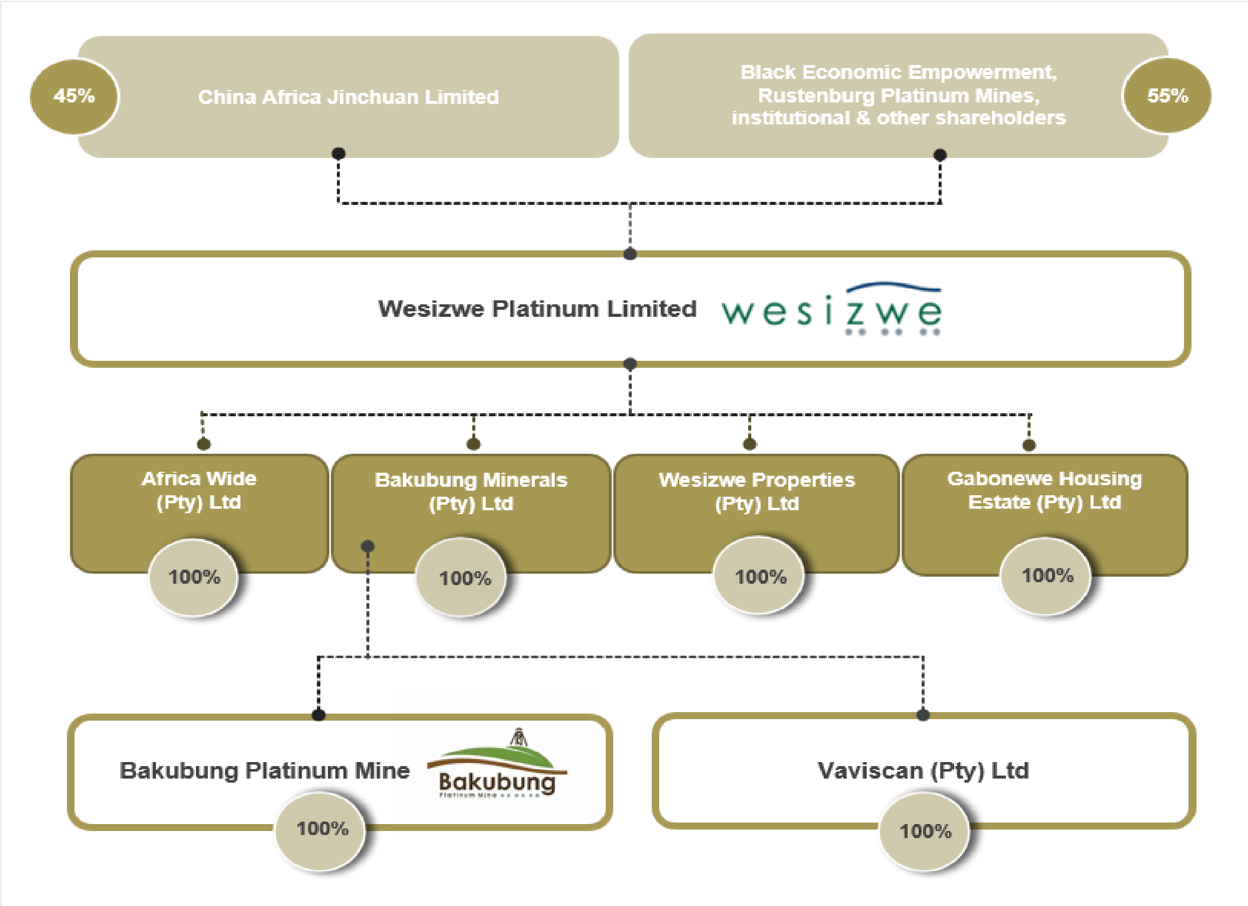

Figure 2-2: Bakubung shareholding structure

Based on the information provided by Wesizwe, beneficial shareholders with a stake greater than 3% of the issued shares, include (Wesizwe Integrated Annual Report ("IAR") 2020):

- China Africa Jinchuan Investments Ltd: 45.00%
- Rustenburg Platinum Mines Ltd: 13.01%
- Micawber 809 (Pty) Ltd: 5.98%
- Africa Continental Resource Venture: 4.52%.

2.3. Adjacent properties

SR 1.3(i)

Mining operations adjacent to the approved BPM mining right area, include operations owned by Royal Bafokeng Platinum Ltd. These comprise the Bafokeng Rasimone Platinum Mine, which consists of a North and South shaft; Styldrift, the concentrator complex; and the Maseve concentrator plant. Details of the Mineral Resource, Mineral Reserve and production activities of the Royal Bafokeng mine can be located on the Royal Bafokeng Platinum Ltd website: https://www.bafokengplatinum.co.za/.

Mining operations owned by Impala Platinum Holdings Ltd ("Implats") are located directly east of the Royal Bafokeng Mine. These operations include shafts number 6, 8, 12 and 20. Details of the Mineral Resource, Mineral Reserve and production activities of these shafts are published on the Implats website: http://www.implats.co.za/.

Figure 2-3 below shows the approximate location of other mines in close proximity to the BPM.

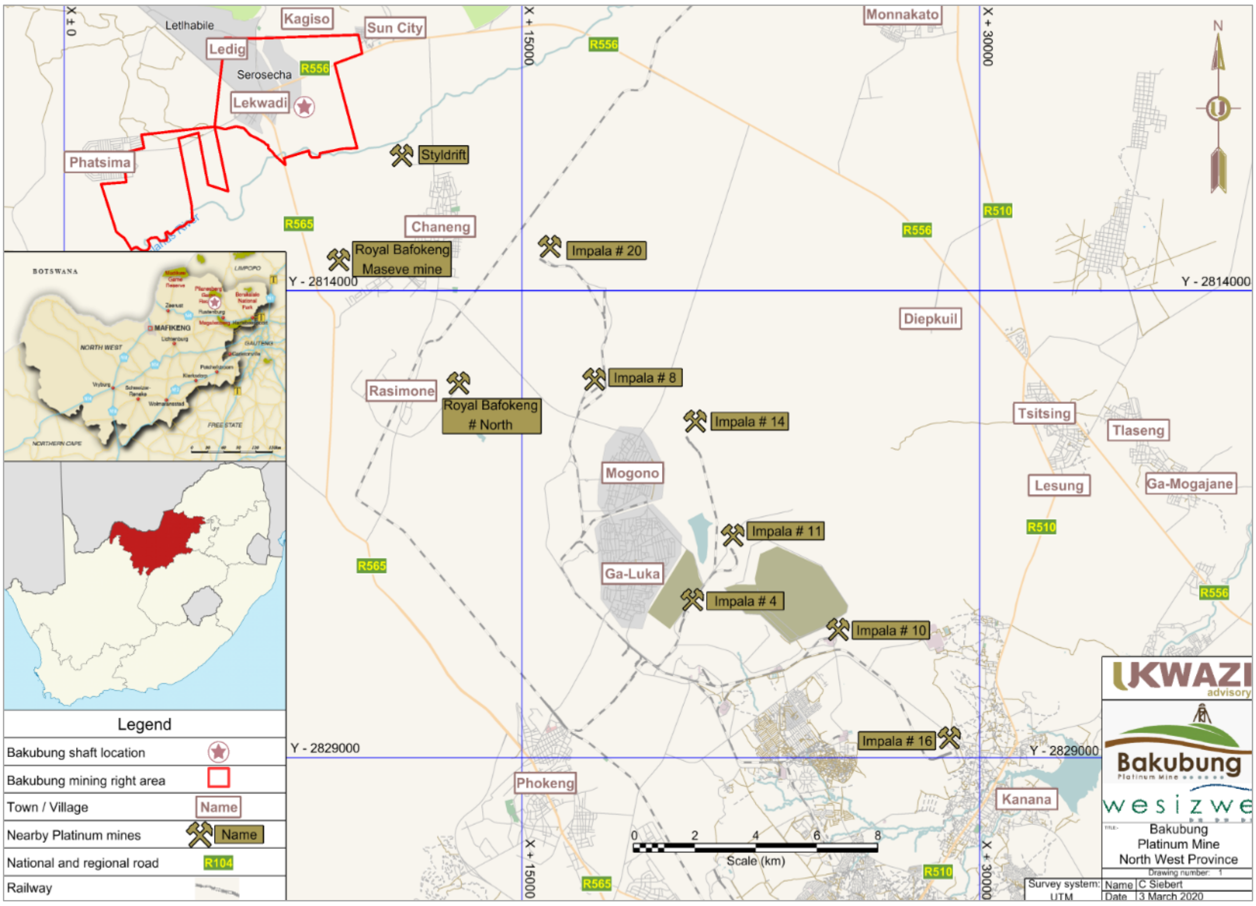

Figure 2-3: Adjacent and nearby properties

2.4. Country profile

SR 1.2(ii)

2.4.1. Overview

SA became a democracy in 1994 and as a multi-party democracy, the country remains stable with regular national, provincial and local government elections. The national and provincial elections were successfully held in May 2019, resulting in another majority electoral victory for the incumbent party, the African National Congress ("ANC"), with its leader, Mr Cyril Ramaphosa, elected as State President. Local government elections are scheduled for 27 October 2021 but are unlikely to proceed given the current levels of infection caused by the coronavirus disease 2019 ("COVID-19") pandemic.

SA has recently embarked on a process to re-establish the credibility of various state institutions, which were the subject of corruption and state capture allegations under the former President, Mr Jacob Zuma. This has given rise to the Zondo Commission of Enquiry into State Capture, which is concluding its hearings and may result in various prosecutions for corruption.

State capture affected various sectors of the economy and society, including mining. A Zuma ally, Minister Mosebenzi Zwane, controversially introduced the new Mining Charter III without satisfactory consultation with the industry (the Mining Charter I was published in 2002 followed by the Mining Charter II in 2010) and was involved in the irregular sale of Glencore owned mines (Optimum and Koornfontein) to the Gupta-owned, Tegeta Resources. The Mining Charter III was challenged in the Supreme Court by the then South African Chamber of Mines (now the Minerals Council of SA), resulting in a stalemate in the industry for the past two years.

Subsequently, a new mining minister, Mr Gwede Mantashe, was appointed in February 2018. Following consultation with the sector, a new version of the Mining Charter III was approved and published for comment by the industry and other stakeholders in June 2018.

The Charter regulates the conditions under which, mining companies obtain mining rights and outlines various stipulations that companies must adhere to, including:

- Meaningful (50%) black board representation
- 30% black shareholder participation, with a "carried interest" or equity share of
  - Employees (5%)
  - Host communities (5%)
- Local procurement targets for capital goods and services set at 70%
- Small business and skills development
- Empowerment of women in mining
- Employment equity across all levels
- Corporate social investment (CSI) initiatives, including the provision of housing and education, which would be considered necessary as a social license to operate.

The 10% equity "carried interest" in new mining projects for labour and communities will affect the cost and financial viability of new mining projects.

In April 2018, the Minerals Council obtained a declaratory order from the North Gauteng High Court indicating that Black economic empowerment ("BEE") transactions completed in terms of the previous charters would not require the "top-up" in terms of ownership from 26% to 30% black ownership relating to the new Charter i.e. the 'once empowered, always empowered' principle should apply even under the new Charter.

Subsequently, negotiations between the Council and the Department of Mineral Resources and Energy ("DMRE") have broken down and the Council has once again turned to the courts to challenge various aspects of the Mining Charter. On 13 August 2020, the Minister of Minerals and Energy, Mr Gwede Mantashe, withdrew the Ministry's appeal against the North Gauteng High Court decision handed down in 2018. This paves the way for a settlement between the Ministry and the Minerals Council regarding the "once empowered, always empowered" principle and may create more certainty for the industry regarding transformation requirements.

From a labour perspective, the mining industry has always had strong trade unions with a history of centralised collective bargaining. Strikes by unions can be protracted and are typically focused on wages and working conditions, led by dominant unions in the industry:

1. The National Union of Mineworkers ("NUM")
2. The Association of Mineworkers and Construction Union ("AMCU")
3. Solidarity trade union ("Solidarity").

A recent strike involving AMCU at Sibanye-Stillwater's gold mining operations took over six months to resolve.

On 16 August 2012, police opened fire on striking workers who were largely members of AMCU at Marikana, Rustenburg, in the North West Province, leaving 34 workers dead and 78 workers injured. The Marikana Massacre had a significant impact on industrial relations within the mining industry and on the collective political psyche overall. The effects of the Marikana massacre still affect the mining industry today.

In July 2021, SA witnessed large scale rioting and looting in Gauteng and KwaZulu Natal following the arrest and imprisonment of the former President, Jacob Zuma. Following interventions by the South African Police Services and the South African Defence Force, the damage to businesses and property were estimated to be in excess of ZAR20 billion and the disruption to food, fuel, vaccination programmes and supply chains has been significant.

Economically, the South African economy is relatively fragile. Recent currency volatility, of the ZAR against major international currencies such as the British Pound, Euro and USD (remain rangebound from ZAR12 to ZAR18/ USD with high levels of volatility) has a significant impact on imports and exports, particularly of capital equipment and where mining and commodity exports are expected to deliver forex earnings for the local economy. SA in particular has benefitted from the commodity boom since 2019, which has seen significant increase in the gold and platinum group metals ("PGM") prices.

According to the Trade Economics website: "The SA economy grew by an annualised 4.6% in the first quarter of 2021, following a downwardly revised 5.8% advance in the October-December period and easily beating market expectations of a 2.5% rise. Eight out of ten industries reported positive growth rates in the first quarter, with mining (18.1%), boosted by the production of PGM, iron ore, gold and chromium; finance (7.4%) and trade (6.2%) making the most significant contributions. Manufacturing also increased 1.6%. Meanwhile, contractions were seen in agriculture (-3.2%), dragged lower by weaker production figures for field crops and animal products; and utilities (-2.6%), due to load shedding and a decline in the supply of water."

Agricultural output remains sensitive to campaigns and debates around land expropriation without compensation and possible amendments to the private property clause (section 25) of the Bill of Rights in the Constitution of the Republic of SA.

Unemployment during the first quarter of 2021 (utilising a narrow definition) was officially estimated at approximately 32.6% by Statistics SA. When measuring factors related to the broader definition of unemployment, figures may be as high as 46%. Youth unemployment is a great concern and high on the government's agenda.

SA suffered downgrades by rating agency: Standard and Poor ("S&P") and Fitch, only Moody's has not downgraded the country. Despite this, the government's monetary policies and fiscal disciplines are being tested by state-owned enterprises such as Eskom, South African Airways (under business rescue), SABC, Denel and the South African Post Office, which require significant bailouts to keep them solvent and operational. At the time of compiling this report, Eskom's debt levels were in excess of ZAR450 billion and its ability to ensure security of supply is a major risk factor that could trigger further investment downgrade.

Despite lockdowns and economic downturns in some sectors, the commodity boom helped to create a tax windfall for the South African Revenue Services ("SARS") of approximately ZAR38 billion in 2020/ 2021 that improved the government's current financial situation. Inflation reached 5.2% in May 2021 according to Statistics South Africa, which was significantly higher than previous years, although still within the SA Reserve Bank target range of 3% to 6%. The increase was mainly driven by higher food, fuel and electricity costs.

Despite promises to restructure government and lower the government wage bill, government has agreed to a 1.5% salary increase and gratuity of ZAR1000 cash payment, bring its 2020/21 wage bill to ZAR650 billion which amongst other things caused the government budget deficit to increase. The budget deficit according to National Treasury is approximately 14% to gross domestic profit ("GDP"), while the gross national debit is 80.3% which is the highest since 1994. The implication being that debt servicing costs of ZAR262 billion per annum or more goes to interest repayment and outflows, rather than into the provision of socially necessary goods and services including infrastructure.

The government announced a renewed commitment to the National Development Plan, including a stimulus package to kickstart the economy, the results of which are still to be seen. In October 2018, the President appointed Mr Tito Mboweni, a former central bank governor, as the new SA Finance Minister. Various government papers and initiatives were published to boost economic growth. However, this has been mainly undermined by consistent load shedding by Eskom.

Socially, SA has a Gini coefficient of 0.6 making it one of the most unequal societies globally. Approximately 18 million people from a total South African population of 57 million depend on social welfare grants. SA suffers from significant deficiencies in health, housing and education. Recently the government has introduced the National Health Insurance ("NHI") bill intended to provide universal health care. The exact implementation mechanisms must still be legislated but it is expected to be rolled out in 2026.

The abovementioned macroeconomic conditions materially impact mining, influencing the cost of financing new mining projects, the regulatory environment that companies must operate in and significantly increasing country risk.

These factors were all exacerbated by the COVID-19 pandemic. The industry endured significant disruption due to the national lockdowns. In the interim, the government had to borrow approximately USD4.3 billion from the International Monetary Fund and announced a ZAR500 billion relief package for the purchase of vaccines from international producers such as Pfizer and Johnson & Johnson.

Although the exact quantification of the impacts of COVID-19 on the local and global economy is yet to be fully determined as the pandemic continues, it is clear that without a vaccine, SA like other countries must adapt to living and working with the virus. To date, more than 2.2 million cases and 65 000 deaths were recorded locally and more than 188 million cases and 4 million deaths were recorded worldwide. Approximately 8.2% of registered candidates have received a single dose and 3% have received two doses of the vaccines, compared to the world average of 25.2% of the population who have received a single dose and 12.5% who have received two doses.

Although social and political considerations generated by the pandemic and lockdowns affect lives and livelihoods, various sectors of the economy were impacted differently. Mining appears relatively resilient provided commodity prices remain high.

2.4.2. Applicable legislation

Mining is regulated from several perspectives. The core areas regulated are as follows:

- Constitutional imperatives
- Company law
- Mining
- Taxation and royalties
- Labour law
- Health and safety
- Environmental authorisations
- Waste management
- Heritage
- Mine closure
- Compliance monitoring.

2.4.3. Constitutional imperatives

Constitutional imperatives related to environmental and property rights are governed by section 24 and section 25 of the Constitution of the Republic of South Africa Act, 108 of 1996 ('the Constitution"). Section 24 of the Constitution states:

"Everyone has the right—

a. to an environment that is not harmful to their health or well-being; and

b. to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that—

i. prevent pollution and ecological degradation

ii. promote conservation and

iii. secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

Section 25 guarantees the right to private property. It envisages expropriation but with compensation. Section 25(2) states that:

"Property may be expropriated only in terms of a law of generational application

a. For a public purpose or in the public interest and

b. Subject to compensation, the amount of which and the time and manner of payment of which have either been agreed to by those affected or decided or approved by a court."

The debate regarding land expropriation without compensation is ongoing, although currently less prominent. The potential impact of expropriation on mining is not clear and remains a risk to the industry. It must be noted that expropriation rights already exist and vest in the DMRE in terms of section 55 of the Mineral and Petroleum Resources Development Act ("MPRDA"): expropriation is permissible if it is in the national interest to do so and/or to further the objectives of the MPRDA.

The holder of a prospecting or mining right has extensive surface rights and may enter the property, place employees or equipment on-site and conduct prospecting or mining activities, including using water for the purposes of prospecting or mining. Best practice suggests that it is preferable to negotiate access and surface rights with relevant landowners.

2.4.3.1. Company law

Standard company laws apply to mining companies whether public or private in terms of the Companies Act 71 of 2008. This relates to the formation of companies, duties of directors, shareholding, dissolution of companies, etc.

2.4.3.2. Mining

Mining is governed by the MPRDA, Act 28 of 2002 which provides for the roles and functions of the DMRE, including the Minister of Mineral Resources. It prescribes the required processes to obtain the relevant permits to conduct reconnaissance, prospecting for minerals (other than petroleum products) and mining.

Prospecting rights are granted for five years, assuming a compliant application, proof of technical and financial capability to conduct the prospecting activities, environmental authorisation including consultation with landowners, an appropriate prospecting works programme and payment of relevant application fees.

A mining right is granted for a maximum of 30 years, assuming a compliant application (lesser and renewable periods are also granted); submission of a mine works programme ("MWP"); environmental authorisation, based on an approved environmental management plan or programme ("EMP"), inclusive of public consultation with interested and affected parties; BEE compliance, 26% black ownership is required in terms of the Mining Charter II; submission of a social and labour plan ("SLP"); and proof of financial and technical capability to conduct the mining operations. A bank guarantee or other method of payment or financial instrument is required by the DMRE in respect of closure costs as well as payment of the relevant application fees. The 26% black ownership remains the current requirement until the proposed 30% BEE ownership requirement in terms of Mining Charter III is implemented.

2.4.3.3. Taxation and royalties

Standard income tax laws apply to mining companies, whether public or private in terms of the Income Tax Act 58 of 1962, including the VAT Act 89 of 1991. Mining royalties are governed by the Mineral and Petroleum Resources Royalty Act 28 of 2008 ("MPRRA"). The MPRRA regulates the imposition and calculation of mining royalties. Mining royalties are deductible for income tax purposes and the effect of the formulae is that the royalty percentage rate, which must be applied to the tax base, varies according to the profitability of the mine.

2.4.3.4. Labour law

In terms of SA's Bill of Rights, section 23 of the Constitution of the Republic of South Africa Act, 108 of 1996 as amended, guarantees the right to fair labour practices, the right to form employer organisations and trade unions, the right to engage in collective bargaining and the protection of the right to strike. In terms of section 24(a) of the Bill of Rights, everyone has the right to an environment that is not harmful to their health or wellbeing. These rights are echoed in SA's primary piece of legislation that governs employment law: The Labour Relations Act, 66 of 1995 as amended ("LRA"). The LRA sets out, in more detail, employer and employee individual and collective rights, dispute resolutions, dismissals, codes of good practice and also deals with unfair discrimination. Employment contracts and benefits, hours of work, sick leave, notice periods, etc. are dealt with in the Basic Conditions of Employment Act, 75 of 1997.

2.4.3.5. Health and safety

Mine health and safety is generally governed by the Mine Health and Safety Act 29 of 1996.

2.4.3.6. Environmental authorisations

Environmental authorisations and environmental management related to the impacts of mining are governed by the National Environmental Management Act 107 of 1998 ("NEMA") and its various regulations. NEMA provides the overarching environmental framework and objectives for environmental management, conservation, prevention of pollution or ecological degradation and mitigation.

The DMRE, in consultation with other competent authorities, grants authorisations based on a basic assessment or full environmental impact assessment of listed activities (with the Minister being the responsible authority for implementing the environmental provisions of NEMA in terms of section 38A of the MPRDA.) These listed activities may not be conducted without prior authorisation and may attract a fine or imprisonment in the event of successful prosecution.

The most important notices prescribing currently listed activities for environmental impact assessments ("EIAs") were published as of Government Notice Regulation ("GNR") 982, 983, 984 in December 2014 and were amended on 7 April 2017 in terms GNR 324, 325 and 327. Individual environmental issues have specific legislation associated with each one including, but not limited to, the following:

- Water management is governed by the National Water Act ("NWA") 36 of 1998 - specific water uses require individual authorisation in terms of section 21. GNR 704 is an important guideline for mining to address surface and groundwater, the implementation of water management strategies that address water conservation, prevention of water pollution, recycling and separation of clean water from mine-affected water and the prevention of acid mine drainage and/or water pollution
- Air quality and atmospheric emissions are governed by the National Environmental Management Air Quality Act ("NEMAQA") 39 of 2004; section 21 read with the prescribed listed activities in terms of GNR 893 published on 22 November 2013 stipulates when an atmospheric emissions license is required. GNR 827, published on 1 November 2013, is important regarding regulations of dust emissions applicable to mining companies
- Biodiversity is governed inter alia by:
  - National Environmental Management Protected Areas Act 57 of 2003
  - National Environmental Management Biodiversity Act 10 of 2004
  - National Environmental Management Integrated Coastal Management Act 24 of 2008.

2.4.3.7. Waste management

Waste management is governed by National Environmental Management Waste Act ("NEMWA") 59 of 2008. In particular, the listed activities in GNR 633 published on 24 July 2015 must be assessed to obtain a waste management license. GNR 921, published on 29 November 2013 guides the storage, recovery, recycling and treatment of waste.

The matters of mine residue dumps ("MRDs") and stockpiles remain a complex and unresolved issue. It is anticipated that new legislation will correct the position i.e., MRDs and stockpiles will not be required to be classified as waste and will, therefore, not require a waste management license. Furthermore, such new legislation is expected to provide that MRD and stockpile facilities will not be required to be lined facilities. Accordingly, the legal position in future regarding MRDs and stockpiles will be regulated by the MPRDA and NEMA as originally intended by the legislation.

2.4.3.8. Heritage

Archaeological, cultural and heritage aspects are governed by the National Heritage Resources Act 25 of 1999. All mining companies are obliged to protect natural and cultural heritage resources and sites. This includes SA's international obligations to preserve world heritage sites.

2.4.3.9. Mine-closure

Historically the holder of a mining right remains responsible for the environmental liability and the management of sustainable closure and post-closure plans in terms of section 43(1) of the MPRDA and sections 53 and 54 of the MPRDA Regulations. These were used to guide the quantum for closure, in conjunction with the DMREs guidelines document for the evaluation of the quantum of closure-related financial provision. The principle remains but the legislation has changed substantially.

The new mine closure and post-closure requirements, governed by the MPRDA and the Regulations pertaining to the financial provision for prospecting, exploration, mining and production operations (GNR 1147 published on 20 November 2015 as amended in terms of the NEMA) intend to replace section 53 and 54 of the MPRDA Regulations and will take effect on 19 June 2022.

Section 24P (1) of NEMA requires an applicant for an environmental authorisation to comply with the requirements of GNR 1147 before the Minister can issue such authorisation. In terms of section 24P (3), every holder of a mining right must assess environmental liability annually and must increase its provision to the satisfaction of the Minister.

GNR 1147 requires a risk-based approach to closure and post-closure management which addresses the known and future residual environmental impacts of mining operations. It requires annual rehabilitation and remediation, final decommissioning and closure of all operations and remediation of latent and residual environmental impacts. In particular, GNR 1147 requires the following:

- Three-year closure plans and financial provisioning must be developed for each mining right in terms of section 11(1): this includes an annual rehabilitation plan; final rehabilitation, decommissioning and mine closure plans and an environmental risk assessment report for residual and latent impacts compiled (reviewed and assessed by an independent expert "who is qualified by virtue of demonstrable knowledge, qualifications, skills or expertise in mining, environmental, resource economy and financial fields")
- Part of the risk-based approach is that residual and latent risks must be addressed, and a latent risk assessment report must be compiled annually
- Costs must be itemised and closure costs stated
- The regulations stipulate what the content of these plans must be. For example, the closure plan must address environmental risks associated with closure, rehabilitation, decommissioning and post-closure pumping of surface and groundwater and mine-affected water
- The closure plans, financial provisions and audit reports must be signed-off by the chief executive officer ("CEO") of the company and submitted to the DMRE annually. The CEO takes ultimate responsibility for implementation of the plan and financial provisioning
- Development of accurate costing based on actual third-party rates and provisioning for closure on an operational budget, must be submitted to the DMRE annually
- The financial provision must be audited annually by an independent auditor registered with the Independent Regulatory Board of Auditors ("IRBA") who must certify that the financial provisions are adequate given the statement of exposure and liabilities. The auditors must reflect this in the company's annual audited financial statements, contingency statements and cash risks. The auditors must submit their reports to the DMRE within three months of the company's financial year-end
- Provision of appropriate financial guarantees or deposits must be put in place to address these costs, alternatively, trusts must be established to house these funds and must are ceded to the DMRE to be administered

- Closure plans and estimates must be submitted to the DMRE and the Department of Human Settlements, Water and Sanitation ("DHSWS") as part of any water use license application ("WULA")
- The order of magnitude for closure funds to be available is immediate closure costs plus ten years projected life of mine ("LOM") closure costs.

2.4.3.10. Compliance monitoring

Prospecting or mining right holders must comply with the conditions of their authorisations and permits and must monitor and report to the DMRE regarding their environmental performance as per their EMP. Typically, an EMP audit and compliance report is required every two years for submission to the DMRE, in terms of GNR 527 promulgated on 23 April 2004. Similarly, water license holders must report on their water quality and water monitoring programmes and must conduct annual performance monitoring against their license conditions.

Monitoring and assessment of closure plans and financial provisioning for closure must be updated and reports must be submitted to the DMRE annually. Mining is a global industry and as in other jurisdictions, the South African mining industry is well regulated. Compliance is an integral component of the social license to operate, even though the legal and bureaucratic requirements are onerous. The major legal risks relate to non-compliance with relevant licensing conditions, failure to monitor or report appropriately and poor stakeholder management.

2.5. Legal aspects and permitting

SR 1.2(ii); 1.5(i); 1.5(ii); 1.5(iii); 1.5(iv); 1.5(v); 4.3(iv) / JSE 12.10(h)(iv)

2.5.1. Mining right

The South African mining law is regulated by the MPRDA, which is the predominant piece of legislation dealing with acquisitions or rights to conduct reconnaissance, prospecting and mining. According to the provisions of the MPRDA, no person may prospect, mine or commence with any work incidental thereto on any area without:

- A valid prospecting right, mining permit or mining right (as the case may be)
- An approved EMP
- Notifying and consulting with the landowner or lawful occupier of the land to which the right relates.

The Minister of Mineral Resources must grant the right if the mineral can be mined optimally, the applicant has access to financial resources and technical ability, the mining will not result in unacceptable pollution, ecological degradation or damage to the environment and the applicant is able to comply with the mine's health and safety requirements.

The applicant must lodge a MWP and a detailed SLP with its application. A mining right, if granted, is valid for a maximum period of 30 years, after which, it may be renewed providing the holder exclusive rights to mine the property. A mining right granted in terms of the MPRDA is a limited real right in respect of the mineral or petroleum and the land to which such right relates.

In compliance with Section 22(1)(a) to (c) of the MPRDA, a mining right application for the mining of PGM, gold ("Au"), silver ("Ag") nickel ("Ni"), copper ("Cu"), cobalt ("Co") and chrome ("Cr") was lodged with the DMRE during 2007. A mining right was granted under protocol NW 30/5/1/2/2/339 MR in terms of Section 23(1) of the MPRDA. The mining right was granted on 25 May 2009 and unless cancelled or suspended will be valid for 25 years ending 24 May 2034.

The approved BPM mining right area is outlined in Figure 2-4.

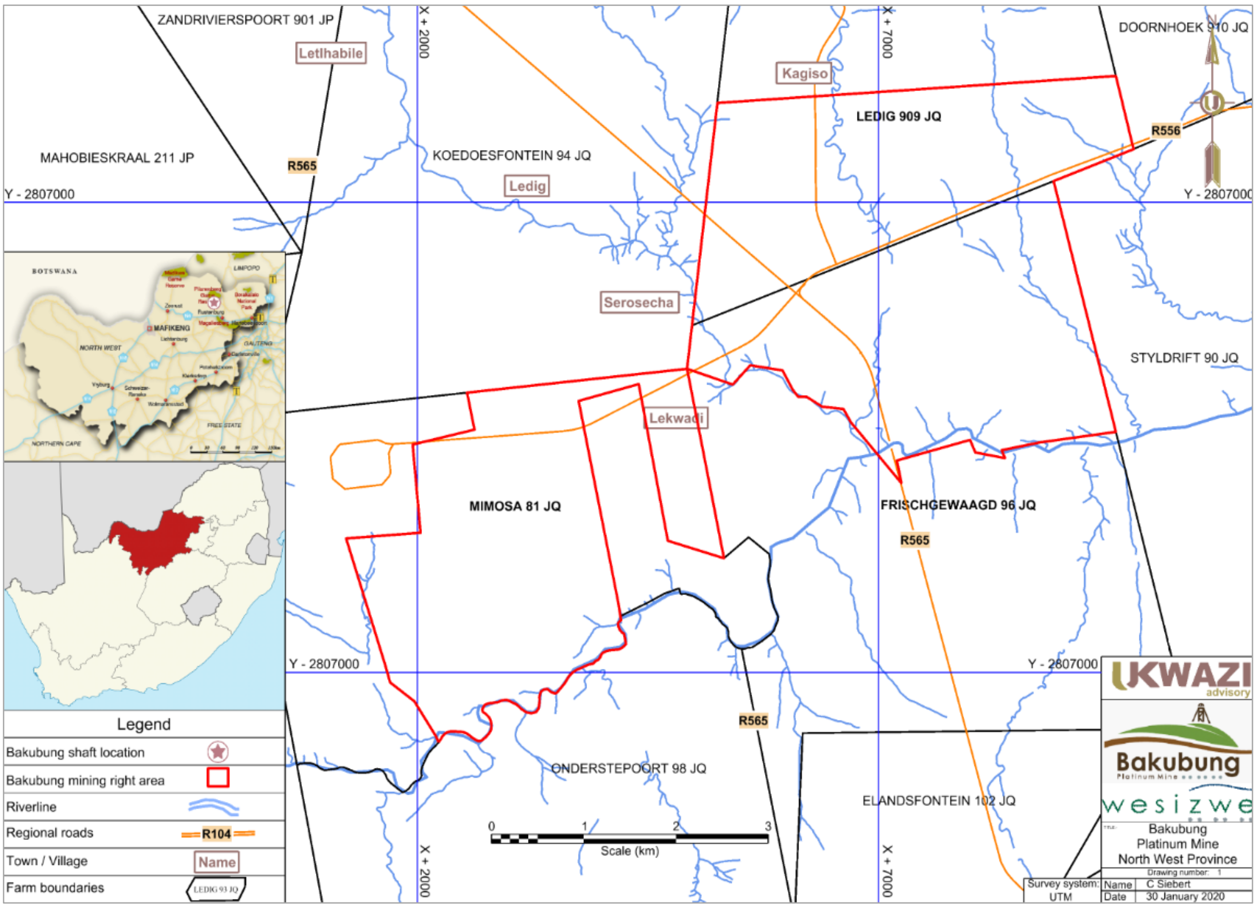

Figure 2-4: BPM approved mining right area

Mining operations are planned on the farms Ledig and Frischgewaagd (mining right area located to the northeast as indicated in Figure 2-4). No Mineral Resources was estimated on the farm Mimosa and no mining operations are currently planned except for future tailings storage.

2.5.2. Surface rights

In 2014, Bakubung signed a surface lease agreement with The Bakubung Ba-Ratheo Community to lease Portion 11 (a portion of Portion 4) of the farm Frischgewaagd 96 JQ held under deed of transfer number T362/1984. The lease agreement commenced on the occupation date of 1 April 2010 for 40 years and shall terminate on the expiration of the lease period or when the lessee has obtained a closure certificate, certifying that mining operations on the leased property are finished and that the rehabilitation of the leased property is complete, whichever event occurs first.

Bakubung is the registered owner of Portion 10 of the farm Mimosa 81 JQ to the extent of approximately 614 hectares ("ha"). The surface areas related to the approved mining right area are listed in Table 2-1, showing the appropriate farm names and details of the registered owners of the properties.

Table 2-1: Summary of surface areas

Property description	Portion	Registered owner	Title deed number	Traditional authorities
Frischgewaagd 96 JQ	R/1	Voesee Jacobus Paulus	T4996/1906BP	Bakubung Ba-Ratheo Tribe
Frischgewaagd 96 JQ	3	Suid-Afrikaanse Bantoe Trust	T36887/1964BP	Bakubung Ba-Ratheo Tribe
Frischgewaagd 96 JQ	R/4	Republic of Bophuthatswana	T362/1964BP	Bakubung Ba-Ratheo Tribe
Frischgewaagd 96 JQ	21	Republic of Bophuthatswana	S.G no: 3973/2015	Bakubung Ba-Ratheo Tribe
Frischgewaagd 96 JQ	R/11	Republic of Bophuthatswana	T362/1984BP	Bakubung Ba-Ratheo Tribe
Ledig 909 (93) JQ	0 (RE)	National Government of the RSA	T63327/2004	Bakubung Ba-Ratheo Tribe
Mimosa 81 JQ	10	Bakubung Minerals (Pty) Ltd	T60757/2015	N/A

Property description	Portion	Registered owner	Title deed number	Traditional authorities
Mimosa 81 JQ	RE	Rustenburg Local Municipality	T161187/2003	N/A
Mimosa 81 JQ	4	Unknown	S.G no: T31805/2012	Phatsima Township extension
Mimosa 81 JQ	8	Unknown	S.G no: T132728/2006	Phatsima Township extension
Mimosa 81 JQ	9	Rustenburg Local Municipality	T129815/2007	N/A

Figure 2-5 illustrates the surface lease area on the farm Frischgewaagd 96 JQ (highlighted in green) and the Bakubung surface ownership on the farm Mimosa 81 JQ (highlighted in purple), both relating to the approved mining right area.

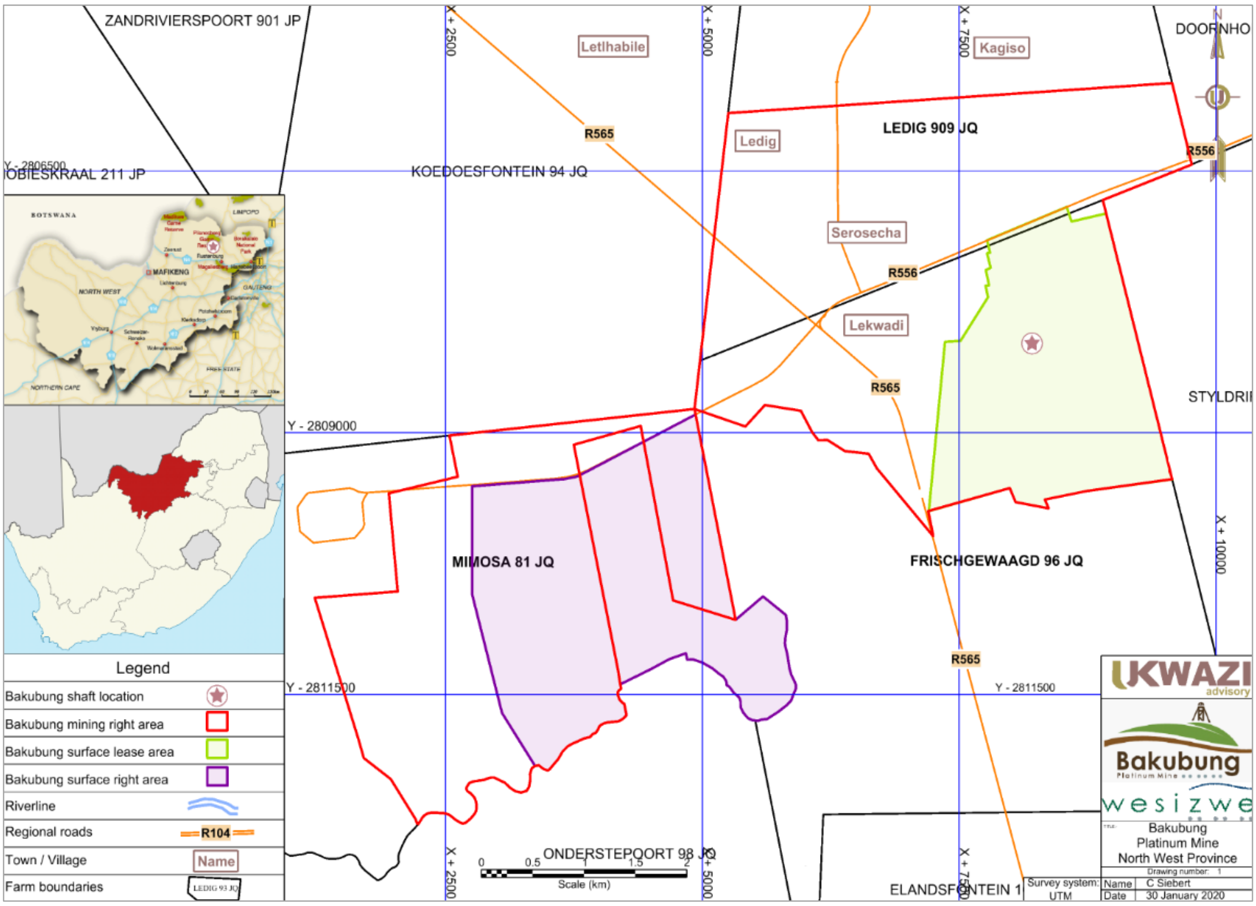

Figure 2-5: Surface rights and surface lease areas

The surface lease and surface right areas are sufficient to accommodate the surface infrastructure required to facilitate the mining and processing operations described in this report. Minor surface right acquisitions/ lease agreements are still to be concluded for the tailing disposal pipeline from the processing plant to the tailings storage facility ("TSF") located on the farm Mimosa 81 JQ.

2.5.3. Environmental authorisation history

In 2008, the BPM conducted an environmental impact assessment ("EIA") process for the development of the project. This was conducted by TWP Environmental Services ("TWP-ES"), 2008. The BPM received environmental authorisation ("EA") in 2009, in terms of both the NEMA (Act 107 of 1998) and MPRDA (Act 28 of 2002). A water use license ("WUL") was issued in terms of the National Water Act (Act 36 of 1998) ("NWA") in 2010.

In 2014, a basic assessment process was completed by AB Enviro-Consult T/A (ABEC, 2015) for the development of on-site mine housing. Authorisation for Phase 1 of the Gabonewe Estate mine housing was received in 2015.
In 2016, the BPM proposed to make several changes to the approved mine layout. The changes were required to cater for an increase in ore processing capacity and optimise the layout and operation of the mine and additional support infrastructure (SLR Consulting (Africa) (Pty) Ltd ("SLR")). The changes were authorised by the DMRE in 2017 and an integrated water use license ("IWUL") was issued for the proposed changes in the same year.

A 166ha TSF was approved on the farm Mimosa 81 JQ. An interim phase was proposed with a smaller TSF on the farm Frischgewaagd 96 JQ. EA in terms of the NEMA (Act 107 of 1998) as amended and the Environmental Management: Waste Act ("NEM:WA") 2008 (Act 59 of 2008) as amended will be required, including a WUL. The authorisation process has commenced to amend the existing EA and waste management license ("WML") granted in 2017 – (NW/30/5/1/2/3/2/1/(339) EM) with approval currently still pending. The following EAs are relevant and approved for the operations:

- Approval of the Environmental Management Programme Report ("EMPR") in terms of section 39 (4) of the MPRDA, 2002 (Act 28 of 2002) with reference number: NW30/5/1/2/3/2/2/339 EM
- Amended integrated EA in terms of the NEMA Act, 1998 (Act 107 of 1998) as amended and NEM:WA, 2008 (Act 59 of 2008) as amended, read together with the EIA Regulations, 2014 for the construction and expansion of the TSF, return water dam ("RWD"), pollution control dams ("PCDs"), relocation of crusher, reprocessing of the waste rock dump, erosion control measures, noise reduction berm, roads, ventilation shaft, storage of general and hazardous waste, construction of Phase 1A housing, solar power plant, stockpiles, pipelines and other associated infrastructure
- EA in terms of the NEMA, 1998 (Act 107 of 1998) as amended for the development of Phase 1 of the Gabonewe Estate mine housing on site (2015)
- South African Heritage Resources Agency – case identity number 8148 final comments in terms of Section 38(8) of the National Heritage Resources Act (Act 25 of 1999).

2.5.4. Water use license

The following IWUL was issued:

- A WUL was issued in terms of the NWA (Act 36 of 1998) in 2010 - License number: 26064730
- An additional WUL was approved in 2017 in terms of the NWA - License number: 07/A22F/CGI/5132.

2.5.5. Waste management license

The waste facilities were approved as part of the amended integrated EA (Ref number: NW 30/5/1/2/3/2/1/339 EM). Waste management at the salvage yard must comply with the norms and standards for the storage of waste in terms of GN 926 of November 2013 and the norms and standards for the potential sorting, shredding, grinding, crushing, screening or baling of general waste, GN 1093 of 11 October 2017. The current salvage area on-site is temporary as the salvage yard is still in the process of being constructed. The norms and standards will apply to the new facility.

2.5.6. Pending environmental authorisations

Existing authorisations are based on the 2014 optimisation study and associated project descriptions contained in the 2016 EMPR. A new application for amendment of the EA was undertaken in terms of the NEMA (Act No. 107 of 1998) and WML in terms of NEM:WA, 2008 (Act No. 59 of 2008) as amended. The listed activities triggered are (Knight Piésold, 2021):

- GN 984 (1): Additional water uses will be triggered by the additional dry stack TSF
- GN 921 Cat B (7): Proposed new dry stack TSF.

An integrated water use license amendment ("IWULA") in terms of the NWA (Act 36 of 1998) and GN 267 (2017) is required and will run in parallel to the EA and WML amendment processes. The water uses to be additionally applied for are:

- 21 (g): New TSF
- 21 (c) and (i) for activities (TSF, evaporation ponds) within 500m of a wetland.

The final EMPR amendment was submitted by Knight Piésold to the DMRE on 19 May 2021; approval is currently pending. The WUL application forms for the TSF were submitted on 31 May 2021. The process will now progress to the next phase, where the DHSWS will determine whether a site visit is required and will confirm the technical documents that must be submitted as part of the application process.

2.6. Royalties and liabilities

SR 1.5(v); 1.6(i); 1.7(i); 4.3(vii); 5.6(iii); 5.6(iv); 5.6(vii)

2.6.1. Royalties

The MPRDA allows the state, as custodian of SA's mineral and petroleum resources, to impose royalties on the transfer of mineral resources. The imposition of mineral and petroleum royalties in SA commenced on 1 March 2010. The MPRRA regulates the imposition and calculation of mining royalties. Mining royalties are deductible for income tax purposes.

In SA, the liability to pay mining royalties arises when mineral resources, which were extracted from within the Republic, are transferred. The transfer of the mineral resources is the trigger for the imposition of the royalty. The term "transfer" is defined as the disposal of a mineral resource, or the consumption, theft, destruction, or loss of a mineral resource if that mineral resource has not previously been disposed of, consumed, stolen, destroyed or lost. Because mineral resources are often temporarily exported for refining, the temporary export of mineral resources is not regarded as a transfer.

The term "mineral resource" includes prospecting rights for minerals, exploration rights for petroleum, mining permits, retention permits or mining rights for minerals and production rights for petroleum issued under the MPRDA. The MPRRA distinguishes between a refined mineral resource and an unrefined mineral resource:

- A refined mineral resource - is a mineral resource that is solely listed in Schedule 1 of the MPRRA or a dually listed resource that is listed in Schedule 1 and Schedule 2, and has been refined to or beyond the condition specified in Schedule 1 for that mineral resource
- An unrefined mineral resource - is a mineral resource that is listed solely in Schedule 2 of the MPRRA or a dually listed mineral resource that fails to meet the condition specified in Schedule 1 for that mineral resource.

The formula applied to calculate royalties distinguishes between refined and unrefined mineral resources and uses two variables to calculate the royalty liability:

1. The value of the minerals (the tax base)
2. A royalty percentage rate which is applied to the base.

Royalties are capped and cannot exceed 5% for refined mineral resources and 7% for unrefined mineral resources. Based on the current strategy, the PGMs, Au, Ag, Ni, Cu, Co and Cr from the BPM are classified as unrefined mineral resources as indicated in Schedule 2 of the MPRRA.

For unrefined mineral resources, the formula to determine the percentage royalty rate is:

Equation 2-1: Unrefined mineral resource royalty formula

$$\text{Royalty rate} = 0.5 + \left[\frac{\text{EBIT}}{\text{Gross sales x 9}}\right] \text{x } 100$$

The formula contains four parameters:

1. The intercept term, 0.5 (%), which indicates the minimum royalty charge applicable
2. Earnings before interest and tax ("EBIT")
3. Gross sales of the unrefined mineral resources
4. Constant of 9 applied for unrefined mineral resources.

The effect of the formulae is that the royalty percentage rate, which must be applied to the tax base, varies according to the profitability of the mine.

2.6.2. Taxation

Any person that registers a business in SA must, in addition, register with the SARS, the competent authority to levy and collect taxes in terms of the Income Tax Act, 58 of 1962 (as amended) for the central state or national government. The main applicable taxes are:

- Company tax, based on the taxable income of a company in terms of revenue sourced within SA (this figure is effectively 28%)
- Individual income tax and/ or payroll taxes are deducted on a sliding scale depending on the income bracket per employee and range from 18% for the lowest income brackets to 45% for the highest income brackets
- Value-added tax ("VAT") is a general sales tax on all goods and services levied at 15%, except on certain basic foods

- Capital gains tax is applicable in certain circumstances; the exact amount depends on the appreciation in the value of specific assets disposed of and may range from 20% to 40%
- Dividend tax, applicable to dividends paid out by companies is 20% based on the amount received by a person
- Withholding tax (which is applicable) amounts to 12% on payments to non-residents
- Custom and excise duties on import and exports vary depending on the value of the goods imported
- Fuel levy paid on fossil fuels is approximately ZAR3.93 per litre ("/l") for petrol and diesel (at the pump), the road accident fund levy amounts to ZAR2.18/l.
- Property levies are based on local government legislation and are estimated using property valuations.

2.6.3. Other applicable fees

In terms of section 43(1) of the MPRDA, the holder of a mining right that has ceased to exist, remains responsible for any environmental liability, pollution, ecological degradation, the pumping and treatment of extraneous water, compliance to the conditions of the environmental authorisation and the management and sustainable closure thereof, until the Minister of Mineral Resources has issued a closure certificate in terms of this Act to the holder or owner concerned.

A third-party closure cost assessment must be conducted for the mine in terms of the new regulations pertaining to the financial provision for Prospecting, Exploration, Mining or Production Operations (GNR 1147), promulgated under the NEMA, No. 107 of 1998, on 20 November 2015 (as amended).

All mines must be compliant with the stipulations of GNR 1147 from 19 June 2022, and require an operational rehabilitation plan, mine closure plan (including risk assessments) and associated rehabilitation and closure costs. Closure estimates for the mine are conducted during the application process, and thereafter, closure and/ or post-closure liabilities must be updated annually.

2.7. Material agreements

SR 1.5(ii); 1.5(iv)

2.7.1. Bakubung shareholders' agreement

Wesizwe purchased Bakubung and Ledig Minerals (Pty) Ltd in 2004. The original shareholder's agreement signed on 30 December 2004 indicated that the owners were:

- A-Persons: 8.13%
- Bakubung Ba-Ratheo Tribe: 33.00%
- Trustees for the time being of the Fikile Memorial Trust: 7.35%
- M-persons: 11.97%
- Lorna Maloney: 3.45%
- Mirador Investment Holdings (Pty) Ltd: 7.30%
- Wesizwe - owned the balance of the shares.

Based on the original shareholders' agreement the parties intended to list the company on the JSE and had a target date for listing on or before 31 August 2005 (as per paragraph 3.2.1 of the shareholder's agreement). Wesizwe listed on the JSE in December 2005 and is publicly owned and traded.

2.7.2. Credit facility agreement

On 31 December 2013, Wesizwe concluded a senior credit facility agreement for USD650 million with the China Development Bank Corporation (as arranger, facilitator and lender), Jin Chuan Group Co Ltd (as guarantor), BPM as the project company and Jovivect (RF) as a security special purpose vehicle.

The agreement is valid until the final payment date, which is 180 months after the initial utilisation date. The first drawdown of USD100 million took place in January 2014. In effect, the agreement is valid for 15 years (carrying an interest rate that has a fixed and variable component) and works on a sliding scale, depending on the quantum of the drawdowns and outstanding balance. Funding is allocated exclusively to the project development of the BPM.

According to the company's consolidated financial statements as at 31 December 2020, Wesizwe has drawn down the full USD650 million loan facility. As a going concern, additional funding will be required to complete development of the BPM, which will most likely be drawn from a variety of sources including shareholders, private investors and a consortium of lenders and/or major banks in China (Wesizwe IAR 2020).

2.7.3. Black economic empowerment

Wesizwe, including its subsidiaries, completed a BEE compliance assessment conducted by Siyandisa Verification Solutions, dated 27 August 2020. The report assessed the company against the latest version of the Mining Charter III published on 27 September 2018 for the reporting period between 1 January 2019 and 31 December 2019. The company was rated as a Level 5 BEE contributor and was assessed to be compliant against the Mining Charter III scoring 56.68% out of a possible 100%:

- 17.13% out of 30% for employment equity
- 28.09% out of 40% for procurement, supplier development and enterprise development
- 11.47% out of 30% for human resource development.

The company scored 26%, the minimum score for BEE ownership. The new requirements for 30% BEE ownership of new mineral rights are not applicable. From a community development and local economic development perspective, the report indicated that the company was compliant in respect of its social and labour plan commitments. This included its contribution to local housing development.

2.7.4. Joint venture agreements

No joint venture ("JV") agreements are applicable.

2.7.5. Contract mining related agreements

2.7.5.1. Engineering and construction agreement – 69 and 72 level

Wesizwe, on behalf of the BPM, entered into an engineering and construction contract ("NEC") with China Coal No 5 Construction (Pty) Ltd (under contract number 4600000026, package A) for the provision of engineering and construction services. These would apply to capital waste infrastructure, reserve development, related equipping and permanent and temporary civil, steel, piping, instrumentation, ventilation and mechanical equipping. The contract includes both the main and service shafts and related infrastructure on levels 69 and 72, which will cater to both the Merensky and UG2 reefs.

The contract commenced on 15 November 2017 with contract payment terms based on a specified cash flow/ instalment schedule. Payment commenced with an initial deposit and monthly instalments from October 2017 for 48 months until May 2021.

Based on the method statement, the waste development consists of the horizontal, vertical, decline and incline development on levels 69 and 72. This includes the development and establishment of tips, cubbies, travelling ways, workways, workshops, stores, ore passes, storage silos, drain holes, settlers, conveyor belts, pump chambers and pressure reducing stations, refuge chambers, substations and chairlifts.

The reef development footprint includes the access drives, return airways, raises, connectors, winzes for the first two levels, the development and establishment of ore passes, storage silos, tips, cubbies, travel ways, satellite workshops, stores, drain holes, dams, conveyor belts, pump chambers, pressure reducing stations, refuge changes, substations, refuelling stations and chairlifts. In both instances, it includes all the support services such as water and electricity supply required to make these installations operational.

The contract was amended on 30 October 2019. The amendment focuses on the removal of certain elements of the scope of works from the contractor and transferred to the employer. These amendments related to the revised layout for the waste and reef development on 69 level ("L") and 72L. The employer will be responsible for vertical development. In terms of paragraph 3.3 of the addendum, it indicates that a revised schedule of completion dates was agreed and a revision of the advanced payment.

2.7.5.2. Engineering and construction agreement – 77 and 81 level

The BPM entered into an NEC (3rd Edition, April 2013) contract with Jinchuan Group Engineering Co SA (Pty) Ltd for Package B (under contract number: Wes 19/0001/00) for the design and construction of capital waste infrastructure, reserve development and related infrastructure. This includes the supply of material, personnel, site establishment and the temporary and permanent supply of related services such as water, waste and electricity. This contract is focused on the horizontal development on 77L and 81L and the provision of ventilation infrastructure and systems. The contract commenced on 6 January 2020 and was scheduled for completion in August 2020.

2.7.6. Surface lease agreement

Bakubung signed a surface lease agreement in August 2014 with The Bakubung Ba-Ratheo Tribe to lease Portion 11 (a portion of Portion 4) of the farm Frischgewaagd 96 JQ, held under deed of transfer number T362/1984, via a notarial lease (registration number IT1306/2013). The lease agreement commenced on the occupation date of 1 April 2010 for 40 years and shall terminate on the expiration of the lease period or when the lessee has obtained a closure certificate, certifying that mining operations on the leased property are completed and that the rehabilitation of the leased property is complete, whichever event occurs first.

2.7.7. Recognition agreement

The mine entered into a recognition agreement with NUM on 6 July 2017 as the majority union within the company and covers members and non-members in the bargaining unit. The purpose of the agreement was to stipulate issues related to collective bargaining, union or organisational rights and procedures for dealing with disputes, strikes and grievances in accordance with the LRA as amended. The agreement may only be terminated on good cause and/ or if the NUM cease to be the majority union within the company.

Following the recognition agreement, a wage agreement was concluded by the parties, which took effect on 1 January 2019 and is valid for three years. This agreement incorporates wages and benefits such as salary increases, housing allowances, medical aid, night shift allowances and job grading, etc. for employees in bands A, B and C.

On 13 August 2020, the company concluded a recognition and procedural agreement with Solidarity. In terms of the agreement, where the union holds a 30% plus 1% representation of employees on the mine, it is entitled to recognition. The majority union must have 50% plus 1% representation. The agreement gives Solidarity organisational and collective bargaining rights in accordance with the LRA, as amended, including for example: access to employees, recognition of shop stewards, deduction of subscriptions, rights to organisation and hold meetings, dispute procedures, etc.

2.7.8. Electricity supply agreement

The BPM and Eskom concluded a supply agreement (with a commencement date of 30 November 2012 for an indefinite period) for the supply of electricity to the mine for a fee, as approved by the National Energy Regulator of South Africa ("NERSA"). The average annual electricity supply was based on forecast quantities as indicated in Table 2-2.

Table 2-2: Estimate electrical demand

Description	2012	2013	2014	2015	2016	2017	2018	2019
Mega Volt Ampere ("MVA")	5	8	8	13	18	35	35	40

The battery limit for the supply is the 33 kilovolt ("kV") line at the Bakubung substation. The mine was responsible for installing its own electrical supply infrastructure and connecting to the substation.

2.7.9. Bulk water supply agreement

The mine entered into a raw water supply agreement with Magalies Water on 19 June 2013. The agreement remains valid for the duration of the economic life of the operation. The outcome of the agreement was that Magalies Water would supply raw water to the mine, based on an estimated demand profile of approximately six megalitres per day from 2017 onwards.

Subsequently, the parties have agreed in principle (un-signed) to an amendment of the water supply agreement. Effectively the amendments are:

- To formalise the main bulk water supply agreement between the parties and record that it remains valid
- To provide for situations where the Water Board may interrupt water supply for testing, inspection, maintenance, rehabilitation of water infrastructure
- To provide for fixed duration (as opposed to an indefinite duration)
- To provide for estimates of quantities, qualities and average daily demand
- To provide for payment of a deposit and drought levy
- The effective date of the proposed amendment was 21 March 2021.

2.7.10. Litigation

The company monitors complaints and litigation against the company as part of its risk management systems, policies and procedures. There is no material litigation against the company that threatens its mineral rights, tenure or operations. The following matters are in progress:

- Wesizwe vs Stalker Hutchinson – the company has instituted a claim of ZAR1.3 million against its own short-term insurer, Stalker Hutchinson who refused to reimburse the company for claims it settled with its travel agents. The travel agents claimed compensation from the company due to the fraudulent conduct of a former employee. The matter is proceeding to court and the outcome will depend on the court's interpretation of the insurance contract or policy between the parties
- Wesizwe vs LTS Construction – the company cancelled an agreement with this construction company. The construction company disputed the cancellation and certain deductions made regarding payments to it. The parties proceeded to arbitration. The matter could not be finalised as LTS went into liquidation and the matter is unlikely to proceed
- A Wesizwe subsidiary, Africa-wide Mineral Prospecting and Exploration (Pty) Ltd ("AMPE") vs Platinum Group Metals RSA (Pty) Ltd ("Platinum Group Metals"), Royal Bafokeng Platinum Limited and Maseve Investments 11 (Pty) Ltd ("Maseve") and others are potentially important
  - AMPE and Platinum Group Metals entered into a shareholder's agreement with Maseve.
  - Maseve owned certain mineral assets, a concentrator plant and surface rights. It used the concentrator to beneficiate Platinum Group Metals products
  - RBP apparently purchased the concentrator, mineral assets and surface rights from Maseve and subsequently then acquired 100% of its shares
  - AMPE disputed the sale of these assets to Bafokeng Platinum Limited, their disposal by Maseve as a violation of the shareholder's agreement and will attempt to have the transactions set aside and its rights restored.

3. Accessibility, physiography, climate, local resources and infrastructure

SV T1.5

3.1. Accessibility

SR 1.1(ii)

The mine is easily accessible through the R565 and R556 provincial roads from Rustenburg and Sun City. Pilanesberg Airport is the nearest airport to the mine site with two flights per week available from Oliver Tambo International airport situated in Johannesburg.

3.2. Topography and vegetation

SR 1.1(ii)

The topography surrounding the mining area is characterised by mountainous and hilly terrain (including the Magaliesberg and Pilanesberg mountain ranges). The surface elevations at the high lying areas vary from approximately 1 200m above mean sea level ("amsl") to 1 700m amsl while the flatter terrain beyond these high lying areas varies between 1 050m amsl to 1 180m amsl. The topography of the mining right area can be described as flat to gently undulating.

The vegetation of the area is classified as Mixed Bushveld and falls within the Savanna Biome. The vegetation can vary from dense, short bushveld to an open tree savanna. Figure 3-1 below, shows the general topography of the mining right area based on 2m surface contour intervals.

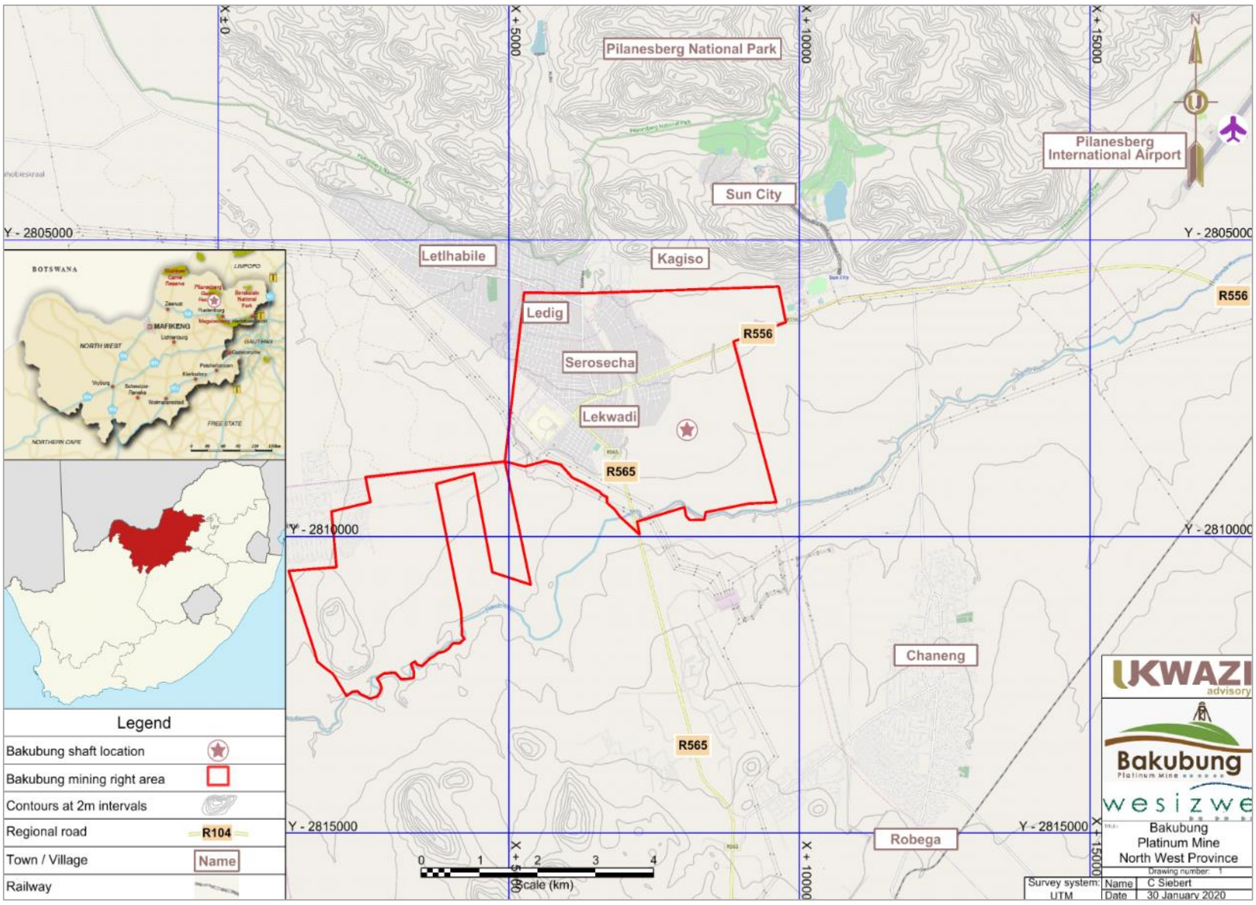

Figure 3-1: Topography

3.3. Climate

SR 1.1(ii)

Climatic conditions of the North West Province vary considerably across the province. The western region is arid, the central region is typically semi-arid, while the eastern region of the province is largely temperate. Rainfall over the province is highly variable over space and time (SLR, 2016).

Rainfall occurs predominantly in the summer months, with the western region of the province receiving less than 300mm per annum, mainly during the midsummer period. The central region receives approximately 550mm per annum during the late summer season, while the eastern and southeastern regions receive over 600mm per annum in the early season (spring). Except for the southeastern region, evaporation exceeds precipitation in the province (SLR, 2016).

Temperature patterns are characterised by great seasonal and daily variations, where summers are hot and winters are mild to cold. The seasonal fluctuations in mean temperatures between the warmest and the coldest months vary between 12 degrees Celsius ("°C") and 15ºC. Windy months occur between August and November (SLR, 2016).

The mine falls within the Highveld climatic zone, which is characterised by warm temperatures, dry winters and summer rainfall (with all conditions being erratic and extremely variable). Rainfall and temperature data were sourced from the on-site weather station from May 2014 (when it started to operate) to October 2015 (SLR, 2016). Average monthly rainfall records based on the available site data are presented in Figure 3-2.

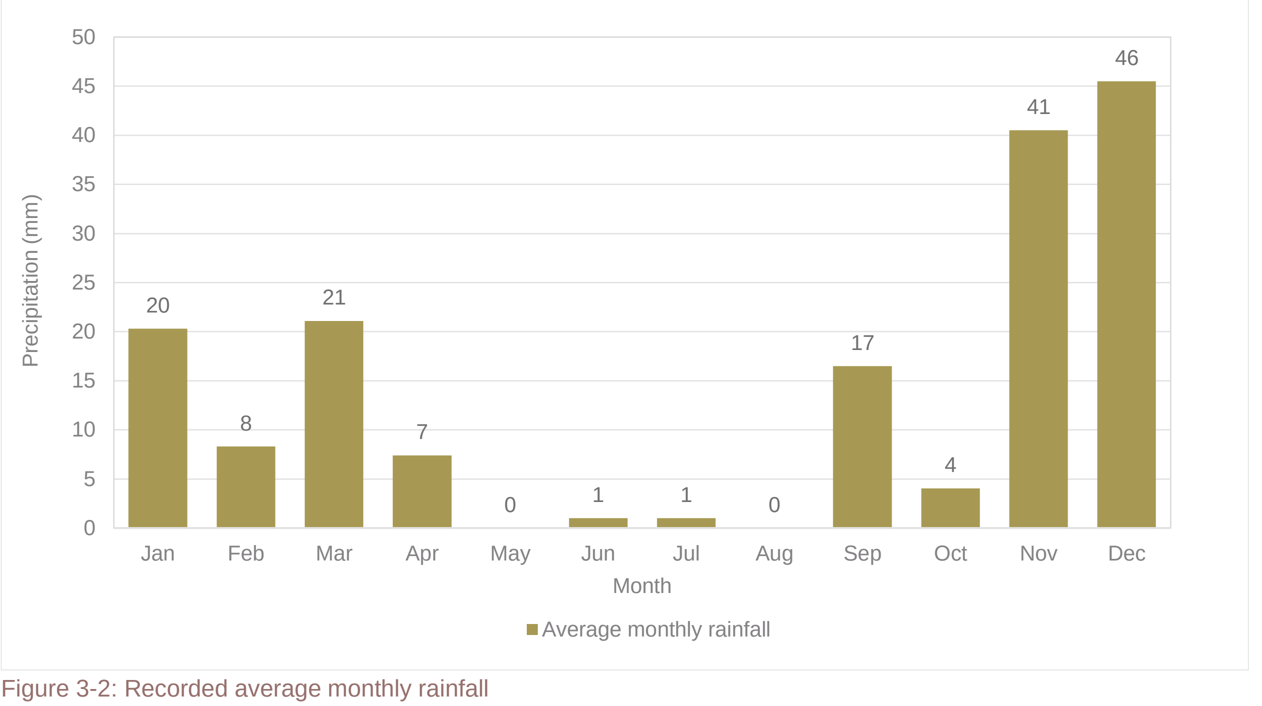

Figure 3-2: Recorded average monthly rainfall

Temperature data were obtained from on-site measurements. The month of August had the lowest recorded temperature of an estimated -2°C, while the maximum recorded temperature of 37°C occurred in February. Temperatures reached their minimum just before sunrise and their maximum between midday and sunset (SLR, 2016). The BPM operations are not restricted by climatic or seasonal occurrences. The recorded data are presented in Table 3-1.

Table 3-1: Recorded temperature data

Description	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum	°C	16	13	14	9	4	-1	-1	-2	7	12	11	14
Maximum		33	37	35	31	32	24	26	32	36	36	35	36
Average		25	26	24	20	17	12	13	17	21	24	22	24

3.4. General infrastructure

SR 1.1(ii); 5.4(i)

Infrastructure in the region is well established, supporting the numerous operational platinum mines in the area. The regional infrastructure includes paved and gravel road networks, Eskom transmission and distribution networks, water supply networks and communication infrastructure.

The Boshoek smelter and railway siding are located approximately 12km south of the mine and the Pilanesberg Airport is situated approximately 10km northeast of the mine. The Lekwadi and Serosecha villages are located within the mining right area upon the Ledig and Frischgewaagd farms. Figure 3-3 shows the regional infrastructure in relation to the mining right area.

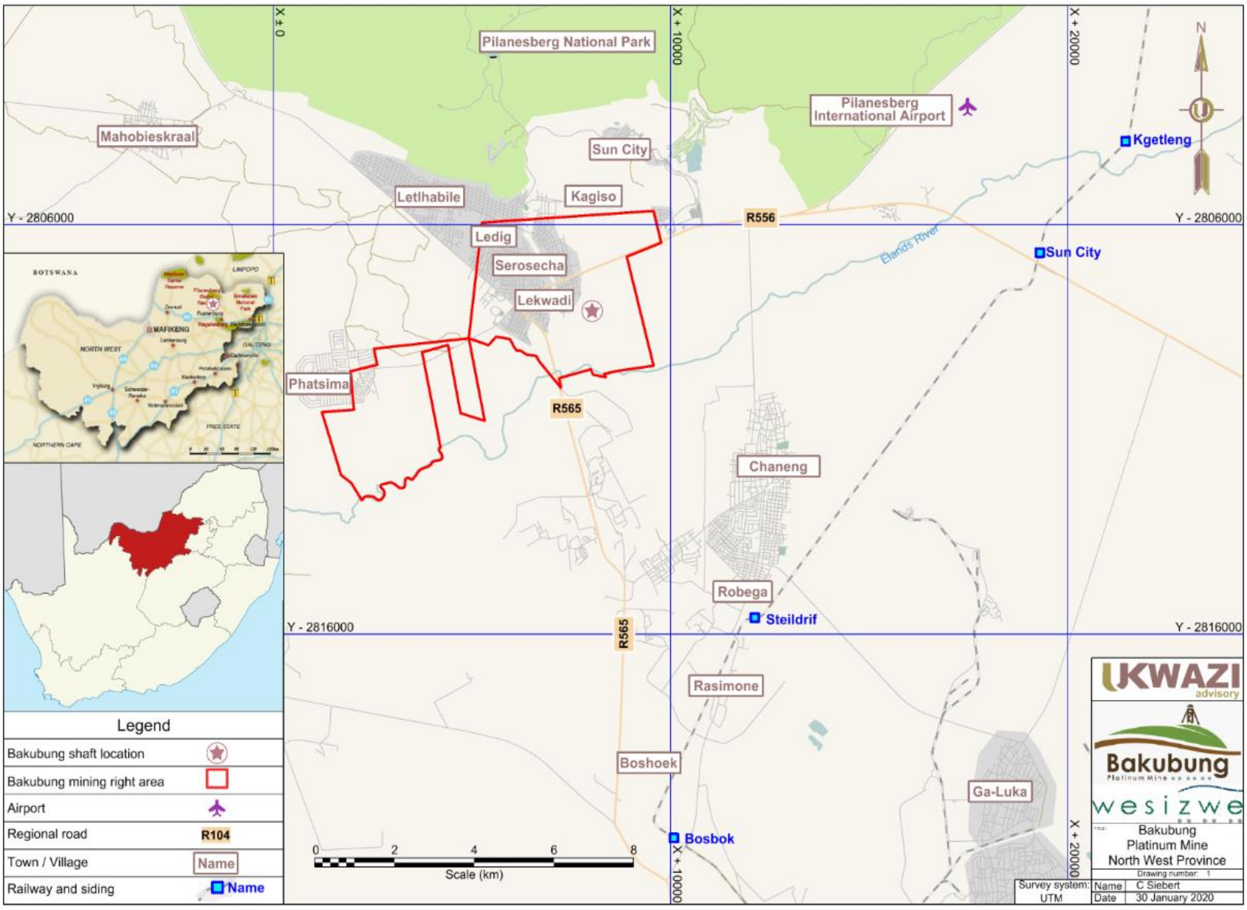

Figure 3-3: Regional infrastructure

3.5. Survey system

SR 1.2(i); 3.1(v)

The mine utilises the Gauss Conform coordinate system, Central Meridian 27° east, referenced to the Hartebeesthoek94 datum (WGS84 Ellipsoid). Figures presented in this CPR, are presented in the Universal Transverse Mercator ("UTM") coordinate system or the Gauss Conform coordinate system.

4. History

SR 1.4(i) / SV T1.6; T1.8

In 2003, the group's initial shareholders identified a potentially viable and virgin portion of the Merensky and UG2 reefs within the Western Limb of the BC of the North West Province. The cost of developing and operating such a mine was assessed against the global demand forecast for PGM over four decades. The project was assessed by the Jinchuan Group Co. Ltd ("Jinchuan") and the China Africa Development ('CAD") Fund, both joining as shareholders and strategic investors as the China Africa Jinchuan Investments Limited ("CAJIL") consortium. This consortium has since invested equity and debt capital into Wesizwe towards the development of the BPM, the timeline of which, is outlined below (Wesizwe IAR 2018, 2019, 2020):

- 2003 to 2009
  - Exploration activities and bankable feasibility study ("BFS")
  - Mining right application submitted in 2007
  - Mining right granted in May 2009
- 2010
  - Term sheet with Chinese consortium signed
- 2011
  - Transaction with CAJIL concluded - USD227 million injected into the group
  - Wesizwe's core project relaunched as the BPM
- 2012
  - Shaft sinking contract awarded
  - First blast of the ventilation shaft
  - Main shaft pre-sink commences
- 2013
  - Main shaft slow sink commences – 345m achieved by December 2013
  - Ventilation shaft headgear commissioned
  - Ventilation shaft slow sink commences – 506m achieved by December 2013
  - USD650 million facility entered with the China Development Bank ("CDB")
  - Project optimisation plan finalised for board approval
- 2014
  - 69 level ("L") and 72L stations' development in the ventilation shaft
  - Merensky reef intersected
  - Bulk sampling programme commences by collecting 300t of ore samples from both shafts
  - Permanent water supply commences with phase 1c infrastructure development
  - Phase 2 power supply programme commences with Eskom and signed agreements with guarantees paid
  - Process plant feasibility study review concluded
- 2015
  - Both shafts reached planned sinking depth, commenced with main shaft equipping
  - Commissioned 1.5 megalitres per day permanent water supply capacity to BPM
  - Waste development on multi-level through the ventilation shaft commences
  - Implemented the mine operational readiness plan
  - Process plant enquiry for the engineering, procurement, construction management ("EPCM") and front-end engineering ("FEE") commences
  - Main and ventilation shafts connected on 72L with loading box excavation completed
- 2016
  - Shaft equipping activities proceeds
  - Bulk services for a 50 megalitre water reservoir completed
  - Bakubung electrical substation commissioned
- 2017
  - Main shaft equipping completed
  - Connections between service shaft and main shaft completed on all levels
  - Work on the permanent waste pass commences
  - Connection between 77L and 81L completed
- 2018
  - Capital footprint developer appointed
  - Main shaft licensed to transport personnel, material and rock
  - Rock hoisting through main shaft commences
  - Automation of rock loading facility completed
  - Surface conveyor from main shaft headgear bin to transfer bin completed
- 2019
  - Completed installation of substation on 69 and 72 levels
  - Appointment of the EPC and building contractors for the construction of the process plant
  - Intersection of the Merensky reef horizon on 69L
- 2020
  - Achieved 3 791m development

- Commenced with earthworks for the process plant and delivery of long-lead items
- Testing and commissioning of 30 tonne ("t") dump trucks on 69L.

4.1. Historical exploration

SR 1.4(i); 3.1(i); 3.2(i): 3.2(iv) / SV T1.8 / JSE 12.10(e)

The historical exploration consisted of an extensive drilling programme conducted continuously from October 2004 to April 2008 (Table 4-1). A three-dimensional ("3D") seismic survey was undertaken by a joint venture between Wesizwe, Anglo American Platinum Corporation Ltd. ("Amplats") and Platinum Group Metals in 2007 and downhole geophysics in 2007/ 2008 for the shaft drill holes.

Table 4-1: Summary of exploration drilling

Description	Unit	Amount
Total drilling	m	172 425
Drill holes	number	179
Deflections	number	439

The total exploration expenditure incurred to date was approximately ZAR342.9 million. Details regarding the exploration expenditure are not available. No additional exploration activities are currently planned at the Bakubung Platinum Mine. (BPM, 2021)

4.2. Previous Mineral Resource estimates

SR 1.4(iii)

A Mineral Resource estimate was completed by The Mineral Corporation ("TMC") in 2009. Details of the Mineral Resource estimate are contained in a TMC report entitled: *"Competent Person's Update of the Mineral Resources at Wesizwe Platinum Limited's Pilanesberg Project"* with report number C-WES-EXP-242-534, dated September 2009. Table 4-2 below shows the Mineral Resource estimates as reported by TMC during September 2009.

Table 4-2: Mineral Resource estimate – September 2009 (TMC)

Reef type	Mineral Resource classification	Facies type	Tonnes [Mt]	PGE (4E) [g/t]	Pt [g/t]	Pd [g/t]	Rh [g/t]	Au [g/t]	Cu [%]	Ni [%]	Width [m]	SG [t/m³]
Merensky	Measured	Normal	6.698	6.27	4.07	1.69	0.29	0.24	0.08	0.25	1.51	3.18
		Subtotal	**6.698**	**6.27**	**4.07**	**1.69**	**0.29**	**0.24**	**0.08**	**0.25**	**1.51**	**3.18**
	Indicated	Detached	5.977	5.94	3.96	1.50	0.27	0.22	0.08	0.21	1.32	3.23
		Normal	7.720	6.16	3.99	1.66	0.28	0.23	0.09	0.25	1.47	3.15
		Single chromitite	4.396	6.12	3.95	1.62	0.29	0.25	0.07	0.17	1.46	3.04
		Subtotal	**18.093**	**6.08**	**3.97**	**1.60**	**0.28**	**0.23**	**0.08**	**0.22**	**1.42**	**3.15**
	Inferred	Detached	5.851	5.61	3.74	1.42	0.25	0.21	0.08	0.20	1.26	3.20
		Normal	1.327	6.00	3.89	1.61	0.27	0.23	0.08	0.23	1.31	3.17
		Normal footwall	3.534	6.33	4.16	1.72	0.25	0.20	0.07	0.16	1.80	3.18
		Single chromitite	0.530	5.53	3.58	1.47	0.26	0.23	0.06	0.14	1.42	3.06
		Subtotal	**11.242**	**5.88**	**3.88**	**1.54**	**0.25**	**0.21**	**0.08**	**0.19**	**1.44**	**3.18**
UG2	Indicated	Normal	13.418	4.80	2.89	1.40	0.50	0.02	0.00	0.13	1.29	3.81
		Regional pothole	19.477	4.52	2.69	1.32	0.48	0.02	0.00	0.12	1.57	3.80
		Subtotal	**32.894**	**4.63**	**2.77**	**1.35**	**0.49**	**0.02**	**0.00**	**0.12**	**1.45**	**3.81**
	Inferred	Normal	1.047	4.72	2.84	1.37	0.49	0.02	0.00	0.14	1.12	3.75
		Regional pothole	9.031	4.10	2.44	1.20	0.44	0.02	0.00	0.11	1.55	3.78
		Subtotal	**10.078**	**4.16**	**2.48**	**1.22**	**0.44**	**0.02**	**0.00**	**0.12**	**1.51**	**3.78**

Notes (based on Wesizwe 2018 IAR):

1) The Mineral Resource was quoted inclusive of the Mineral Reserve
2) The Mineral Resource was reported as in situ tonnes and grade and allows for (inclusive) geological losses (25% for the Merensky and 27.5% for the UG2 Reef)
3) No Mineral Resource was excluded due to cut-off grade (pay limit) considerations
4) The Mineral Resource was quoted as 4E (Pt, Pd, Rh, Au) unless otherwise stated
5) The BPM Mineral Resource Statement (September 2009) was prepared by TMC and has been signed off in accordance with the SAMREC Code (2007, amended 2009) by David Young, a former Director of TMC. David's qualifications are BSc (Hons), FGSSA, FSAIMM, FAusIMM (204659), Pr Sci Nat (400989/83) and his business address is Homestead Office Park, 65 Homestead Avenue, Bryanston 2021. All independent Mineral Resource estimates have been substantiated by evidence obtained from site visits and observations. They are supported

by details of drilling results, analyses and other evidence and account is taken of all relevant information supplied by Wesizwe management. The Company is in possession of written confirmation from the Competent Person that the resource information disclosed in this report is compliant with the SAMREC Code and any relevant Section 12 and Table 1 requirements and that it may be published in the form and context as intended. This written confirmation is available for scrutiny as and when necessary

6) Rounding of numbers may result in insignificant computational discrepancies
7) Mr Young is a member of SACNASP, a body recognised by SAMREC. The physical address of SACNASP is Management Enterprise Building, Mark Shuttleworth Street, Innovation Hub, Pretoria, 0087.

For the Merensky reef, the total Mineral Resource was estimated at 36 million tonnes ("Mt") at a three-platinum group element ("3PGE"): Platinum ("Pt"), Palladium ("Pd"), Rhodium ("Rh") plus Au grade of 6.05 gramme per tonne ("g/t"). The Mineral Resource for the UG2 Chromitite layer was estimated at 43Mt at a 3PGE+Au grade of 4.52g/t.

4.3. Previous Mineral Reserve estimates

SR 1.4(iii)

No previous code-compliant Mineral Reserve estimates were publicly reported for the BPM.

4.4. Historical production

SR 1.4(i); 1.4(ii); 1.4(iii)

A summary of the production data from 2014 to 2020 for the BPM is shown in Figure 4-1 and summarised in Table 4-3. The waste production data in this figure are indicated on a volume basis in bank cubic meters ("BCM") and the ore production data are presented in tonnes. The terms "ore" and "reef" are used throughout this CPR, these terms are considered to be synonymous.

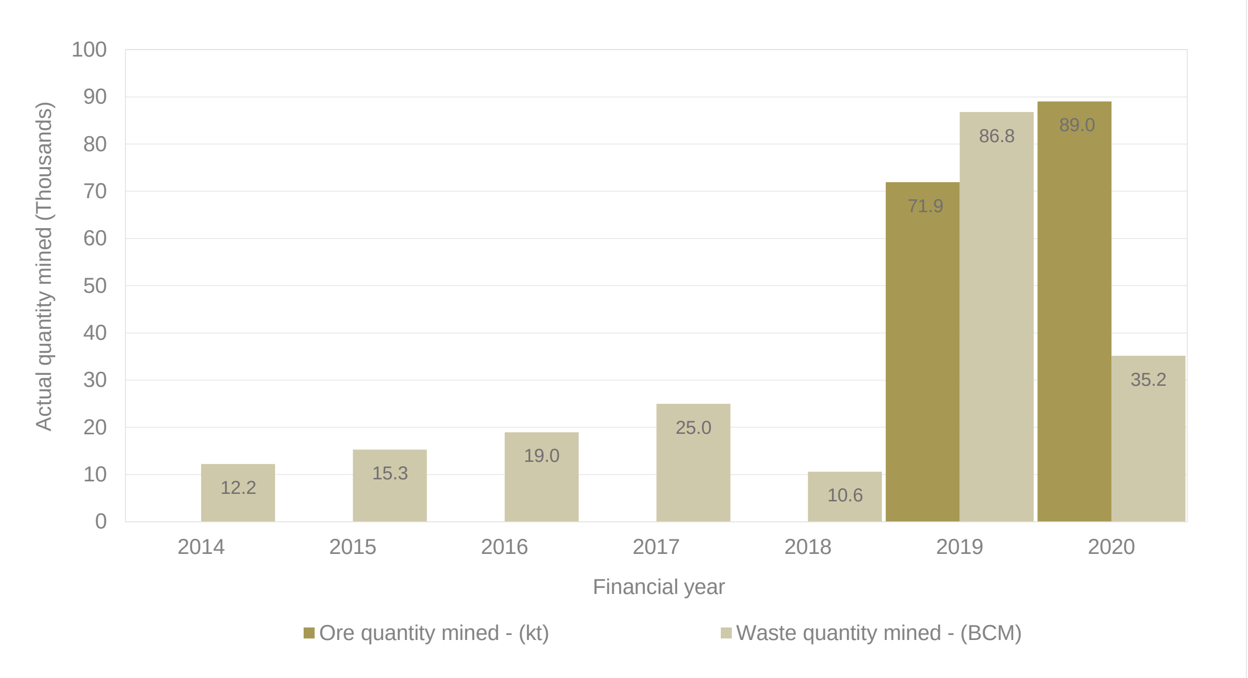

Figure 4-1: Historical production data from 2014 to 2020 (Source: BPM, June 2021)

Table 4-3: Summary of historical production data from 2014 to 2020 (Source: BPM, June 2021)

Description	Unit	2014	2015	2016	2017	2018	2019	2020
Ore quantity mined	kt	0.0	0.0	0.0	0.0	0.0	71.9	89.0
Waste quantity mined	BCM thousand	12.2	15.3	19.0	25.0	10.6	86.8	35.2

A summary of the production data for the 2020 financial year ("FY") is shown below in Table 4-4.

Table 4-4: Actual production summary FY20 (Source: BPM, June 2021)

	Description	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul
Actual	Horizontal development	BCM	8 311	6 299	4 922	0	469	0	2 071
	Total BCM		**8 311**	**6 299**	**4 922**	**0**	**469**	**0**	**2 071**
	Ore BCM		1 716	2 287	1 597	0	303	0	328
	Waste		6 595	4 012	3 325	0	166	0	1 743
	Ore tonnes (wet basis)	Tonne	7 105	5 876	4 624	0	939	0	1 018

	Description	Unit	Aug	Sep	Oct	Nov	Dec	Total FY20
Actual	Horizontal development	BCM	4 237	7 149	11 054	10 035	7 257	**62 074**
	Total BCM		**4 237**	**7 149**	**11 054**	**10 035**	**7 257**	**62 074**
	Ore BCM		907	3 041	8 268	5 619	2 836	**26 903**
	Waste		3 330	4 108	2 786	4 687	4 421	**35 171**
	Ore tonnes (wet basis)	Tonne	2 813	9 956	25 370	17 777	13 563	**89 040**

5. Geological setting and mineralisation and deposit types

SV T1.7 / JSE 12.10(h)(v)

The BPM is located on the Western Limb of the BC, immediately south of the Pilanesberg Alkaline Intrusion and is underlain by the Merensky reef and UG2 Chromitite layer. Figure 5-1 indicates a map of the BC, showing the location of the BPM.

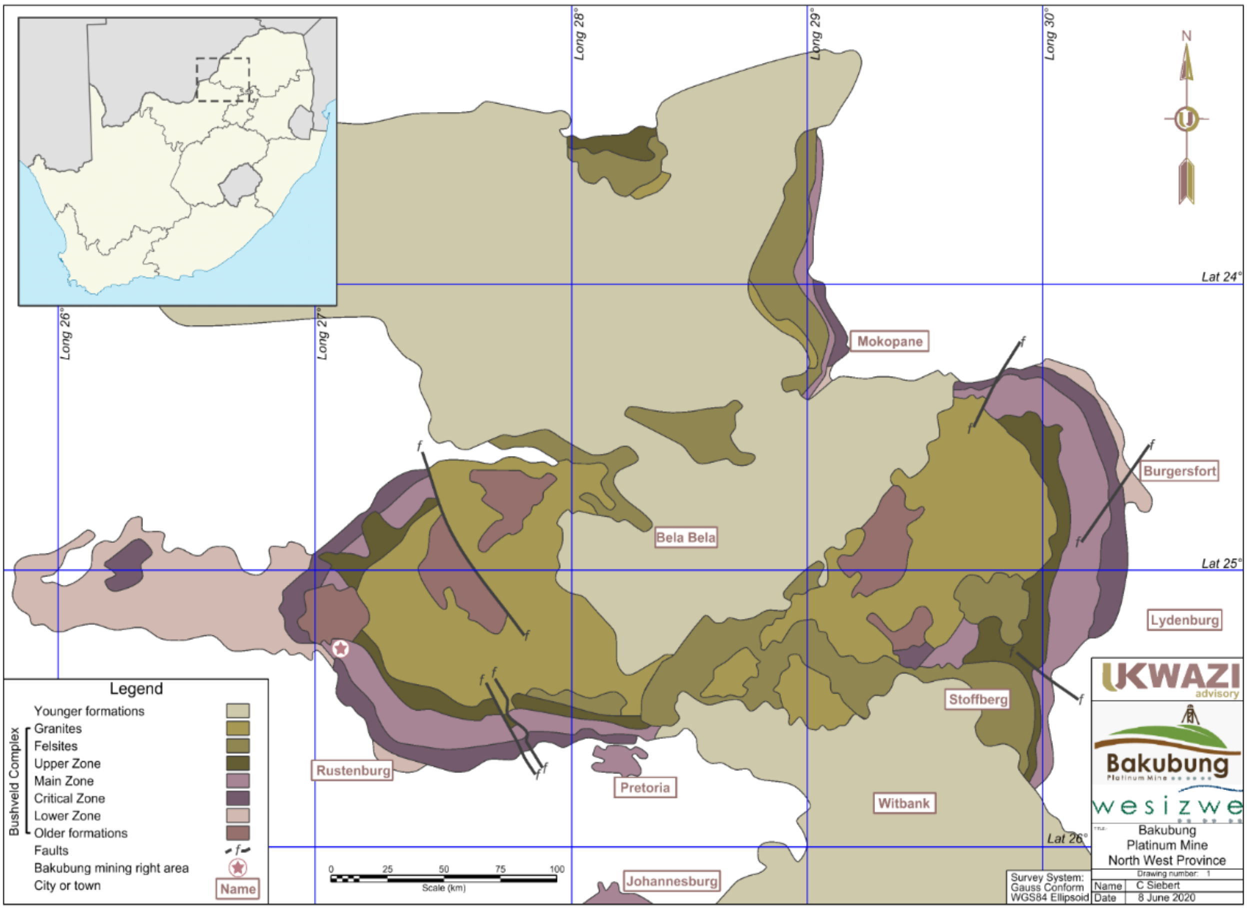

Figure 5-1: Map of the BC showing the location of the BPM

5.1. Geological setting

SR 2.1(i)

The stable Kaapvaal and Zimbabwe Cratons in Southern Africa are characterised by the presence of large mafic to ultramafic layered complexes, the best known being the Great Dyke in the Zimbabwe Craton and the Bushveld and Molopo Complexes in the Kaapvaal Craton. By far, the largest, most renowned and most economically viable of these, is the BC which was intruded approximately 2 060 million years ago into rocks of the Transvaal Supergroup - largely along an unconformity between the Magaliesberg quartzite of the Pretoria Group and the overlying Rooiberg felsites.

The total estimated extent of the BC is approximately 66 000km^2, of which, about 55% is covered by younger formations. The mafic rocks of the BC host layers are rich in PGM, chromium and vanadium and constitute the world's largest known resource of these metals.

5.1.1. Bushveld Complex stratigraphy

The mafic rocks (collectively termed the Rustenburg Layered Suite ("RLS")) can be divided into five zones known as the Marginal, Lower, Critical, Main and Upper Zones from the base upwards (Figure 5-2). The Marginal Zone comprises generally finer-grained rocks than those of the interior of the BC and contains abundant xenoliths of country rock. The zone is highly variable in thickness and may be completely absent in some areas containing no known economic mineralisation.

The Lower Zone is dominated by orthopyroxenite with associated olivine-rich cumulates in the form of harzburgites and dunites. The Lower Zone may be completely absent in some areas.

The Critical Zone is characterised by regular and often fine-scale rhythmic, or cyclic, layering of well-defined layers of cumulus chromite within pyroxenites, olivine-rich rocks and plagioclase-rich rocks (norites, anorthosites etc). The economically important PGM deposits are part of the Critical Zone.

The Critical Zone hosts all the Chromitite layers of the BC, of which up to 14 were identified. The first important cycle is the lower of the two UG Chromitite layers (the UG1 Chromitite layer). This unit consists of a Chromitite layer and underlying FW Chromitite layers that are interlayered with anorthosite. The most important of the chromite cycles for PGM mineralisation is the upper of the two UG Chromitite layers (the UG2 Chromitite layer) with an average thickness of approximately 1m that is mined throughout the BC.

Underlying the UG Chromitite layers are the middle group ("MG") Chromitite layers, which consist of five groups of Chromitite layers over an overall thickness of 50m to 80m. These Chromitite layers are important as they contain significant concentrations of chromite and PGMs.

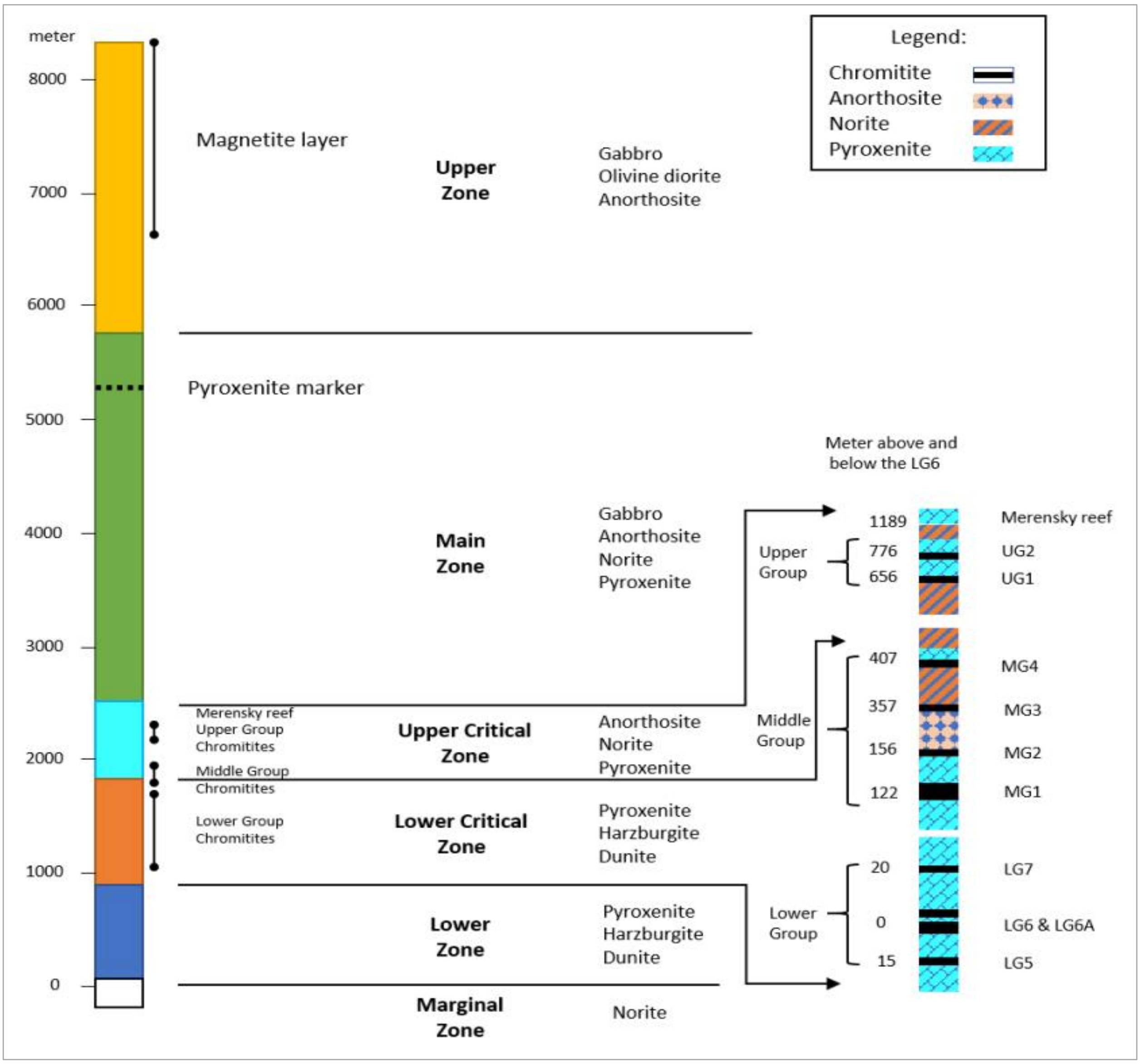

Figure 5-2: Generalised stratigraphic column of RLS, BC

The two uppermost units of the Critical Zone are the Merensky and Bastard units. The former is of great economic importance as it contains, at its base, the PGM-bearing Merensky reef, a feldspathic pyroxenitic assemblage with associated thin Chromitite layers that rarely exceed 1m in thickness. The top of the Critical Zone is generally defined as the top of the robust anorthosite (the Giant Mottled Anorthosite) that forms the top of the Bastard cyclic unit. The Critical Zone may be subdivided into the Upper and Lower Critical Zones based on the last appearance of cumulus feldspar. This boundary is between the UG and MG Chromitite layers.

The economically viable chromite layers of the BC, most of which are hosted in the Critical Zone, were estimated at 68% of the world's total known reserves, whilst the BC contains 56% of all known PGMs. The Merensky reef, which developed near the top of the Critical Zone, can be traced along strike on the eastern and western limbs and is estimated to contain 60 000t of PGM to a depth of 1 200m below surface. The pyroxenitic Platreef mineralisation, north of Mokopane (formerly Potgietersrus), contains a wide zone of more disseminated style Pt mineralisation, along with higher grades of Ni and Cu than those that occur in the rest of the BC.

The well-developed Main Zone consists of norites grading upwards into gabbronorites. It includes several mottled anorthosite layers in its lower sector and a distinctive pyroxenite layer two-thirds of the way up, termed the Pyroxenite marker.

The base of the overlying Upper Zone is defined by the first appearance of cumulus magnetite above the Pyroxenite marker. In all, 25 layers of cumulus magnetite punctuate the Upper Zone, with the fourth (Main Magnetite layer) being the most prominent. This is a significant marker, approximately 2m thick, resting upon anorthosite and is exploited for its vanadium content in the Eastern and Western Limbs of the BC.

Another unique feature of the geology of the BC is the mafic/ ultramafic pegmatites sometimes referred to as iron-rich ultramafic pegmatites ("IRUPs") or replacement pegmatites. While these often destroy the structure of the Chromitite layer, the PGMs may be unaffected. It can result in challenging mining conditions, especially underground, as it becomes problematic to identify the mineralised horizons.

5.2. Nature of deposit and mineralisation

SR 2.1(ii); 2.1(v); 2.1(vi)

5.2.1. Merensky reef

The Merensky reef was traditionally the most important Pt producing layer in the BC. Seismic surveys undertaken by the Council for Geoscience indicate that reflectors associated with the Merensky reef can be traced as far as 50km down dip, to depths of 6 000m below surface. The Merensky reef varies considerably in its nature but can broadly be defined as a mineralised zone within, or closely associated with the ultramafic cumulate at the base of the Merensky cyclic unit.

The Merensky reef is a regular cyclic unit within the Critical Zone. The Merensky reef is located between 60m to 100m below the top of the Critical Zone and grades upward through the cycle into norite, a 'spotted' anorthosite and finally, into a 'mottled' anorthosite (at the top of the cycle). On the Western Limb, the Merensky reef exhibits significant variations in lithology and grade. It was originally subdivided into the Rustenburg facies and Swartklip facies (south and north of the Pilanesberg Alkaline Complex) respectively, by Wagner (1929), based upon a number of differences including the abundance of olivine-rich cumulates and thinner pre-Merensky units (UG1 and UG2) in the Zwartklip facies (Maier & Eales, 1997).

5.2.2. Upper Group 2 Chromitite layer

In addition to the PGM mineralisation associated with the Merensky reef, all Chromitites in the Critical Zone at times contain elevated concentrations of PGMs. The UG2 Chromitite layer is widely exploited for PGMs.

The UG2 Chromitite layer varies between 60cm and 80cm in thickness and often displays a mottled appearance due to the presence of large bronzite grains within the Chromitite. The main Chromitite is overlain by a relatively thick (up to 6m) porphyritic pyroxenite layer, which contains (in its lower portion) up to three leader Chromitite layers (the Triplets), which are known to bifurcate and coalesce on a local scale (Viljoen M.J. et al (1986) and Leeb-Du Toit (1986)). The UG2 reef is generally underlain by a pegmatoidal feldspathic pyroxenite, with a diffuse basal contact and frequently, a thin (2cm) chromite stringer below the base of the main UG2 Chromitite layer.

5.3. Local geology

SR 2.1(ii); 2.1(vi)

The information presented below was cited or presented from CPRs produced by TMC (2008, 2009).

5.3.1. Merensky reef

Four facies or types of Merensky reef were identified at the mine with their rock type composition and grade distribution (red bar) presented in Figure 5-3:

1. Normal Merensky reef
2. Single Chromitite Merensky reef
3. Normal FW Merensky reef
4. Detached Merensky reef.

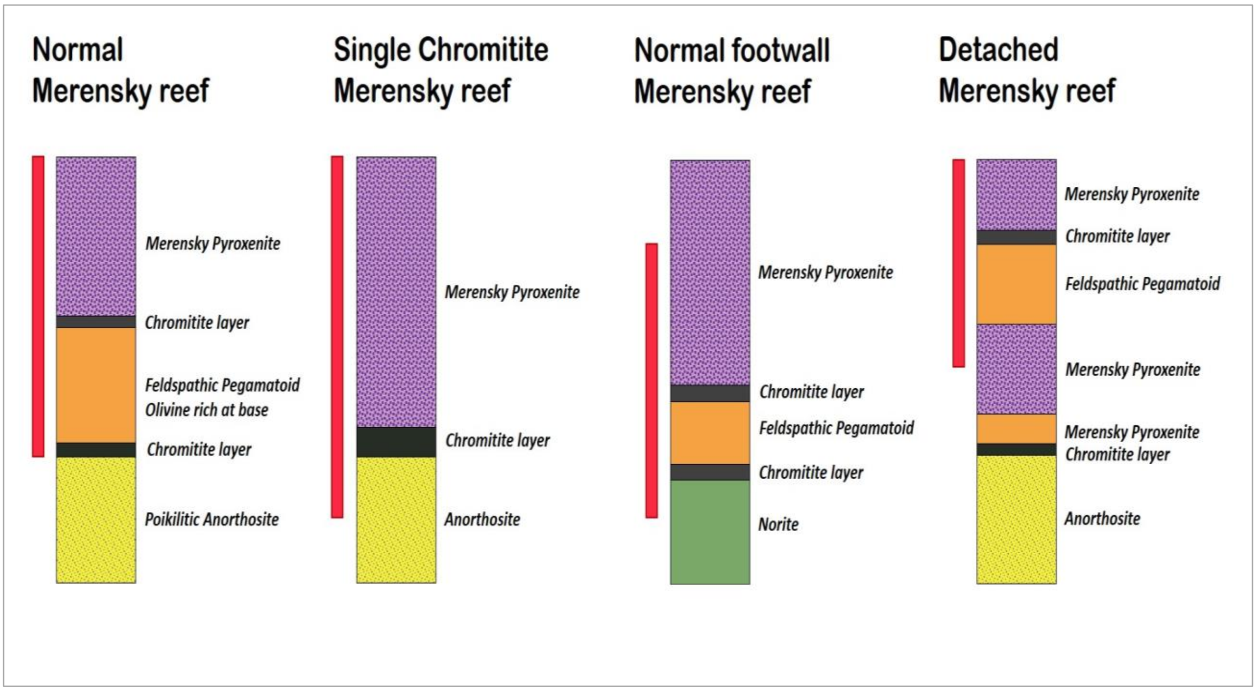

Figure 5-3: Merensky reef facies types with the location of mineralisation (red vertical bar)

The relative location of each of the Merensky facies over the Ledig and Frischgewaagd target areas of the mining right area is shown in Figure 5-4.

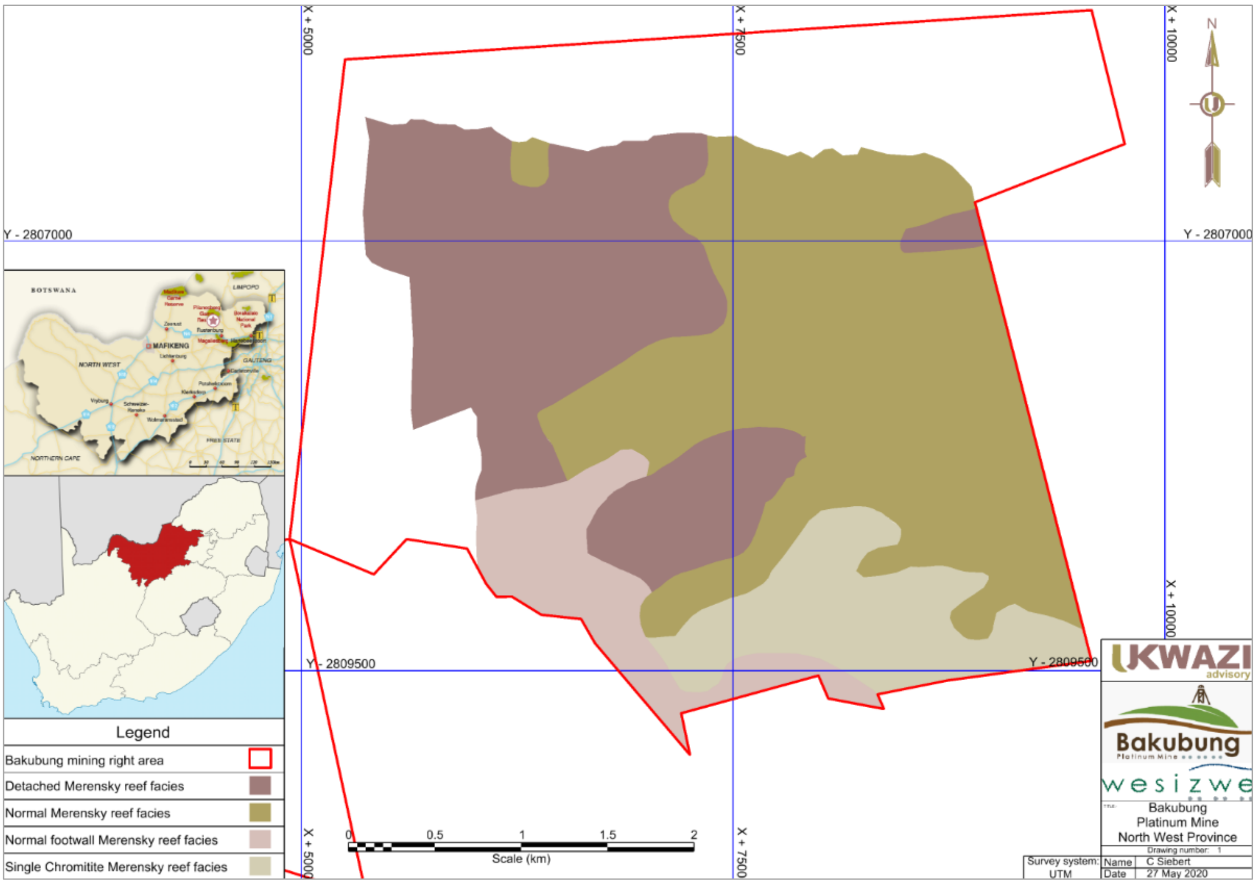

Figure 5-4: Merensky reef facies distribution

5.3.1.1. Normal Merensky reef

The Normal Merensky reef facies consist of a thin (<1cm) upper and basal Chromitite layers, between which a coarse-grained (>2cm) pegmatoidal feldspathic pyroxenite occurs. The pegmatoidal feldspathic pyroxenite becomes more harzburgitic–troctolitic (olivine/ feldspar assemblage) towards the basal Chromitite. The basal Chromitite is underlain by a poikiolitic anorthosite which is typically barren. The upper Chromitite is overlain by approximately 3m of medium-grained (<5mm) feldspathic pyroxenites, termed the Merensky Pyroxenite. Macroscopic base metal sulphides ("BMS") mineralisation is located within the pegmatoidal feldspathic pyroxenite bounded by the upper and lower Chromitites and displays local enrichment within and directly above the upper Chromitite. This facies type is similar to those occurring at the surrounding Implats and Amplats operations, although the average mineralised intersection width intersected at BPM is 1.2m.

5.3.1.2. Normal Footwall Merensky reef

The Normal FW Merensky reef facies is similar to the Normal Merensky reef facies type with a pegmatoidal feldspathic pyroxenite, bounded by upper and lower Chromitite layers. The pegmatoidal feldspathic pyroxenite may be more harzburgitic-troctolitic in character than the Normal Merensky reef facies. The significant difference between the Normal facies and Normal FW facies is that the basal Chromitite is joined to the FW 6 Chromitite and the entire package is directly underlain by alternately layered olivine norites of the stratigraphically consistent FW 7 Chromitite. Significant PGE and BMS mineralisation are associated with this unit and the width over which mineralisation extends can be extensive (approximately 2m in places). The average mineralised intersection width intersected at BPM is 1.6m but the facies include more geological losses than the Normal Merensky reef facies.

5.3.1.3. Single Chromitite Merensky reef

The Single Chromitite Merensky reef facies consist of one chromite layer with the usual two bounding upper and lower Chromitites joining to form a single Chromitite layer. Occasional intersections were observed where the upper-lower Chromitite separation allows for the observation of the internal pegmatoidal feldspathic pyroxenite, highlighting the gradational nature of this facies type close to the facies boundary. The Chromitite(s) are underlain by poikiolitic-spotted anorthosites and norites which comprise a severely "compressed" FW stratigraphy. Whereas the FW stratigraphy thickness underlying the Normal Merensky reef facies is approximately 12m, (to the regionally significant and consistent FW 6 boulder bed Chromitite), the stratigraphic separation pertaining to the Single Chromitite Merensky reef facies is approximately 3m. This is evidence of a transgression of the Merensky reef FW stratigraphy regionally. Mineralisation occurs in the underlying anorthosites and norites and the overlying feldspathic pyroxenites, giving rise to isolated mineralisation widths in excess of 2m. The average mineralised width intersected at BPM is 1.4m.

5.3.1.4. Detached Merensky reef

The Detached Merensky reef facies consist of a lower Chromitite layer overlain by 10cm to 20cm pegmatoidal feldspathic pyroxenite (which occasionally shows evidence of harzburgite) and approximately 8m of fine-grained (<2mm) orthopyroxenite with occasional coarse-grained phenocrysts of clinopyroxene which is overlain by pegmatoidal feldspathic pyroxenite and the upper Chromitite layer. The basal Chromitite is underlain by the same stratigraphy as the Normal Merensky reef facies. Mineralisation is localised to the pegmatoidal feldspathic pyroxenite immediately below the upper Chromitite and upwards (20cm) into the overlying Merensky Pyroxenite. The average mineralised intersection width intersected at BPM is 1.6m.

5.3.2. Upper Group 2 Chromitite layer

Two facies of the UG2 Chromitite layer were identified with the distinction between them being the nature and thickness of the immediate FW (Figure 5-6). The facies distribution is presented in Figure 5-5, the identified UG2 facies include:

1. Normal UG2 reef facies
2. Regional pothole UG2 reef facies.

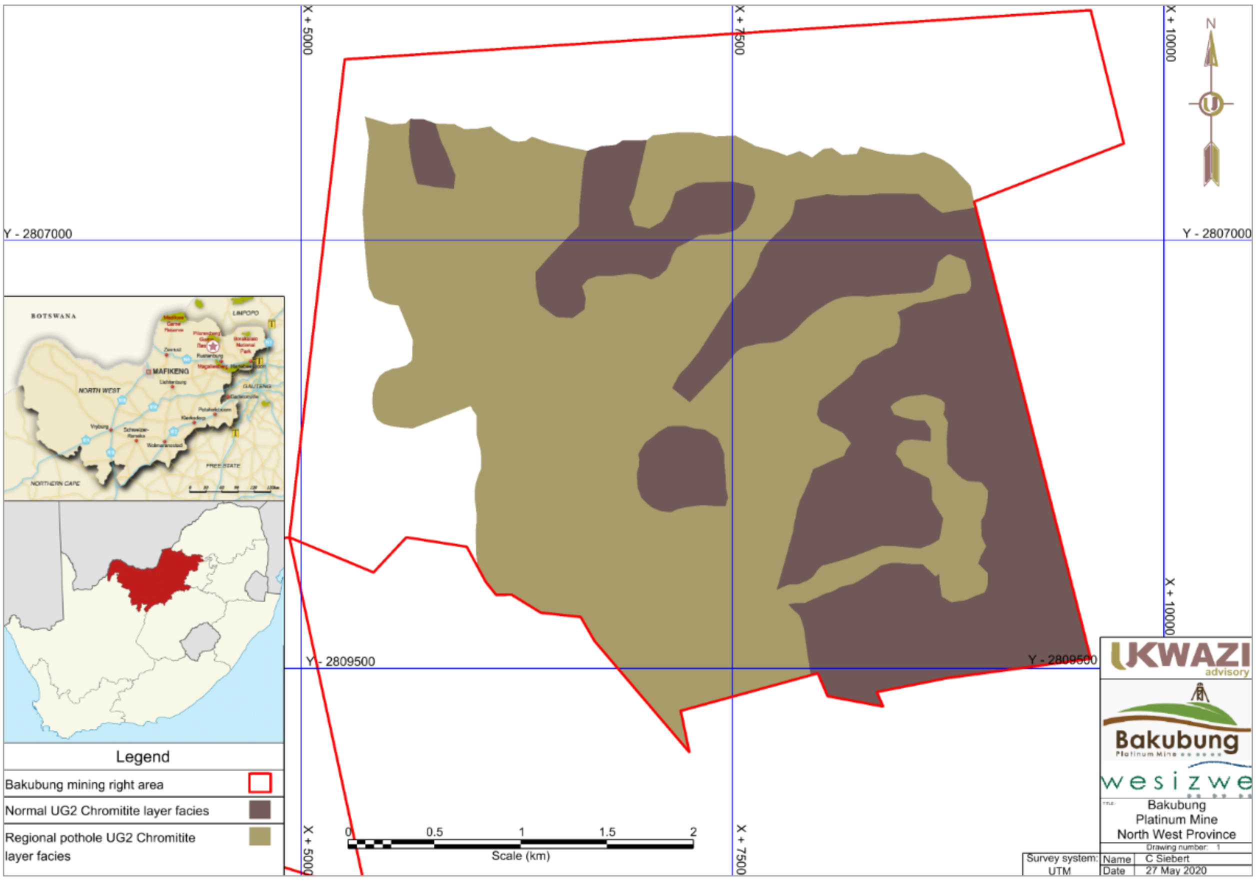

Figure 5-5: UG2 Chromitite layer facies distribution

5.3.2.1. Normal UG2 reef facies

The Normal UG2 Chromitite layer facies consist of a main Chromitite layer (approximately 65cm thick) underlain by a pegmatoidal feldspathic pyroxenite (containing laterally discontinuous Chromitite lenses and stringers) and subsequently underlain by a poikiolitic anorthosite and a series of leucocratic norites. This FW sequence can attain a thickness of approximately 7m before encountering a single Chromitite that overlies the UG1 hangingwall ("HW") pyroxenite. The UG2 main Chromitite layer is consistently overlain by three Chromitite layers (ranging from 10cm to 20cm thick), locally termed "the triplets" which can vary in their parting distance to the UG2 main Chromitite layer between 0.25m to 0.75m. Typically, the Chromitite layers are mineralised and the intervening fine-grained orthopyroxenite contains lower concentrations of the PGMs.

5.3.2.2. Regional pothole UG2 reef facies

The Regional Pothole facies of the UG2 Chromitite layer has similar characteristics to the normal facies but generally has reduced stratigraphy between the UG2 Chromitite layer and the UG1 Chromitite layer. The typical separation of the UG2 and UG1 Chromitite layer is presented in Figure 5-6. The main chromitite layer is slightly thicker than the Normal UG2 reef facies, with an average width of 75cm. The thickness from the HW to the main chromitite layer is generally greater, with various Chromitite layers present.

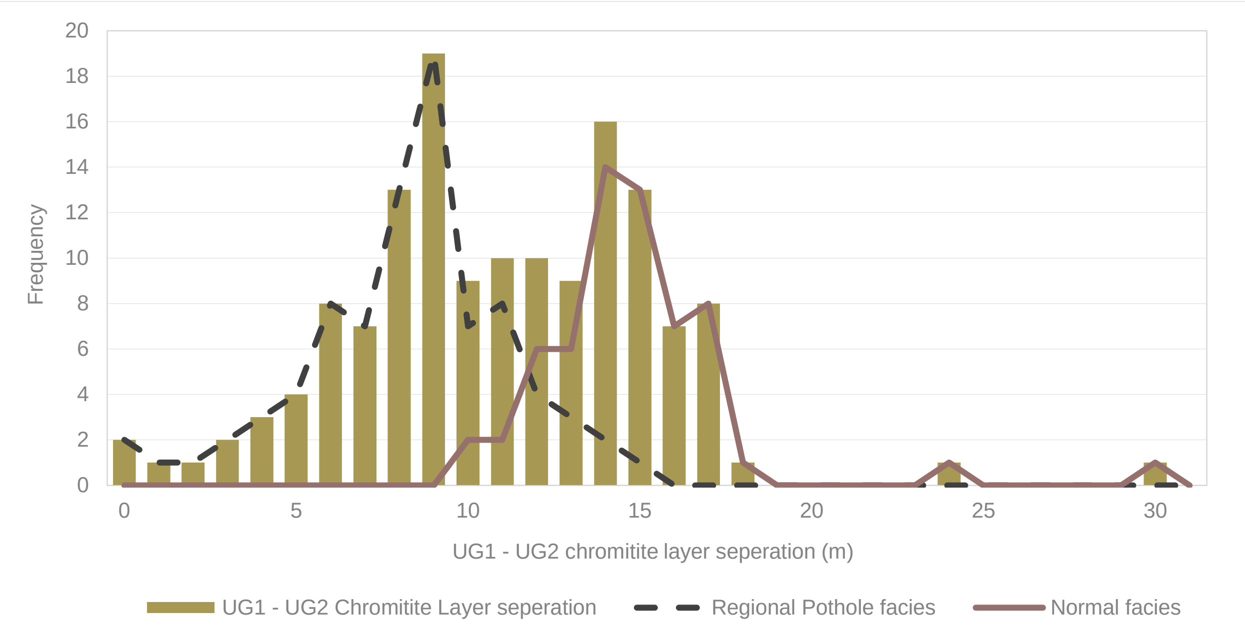

Figure 5-6: Separation width of the UG2 and UG1 Chromitite layers

TMC determined that the Merensky reef progressively transgresses its FW (Figure 5-7) and that it is probable that the reef sub-crops against the Main Zone gabbro norite towards the southwest. Due to the transgressive nature of the Merensky reef towards the southwest, the single Chromitite facies was interpreted as separate regional facies.

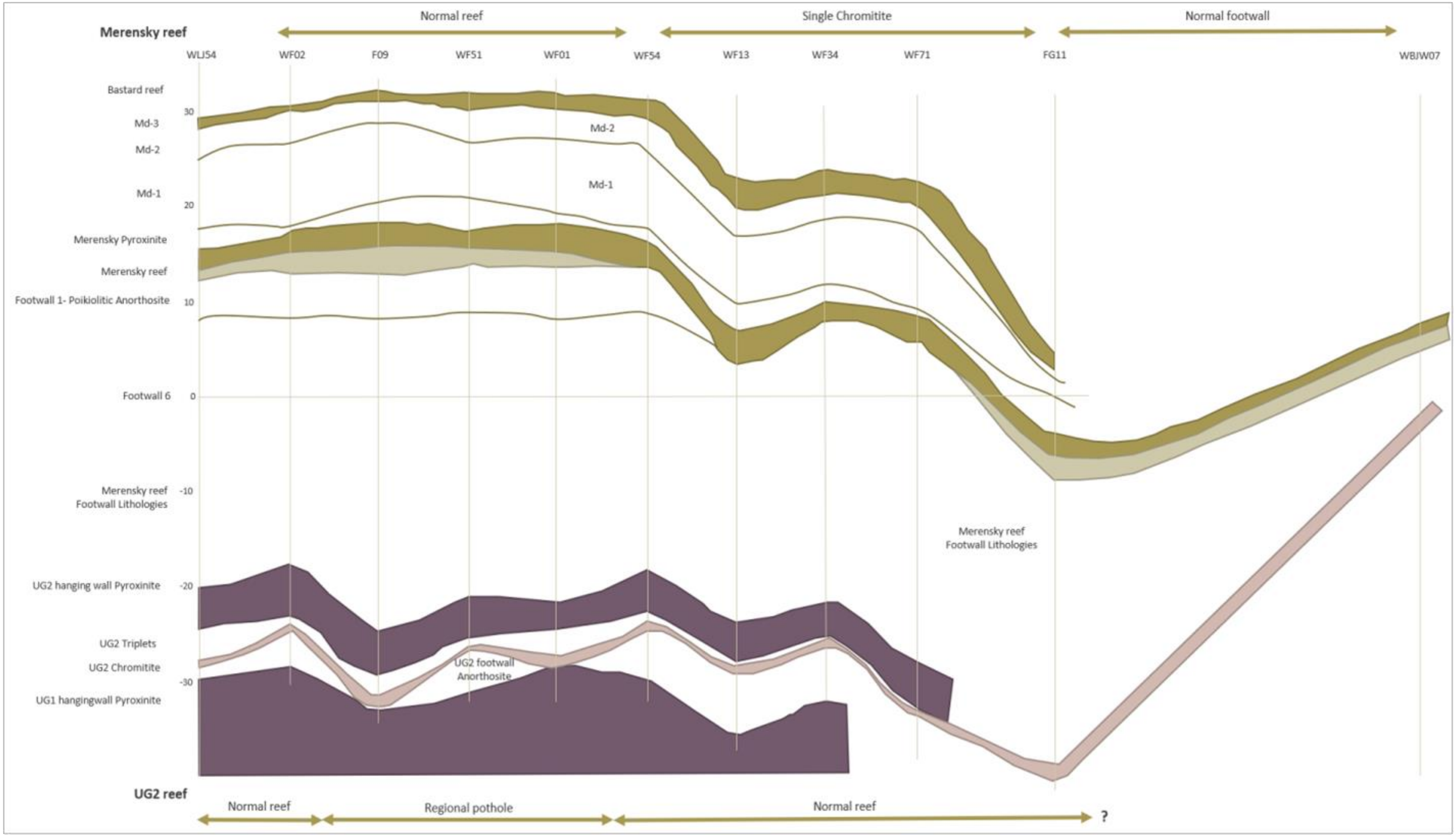

Figure 5-7: Transgressive nature of the Merensky and UG2 reefs towards the south-west (TMC 2009)

6. Exploration and drilling

SR 3.1(iii); 3.1(iv); 3.1(vii)/ SV T1.7; T1.8/ JSE 12.10(h)(vi)

The information in this section was cited or presented from CPRs produced by TMC (2008, 2009).

The exploration activities consisted primarily of the drilling of drill holes across an area that included the mining right area of the BPM. Drilling took place from October 2004 to April 2008 with 179 drill holes completed, totalling 172 425m. Each drill hole typically had three deflections, not all the deflections were sampled.

A detailed structural analysis was undertaken by Wesizwe, Amplats and Platinum Group Metals, in a joint venture, using a 3D seismic survey. The 3D seismic survey was undertaken in August and September 2007 with the final interpretation completed in 2008. An aeromagnetic survey was undertaken by Amplats and shared with Wesizwe.

6.1. Drilling

SR 3.1(i); 3.1(v); 3.2(i); 3.2(ii); 3.2(iv); 3.2(v); 3.3(iv); 4.1(iv)

Diamond drilling was employed to prospect for the Merensky reef and UG2 Chromitite layer.

6.1.1. Drilling management

The management of the drilling programme was undertaken by experienced geologists and support personnel. TMC assisted and undertook regular and routine visits to the site during the drilling campaign. TMC stated that the procedures and protocols established ensured that fieldwork, drilling, logging and sampling activities were conducted methodically and to an acceptable standard (TMC, 2008 and 2009).

Each drill hole was collared with NXC core (68.46mm internal diameter) to a depth of 30m, with the drill hole completed to its final depth with BQ core (36.4mm internal diameter). Three deflections from the parent drill hole were routinely drilled. Not all deflections were sampled. The core was processed and stored at a dedicated facility some 10km south of the property.

Core loss was recorded to have occurred in various drill holes across the property. In general, reported recoveries outside of the mineralised zones were recorded between 95% and 100% (excluding fault zones), whereas recoveries within the mineralised zones were recorded between 96% and 100%.

Core logging and sampling activities were undertaken by a number of geologists with experience in Western BC stratigraphy. This was reflected in the recognition and recording of nomenclature and lithological types to a high standard (TMC, 2008 and 2009).

Geological, structural, geotechnical observations and sampling measurements were initially captured onto specially designed drill hole logging forms, which were captured digitally into the SABLE database.

6.1.2. Surveying activity

All coordinates were determined by appropriate survey methods in the WGS 84 LO 27 coordinate system. The collar coordinates of the drill holes were surveyed by a certified surveyor and are deemed accurate.

6.2. Sampling

SR 3.1(i); 3.2(iii); 3.3(i) - (vii); 4.1(iv)

6.2.1. Drill core sample preparation

The sampling of the drill hole core was undertaken by specialised personnel after the core was marked up by the geologist for sampling purposes. Drill holes were drilled vertically and the mineralised layers are considered virtually flat-lying, the intersections and therefore the sampling, are at almost 90° to the mineralisation.

A critical area of control was the marking of the core 2cm above the uppermost Chromitite for the Merensky reef or 2cm above or below the Chromitites of the UG2 Chromitite layer. This procedure was adopted to ensure that the entire Merensky reef Chromitite was sampled within one sample. Similarly, the rationale for the UG2 Chromitite layer sampling was to ensure that the mineralisation, which is often elevated at the chromitite contact, was recorded in the Chromitite.

Sample marking continued from the upper Chromitite (Merensky reef) or edge of the Chromitite (UG2 Chromitite layer) both downwards and upwards in the core. Marking was performed with permanent marker pens, with sample lengths varying between 15cm and 18cm, ensuring that a sufficient sample was obtained for accurate analysis.

The drill hole core was split by a diamond saw blade into two halves, with one half of the core taken for assay and the other half retained. The remaining core was labelled with the assay number and sample distances after which the intersection was photographed and stored separately to the remainder of the drill hole.

Commercially available Certified Reference Materials ("CRMs") were routinely inserted within the sampling process at a predetermined frequency such that approximately 10% of the samples submitted to the analytical laboratories were of a known 4PGE grade. TMC maintained a well-documented audit function on this aspect of the sampling process.

6.3. Database management

SR 3.1(i); 3.1(ii); 3.1(v); 3.5(i) – (iv); 4.1(i); 4.1(iv)

6.3.1. Competent Persons' review of the database

The CP assessed the TMCs CPRs (2008, 2009) and concurs with the conclusions presented, considering the database to be suitable for use in the Mineral Resource estimate.

6.4. Assay analysis

SR 3.1(i); 3.2(iii); 3.3(i); 3.4(i) – (iii); 3.5(i); 3.7(i); 3.7(iv); 4.1(iv)

Assays were undertaken from five laboratories namely:

1. Mintek
2. SGS Lakefield
3. Setpoint
4. Anglo American Research Laboratories ("AARL")
5. Genalysis (only one batch of samples analysed).

The laboratory accreditations are shown in Table 6-1 below.

Table 6-1: Details of laboratory accreditations

Laboratory	Facility accreditation number	Methods accredited
Mintek Analytical Services Division	T0042 (South African National Accreditation System ("SANAS"))	Determination of Individual PGMs Pt, Pd, Rh, Ir, Ru and Au (5PGE+Au) by ICP-OES after NiS collection by Fire Assay
Setpoint Technology	T0223 (SANAS)	Determination of Au, Pt and Pd by fire assay (ICP finish) Determination of Cu and Ni by pressed pellet XRF Determination of SG by gas pycnometer
Anglo Operations (Pty) Ltd, Mining and Technology Technical Solutions	T0051 (SANAS)	Pt, Pd, Au, Rh, Ir and Ru by NiS fusion and determination by ICP-MS Cu, Ni, Co, Cr203 and Fe by Sodium peroxide fusion and determination by ICP-OES Relative Density determination using the Pycnometer analyser
SGS Lakefield	Laboratory was closed in 2010	N/A
Genalysis (Now Intertek)	T0464 (SANAS)	Determination of individual PGMs Pt, Pd, Rh, Ir, Ru and Au (5PGE+Au) by ICP-OES after NiS collection by Fire Assay

The various assay methodologies were:

- **SGS Lakefield** – Pt, Pd, Rh by Ni sulphide fusion followed by ICP-OES and ICP-MS and Cu and Ni by XRF
- **Mintek** – Standard fire assay with Ni sulphide collector, followed by crushing, leaching and dissolution of the Ni sulphide button in aqua-regia and analysis using ICP-OES. Cu and Ni by XRF on a pressed pellet
- **Setpoint** – Standard fire assay with Ni sulphide collector followed by ICP analysis and Cu and Ni by XRF
- **AARL** – The details from AARL are not available
- **Genalysis** – Pt, Pd, Rh, Ru, Ir, Os, Au using NiS collection and ICP-MS. Cu and Ni by 4 acid digest and ICP-OES (Note: Only one batch of samples was analysed by Genalysis).

6.5. Quality assurance and quality control procedures

SR 3.1(ii); 3.5(i) – (iii); 3.5(iv); 3.6(i); 4.1(iv)

A comprehensive quality assurance and quality control programme was implemented. A summary of the sample detail is presented in Table 6-2.

Table 6-2: Summary of quality control samples

Description	Number of samples	[%]
Assays	29 919	-
CRMs	2 683	9.0
Blanks	1 533	5.1
Duplicates	903	3.0

6.5.1. Certified reference materials

Commercially available CRMs were routinely inserted during the sampling process at a predetermined frequency, such that, approximately 10% of the samples submitted to the analytical laboratories were CRMs. The quality control samples used during the programme consisted of 21 various CRMs. TMC maintained a well-documented audit function when it came to this aspect of the sampling process.

6.5.2. Field duplicates and repeats

The precision of the assay laboratories was tested by submitting samples for duplicate analysis. The analysis confirmed the precision of the laboratories used in the drilling campaign.

6.5.3. Competent Persons' review of assaying, quality assurance and quality control

SR 7.1(i); (ii)

Maxwell Geoservices (2008) was engaged by Wesizwe to conduct an independent data audit and verification of the assay data from the laboratory. Maxwell noted various discrepancies including possible swapped and mislabelled samples. Notwithstanding these and the other concerns identified, Maxwell concluded that there were no serious issues related to the data contained in the database. This report was thoroughly reviewed, and the CP supports its findings, considering the data to be suitable for use as basis for the Mineral Resource estimate.

6.6. Exploration plan

JSE 12.10(e)

No additional exploration is currently planned at the BPM.

7. Geological modelling

SR 3.1(iv) / SV T1.7

The latest results of the exploration campaign (up to June 2008) were used in conjunction with the geological data reported in the November 2005 CPR, to estimate the Mineral Resources. Various facies types for both the Merensky and UG2 reefs were identified and modelled separately.

7.1. Structural interpretation

SR 2.1(iii); 2.1(vii); 3.1(vi); 3.1(vii), 3.3(iv); 4.1(i); 4.1(ii); 4.1(iv); 4.1(v)

The structural interpretation was based on drill hole data, surface mapping and aeromagnetic data. A 3D seismic survey was completed as a joint venture between Amplats, the Western Bushveld joint venture and Wesizwe. A preliminary interpretation of data was completed by Anglo American Technical Division, Geosciences with the final interpretation of the seismic data completed and presented by Rock Deformation Research Ltd ("RDR") (Souque and Freeman, 2008).

TMC concluded that "with respect to the Wesizwe core area (BPM), the final seismic interpretation has significantly increased confidence in and definition of the earlier structural interpretation without finding any further structural complexity" (TMC, 2009). The final seismic interpretation had the following resolution characteristics:

- In the area of good seismic data (Wesizwe core area), it was estimated that faults with an apparent vertical displacement down to 8m were identified
- In the area of poor data (west of the Koedoesfontein Fault) only faults with an apparent vertical displacement of more than 20m could be reliably identified
- The lateral position of faults is generally thought to be within 50m of the interpreted position. The position of the Caldera Fault is probably only accurate to within 80m, due to its position on the margin of the survey area
- The elevation of the reefs within the Wesizwe core area is generally better than 10m. In the Mimosa area and distant from drill hole control, errors in elevation of approximately 45m can be anticipated.

The interpretation included an understanding of the attitude of the Merensky reef and UG2 Chromitite layer, the structural features (dykes and faults) and the associated displacements. Various interpretations are presented in the subsequent figures indicating the general attitude and structure, range of dips of the UG2 Chromitite layer, the interpreted faults and the separation of the Merensky reef and UG2 Chromitite layer.

Figure 7-1 shows the general attitude and structure of the UG2 Chromitite layer. The red dots illustrate the locations of the exploration drill holes. The geological model generated from the 3D seismic survey in 2008 was justified to the drill hole intersections and utilised in the previous Mineral Resource estimate.

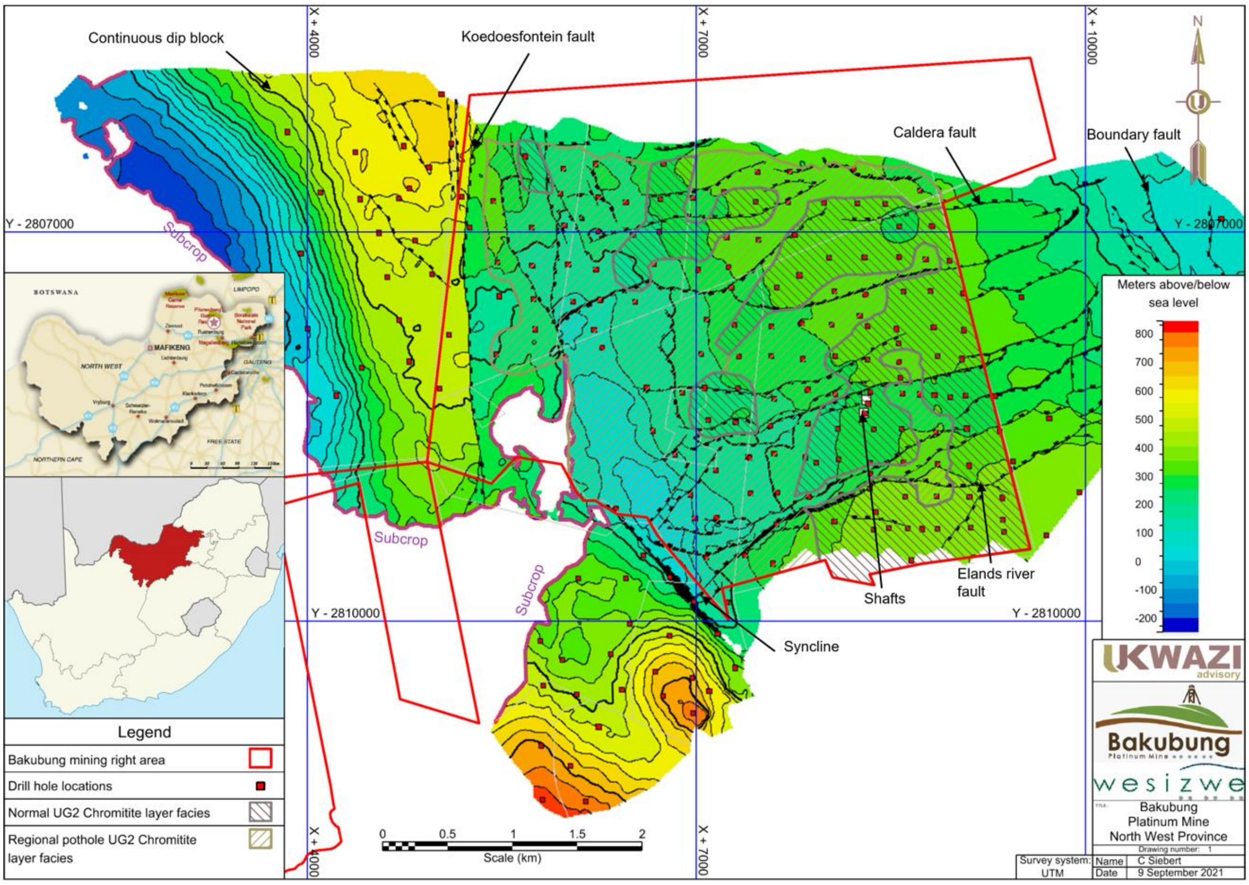

Figure 7-1: Structural map of the UG2 Chromitite layer with reef elevation

An isometric view of the UG2 Chromitite layer is shown in Figure 7-2.

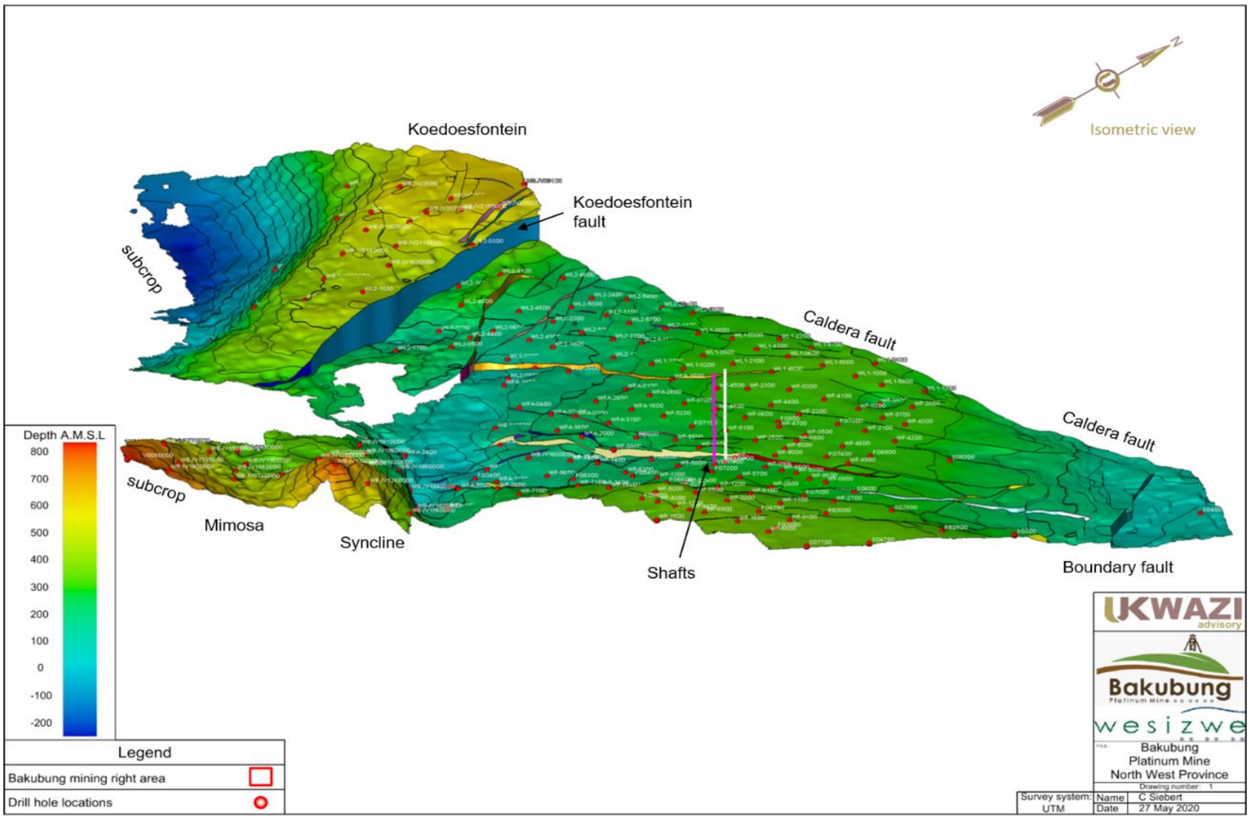

Figure 7-2: Isometric view of the UG2 Chromitite layer structure

The range of dips within the UG2 Chromitite layer is shown in Figure 7-3 and the interpreted faults and associated displacements are shown in Figure 7-4.

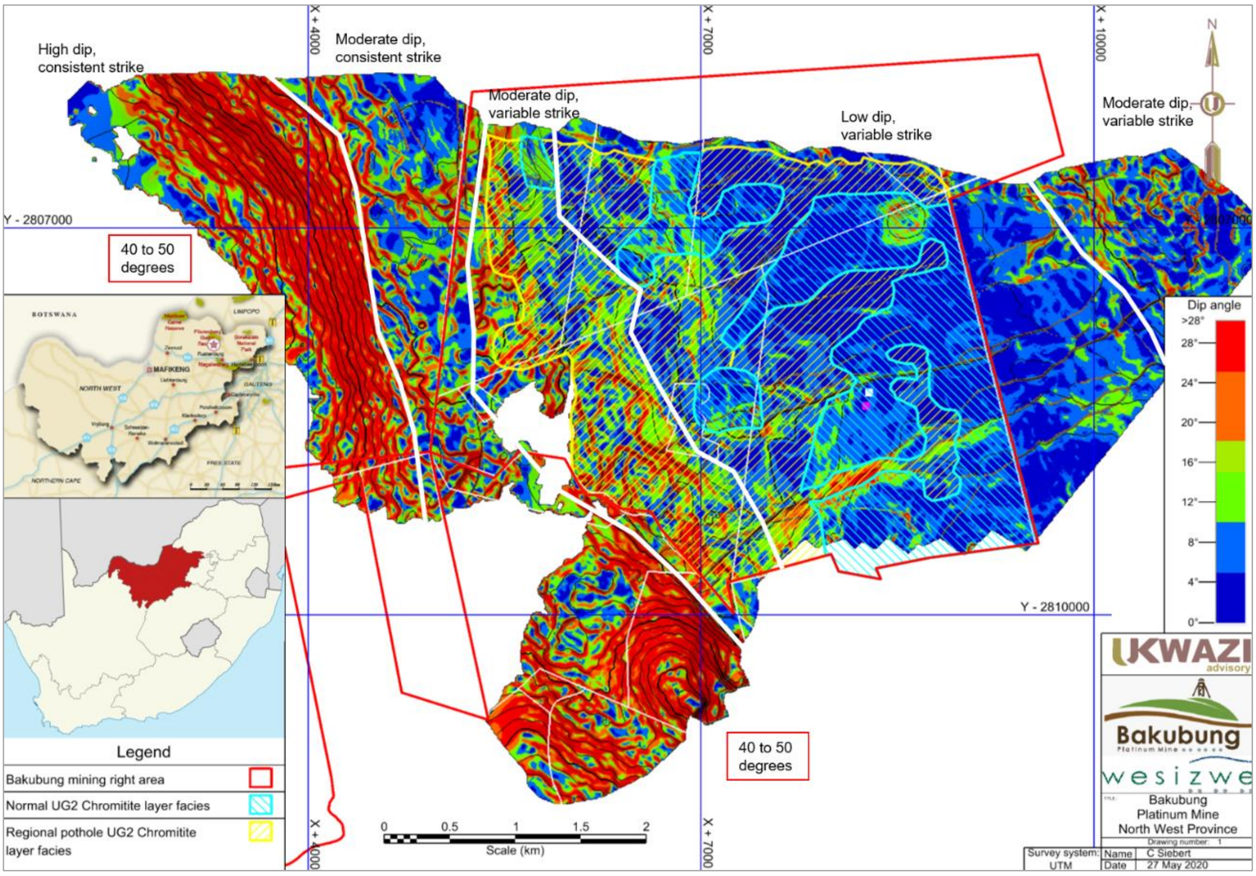

Figure 7-3: Map of the dip range of the UG2 Chromitite layer

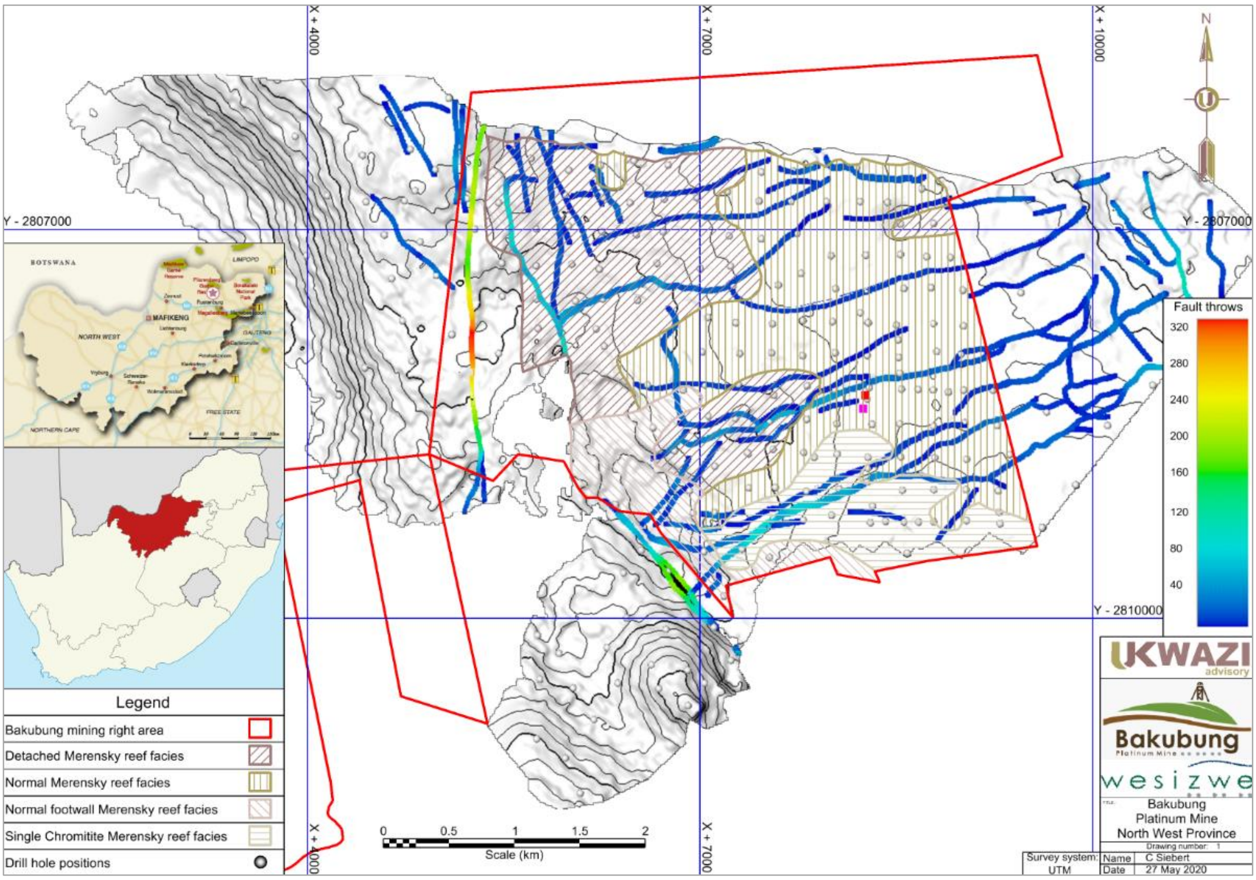

Figure 7-4: Map showing faulting and estimated displacement

The structural models for the Merensky Reef and UG2 Chromitite layer are presented as Figure 7-5 and Figure 7-6.

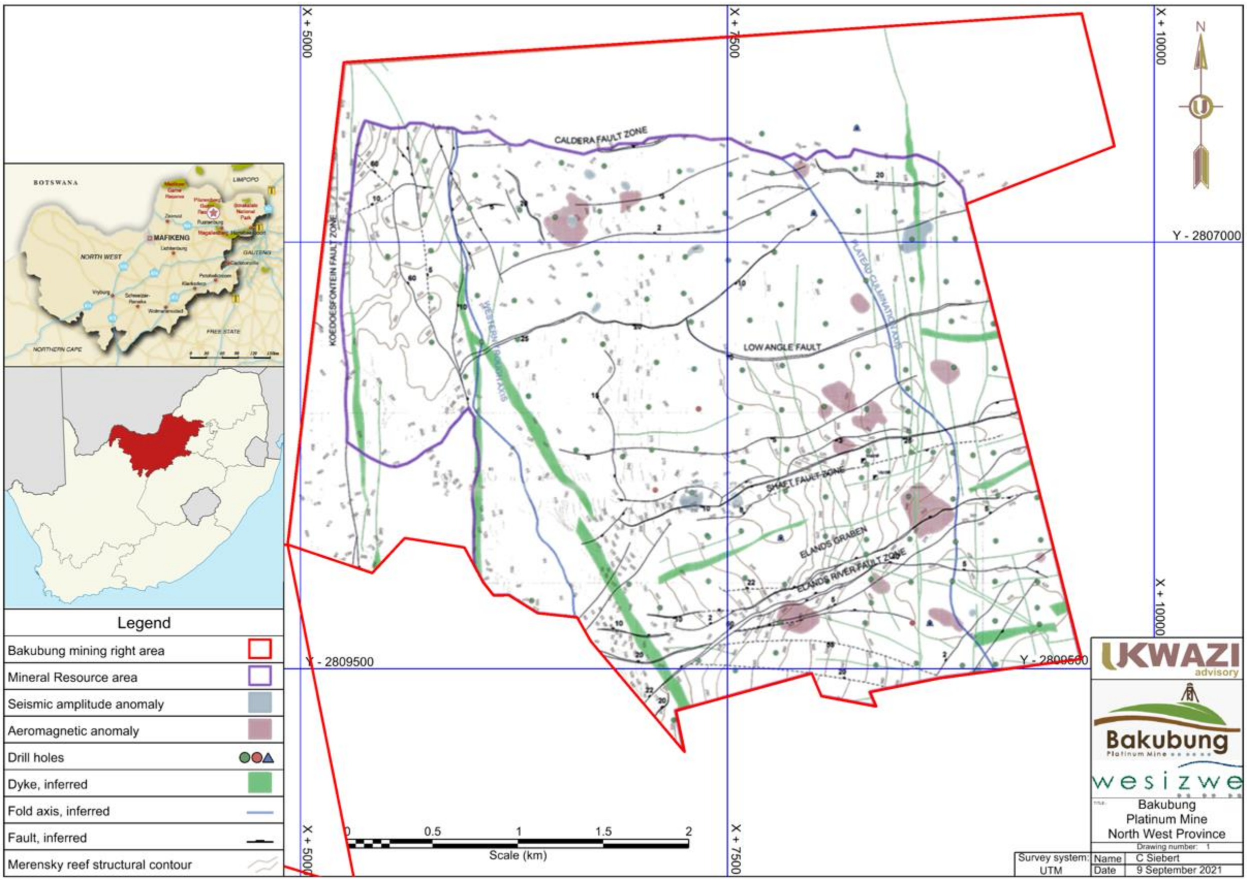

Figure 7-5: Merensky reef structural plan

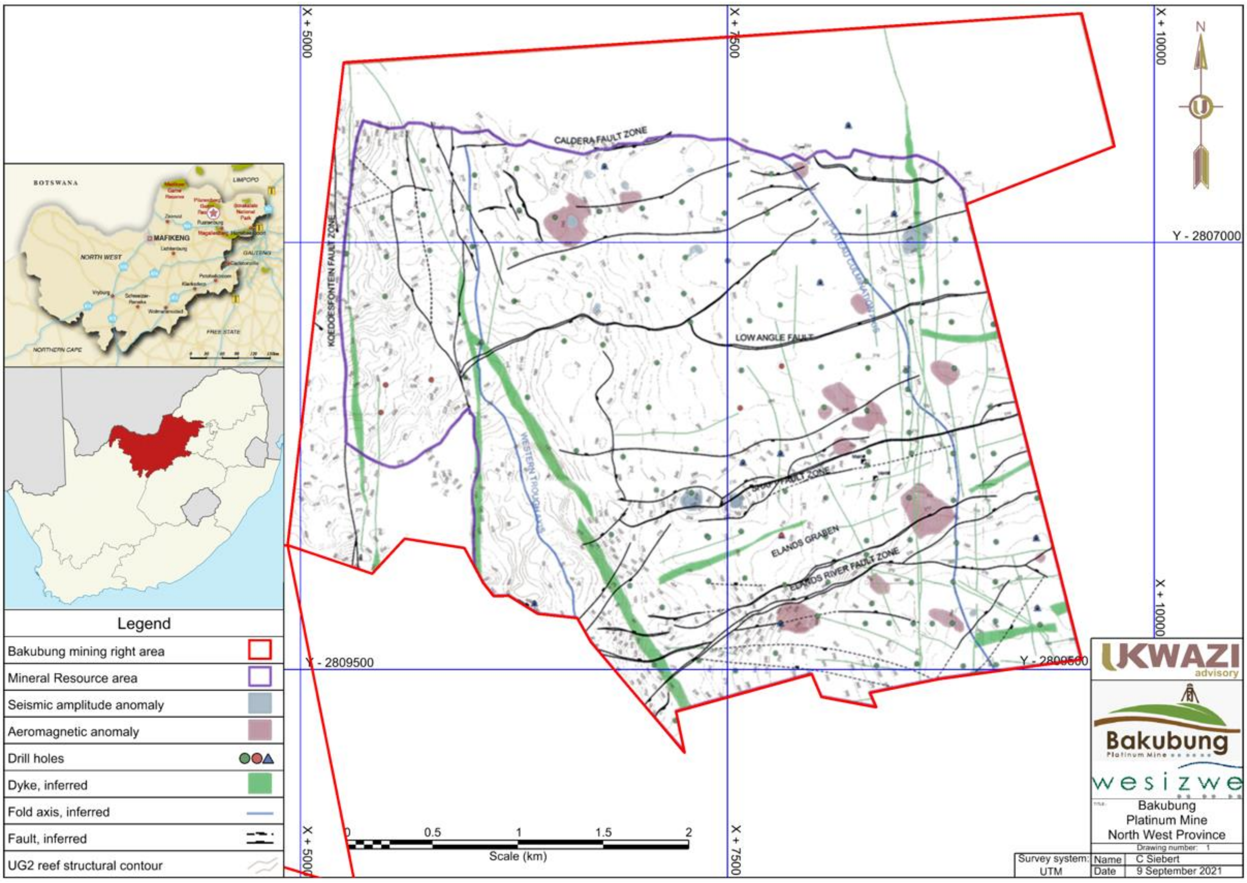

Figure 7-6: UG2 Chromitite layer structural plan

7.2. Additional input information

SR 2.1(iii); 2.1(vii); 3.1(vii); 3.3(iv); 4.1(i); 4.1(ii); 4.1(iv); 4.1(v)

There is no additional information.

8. Mineral Resource estimate

SV T1.10/ JSE 12.10(h)(vii); (h)(ix)

As a critical first step in the process to estimate the Mineral Resource, the Merensky reef and UG2 Chromitite layer cuts were selected (Sections 8.1.2 and 8.1.3). The data for each drill hole were composited and weighted on intersection length and density, over the full width of the intersection.

Statistical analysis was subsequently completed on the composite data, grouped by facies type. Each intersection was composited for Pt, Pd, Rh, Au, Cu and Ni concentrations, utilising the weighting by thicknesses and densities. An analysis of the unit thickness indicated that there is little correlation between the concentration and thickness, confirming that the use of concentration was appropriate in the Mineral Resource estimate.

An assessment of the high-grade composites was completed to determine whether high-grade cutting was required. The review indicated that no high-grade cutting or capping was necessary.

A block size of 125m x 125m was selected. The search criteria included an isotropic search volume of 500m that expanded to 750m and then 1 000m, if the criteria of a minimum of 12 and a maximum of 24 composite data for each block estimate were not met.

A two-dimensional grade (seam model approach) estimate was generated for the Merensky reef and UG2 Chromitite layer. The facies boundaries were treated as soft boundaries as the facies were observed to be transitional. The Mineral Resource estimate was completed using ordinary kriging for each variable. A geological loss was determined for each facies type, based on the number of intersections that were available and the number of intersections that were affected by geological features.

8.1. Input data analysis

SR 3.1(viii); 4.2(ii); 4.3(i); 4.5(i); 4.5(ii)

8.1.1. Database verification

The database provided was an export from the original SABLE database that was received from TMC. The database included:

- Collar coordinates
- Downhole surveys
- Assays – Pt, Pd, Rh, Au, Cu and Ni
- Bulk density
- Geological variables, such as lithology, alterations and structural information.

Prior to the Mineral Resource estimation, a review of the database was completed. The following general actions were undertaken during this database validation:

- Ensuring compatibility of total hole depth data in the collar, survey, assay and geology database files
- Checking drill survey data for unusual or suspicious downhole deviations
- Ensure sequential downhole depth and interval data in the survey, assay or geology files
- Ensuring that there were no overlaps or gaps in the drill holes
- Assessing missing and zero values
- Reviewing the data for obvious anomalies and outliers.

Numerous missing or zero values were noted. These were replaced by half the detection limit for the specified element for the designated laboratory. The validation process confirmed that the data are suitable for use in the Mineral Resource estimation.

8.1.2. Merensky reef cut selection

The Merensky reef has four facies types:

1. Normal Merensky reef
2. Normal FW Merensky reef
3. Single Chromitite Merensky reef
4. Detached Merensky reef.

The geological description of the facies is described in Section 5.4 of this report. In addition to the geological distinction, each facie has a distinct mineralisation profile/ grade histogram.

Figure 8-1 to Figure 8-4 shows the various Merensky reef facies and associated histograms.

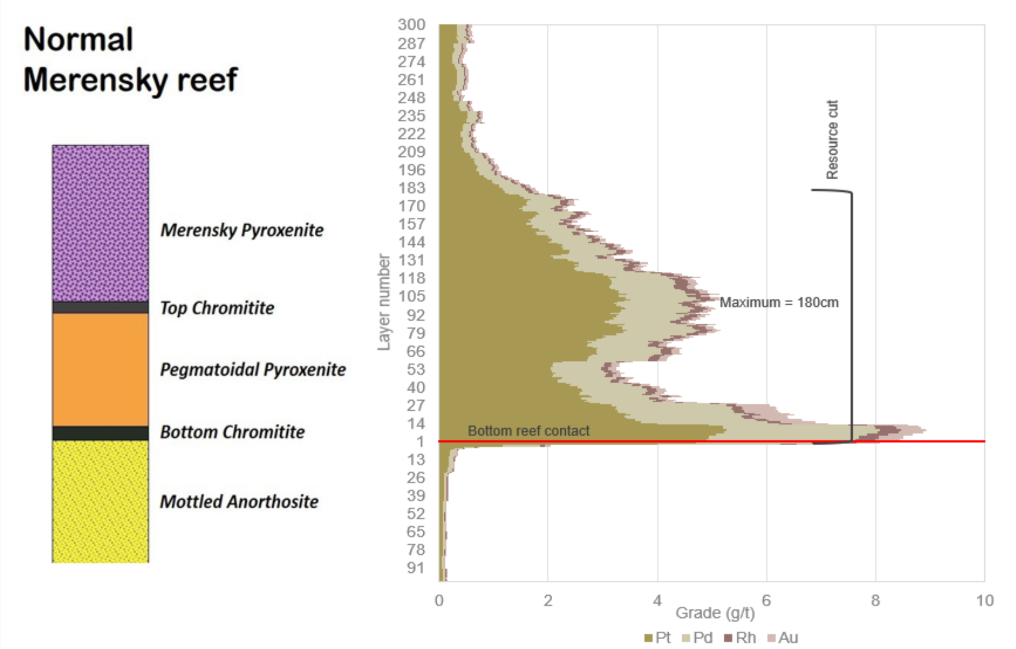

Figure 8-1: Grade histogram - Normal Merensky reef - 3PGE+Au (g/t)

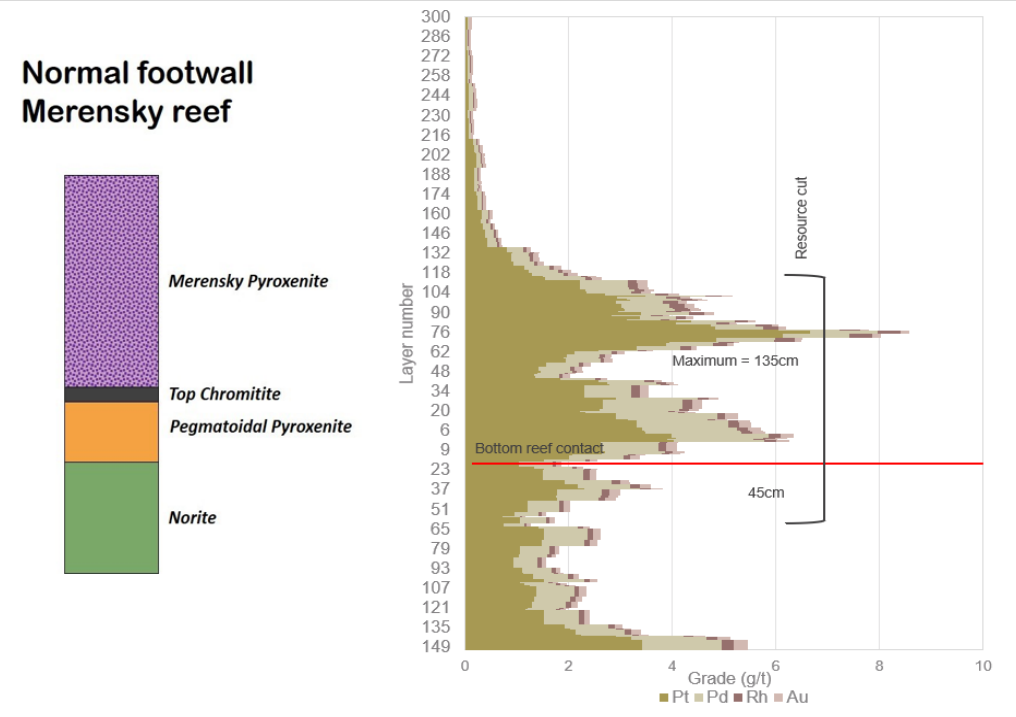

Figure 8-2: Grade histogram - Normal FW Merensky reef - 3PGE+Au (g/t)

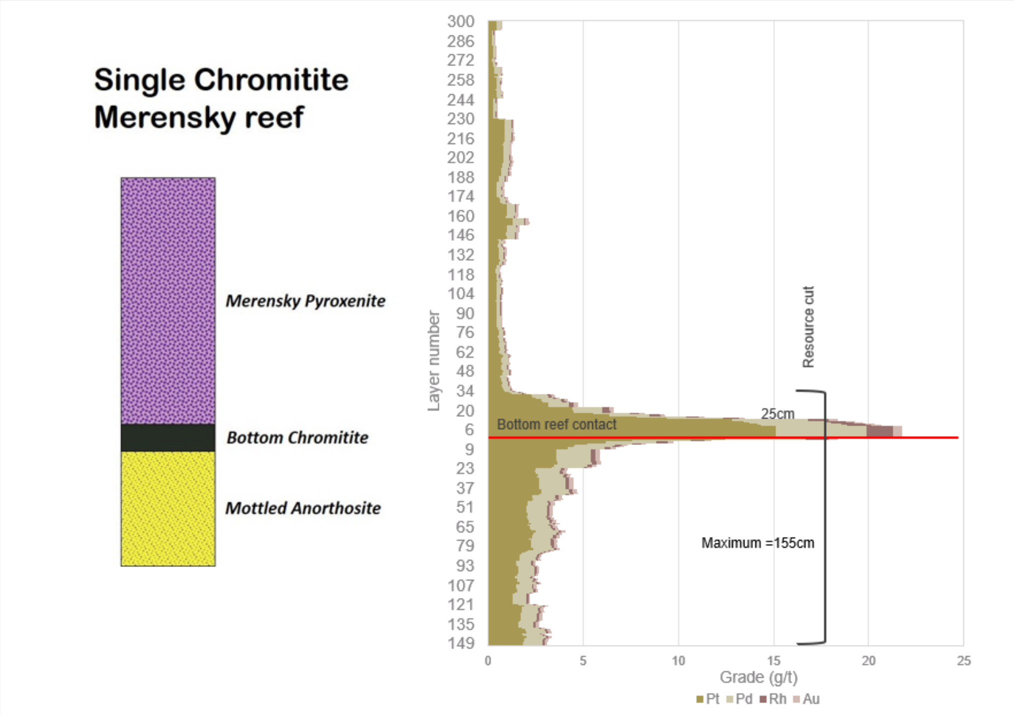

Figure 8-3: Grade histogram - Single Chromitite Merensky reef - 3PGE+Au (g/t)

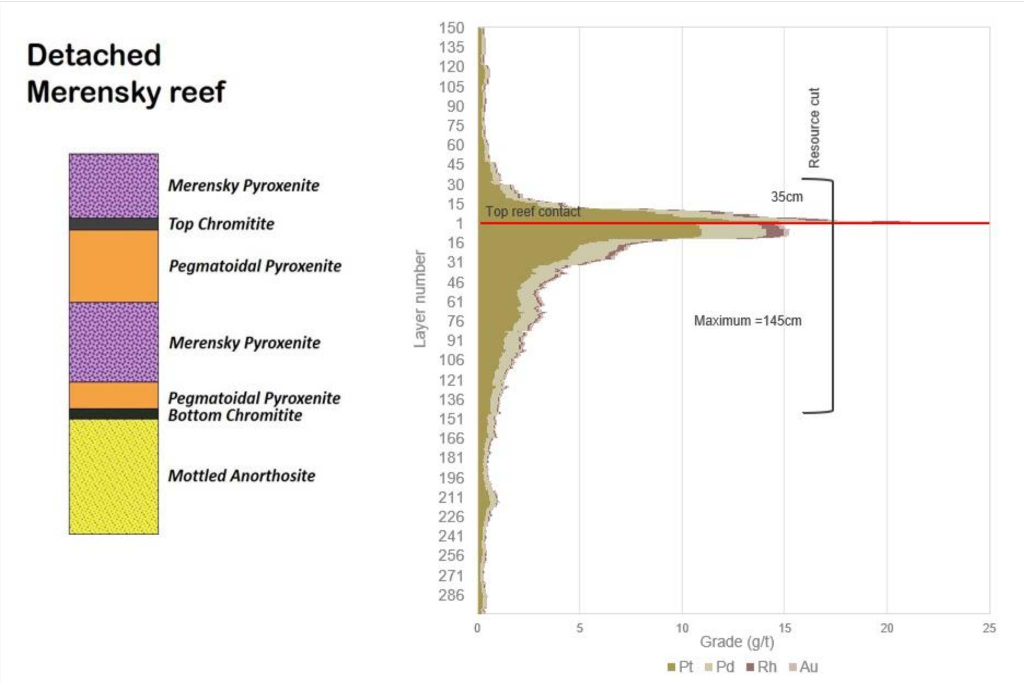

Figure 8-4: Grade histogram - Detached Merensky reef - 3PGE+Au (g/t)

Based on these grade profiles, the average best cut was applied to the respective facies. It is essential that consistent reef cut instruction is provided to and applied by the mining department. It is considered unlikely that the highest-grade cut will be achieved for every blast and every face as it advances.

The rationale for the average best cuts per facies type is presented in Table 8-1.

Table 8-1: Merensky reef Mineral Resource cut parameters

Merensky reef facies	Average best-cut
Normal Merensky reef facies	Cut is from the bottom reef contact upwards to include the whole Merensky reef to a maximum of 1.8m with a minimum cut of 0.9m
Normal FW Merensky reef facies	Cut is from the bottom reef contact with a fixed FW cut of 0.45m and a cut above the bottom reef contact of the recognised Merensky reef unit to a maximum HW cut of 1.35m and a minimum HW cut of 0.45m
Single Chromitite Merensky reef facies	Cut is from the bottom reef contact with a fixed HW cut of 0.25m and a cut below the bottom reef contact of the recognised Merensky reef unit to a maximum FW cut of 1.55m and a minimum FW cut of 0.65m
Detached Merensky reef facies	Cut is from the top reef contact with a fixed HW cut of 0.35m and a cut below the top reef contact of the recognised Merensky reef unit to a maximum FW cut of 1.45m and a minimum FW cut of 0.55m

8.1.3. Upper Group 2 Chromitite layer cut selection

In the selection of a Mineral Resource cut, appropriate consideration of the practical mining cut (minimum 0.9m and maximum 1.85m), the grade (noting that the UG2 Chromitite layer is bottom-loaded) and the geotechnical constraints (a minimum under-cut beam/ parting width of 0.5m) is required.

The critical factor in the UG2 cut selection was the consideration of geotechnical constraints. The UG2 main Chromitite layer is consistently overlain by three Chromitite layers (ranging from 10cm to 20cm in thickness), locally termed "the triplets", which can vary in their parting distance (between 0.25m and 0.75m) to the UG2 main Chromitite layer. Based on the numerical modelling conducted, which considered the current mine design criteria and site-specific rock mass properties, a parting width of at least 0.5m is required between the main UG2 Chromitite layer and the triplets to safely undercut the triplets. Figure 8-5 below shows the UG2 facies types and leader layers.

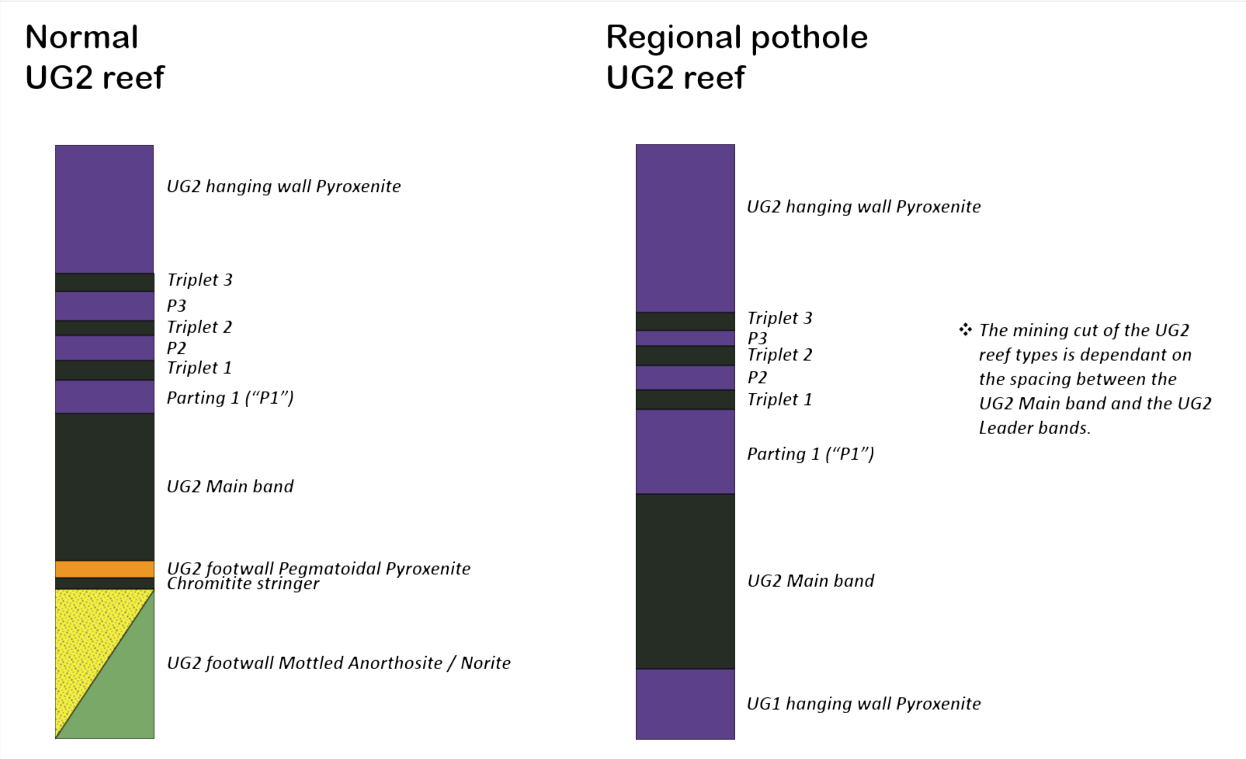

Figure 8-5: UG2 facies and leader layers

The selection, for both the Normal UG2 facies and the Regional Pothole UG2 facies, was undertaken in a systematic approach that can be described as:

- Determine parting width ("P1") between UG2 main Chromitite layer and triplets
- If P1 was >0.5m: Select full UG2 main Chromitite layer with a minimum cut of 0.9m and maximum cut of 1.85m. Where the minimum cut of 0.9m was not achieved, the cut was extended into the FW
- If P1 was <0.5m but parting 2 ("P2") or P3 was >0.5m: Mining cut selected to a maximum of 1.85m from the parting with a width of more than 0.5m to the base of the main Chromitite layer. Where the minimum cut of 0.9m was not achieved, the cut was restricted to where the parting was >0.5m and extended into the FW
- Where no parting of >0.5m existed, the selection of a cut for the top of the leader layers to the maximum of 1.85m, which in some cases resulted in the elimination of the high grades at the base of the main Chromitite layer.

8.2. Data analysis

SR 3.1(vi); 4.2(ii); 4.2(iii); 4.2(vi); 4.5(ii)

The drill holes were drilled vertically and intersected the mineralised layers, which are virtually flat dipping, at close to 90°. The raw assay data for each drill hole were composited, weighting on intersection length and density, over the full width of the cut selected as presented in Sections 8.1.2 and 8.1.3. A detailed statistical analysis of the composite data was undertaken for each of the facies. The analysis confirmed that the distribution of the data approximates a normal statistical distribution.

8.2.1. Data analysis of the Merensky reef facies

The detailed statistical analysis of the intersections for the four Merensky reef facies is presented in Table 8-2 and Figure 8-6 to Figure 8-9.

Table 8-2: Statistical analysis of the Merensky reef facies

Normal Merensky reef facies									
Description	Pt [g/t]	Pd [g/t]	Rh [g/t]	Au [g/t]	3PGE+Au [g/t]	Cu [%]	Ni [%]	Density [t/m^3]	Thickness [m]
Count	185	185	185	185	185	185	185	185	185
Mean	3.86	1.72	0.28	0.27	6.12	0.08	0.23	3.20	1.26
Min	0.01	0.01	0.01	0.01	0.01	0.00	0.00	2.85	0.90
Max	12.27	18.39	1.06	6.24	27.34	0.35	0.76	3.67	1.80
Range	12.26	18.38	1.05	6.23	27.33	0.35	0.76	0.82	0.90
Std dev	2.48	1.64	0.19	0.47	4.08	0.05	0.10	0.10	0.35
Median	3.49	1.49	0.26	0.21	5.49	0.07	0.21	3.21	1.16
CoV	64%	95%	68%	173%	67%	61%	44%	3%	28%
Normal FW Merensky reef facies									
Description	Pt [g/t]	Pd [g/t]	Rh [g/t]	Au [g/t]	3PGE+Au [g/t]	Cu [%]	Ni [%]	Density [t/m^3]	Thickness [m]
Count	14	14	14	14	14	14	14	14	14
Mean	3.65	1.40	0.24	0.22	5.50	0.08	0.16	3.22	1.80
Min	1.22	0.33	0.07	0.10	1.75	0.02	0.06	3.17	1.80
Max	7.93	2.96	0.48	0.43	11.19	0.14	0.27	3.36	1.80
Range	6.71	2.63	0.41	0.34	9.44	0.12	0.21	0.19	0.00
Std dev	1.89	0.77	0.11	0.10	2.78	0.04	0.07	0.05	0.00
Median	3.09	1.27	0.22	0.20	5.01	0.07	0.17	3.21	1.80
CoV	52%	55%	48%	45%	51%	55%	41%	2%	0%
Single Chromitite Merensky reef facies									
Description	Pt [g/t]	Pd [g/t]	Rh [g/t]	Au [g/t]	3PGE+Au [g/t]	Cu [%]	Ni [%]	Density [t/m^3]	Thickness [m]
Count	41	41	41	41	41	41	41	41	41
Mean	3.90	1.54	0.32	0.20	5.95	0.06	0.13	2.98	1.51
Min	0.01	0.01	0.01	0.01	0.01	0.00	0.00	2.86	1.22
Max	12.64	4.37	1.25	0.50	18.40	0.13	0.28	3.52	1.80
Range	12.63	4.36	1.24	0.49	18.39	0.12	0.28	0.66	0.58
Std dev	2.93	1.08	0.29	0.12	4.35	0.03	0.06	0.12	0.26
Median	3.25	1.31	0.22	0.20	4.74	0.05	0.12	2.95	1.32
CoV	75%	70%	90%	61%	73%	60%	50%	4%	17%

Detached Merensky reef facies									
Description	Pt [g/t]	Pd [g/t]	Rh [g/t]	Au [g/t]	3PGE+Au [g/t]	Cu [%]	Ni [%]	Density [t/m^3]	Thickness [m]
Count	111	111	111	111	111	111	111	111	111
Mean	2.71	1.06	0.18	0.17	4.10	0.06	0.17	3.23	1.79
Min	0.01	0.01	0.01	0.01	0.01	0.00	0.05	2.89	1.45
Max	8.31	2.69	0.41	0.56	10.86	0.18	0.95	3.42	1.81
Range	8.30	2.68	0.41	0.56	10.85	0.18	0.89	0.54	0.36
Std dev	1.34	0.52	0.08	0.10	1.96	0.03	0.09	0.09	0.04
Median	2.58	1.02	0.17	0.15	4.04	0.06	0.16	3.23	1.80
CoV	49%	49%	42%	59%	48%	45%	50%	3%	2%

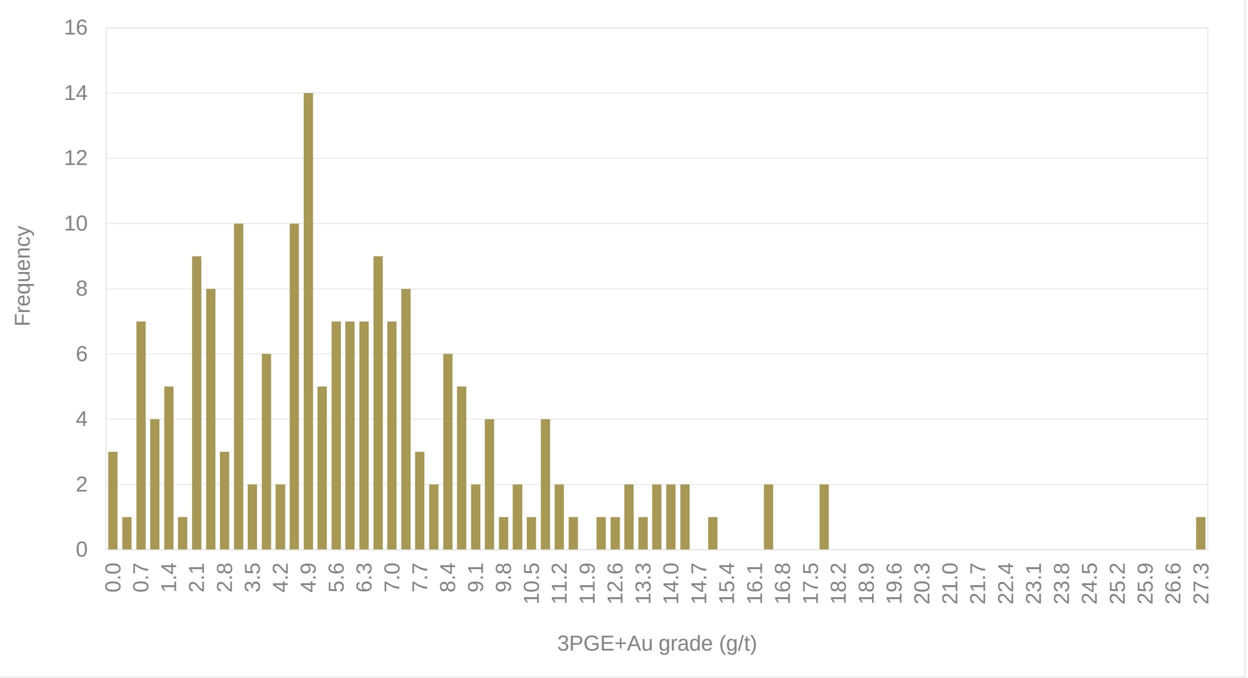

Figure 8-6: Normal Merensky reef facies - 3PGE+Au grade

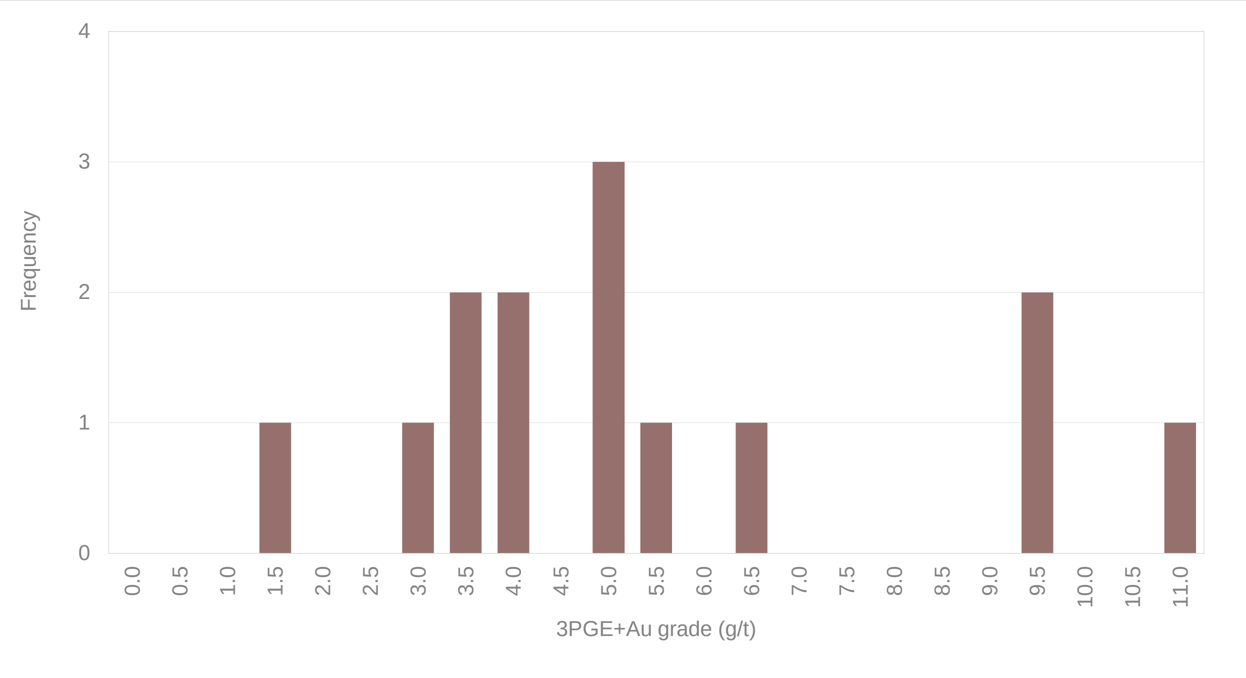

Figure 8-7: Normal FW Merensky reef facies - 3PGE+Au grade

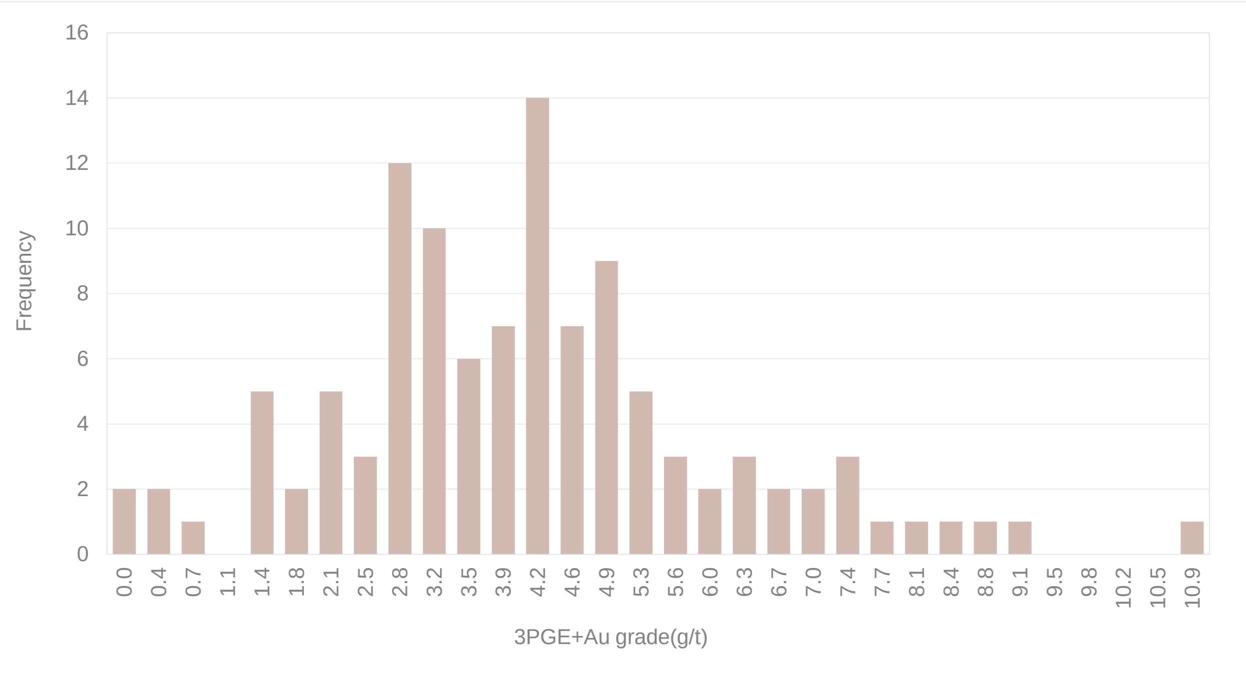

Figure 8-8: Detached Merensky reef facies - 3PGE+Au grade

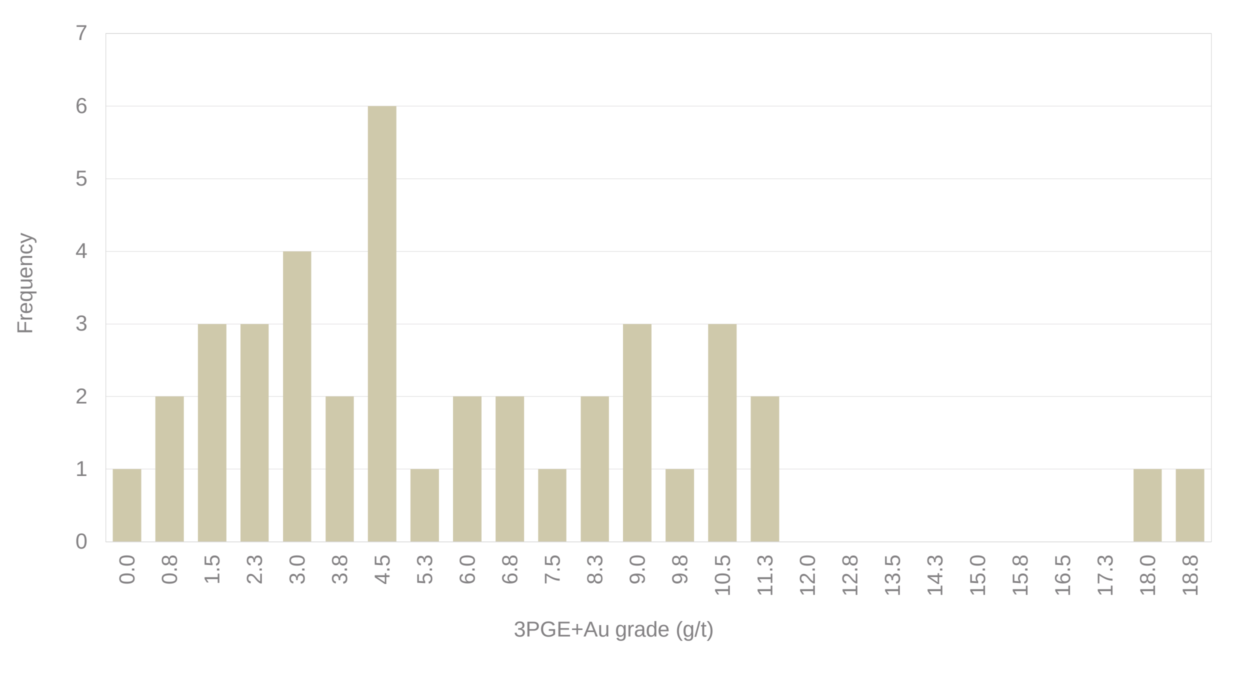

Figure 8-9: Single Chromitite Merensky reef facies - 3PGE+Au grade

8.2.2. Data analysis of the UG2 Chromitite layer facies

The detailed statistical analysis of the intersections for the two UG2 Chromitite layer facies are presented in Table 8-3 and Figure 8-10 to Figure 8-11.

Table 8-3: Statistical analysis of the UG2 Chromitite layer facies

Normal UG2 Chromitite layer facies									
Description	Pt [g/t]	Pd [g/t]	Rh [g/t]	Au [g/t]	3PGE+Au [g/t]	Cu [%]	Ni [%]	Density [t/m^3]	Thickness [m]
Count	159	159	159	159	159	159	159	159	159
Mean	2.88	1.41	0.52	0.02	4.82	0.01	0.11	3.84	1.23
Min	0.01	0.01	0.01	0.01	0.01	0.00	0.00	3.05	0.90
Max	12.30	7.07	2.41	0.11	21.78	0.04	0.18	4.29	1.94
Range	12.29	7.06	2.40	0.11	21.77	0.04	0.18	1.24	1.04
Std dev	1.11	0.77	0.23	0.02	2.02	0.01	0.03	0.19	0.29
Median	2.98	1.29	0.53	0.02	4.91	0.01	0.13	3.87	1.19
CoV	39%	55%	44%	70%	42%	72%	30%	5%	24%
Regional Pothole UG2 Chromitite layer facies									
Description	Pt [g/t]	Pd [g/t]	Rh [g/t]	Au [g/t]	3PGE+Au [g/t]	Cu [%]	Ni [%]	Density [t/m^3]	Thickness [m]
Count	155	155	155	155	155	155	155	155	155
Mean	2.71	1.31	0.47	0.02	4.51	0.01	0.12	3.85	1.35
Min	0.01	0.01	0.01	0.01	0.01	0.00	0.00	3.16	0.90
Max	6.88	4.14	1.06	0.12	11.54	0.06	0.24	4.21	1.98
Range	6.87	4.13	1.05	0.11	11.53	0.06	0.24	1.04	1.08
Std dev	1.07	0.75	0.18	0.02	1.90	0.01	0.04	0.22	0.35
Median	2.73	1.15	0.47	0.02	4.43	0.01	0.12	3.88	1.30
CoV	40%	57%	39%	79%	42%	86%	31%	6%	26%

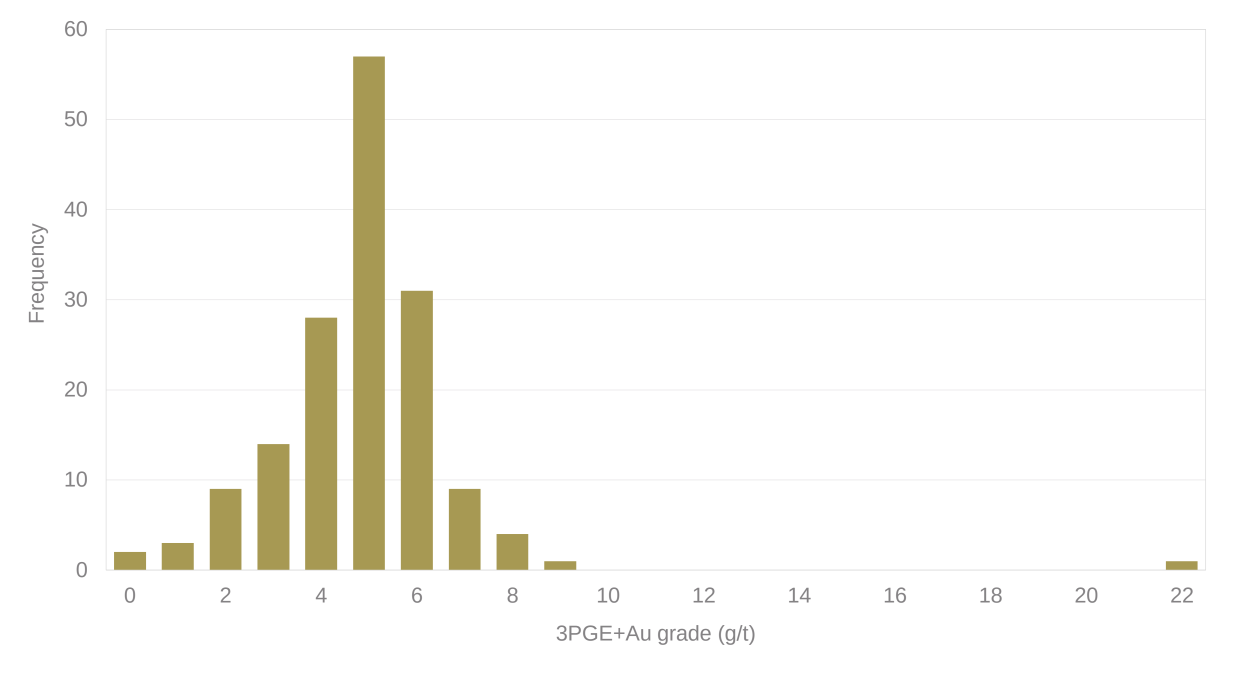

Figure 8-10: Normal UG2 Chromitite layer facies - 3PGE+Au grade

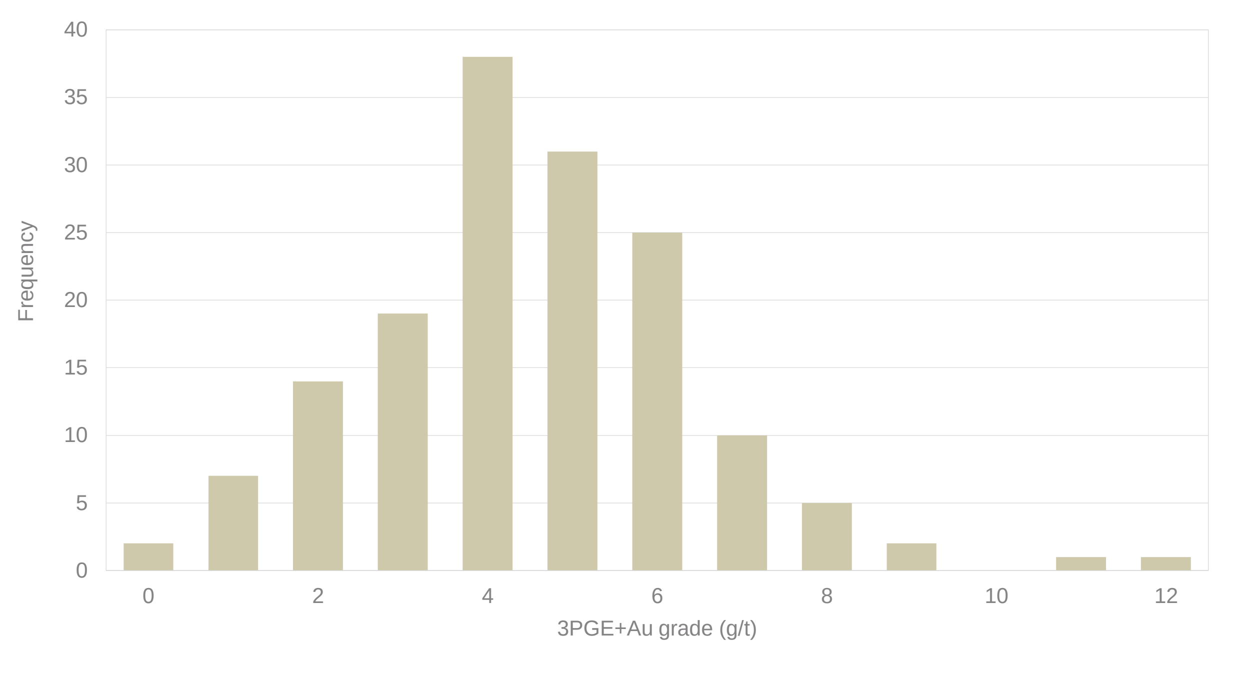

Figure 8-11: Regional pothole UG2 Chromitite layer facies - 3PGE+Au grade

8.3. Block size determination and optimisation

SR 4.2(ii)

A Kriging Neighbourhood Analysis ("KNA") was undertaken to optimise the block size for the estimation. The Merensky reef 3PGE+Au data was used for the analysis. The results are presented in Figure 8-12. Based on the slope of regression, the largest block size would be optimal. The Kriging efficiency did not indicate any significant variance in performance for various block sizes. The data has a nominal spacing of 250m x 250m and the previous estimate (TMC, 2009) was undertaken with a 250m x 250m block size. As larger blocks will limit the definition of the estimate and potentially impact on the accuracy of the estimate, a 125m x 125m block size was selected for this estimate.

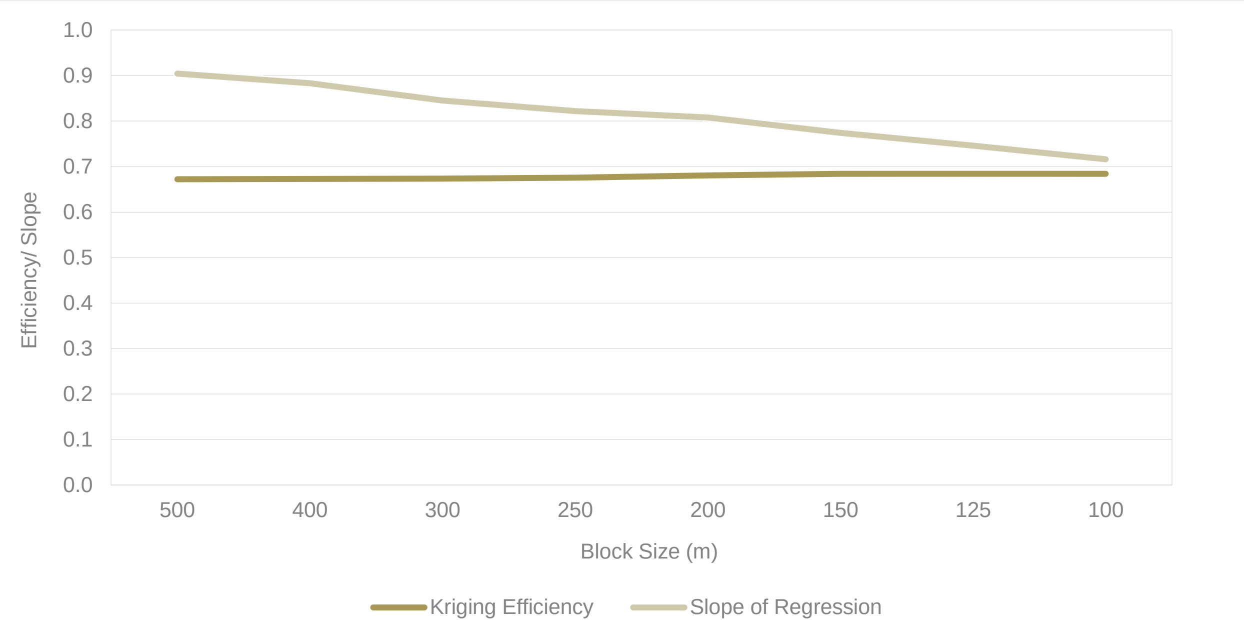

Figure 8-12: Results of the KNA

8.4. Estimation and modelling techniques

SR 4.2(ii); 4.2(iv); 4.2(vi); 4.5(ii)

The estimate was undertaken utilising Datamine™ Studio RM version 1.5.2.0 software.

8.4.1. Variography

8.4.1.1. Merensky reef

Omnidirectional variograms were modelled for all the variables estimated, as shown in Table 8-4 and Figure 8-13.

Table 8-4: Details of the variograms modelled for the Merensky reef

Element	Nugget	Range 1	Sill 1	Range 2	Sill 2	Total sill	Relative nugget
Pt (g/t)	3.21	301.9	1.66	1 438.3	0.22	5.1	63%
Pd (g/t)	1.59	302.0	0.14	0	0	1.74	92%
Rh (g/t)	0.02	302.7	0.01	3 000	0	0.03	52%
Au (g/t)	0.10	289.2	0.02	3 000	0.01	0.13	81%
3PGE+Au (g/t)	10.75	296.7	1.85	3 000	0.65	13.24	81%
Cu (%)	0.00088	314.5	0.00078	0	0	0.00166	53%
Ni (%)	0.00527	337.5	0.00224	1 442.0	0.00233	0.00984	54%
Thickness (m)	0.03843	322.9	0.01965	1 473.1	0.07774	0.13582	28%
Density (t/m³)	0.00706	293.2	0.00204	1 285.2	0.00612	0.01522	46%

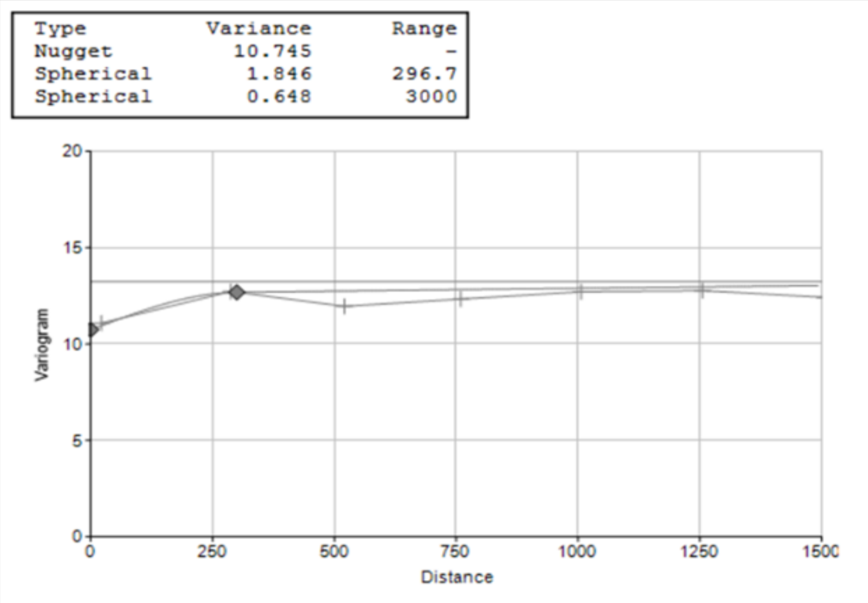

Figure 8-13: Variogram for 3PGE+Au grade for the Merensky reef

8.4.1.2. Upper Group 2 Chromitite layer

Omnidirectional variograms were modelled for all the variables estimated, as shown in Table 8-5 and Figure 8-14.

Table 8-5: Details of the variograms modelled for the UG2 Chromitite layer

Element	Nugget	Range 1	Sill 1	Range 2	Sill 2	Total sill	Relative nugget
Pt (g/t)	0.63	295.3	0.28	1181.1	0.37	1.28	49%
Pd (g/t)	0.36	288.1	0.12	783.1	0.11	0.60	61%
Rh (g/t)	0.02	323.0	0.02	1221.3	0.01	0.05	43%
Au (g/t)	0.00	323.8	0.00	751.4	0.00	0.00	79%
3PGE+Au (g/t)	2.14	293.7	0.80	991.8	1.19	4.12	52%
Cu (%)	0.000032	296.1	0.000019	3000	0.000010	0.000061	52%
Ni (%)	0.000671	295.8	0.000509	3000	0.000159	0.001339	50%
Density (t/m^3)	0.028758	363.2	0.007075	761.1	0.009265	0.045098	64%
Thickness (m)	0.045447	310.5	0.054947	1432.1	0.010630	0.111024	41%

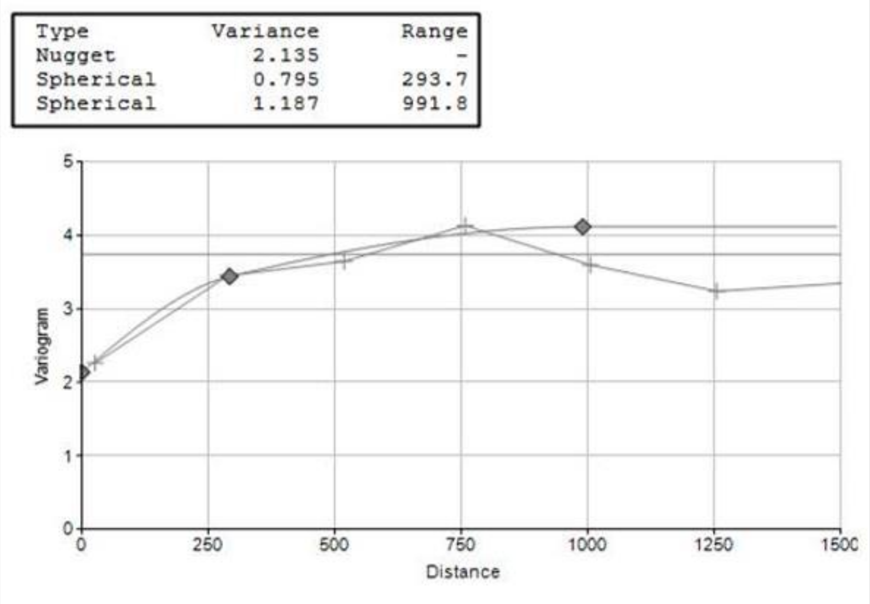

Figure 8-14: Variogram for 3PGE+Au grade for the UG2 Chromitite layer

8.4.2. Estimation methodology

The estimation methodology used the concentration of thickness (m), Pt (g/t), Pd (g/t), Rh (g/t), Au (g/t), Cu (%), Ni (%) and bulk density (t/m^3) for the Merensky reef and UG2 Chromitite layer, using the composite grades over the thickness of that unit (seam model approach).

8.4.3. Search parameters

Based on the understanding of spatial variation of the data, clustering due to deflections and knowledge of geology, a spherical search was adopted. The approach consisted of a three-stage process in which, an attempt to meet the initial criteria is made and if not successful, the data are tested against the second or third set of search criteria. Several search radii were tested for the various elements before finalising the search radii and the number of intersections required for a successful estimate of an individual block. Search criteria were finalised after the various options below were tested (Table 8-6).

Table 8-6: Search parameters

Description	First search volume			Second search volume			Third search volume		
	Search radius [m]	Minimum number of samples	Maximum number of samples	Search radius [m]	Minimum number of samples	Maximum number of samples	Search radius [m]	Minimum number of samples	Maximum number of samples
Merensky reef	500	12	24	750	12	24	1 000	1	24
UG2 Chromitite layer	500	12	24	750	12	24	1 000	1	24

8.4.4. Results

Figure 8-15 and Figure 8-16 show the distribution of the 3PGE+Au grade for the Merensky reef and UG2 Chromitite layer, respectively.

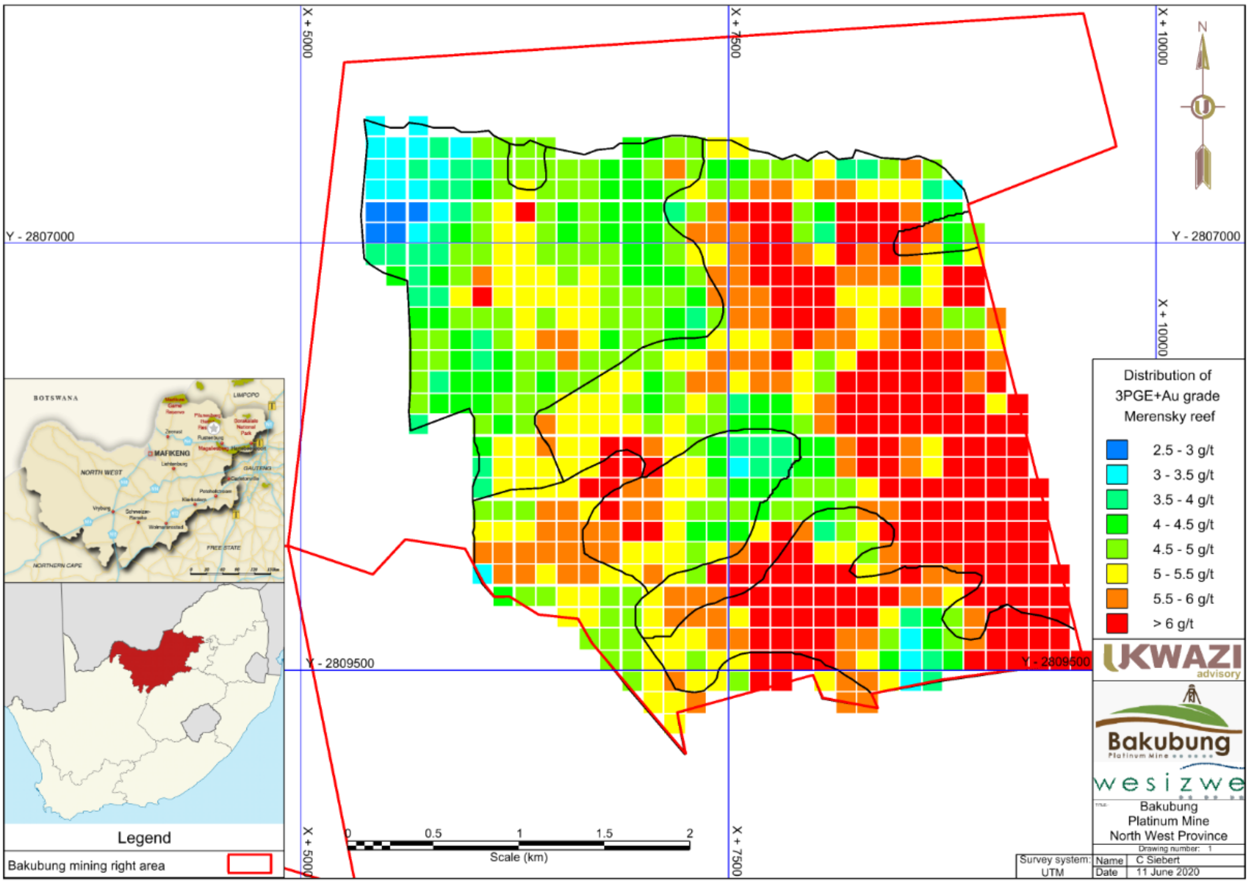

Figure 8-15: Distribution of the 3PGE+Au grade for the Merensky reef

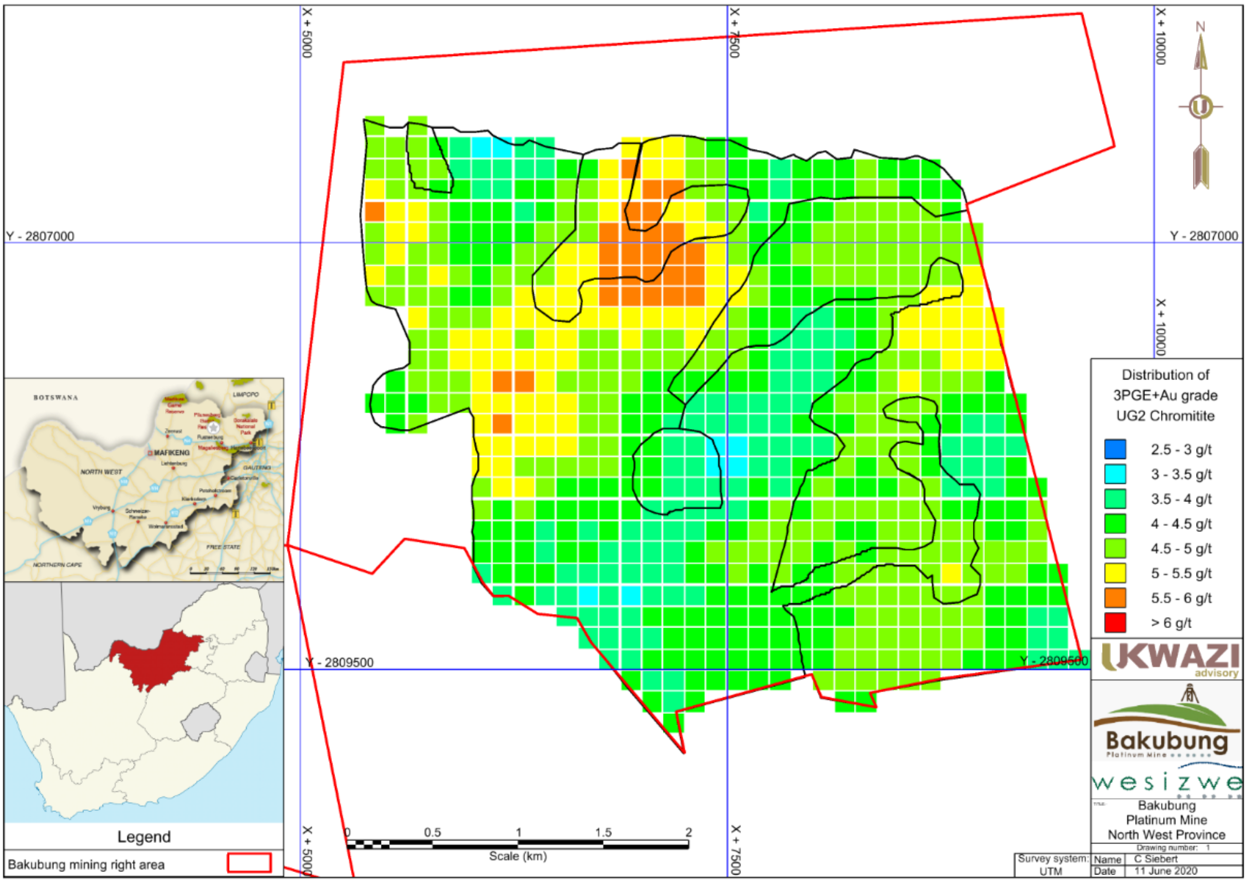

Figure 8-16: Distribution of the 3PGE+Au grade for the UG2 Chromitite layer

8.5. Geological losses

SR 4.1(vi); 4.3(i)

The major geological features that affect the Merensky reef and UG2 Chromitite layers are faults, dykes, potholes and mafic/ ultramafic pegmatites. Potholes are features of subsidence or erosion where the igneous layer is absent or occurs at a lower elevation in a modified form. Typically, the PGM concentration and the thickness of the layer are modified, with potholes generally approaching a circular shape. Potholes occur within all stratigraphic units of the BC and poor ground conditions may be associated with potholes and pothole edges.

The geological model was used as the basis for the determination of geological loss as various geological features impact the presence of the mineralised layers. The geological losses were determined by considering the number of drill holes that intersected the economic horizon which included a geological disturbance or feature and ratioed these to the number of drill hole intersections where the intersection was unaffected by geological disturbances or features. Where the geological loss was considered to be under-accounted, a geological loss in line with local knowledge was proposed as shown in Table 8-7 below. The Normal and Detached Merensky reef facies are mostly impacted by intrusives (dykes or sills). The Normal FW and Single Chromitite Merensky reef facies are impacted by a number of geological features but the most prominent are IRUPs. The UG2 Chromitite layer is mostly impacted by IRUPs.

Table 8-7: Determination of the geological losses

Description	Merensky reef facies				UG2 Chromitite layer facies	
	Normal	Normal FW	Single Chromitite	Detached	Normal	Regional Pothole
Total intersections	**248**	**18**	**95**	**178**	**275**	**294**
Full intersections	**234**	**11**	**77**	**158**	**251**	**242**
	Geological loss – Number of drill hole intersections					
Intrusive intersections	8	1	7	13	8	7
Structure intersections	3	2	1	2	1	1
IRUP intersections	3	4	10	5	15	38
Too narrow intersections	0	2	0	2	8	7
Total geological loss intersections	**14**	**7**	**18**	**20**	**24**	**52**
Calculated loss percentage (%)	5.6	39.0	19.0	11.0	8.7	17.7
Proposed loss percentage (%)	**12.5**	**40**	**25**	**15**	**10**	**20**

8.6. Model validation

SR 4.2(ii); 4.2(v)

8.6.1. Merensky reef

The validation included a comparison of the grades of the drill holes and the block model in 500m wide swaths (Figure 8-17 and Figure 8-18). Comparison of the 3PGE+Au grade and the Merensky reef thickness indicated good correlation. The block model was considered a reliable estimate of the grade of the Merensky reef.

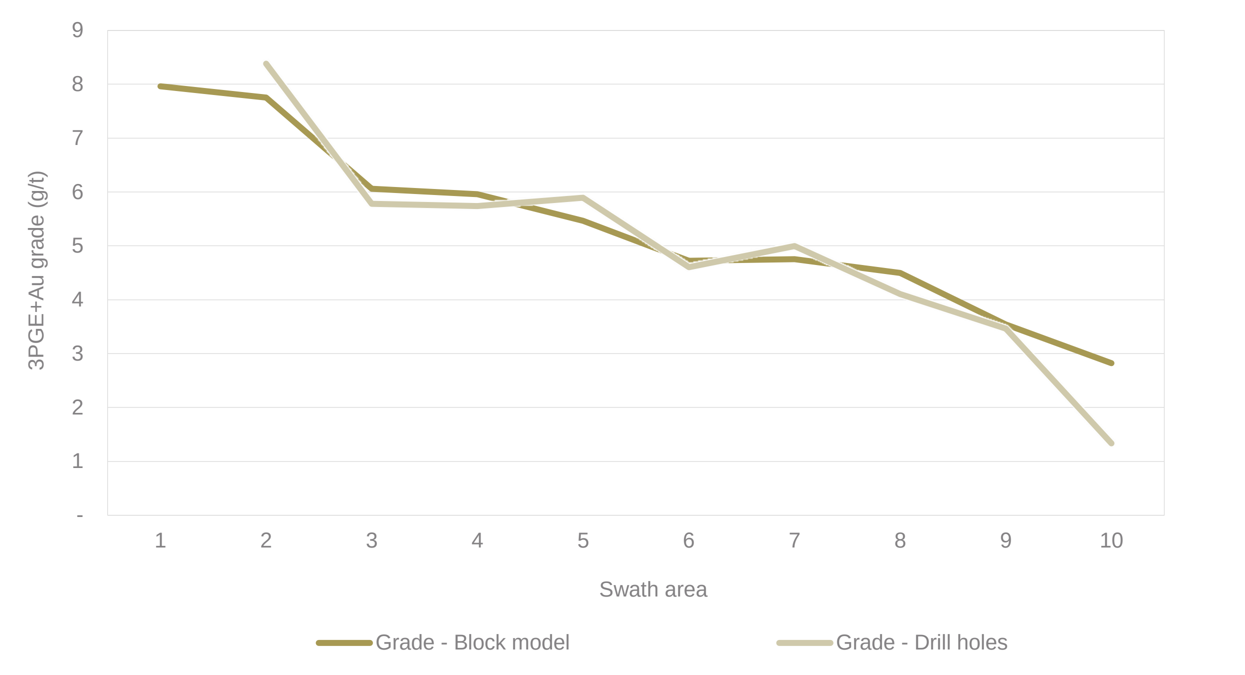

Figure 8-17: Merensky reef - Swath plots for validation of 3PGE+Au grade estimate

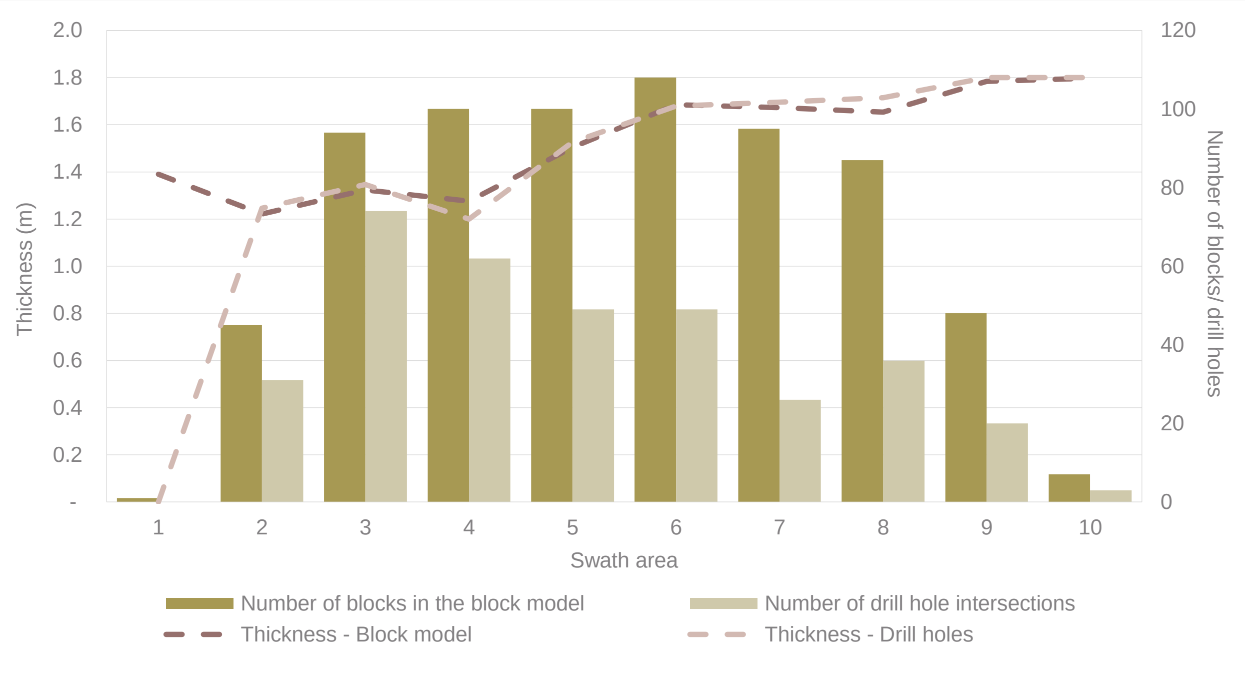

Figure 8-18: Merensky reef - Swath plots for validation of estimated reef thickness

8.6.2. Upper Group 2 Chromitite layer

The validation included a comparison of the grades of the drill holes and the block model in 500m wide swaths (Figure 8-19 and Figure 8-20). Comparison of the 3PGE+Au grade and the UG2 Chromitite layer thickness indicated good correlation. The block model was considered to be a reliable estimate of the grade of the UG2 Chromitite layer.

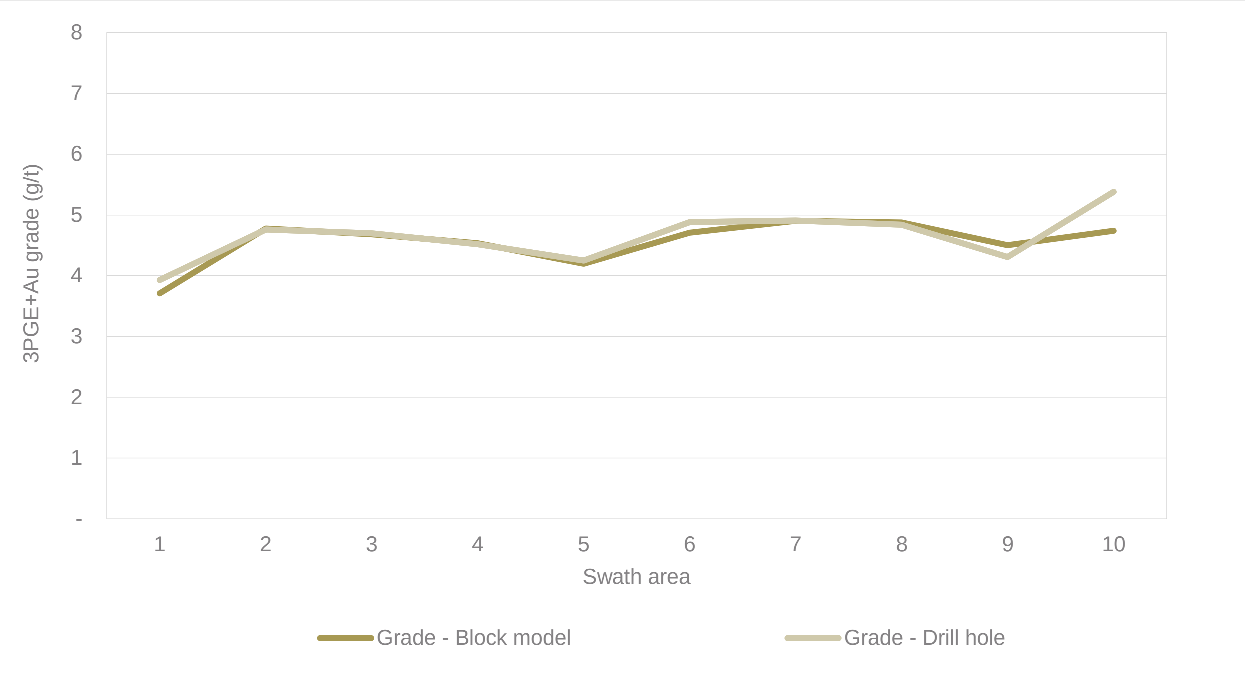

Figure 8-19: UG2 Chromitite layer - Swath plots for validation of 3PGE+Au grade estimate

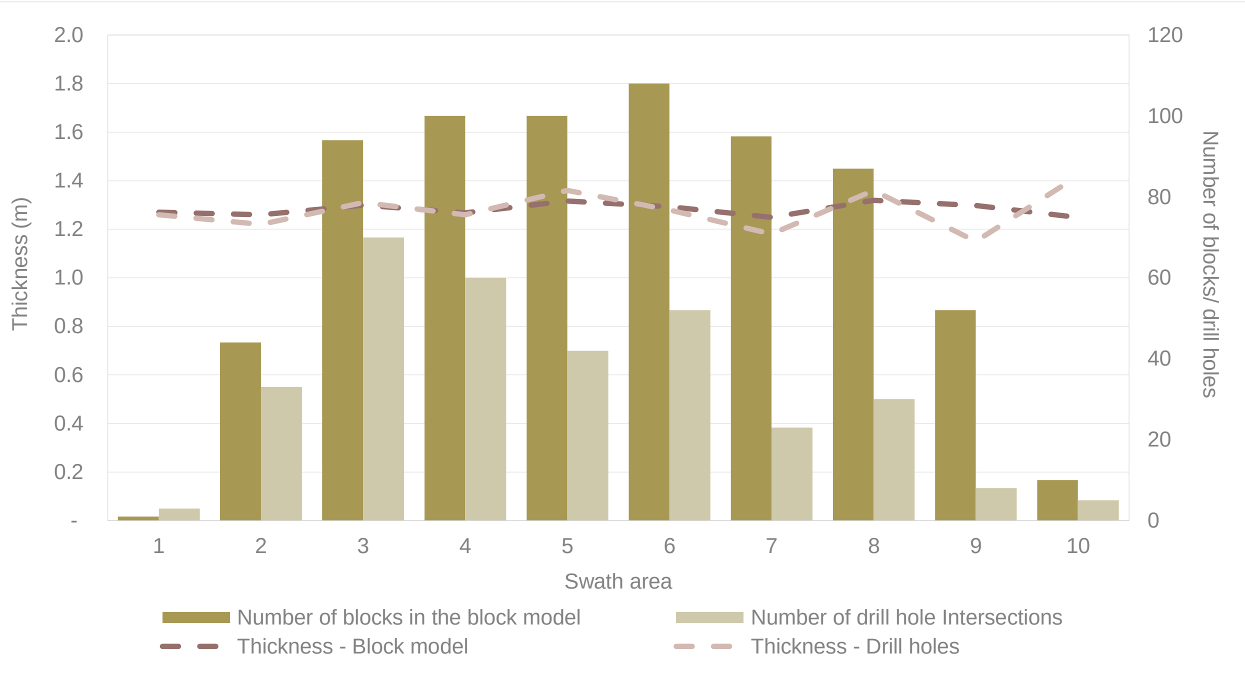

Figure 8-20: UG2 Chromitite layer - Swath plots for validation of estimated reef thickness

8.7. Mineral Resource classification criteria

SR 3.1(vi); 4.4(i)

The Mineral Resource classification areas remain unchanged from the previous estimate (TMC, 2009), which utilised the kriging efficiency. Various parameters such as kriging efficiency, search volume, slope of regression etc. were examined to confirm that the classification criteria applied were appropriate. Figure 8-21 and Figure 8-22 show the Mineral Resource classification superimposed on the facies distribution for the Merensky reef and UG2 Chromitite layer, respectively.

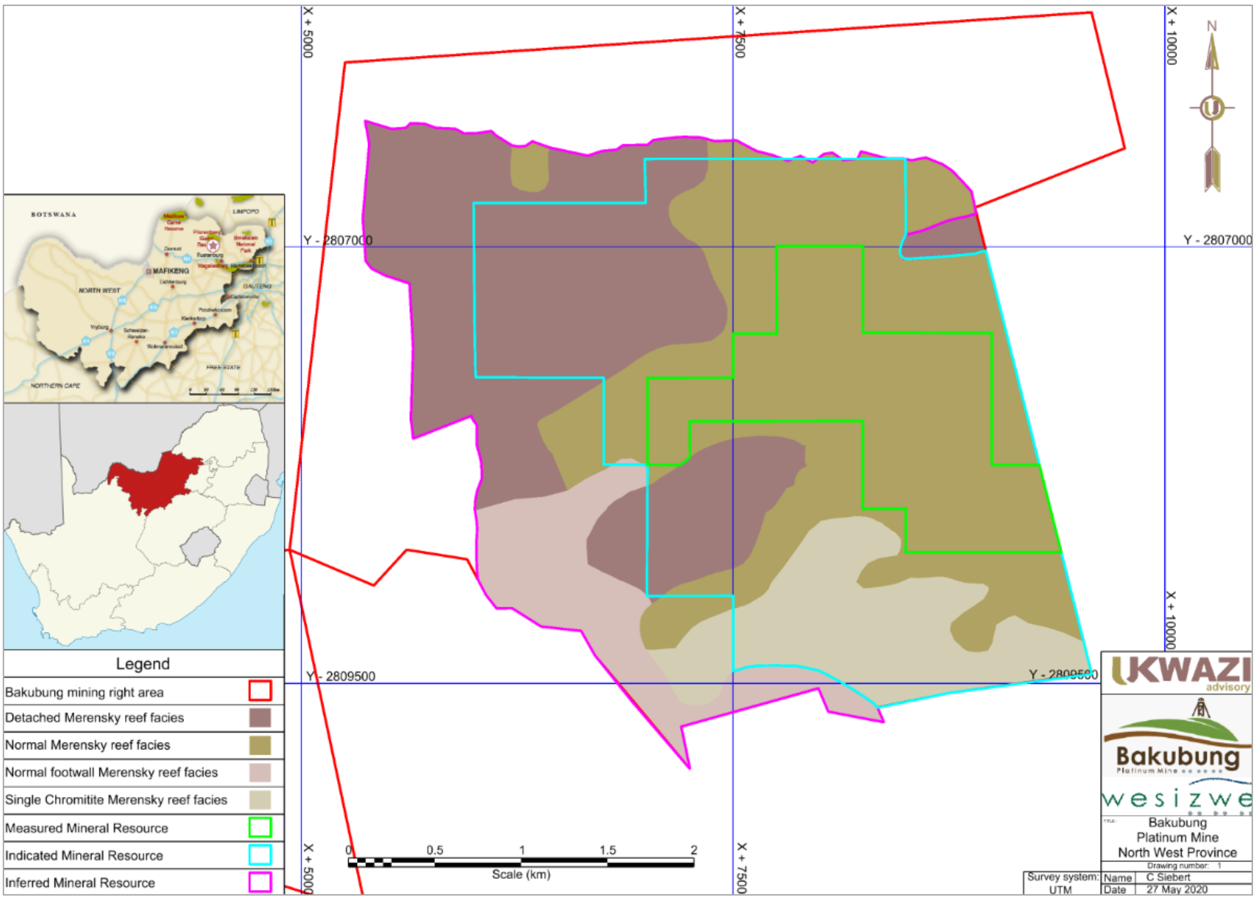

Figure 8-21: Mineral Resource classification of the Merensky reef

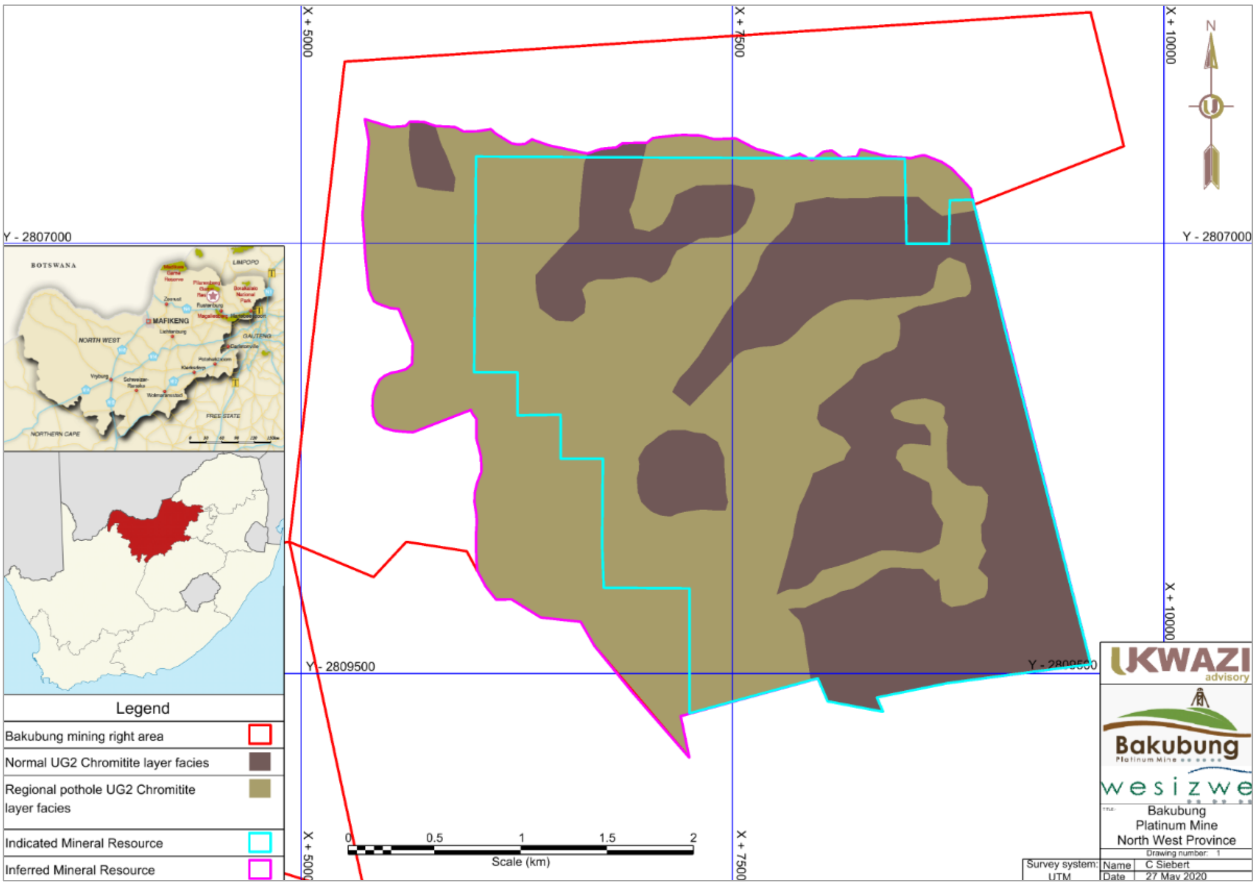

Figure 8-22: Mineral Resource classification of the UG2 Chromitite layer

8.8. Reasonable prospects for eventual economic extraction

SR 4.3(ii); 4.3(iii); 4.3(iv); 4.3(vii); 4.3(ix); 5.1(i)

The studies undertaken to estimate and classify the Mineral Reserve are sufficient to confirm that there is a "reasonable prospect for eventual economic extraction" for the Mineral Resources of both the Merensky reef and UG2 Chromitite layer.

8.9. Mineral Resource statement

SR 4.5(v); 4.5(vii); 6.3(vi) / SV T1.9

The estimation and classification of the Mineral Resources were undertaken in accordance with the guidelines of the SAMREC Code (2016). The CP responsible for the Mineral Resource estimation and classification is Mr Ken Lomberg (Pr.Sci.Nat.)

The Mineral Resource statements for the Merensky reef and UG2 Chromitite layer are presented in Table 8-8 and Table 8-9, respectively.

Table 8-8: Mineral Resource statement for Merensky reef as at 1 June 2021

Classification	Facies type	Tonnage [Mt]	Thickness [m]	Density [t/m³]	3PGE+Au [g/t]	Pt [g/t]	Pd [g/t]	Rh [g/t]	Au [g/t]	Pt:Pd:Rh:Au [ratio]	Cu [%]	Ni [%]	3PGE+Au [koz]	Pt [koz]	Pd [koz]	Rh [koz]	Au [koz]	Cu [t]	Ni [t]
Measured	Normal	6.53	1.28	3.20	6.52	4.14	1.83	0.29	0.26	63:28:4:4	0.07	0.23	1 369	869	383	62	55	4 900	15 100
	Normal FW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Single Chromitite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Detached	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	**6.53**	**1.28**	**3.20**	**6.52**	**4.14**	**1.83**	**0.29**	**0.26**	**63:28:4:4**	**0.07**	**0.23**	**1 369**	**869**	**383**	**62**	**55**	4 900	15 100
Indicated	Normal	9.05	1.35	3.18	5.69	3.59	1.59	0.26	0.25	63:28:5:4	0.07	0.21	1 654	1 044	461	75	74	6 500	18 700
	Normal FW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Single Chromitite	3.96	1.44	3.04	6.00	3.93	1.53	0.32	0.22	66:25:5:4	0.07	0.15	765	501	195	41	28	2 600	6 100
	Detached	8.91	1.76	3.23	4.55	2.98	1.18	0.20	0.19	66:26:4:4	0.06	0.18	1 302	854	339	56	54	5 500	16 000
	Total	**21.92**	**1.51**	**3.17**	**5.28**	**3.40**	**1.41**	**0.24**	**0.22**	**64:27:5:4**	**0.07**	**0.19**	**3 722**	**2 399**	**995**	**172**	**156**	14 600	40 800
Inferred	Normal	1.88	1.53	3.19	4.72	3.00	1.31	0.21	0.21	64:28:4:4	0.07	0.19	285	181	79	12	13	1 300	3 600
	Normal FW	3.21	1.65	3.19	5.04	3.31	1.30	0.22	0.20	66:26:4:4	0.06	0.15	519	341	134	23	21	2 000	4 700
	Single Chromitite	0.72	1.77	3.14	4.86	3.09	1.33	0.22	0.21	64:27:5:4	0.07	0.16	112	71	31	5	5	500	1 100
	Detached	8.30	1.70	3.22	3.97	2.60	1.03	0.17	0.17	66:26:4:4	0.06	0.17	1 059	694	274	46	44	4 700	14 100
	Total	**14.10**	**1.67**	**3.20**	**4.36**	**2.84**	**1.14**	**0.19**	**0.18**	**66:26:4:4**	**0.06**	**0.17**	**1 975**	**1 288**	**518**	**86**	**83**	**8 500**	**23 500**
Total Mineral Resource		**42.55**	**1.52**	**3.19**	**5.16**	**3.33**	**1.39**	**0.23**	**0.21**	**64:27:5:4**	**0.07**	**0.19**	**7 065**	**4 556**	**1 896**	**320**	**293**	**28 000**	**79 400**
Total per facies type	Normal	17.46	1.34	3.19	5.89	3.73	1.65	0.26	0.25	63:28:4:4	0.07	0.21	3 308	2 094	924	149	141	12 700	37 400
	Normal FW	3.21	1.65	3.19	5.04	3.31	1.30	0.22	0.20	66:26:4:4	0.06	0.15	519	341	134	23	21	2 000	4 700
	Single Chromitite	4.68	1.48	3.06	5.83	3.80	1.50	0.31	0.22	65:26:5:4	0.07	0.15	877	572	225	46	33	3 100	7 200
	Detached	17.21	1.73	3.22	4.27	2.80	1.11	0.18	0.18	66:26:4:4	0.06	0.17	2 361	1 548	613	102	98	10 200	30 100
Total Mineral Resource		**42.55**	**1.52**	**3.19**	**5.16**	**3.33**	**1.39**	**0.23**	**0.21**	**64:27:5:4**	**0.07**	**0.19**	**7 065**	**4 556**	**1 896**	**320**	**293**	**28 000**	**79 400**

Notes:

1) The Mineral Resource estimate was reported in accordance with the guidelines of The SAMREC Code, 2016 Edition
2) The Mineral Resource was reported inclusive of Mineral Reserve
3) The Mineral Resource was reported as contained in-situ estimates
4) No cut-off grades were applied in the Mineral Resource estimate
5) 3PGE/ 4E (g/t) = Pt grade (g/t) + Pd grade (g/t) + Rh grade (g/t) + Au grade (g/t)
6) Numbers may not add up due to rounding of decimals.

Table 8-9: Mineral Resource statement for the UG2 Chromitite layer as at 1 June 2021

Classification	Facies type	Tonnage [Mt]	Thickness [m]	Density [t/m³]	3PGE+Au [g/t]	Pt [g/t]	Pd [g/t]	Rh [g/t]	Au [g/t]	Pt:Pd:Rh:Au [ratio]	Cu [%]	Ni [%]	3PGE+Au [koz]	Pt [koz]	Pd [koz]	Rh [koz]	Au [koz]	Cu [t]	Ni [t]
Measured	Normal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Regional Pothole	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Indicated	Normal	17.70	1.26	3.84	4.76	2.83	1.40	0.51	0.03	59:29:11:1	0.01	0.11	2 711	1 609	796	291	14	1 500	20 300
	Regional Pothole	17.13	1.30	3.84	4.54	2.74	1.31	0.47	0.02	60:29:10:1	0.01	0.12	2 502	1 510	719	259	13	1 800	19 700
	Total	**34.83**	**1.28**	**3.84**	**4.66**	**2.79**	**1.35**	**0.49**	**0.02**	**60:29:10:1**	**0.01**	**0.12**	**5 213**	**3 119**	**1 516**	**550**	**28**	**3 300**	**40 100**
Inferred	Normal	0.73	1.36	3.80	4.61	2.74	1.36	0.49	0.02	59:29:11:1	0.01	0.12	108	64	32	11	1	100	800
	Regional Pothole	9.41	1.31	3.87	4.63	2.82	1.30	0.48	0.03	61:28:10:1	0.01	0.11	1 401	855	394	144	8	1 100	10 500
	Total	**10.14**	**1.31**	**3.86**	**4.63**	**2.82**	**1.31**	**0.48**	**0.03**	**61:28:10:1**	**0.01**	**0.11**	**1 509**	**919**	**426**	**156**	**8**	**1 200**	**11 300**
Total Mineral Resource		**44.97**	**1.29**	**3.85**	**4.65**	**2.79**	**1.34**	**0.49**	**0.03**	**60:29:10:1**	**0.01**	**0.11**	**6 722**	**4 038**	**1 942**	**706**	**36**	**4 500**	**51 400**
Total per facies type	Normal	18.43	1.26	3.84	4.76	2.82	1.40	0.51	0.03	59:29:11:1	0.01	0.11	2 819	1 673	828	302	15	1 600	21 200
	Regional Pothole	26.54	1.30	3.85	4.57	2.77	1.31	0.47	0.03	60:29:10:1	0.01	0.11	3 903	2 365	1 114	403	21	2 900	30 200
Total Mineral Resource		**44.97**	**1.29**	**3.85**	**4.65**	**2.79**	**1.34**	**0.49**	**0.03**	**60:29:10:1**	**0.01**	**0.11**	**6 722**	**4 038**	**1 942**	**706**	**36**	**4 500**	**51 400**

Notes:
1) The Mineral Resource estimate was reported in accordance with the guidelines of The SAMREC Code, 2016 Edition
2) The Mineral Resource was reported inclusive of Mineral Reserve
3) The Mineral Resource was reported as contained in-situ estimates
4) No cut-off grades were applied in the Mineral Resource estimate
5) 3PGE/ 4E (g/t) = Pt grade (g/t) + Pd grade (g/t) + Rh grade (g/t) + Au grade (g/t)
6) Numbers may not add up due to rounding of decimals.

8.10. Mineral Resource reconciliation

SR 4.2(v); 4.5(vi)

A comparison was made with the previous Mineral Resource estimates completed by TMC in 2009. The variance of the current Merensky reef Mineral Resource estimate relative to the 2009 Mineral Resource estimate (Table 8-10) was attributed to:

- The respective facies were re-delineated resulting in changes to the estimates for the individual facies
- The approach included an average cut for each facies as opposed to a best-cut approach for each respective drill hole cluster utilising a 1.0g/t (3PGE+Au) cut-off grade
- The geological loss for the Merensky reef was estimated and reduced from 25% to 18%, with significant changes on all facies.

The cumulative impact of the 2021 changes in the Mineral Resource estimation process, resulted in an increase in total 3PGE+Au metal content for the Merensky reef of 1%.

Table 8-10:Comparison of the 2009 and 2021 Mineral Resource estimates for the Merensky reef

Facies type	2009 estimate			1 June 2021 estimate			Variance		
	Tonnage [Mt]	3PGE+Au [g/t]	3PGE+Au [Moz]	Tonnage [Mt]	3PGE+Au [g/t]	3PGE+Au [Moz]	Tonnage basis [%]	3PGE+Au grade basis [%]	3PGE+Au ounce basis [%]
Normal	15.75	6.20	3.14	17.46	5.89	3.31	11	-5	5
Normal FW	3.53	6.33	0.72	3.21	5.04	0.52	-9	-20	-28
Single Chromitite	4.93	6.05	0.96	4.68	5.83	0.88	-5	-4	-8
Detached	11.83	5.78	2.20	17.21	4.27	2.36	45	-26	7
Total	**36.03**	**6.05**	**7.01**	**42.55**	**5.16**	**7.06**	**18**	**-15**	**1**

The variance of the current UG2 Chromitite layer Mineral Resource estimate relative to the 2009 Mineral Resource estimate (Table 8-11) is attributed to:

- The facies were re-delineated resulting in changes to the estimates for the individual facies
- The geological loss for the UG2 Chromitite layer was estimated and reduced from 27.5% to 16% with each facies showing significant change
- The cut selection considered site-specific geotechnical constraints.

The cumulative impact of the changes resulted in an increase in total 3PGE+Au metal content for the UG2 Chromitite layer of 7%.

Table 8-11: Comparison of 2009 and 2021 UG2 Chromitite layer Mineral Resource estimates

Facies type	2009 estimate			1 June 2021 estimate			Variance		
	Tonnage [Mt]	3PGE+Au [g/t]	3PGE+Au [Moz]	Tonnage [Mt]	3PGE+Au [g/t]	3PGE+Au [Moz]	Tonnage basis [%]	3PGE+Au grade basis [%]	3PGE+Au ounce basis [Moz]
Normal	14.46	4.80	2.23	18.43	4.76	2.82	27	-1	26
Regional pothole	28.51	4.39	4.02	26.54	4.57	3.90	-7	4	-3
Total	**42.97**	**4.53**	**6.26**	**44.97**	**4.65**	**6.72**	**5**	**3**	**7**

9. Geotechnical

SR 4.3(ii); 5.2(ii); 5.2(vi); 5.2(viii) / SV T1.10 / JSE 12.10(h)(vii)

9.1. Mining geotechnical

9.1.1. Introduction

The BPM is located on the Western Limb of the BC and is in the development phase of its operations. Horizontal development is in progress with shaft sinking of four levels, namely 69L, 72L, 77L and 81L completed. The targeted reefs are the Merensky and UG2 reef horizons which are separated by various types of pyroxenite, anorthosite and norite. Notably and typically, the UG2 HW contains Chromitite stringers that are well-known release surfaces. From a geotechnical perspective, the small separation, or middling distances between the Merensky and UG2 reef horizons further complicate the design and placement of on-and off-reef excavations.

The mining right area is traversed by several large-scale geological features such as dykes and faults which has resulted in the subdivision of mining blocks between these features. Stoping was planned using hybrid breast mining methods i.e., mechanised cleaning with hand-held conventional drilling.

9.1.2. Basis of design

Initial designs were derived at a pre-feasibility ("PFS") level of accuracy in 2007 and later updated to a bankable feasibility study ("BFS") in 2009. During the BFS, the PFS geotechnical information was augmented with information from two additional drill holes (the main shaft and ventilation shaft holes). An optimisation study was completed in 2013, which included the geotechnical logging of approximately 52 drill holes across the mining right area. Design methods included empirical, analytical and numerical approaches, which were validated, benchmarked and optimised with information from in-situ observational assessments. Table 9-1 outlines the design approaches used at the mine, all of which, are aligned to general industry practice.

Table 9-1: Design methodologies employed

Design aspect	Parameter	Methodology
Shaft design	Stability	Elastic modelling of vertical stress in the pillar centre and vertical strain in the shaft barrel.
		Benchmarking of pillar dimensions against neighbouring operations.
	Support	Empirical guidelines and analytical equations based on the Q Index.
Service level tunnels/ horizontal development	Spacing	Elastic modelling of average pillar stress ("APS") at the centre of pillars between adjacent excavations.
	Placement	Elastic modelling using Hoek-Brown failure criteria for fracture initiation.
	Support	Empirical rules of thumb, analytical equations based on Q Index and Rockwall condition factor ("RCF")
		Deterministic modelling of wedge stability.
Large chambers (workshops, conveyor drives etc.)	Support	Empirical guidelines and analytical equations based on the Q Index and rock mass rating ("RMR") data.
Regional pillars	Spacing	Empirical guidelines and industry practice.
		Analytical equations for tensile zone height.
	Stability	Elastic modelling using Hoek-Brown failure criteria for fracture initiation Elastic modelling to determine APS which should not exceed foundation failure criteria (APS ≤ 2.5 x Uniaxial compressive strength ("UCS") of the foundation rock).
Stoping	Span	Unsupported span analysis using the Q Index and stability number ("N'').
	In stope pillar	Empirical guidelines for width: height and factor of safety ("FoS").
	Support	Analytical equations to determine support requirement based on the depth of the weakest parting in the HW.

9.2. Geological characterisation and setting

SR 3.1(i); 3.2(ii)

Based on the information collected, analysed and transformed into usable data from core logging, the most common rock types encountered are anorthosite, norite, pyroxenite, pegmatoid pyroxenite and Chromitite, with dolerite and lamprophyre comprising the intrusions. The rock mass was characterised and packaged into the following domains:

- Merensky HW
- Merensky reef
- Merensky FW
- UG2 HW
- UG2 reef
- UG2 - UG1 middling
- UG1 reef.

Aeromagnetic surveys and geologically assessed drill hole data indicated structural complexities towards the western sections of the mining area and depicted the influence of the Pilanesberg extrusion and Caldera fault zone towards the north. The dominant features encountered at the mine are:

- IRUP
- Replacement pegmatoids
- Lamprophyre dykes
- Doleritic dykes, sills and pipes
- Jointing and faulting
- Potholes.

9.2.1. Discontinuity properties

Two steeply dipping joint sets (J1 and J2) and a third less prominent, randomly orientated shallow dipping set (J3) are the common discontinuities as described in Table 9-2 and Figure 9-1. The J3 set is not depicted on the stereonet in Figure 9-1 as it is described as a random set that was noted during observational assessments completed by the on-mine personnel.

The physical characteristics of the sub-vertical sets are described as slightly rough, planar surfaces with a serpentinite or talc coating that varies between surface staining to a 5mm thick weathered infill. Slicken sided joint surfaces indicating flexural slip and potential loss of cohesion are common. The J3 joint set is commonly associated with sill intrusions or identified as flexural slip structures in the horizontal development but can occur on its own.

Table 9-2: Description of joint sets identified

Joint description	Dip [°]	Strike orientation [°]
J1	70 to 90	325 to 25
J2	70 to 90	65 to 125
J3	Random set with no consistency regarding frequency, dip angle and direction	

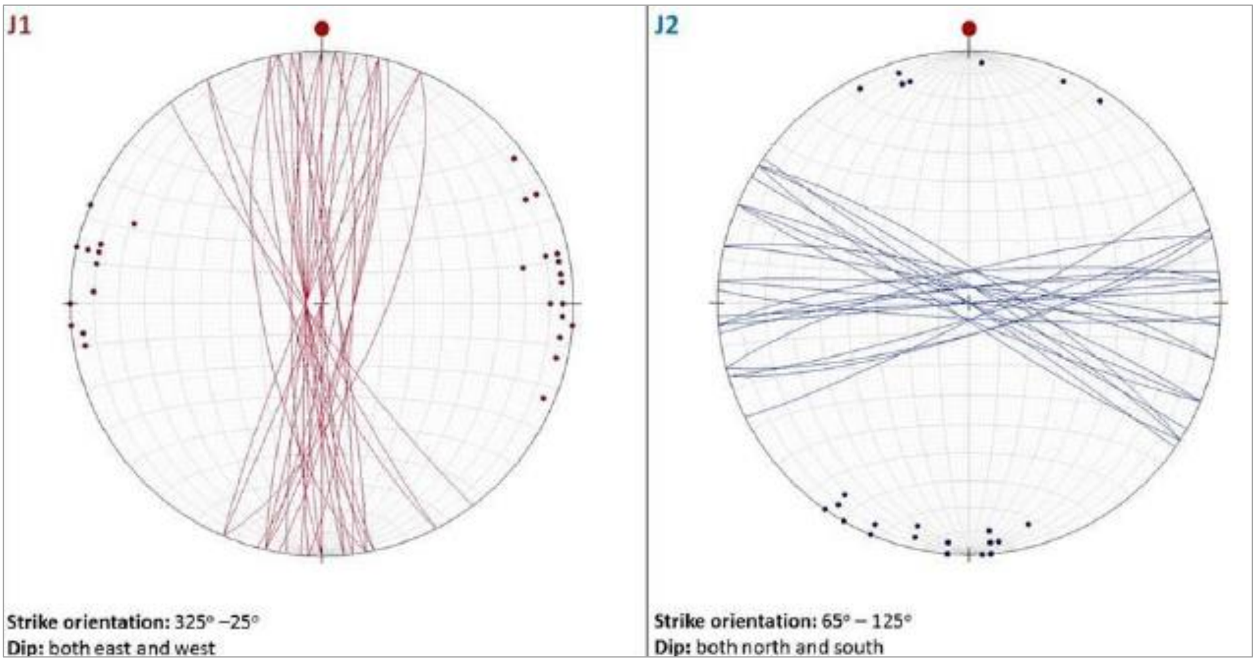

Figure 9-1: Stereographic projection of the sub-vertical joint sets (BPM, 2016)

Figure 9-2 illustrates the average fracture frequency per drill hole across the mining right area, showing that the frequency decreases towards the east. This correlates well with the geological surveys that indicated that the western portion of the mining area is structurally complex.

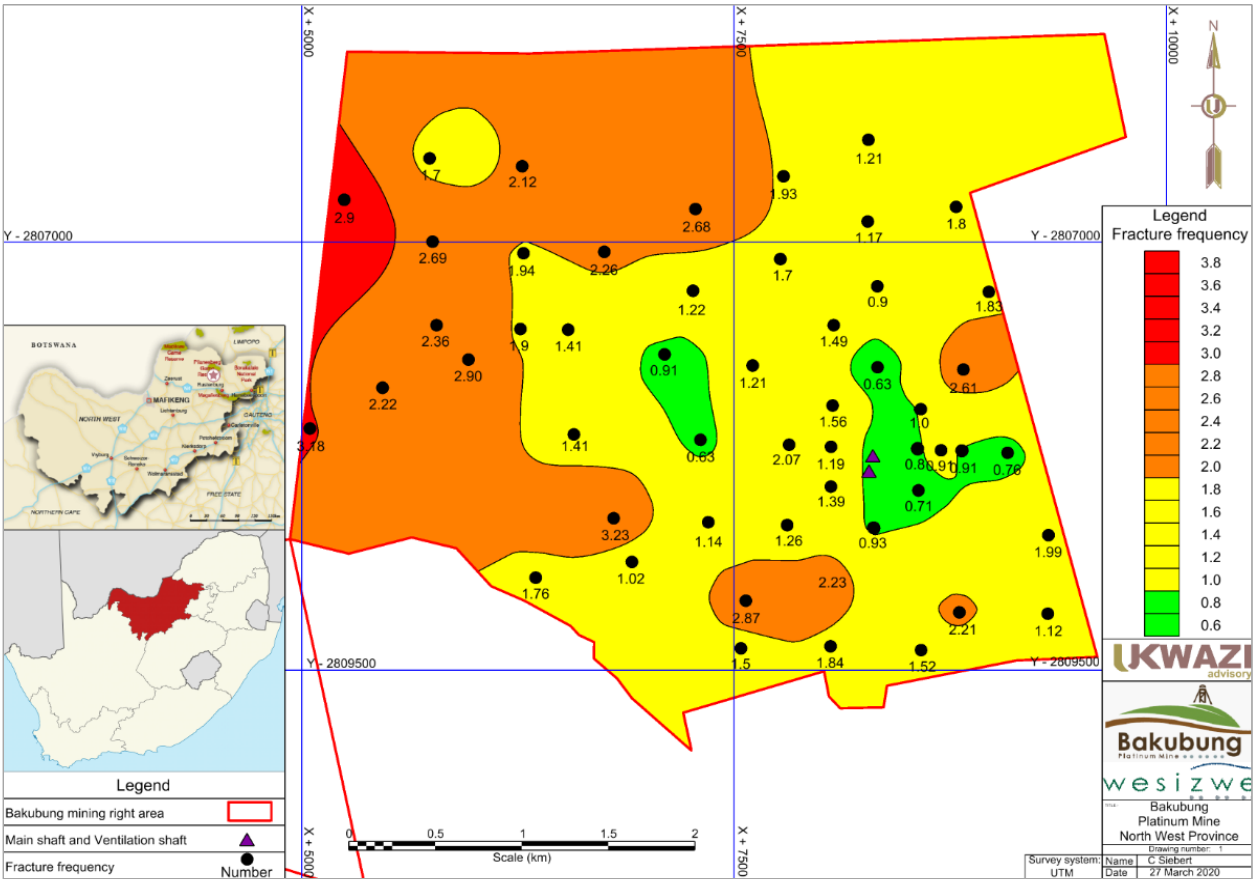

Figure 9-2: Average number of discontinuities per meter (TWP, 2013)

The average spacing of discontinuities for each rock type is provided below in Table 9-3, from which, it is evident that the IRUP and pyroxenite lithologies are the densely jointed units.

Table 9-3: Discontinuity spacing per rock type

Rock type	Average discontinuity spacing [m]
Feldspathic pyroxenite	0.75
Mottled anorthosite	1.0
Norite and leuco norite	1.0
Feldspathic pyroxenite and Chromitite	0.7
IRUP	0.6

The average number of discontinuities recorded per metre for each rock type and each geotechnical domain is tabulated in Table 9-4 and Table 9-5, respectively. The results show that typically, the pyroxenite and IRUP rock masses have the highest frequency of discontinuities and that the geotechnical domains with the most discontinuities are the Merensky HW and UG2 reef. The anorthosite and HW of the UG2 reef appear to be the least jointed of the domains.

Table 9-4: Number of discontinuities per meter (frequency) for each rock type

Rock type	Discontinuities/ m
Feldspathic pyroxenite	1.60
Mottled anorthosite	1.48
Norite and leuco norite	1.70
Feldspathic pyroxenite and Chromitite	2.00
IRUP	2.05

Table 9-5: Number of discontinuities per meter (frequency) for each geotechnical domain

Geotechnical domain	Discontinuities/ m
Merensky HW	1.95
Merensky reef	1.20
Merensky FW	1.25
UG2 HW	1.00
UG2 reef	1.80
UG2 – UG1 Middling	1.40
UG1 reef	2.05

9.2.2. Rock strength

UCS tests were conducted during the BFS in 2009. No further rock tests were carried out thereafter and the mechanical properties required to fully characterise the rock (such as density, elastic modulus and Poisson's ratio) were not available. The minimum, maximum and average UCS values from laboratory tests conducted are provided below in Table 9-6. It was unclear how many samples per rock type were tested and whether the samples were representative of the entire mining area.

Table 9-6: UCS laboratory test results

Rock type	Minimum UCS [MPa]	Maximum UCS [MPa]	Average UCS [MPa]
Anorthosite	175	234	207
Leuco Norite	151	156	154
Norite	235	276	256
Lamprophyre	53	69	58

Rock type	Minimum UCS [MPa]	Maximum UCS [MPa]	Average UCS [MPa]
IRUP	95	150	115
Pyroxenite	139	170	159
Merensky reef	79	113	92
UG2 Chromitite	57	68	62

Table 9-7 presents the UCS values that were used in the BFS optimisation geotechnical study (2013). These values were based on tested samples from adjacent mines as some of the UCS results were deemed to be misrepresented by the study.

Table 9-7: UCS values used for the optimisation study

Rock type	UCS [MPa]
Anorthosite	210
Leuco Norite	150
Norite	150
IRUP	180
Pyroxenite	140
Pegmatite	100
Chromitite	60
Lamprophyre	55
Merensky reef	82
Bastard reef	85

Figure 9-3 to Figure 9-8 presents a graphical comparison per rock type of the UCS values from the laboratory against benchmarked UCS data (where possible) and the eventual value utilised at the mine. The laboratory tests and benchmarked values are represented by the beige and tan columns, respectively and the value used by the mine is reflected by the grey line. The solid brown and purple lines provide the average of the benchmarked results (where applicable) as well as the average of the laboratory results, respectively.

The analysis illustrates the variance in benchmarked and actual UCS values. The UCS values that were selected for use at the mine are appropriate, although conservative, as most of the values fall below the average benchmarked results (except for the anorthosite and the Merensky reef). The UCS database must be scrutinised and supplemented with additional tests to verify the in-situ test results.

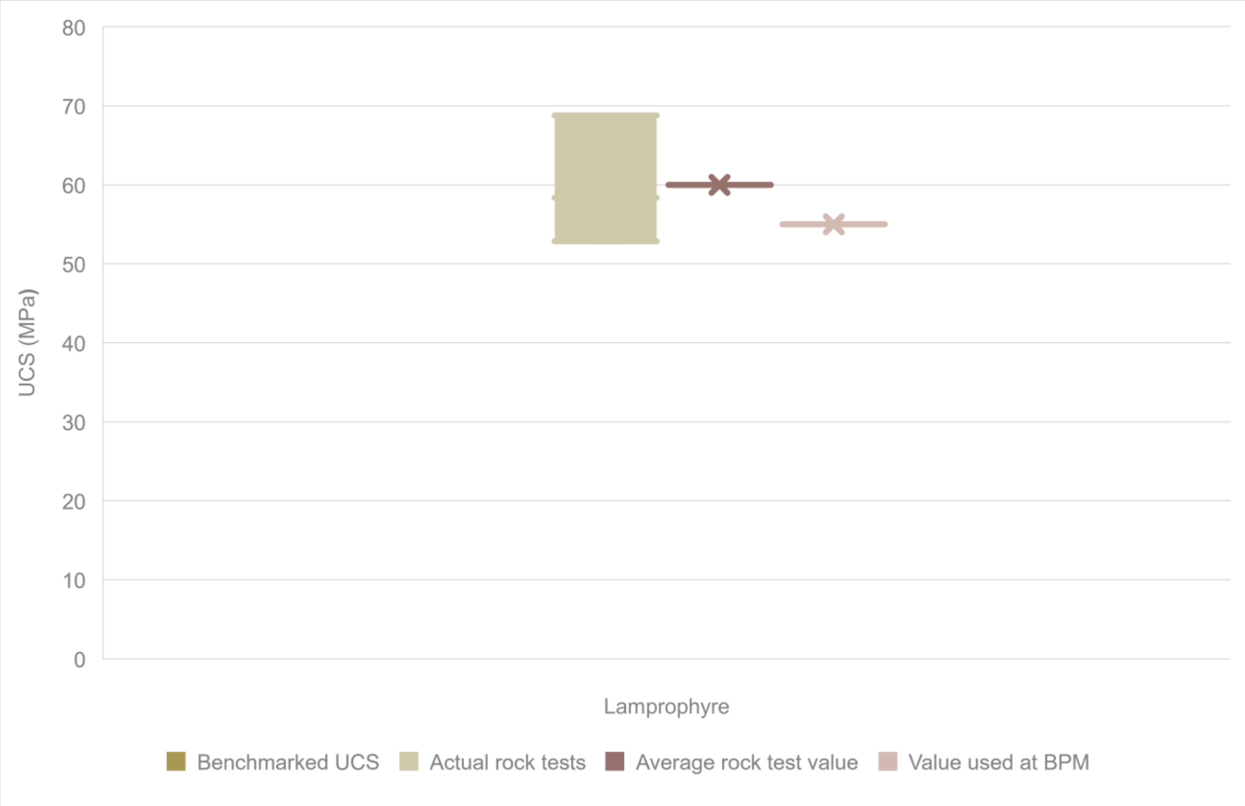

Figure 9-3: Lamprophyre UCS values

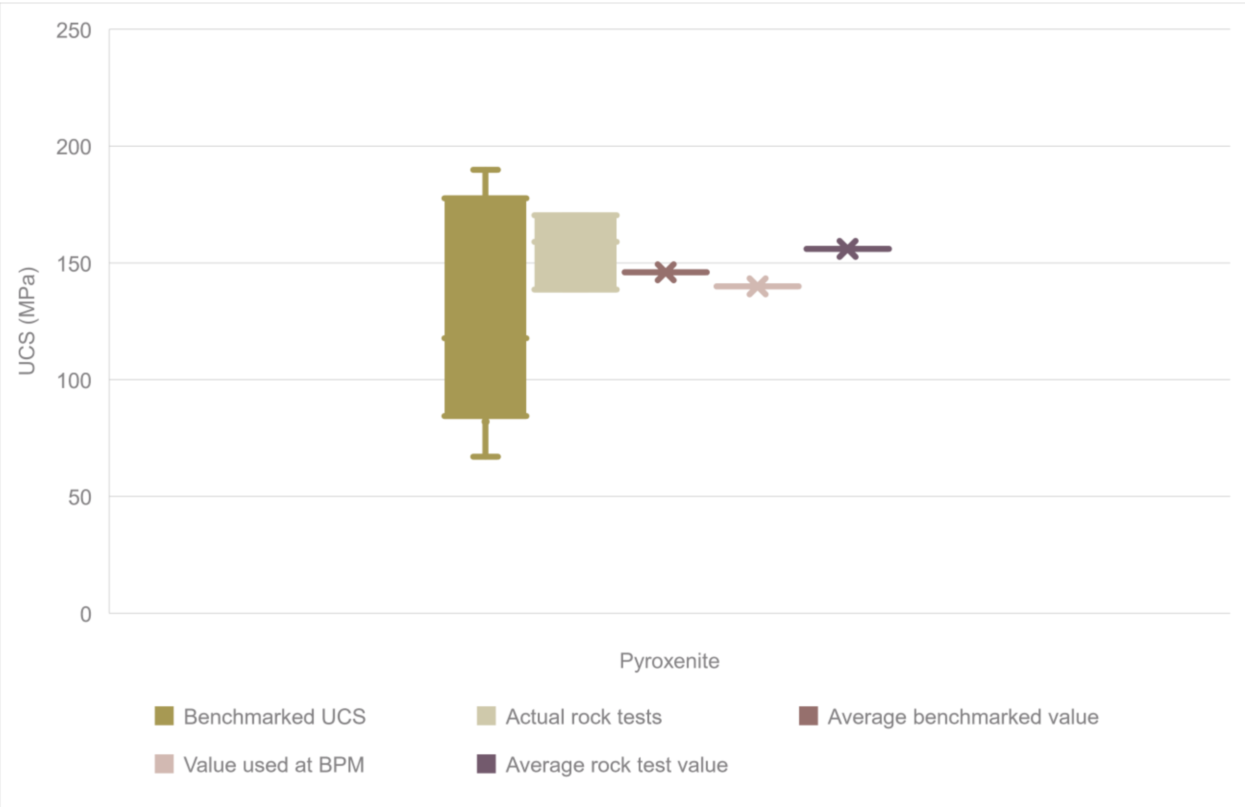

Figure 9-4: Comparison of pyroxenite UCS values

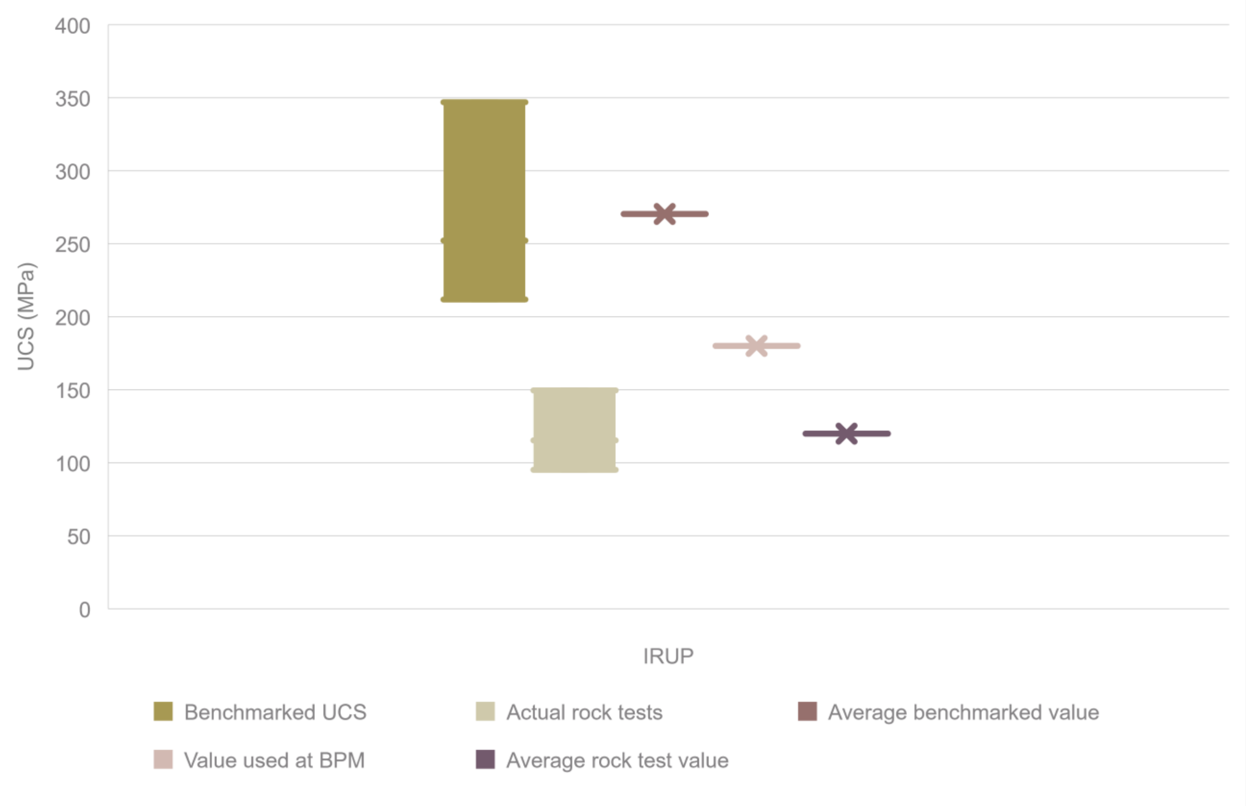

Figure 9-5: IRUP UCS values

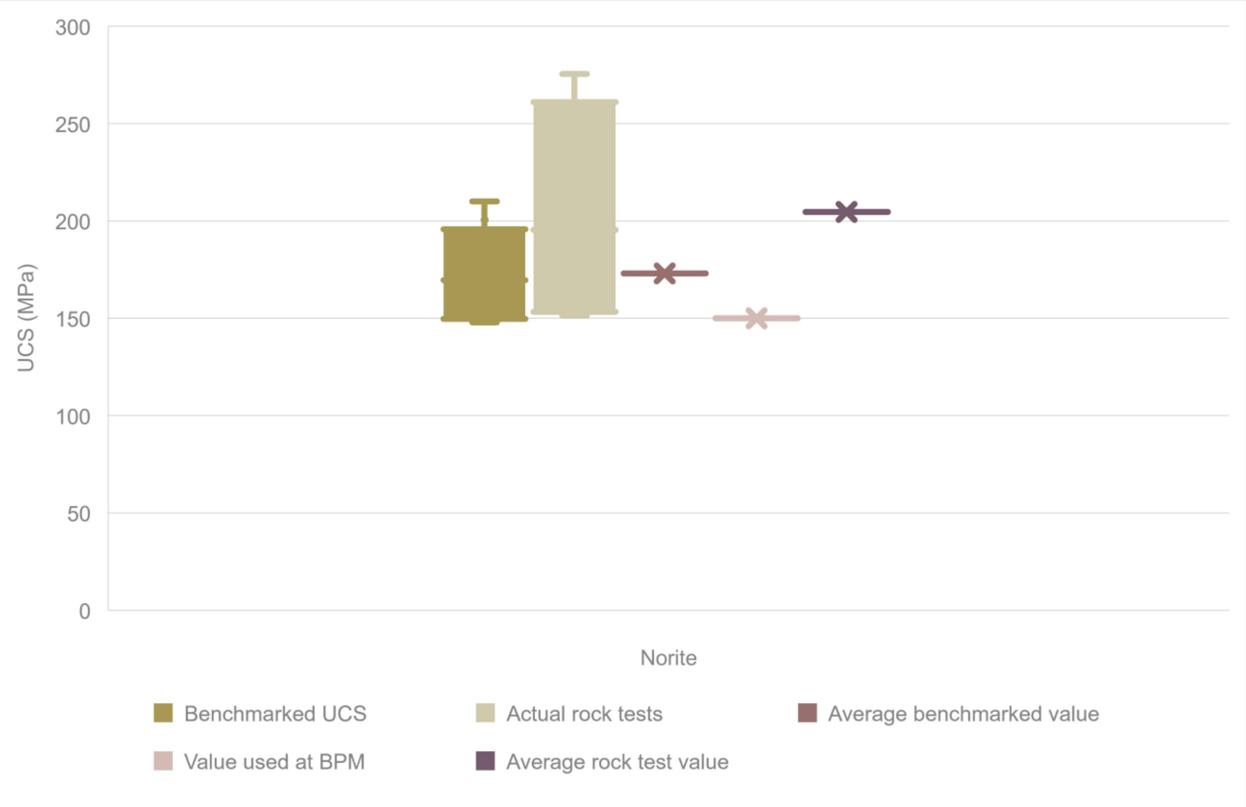

Figure 9-6: Norite UCS values

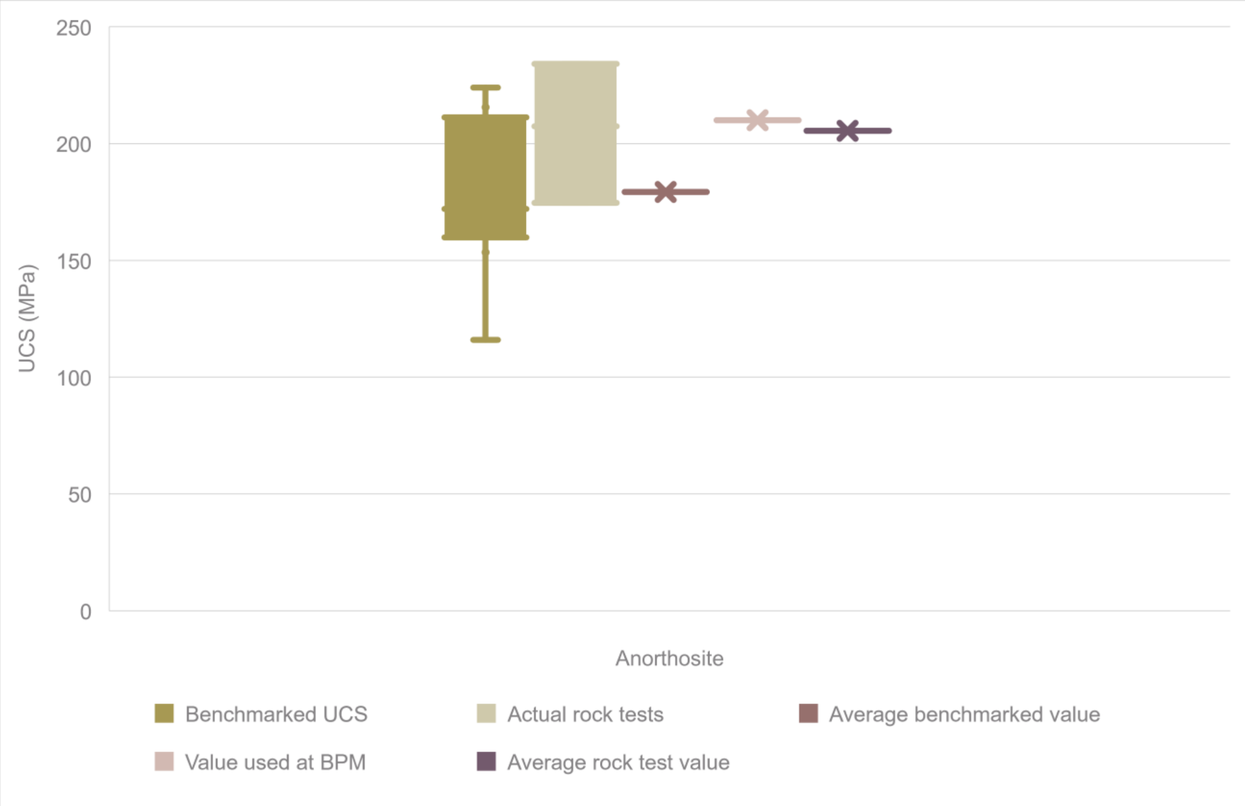

Figure 9-7: Comparison of anorthosite UCS values

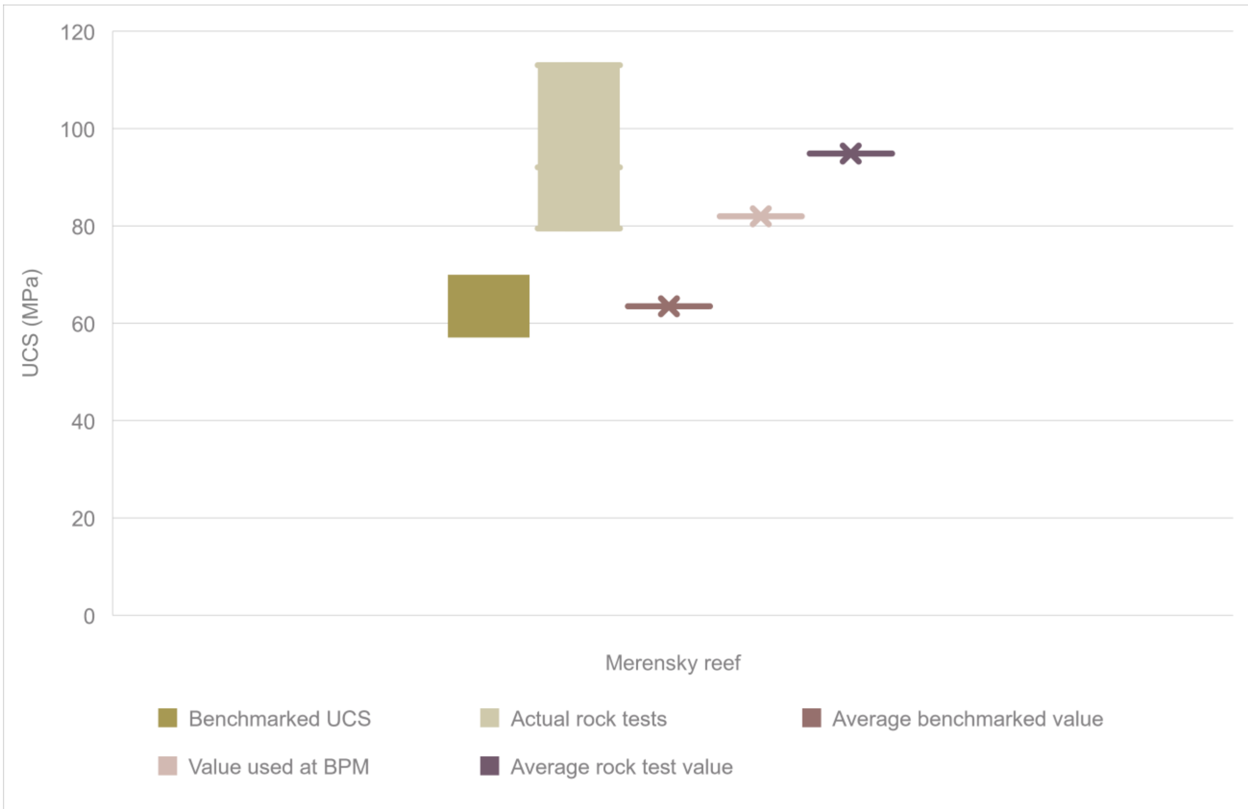

Figure 9-8: Comparison of Merensky reef UCS values

Actual density values were not available and an average density of 3 000 kilograms per cubic meter ("kg/m^3") was used. Typical individual rock mass densities range between 2 650kg/m^3 and 4 100kg/m^3, with average densities tabulated below in Table 9-8.

Table 9-8: Typical densities of the BC rock types

Rock type	Average typical density [kg/m^3]
Lamprophyre	2 980
Pyroxenite	3 130
IRUP	3 500
Norite	2 830
Anorthosite	2 810
Merensky reef	3 150
Chromitite	3 625

Figure 9-9 (below) provides a summary of the benchmarked density data of various rock types. The average of all the samples was 3 063kg/m^3. It is critical to note, that the density per rock type must be estimated from in-situ samples and not average values.

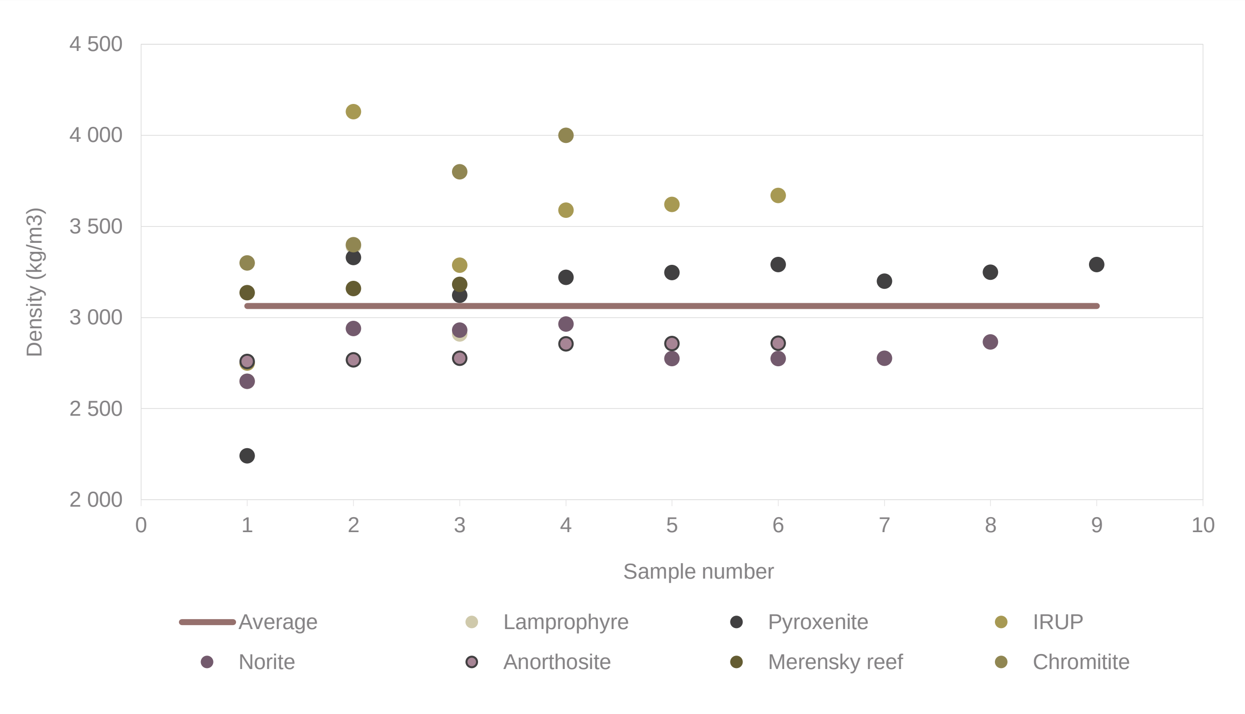

Figure 9-9: Benchmarked densities of various rock types

9.2.3. Rock quality indicators

Several classification systems are available for use in mine design, several of which were used to describe the rock mass at the BPM. The rating systems applied to the data from the 52 drill holes were rock quality designation ("RQD"), RMR and the Norwegian Geotechnical Institute ("NGI") rock tunnel quality index (Q). The mining rock mass rating ("MRMR") was applied to the two drill holes drilled at the main and ventilation shaft locations. Average RQD and RMR per rock type are provided in Table 9-9, while Table 9-10 outlines the RQD, RMR and Q per geotechnical domain.

Table 9-9: Summary of RQD and RMR values per rock type

Lithological unit	Mean unweighted RQD	Mean unweighted RMR
Feldspathic pyroxenite	90.50	61.50
Mottled anorthosite	91.25	69.00
Norite and leuco norite	90.50	61.25
Feldspathic pyroxenite and Chromitite	88.25	69.50
IRUP	89.25	59.50

Table 9-10: Summary of RQD, RMR and Q values per geotechnical domain

Domain	Mean unweighted RQD	Mean unweighted RMR	Q
Merensky HW	89.2	60.0	14
Merensky reef	90.5	65.5	35
Merensky FW	92.5	64.5	19
UG2 HW	91.2	62.0	21
UG2 reef	86.5	71.0	42
UG2 – UG1 Middling	92.7	62.5	23
UG1 reef	90.1	70.0	38

To obtain the MRMR, the in-situ RMR is adjusted to account for the mining environment, with parameters such as the influence of weathering, structural orientation, induced or changes in stresses and blasting. The MRMR values per rock type for the main and ventilation shaft drill holes are shown in Table 9-11.

Table 9-11: MRMR values per rock type for the main and ventilation shaft drill holes

Rock type	Mean unweighted MRMR - main shaft	Mean unweighted MRMR - vent shaft
Anorthosite	65	63
Chromitite	53	55
Dolerite	60	61
IRUP	58	59
Lamprophyre	54	-
Norite	62	62
Pegmatoid	58	56
Pyroxenite	57	57
Saprolite	18	17

RQD is not considered a suitable rock mass quality indicator on its own but can be a useful input parameter in some classifications. The RQD values shown in Table 9-9 and Table 9-10 are high as these results are based on core logging, which is generally more conservative than what is expected underground. The rock mass classification systems mentioned above are internationally accepted and were successfully used for the determination of mining spans and support guidelines.

9.2.4. Stress field

The BPM operation is classified as a medium-depth operation as mining is planned to a maximum depth of approximately 1 000m below surface. In-situ stress measurements were conducted on 72L in 2016 and are shown in Table 9-12. The k-ratio, which is a measure of the horizontal and vertical stress, is low (0.44 to 0.81), in comparison to the typical stress regimes on platinum mines (these are usually higher than 1.2). The low k-ratio implies that the vertical stress component is larger than the horizontal component, which is more akin to deeper level gold mine environments and not common to medium-depth platinum mines. This was accounted for in the stope design, where yielding support was recommended instead of stiff support. Numerical modelling results from the BFS optimisation geotechnical study indicated that severe stress fracturing can be expected when stress levels approach 70MPa.

Table 9-12: Results of in-situ stress measurements

Result group	Stress component	Magnitude [MPa]	Bearing [°]
k-ratio	K_{max} (horizontal stress/ vertical stress)	0.75 ±0.06	162
	K_{min} (horizontal stress/ vertical stress)	0.48 ±0.04	72

9.2.5. Seismicity

The natural propensity of earthquakes in SA is regarded as low by world standards and the BPM falls in an area with a low probability for natural seismicity.

Mining induced seismicity is generally related to high-stress concentrations, a geologically disturbed rock mass or the failure of pillars or abutments. Seismicity is not anticipated at the current development phase and was not catered for in designs. Seismic events are not unheard of at such depths. A seismic network must be investigated when stoping commences, especially in the deeper sections (750m and deeper). Information such as seismic event frequency, related damage and anomalous stress behaviour must be collected, analysed and monitored as mining operations progress. Much can be learnt and derived from neighbouring platinum mines that operate deeper than 800m below surface (Brandt, 2011).

9.3. Regional stability

Regional stability was attained by systematic regional pillars, which were designed to carry the full overburden weight of the rock mass to surface, to prevent cascading stope collapses or back breaks. Regional pillars are supplemented by bracket pillars, which are areas left unmined, to reduce the hazard of mining within or near a seismically active or major geological structure associated with blocky friable conditions.

The modelled Merensky reef indicating the shaft, regional and bracket pillars are shown in Figure 9-10 below.

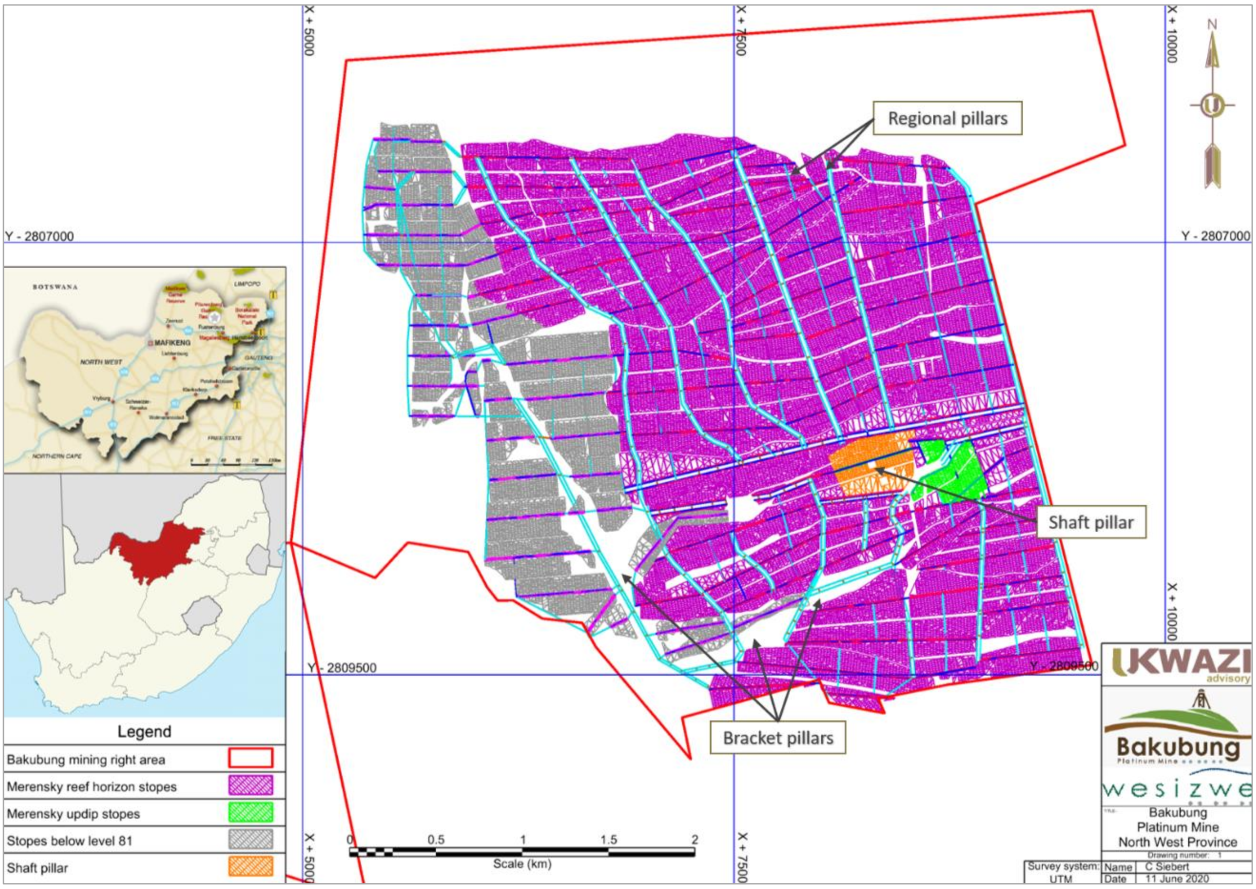

Figure 9-10: Modelled Merensky reef horizon showing the bracket and regional pillars

The regional pillars consist of 12m wide pillars with a maximum strike spacing of 230m. Numerical modelling confirmed the stability of the regional pillars, the criteria and results of which are described in Table 9-13.

Table 9-13: Regional and bracket pillar design criteria

Pillar type	Design criteria	Threshold	Result
Regional pillar	Modelled APS ≤ 2.5 x UCS of the foundation rock	Using either an anorthosite or norite foundation rock, this yields a stress limit of approximately 450MPa	The APS in the centre of numerically simulated pillars ranges between 285MPa and 315MPa. The average pillars stress across the two pillars are 380MPa and 405MPa, respectively
	Modelling the excess sigma 1 stress using Hoek and Brown formula as follows: $\Delta\sigma_1 = \sigma_1 - [\sigma_3 + (m\sigma_c\sigma_3 + s\sigma_c^2)\ 0.5]$	Where Δσ1 is negative, it suggests the rock has not failed and where it is positive it has reached a state of failure	Approximately 8m of the centre of the pillar is intact and not failing. The failure zone on the perimeters of the pillar extends roughly 2m on either side. The edges of the pillar are expected to fracture but will still yield a confining force to the centre of the pillar
Bracket pillar	Modelled APS ≤ 2.5 x UCS of the foundation rock	Stress in the centre of the bracket pillars does not exceed 200MPa	Supplement regional pillars where possible
	Minimum width of barrier pillars is 10m		

9.4. Design aspects

9.4.1. Life of mine and development excavation placement and spacing

Generally, the size and shape of primary excavations are governed by operational requirements such as equipment, the services that must be provided and geotechnical rock mass constraints, typically high-stress concentrations or adverse ground conditions.

Best practice guidelines suggest that excavation sizes must be kept as small as practically possible to facilitate operational requirements. In low-stress environments where geological structures are prominent, excavation profiles must conform to the naturally stable shape which will assist in reducing support requirements. In highly stressed environments, the ideal stability is achieved when the long axis of the excavation is orientated perpendicular to the major stress direction. The BPM has adopted excavations with a rectangular cross-sectional area for primary development and large excavations such as haulages, travelling ways and workshops.

The vertical shaft is a crucial LOM excavation and to maintain its stability, a protection pillar was left on each of the two reef horizons. The shaft pillar dimensions are approximately 500m x 500m or 300m radius with an area of approximately 140 000m^2. These dimensions were benchmarked against neighbouring operations and deemed appropriate. Elastic 3D modelling was completed to determine the absolute vertical stress field in the centre of the pillar and the absolute vertical strain in the shaft barrel. The same design criteria (outlined in Table 9-14 below) were used to verify the stability of the ventilation shaft.

Table 9-14: Shaft pillar design criteria (BPM, 2018)

Parameter	Unit	Tolerance
Absolute value of induced strain	Milli strain	<0.4 for shaft host rock and steelwork <1 for ventilation shafts
Induced vertical stress in the shaft host rock	MPa	<18
Strain in shaft lining (concrete)	Milli strain	<2
Total vertical stress in areas where service excavations sited	MPa	Should not exceed 0.5 x UCS of the rock being supported

9.4.2. Development support strategy

The shaft barrel and station support strategies were based on empirical rock mass classification guidelines and typical industry practice as indicated in Table 9-15.

Table 9-15: Shaft barrel and station support

Excavation type	Support type	Specification
Shaft barrel	1.5m long split set	1.5m x 1.5m spacing for normal conditions 1.0m x 1.0m spacing for poor conditions
	Wire mesh	In conjunction with split sets
	Concrete lining	300mm thick, 30MPa strength
Shaft station	2.2m resin bolt	1.5m vertical spacing and 3.0m horizontal spacing
	Fibre-reinforced shotcrete	75mm thick
	6.0m long, 38t cable anchor	1.5m vertical spacing and 3.0m horizontal spacing, over the shotcrete, using large faceplates

Empirical methods based on rock mass classification, predicted stresses and deterministic numerical modelling using the joint orientation data were employed to determine the support strategies for development and large excavations. This methodology is aligned with industry practice and a summary of the strategy is shown in Table 9-16.

Table 9-16: Support specifications for development ends and large excavations

Excavation type	Height [m]	Width [m]	Support type	Specification
Haulage (flat-end development)	3.1	4.8	20mm diameter, 1.8m long resin bolt	1.5m x 1.5m spacing
Flat end intersections	3.1	>4.8	20mm diameter, 1.8m long resin bolt	1.5m x 1.5m spacing
			4.0m long, 38t grouted cable anchor	2.0m x 2.0m spacing
	4.0 to 6.0	6.0	20mm diameter, 1.8m long resin bolt	1.5m x 1.5m spacing

Excavation type	Height [m]	Width [m]	Support type	Specification
Large excavations (workshops, conveyor decline etc.)			4.0m long, 38t grouted cable anchor	2.0m x 2.0m spacing
			Fibre-reinforced shotcrete	75mm to 100mm thickness

9.4.3. Stoping configuration

A typical medium depth extraction strategy was planned with systematic regional dip pillars and in-stope crush pillars to reduce the effect of the tensile zone. The estimated height of the tensile zone range from 37m to 65m for 200m to 250m spans and a depth range of 600m to 900m. Figure 9-11 shows the breast mining layout planned.

Crush pillars support the tensile zone between regional pillars and aid in supporting the dead weight of any pre-defined parting. The guidelines for crush pillar design recommend width to height ratios of 1.7 to 2.5 and FoS < 1 at a depth greater than 600m (Jager & Ryder, 1999).

Numerical modelling reported in the BFS optimisation geotechnical study (2013) resulted in systematic crush pillars of 3m in width and 4m in length spaced 3m apart on strike (3m holing) and 30m apart on dip between regional pillars spaced 230m apart will reduce the tensile height from 60m to less than 10m. The APS on regional pillars decreased from 190MPa to 48MPa with the introduction of crush pillars. An extraction ratio of approximately 84% will be achieved with this layout, excluding bracket pillars and any further un-minable ground.

The 33m dip panel spans (between 230m strike spans with 3m x 4m crush pillars) will be applied to both the Merensky and UG2 reef horizons. This stoping layout is viable in single reef situations where the middling between the UG2 and Merensky horizons are far enough apart to simulate such conditions. Validation of panel spans will be required in instances where the UG2 reef horizon is being extracted near the overlying Merensky reef horizon. Mines with similar, narrow middling scenarios adopt panel spans of less than 26m. Refer to Section 9.4.5 for multi-reef design considerations.

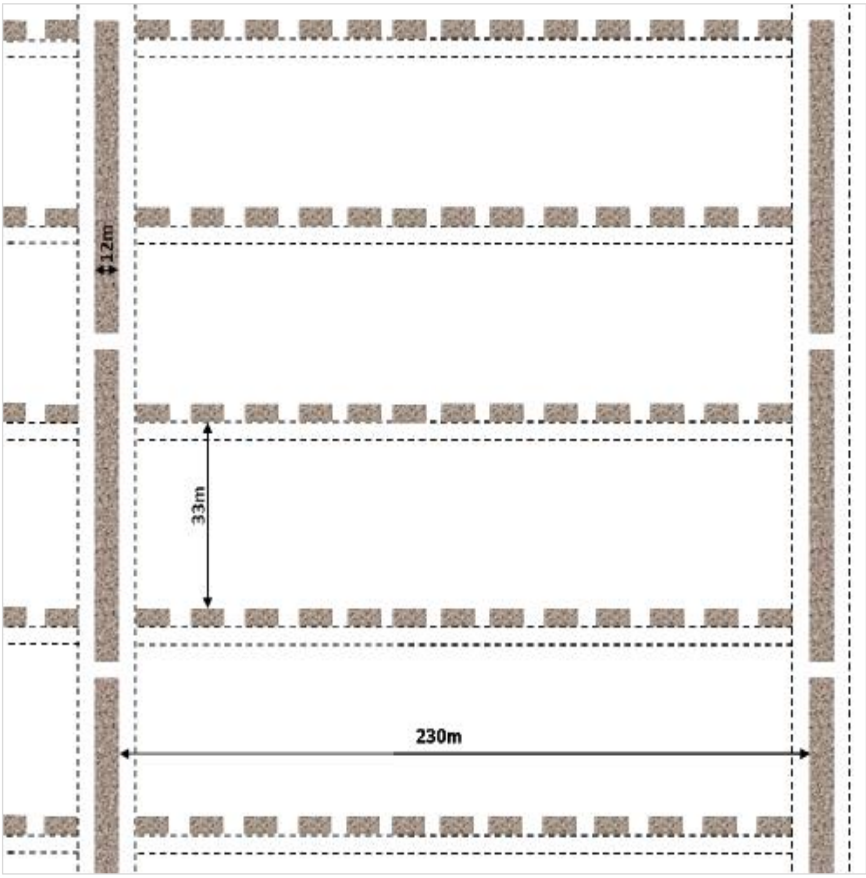

Figure 9-11: Breast mining layout planned at BPM (TWP, 2013)

9.4.4. On-reef support strategy

The support design was based on the support resistance requirements from various geotechnical zones, depending on the depth of the weakest structure (sills, parting planes and contacts) in the HW. The spatial distribution of these zones is depicted in Figure 9-12 and Figure 9-13 for the Merensky and UG2 reefs respectively and described in Table 9-17.

Table 9-17: Description of geotechnical zones and required support resistance

Geotechnical zone	Parting depth range [m]	Height used for support resistance [m]	Required support resistance [kN/m^2]
1	0 to 2	3.5	104
2	2 to 8	7.4	219
3	>8	12.7	375

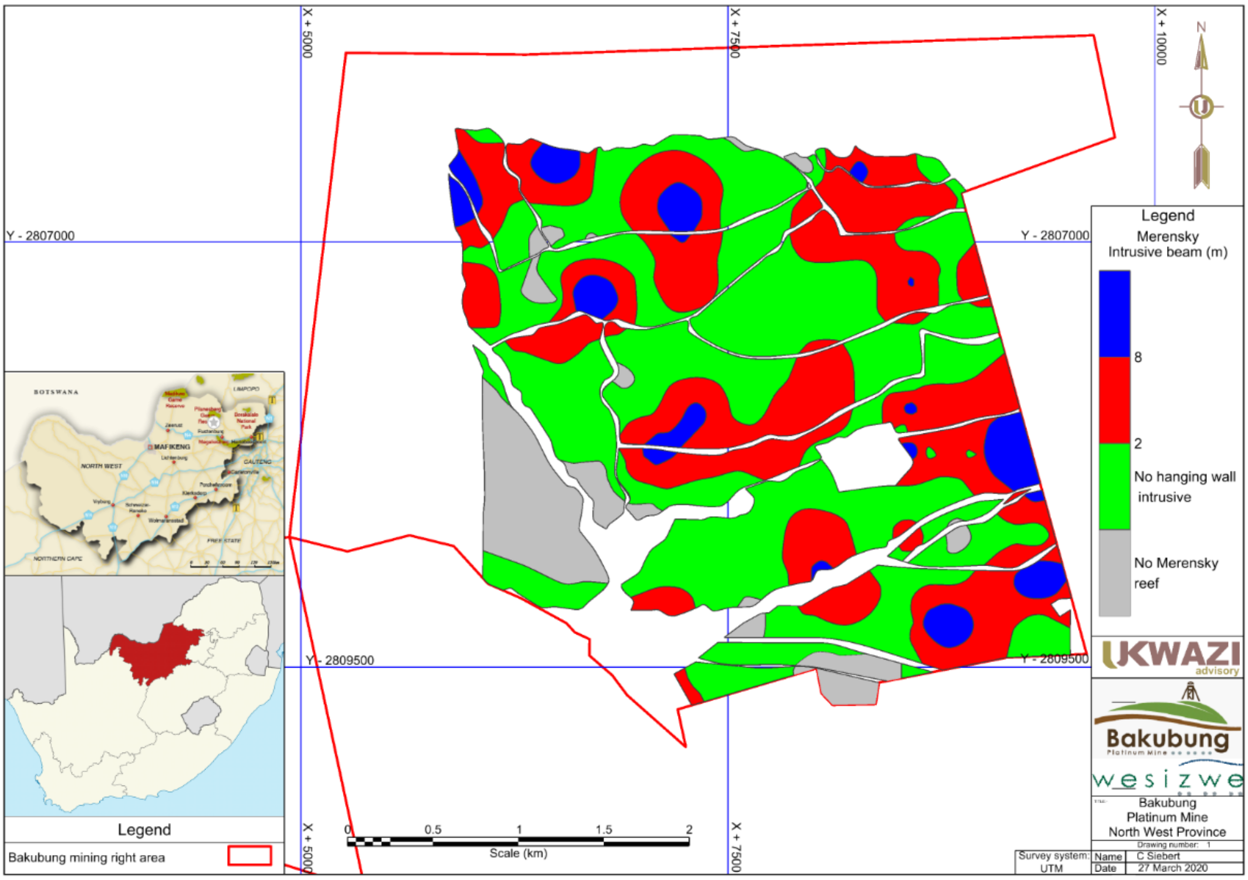

Figure 9-12: Spatial distribution of geotechnical zones on the Merensky reef (TWP, 2013)

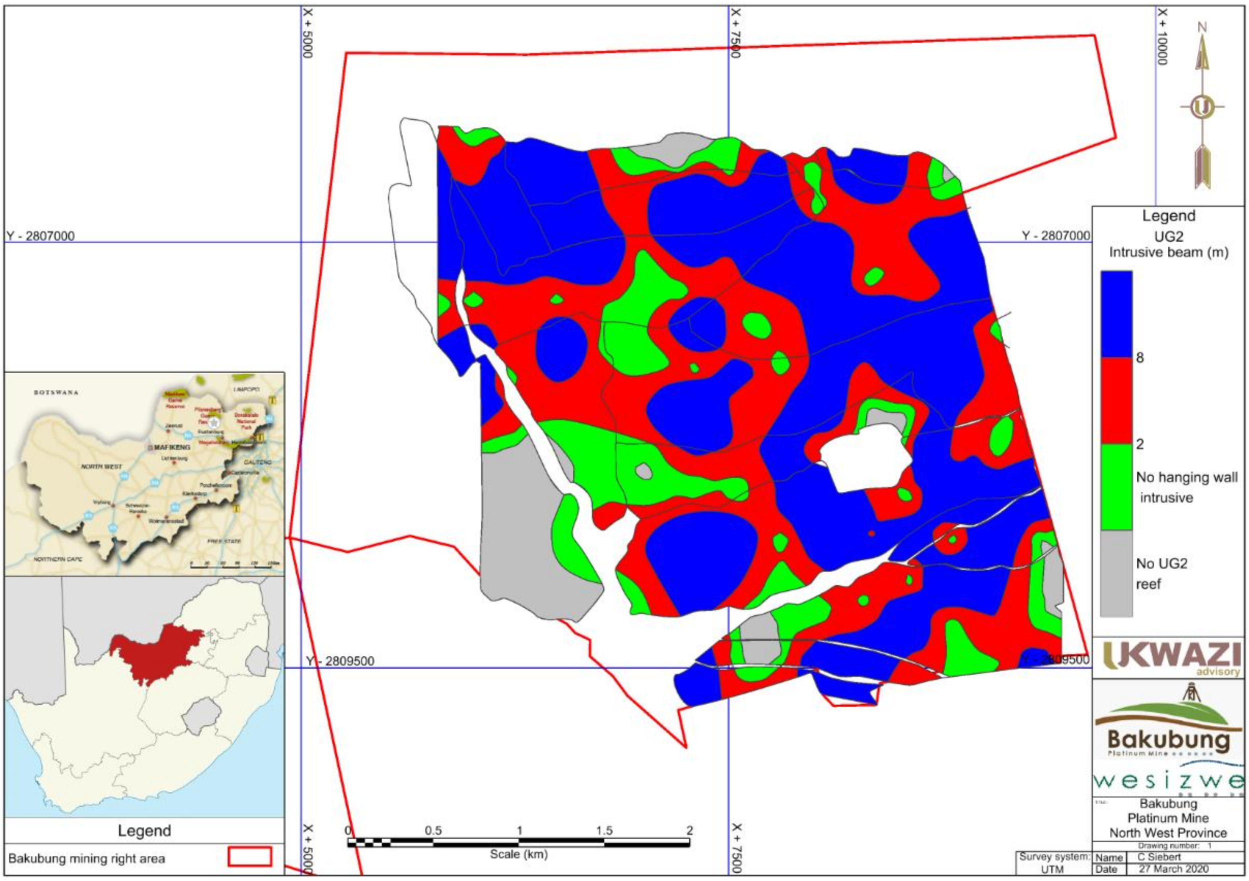

Figure 9-13: Spatial distribution of geotechnical zones on the UG2 reef (TWP, 2013)

The BFS optimisation geotechnical study deduced the following:

- Most of the area falls within zone 1 for the Merensky reef horizon, followed by zone 2 and a few areas with intersected weak structures greater than 8m into the HW
- Most areas on the UG2 horizon lie in zone 3 where weak structures were identified more than 8m into the HW. In the multi-reef environment, this and the stress associated with mined out Merensky reef sections will have a significant impact on the support requirements and resultant strategy
- The proposed support methodology provided below was considered as an initial assessment and must be updated and optimised as the multi-reef extraction situation requires site-specific detail. This can be achieved by using instrumentation (closure loggers, drill hole cameras etc.) as information becomes available.

The temporary and permanent support strategies for the Merensky and UG2 stopes (as reflected in the BFS optimisation geotechnical study) are detailed in Table 9-18. The raise and advanced strike drives ("ASD") support are summarised in Table 9-19.

Table 9-18: Support strategy for panels

Phase	Support type	Support spacing	Distance from the face [m]
Temporary support	2 lines of mechanical props	2m dip x 1m strike	0.5m
	Safety net	Suspended between 1st row of props and in-stope bolts at 3m from the face	-
Permanent support (all zones)	Pre-stressed yielding elongate (pencil prop) 180mm to 200mm diameter	2m dip x 2m strike	Maximum 3.5m after the blast
	Full column resin bolt 1.5m length	2m dip x 2m strike	0.5m before the blast
Permanent support (zone 1)	800mm x 800mm grout pack	4m dip x 14m strike	

Phase	Support type	Support spacing	Distance from the face [m]
Permanent support (zone 2)		4m dip x 4m strike	Not specified, typically 10m to 12m
Permanent support (zone 3)		2m dip x 14m strike	

Table 9-19: Support specifications for the raise and ASD

Phase	Support type	Support spacing	Area
Temporary support	Not required due to mechanised development. If conditions are blocky, a safety net can be suspended between the permanent bolts		
Raise: permanent support (all zones)	Full column resin bolt 1.8m length	1.5m dip x 1.5m strike	HW and sidewalls
ASD: permanent support (all zones)	Full column resin bolt 1.8m length	1.5m dip x 1.5m strike	HW and sidewalls
	800mm x 800mm grout pack	2m apart on strike	Ledge/ ASD shoulder

9.4.5. Multi reef design strategy

The middling between the Merensky and UG2 reef horizons at the mine ranges between 20m and 50m with an average of 38m. Numerical modelling indicated that where the UG2 horizon is 30m or less below a Merensky pillar or abutment, the stresses reach levels where fracturing of the rock mass is induced. The BFS optimisation geotechnical study recommended the following strategies and considerations:

- The 45° rule must be applied for estimating the stress concentration from Merensky abutments
- High closure rates must be anticipated on the UG2 reef horizon and may result in large falls of ground especially in back areas
- Support systems must be modified to cater for large deformations while maintaining stiff support for HW integrity
- Consider introducing a siding on the down-dip side of the gully.

Typical industry precautions are outlined below:

- Support must be installed timeously and implemented before approaching the 45° abutment stress zone
- Large lead/ lags must be avoided.

A spatial distribution analysis of the middling between the Merensky and UG2 reef horizons is required, as this will significantly influence the stope span, pillar and support design. The analysis should be possible using the information from the 52 geotechnical drill holes.

9.4.6. Regional and local sequencing

Typical best-practice approaches were utilised such as mining commencing from the shaft area outwards on strike and dip, away from the shaft. To avoid unnecessary remnant creation, either an underhand (top panels leading) or overhand (bottom panels leading) configuration must be adopted and leads/ lags between panels must be kept to a minimum of 5m to 8m.

9.5. Improvement and optimisation

Potential improvements or further work to be considered are outlined below:

- The multi reef layout at the mine comprises the same panel layouts, pillar dimensions and support strategies across both reefs. Extensive elastic modelling was completed and the stress profile is well understood. Inelastic modelling and/or further modelling and a middling analysis are suggested. The following investigations are recommended
  - Conduct a middling analysis between the Merensky and UG2 reef horizons. Analyse the data spatially to better delineate stoping ground control districts in relation to critical middling as this will influence the resultant stope span, pillar positioning and/ or dimensions and support design
  - Utilise elastic and inelastic modelling techniques to test various support strategies (support units, spacings, 45° approach rule, panel layouts and pillar superimposition) and adopt the correct practice prior to mining narrow middling areas
- Verify or validate the UCS results conducted on the in-situ rock samples by augmenting the database with additional tests, representative of the entire mining area. Additional properties such as density, elastic modulus and Poisson's ratio must be tested or measured
- Redefine geotechnical ground control districts, taking cognisance of rock strength, critical middling distances and potential planes.

10. Hydrogeology and hydrology

SR 3.1(i); 4.3(ii); 5.2(ii); 5.2(viii) / SV T1.10 / JSE 12.10(h)(vii)

Geohydrological investigations were conducted by Africon Engineering ("Africon") during 2008, DTM Mining Services in 2016 and Geo Pollutions Technology – Gauteng (Pty) Ltd ("GPT") in 2020. The studies were conducted in support of the various authorisation processes. The focus of the 2016 assessment was the TSF located on the farm Mimosa 81 JQ, while the 2020 study was for a TSF proposed on the farm Frischgewaagd 96 JQ.

10.1. Hydrogeology

10.1.1. Hydrogeology setting and sensitive receptors

Detailed studies conducted on the Mimosa farm state that aquifers can be divided into two units: the shallow weathered zone located 10m below ground level ("bgl") and the lower fractured aquifer anorthosite/ norite/ gabbro-norites (which are subjected to fracturing, associated with tectonic movements and rock suite layering). A hydro census survey conducted during 2008, aimed to identify sensitive receptors. The assessment concluded the following:

- Based on the results of the hydro census, the aquifer underlying the study area can be classified as a "minor aquifer system", which is defined as follows: "Fractured or potentially fractured rocks that do not have high primary permeability or other formations of variable permeability"
- Aquifer extent may be limited and water quality variable. Although these aquifers seldom produce large quantities of water, they are important for local supplies and for supplying baseflow for rivers. Groundwater is important for the baseflow component of the Elands River (Africon, 2008)
- The Rustenburg Fault is not expected to cross through the latest footprint of the TSF and passes to the west of the TSF footprint
- Numerous boreholes, mostly equipped with hand pumps, are present within the villages surrounding the mining boundaries (Figure 10-1)
- Water is mainly used for domestic purposes, while irrigation from boreholes takes place on farms south of the Elands River. Average borehole yields are approximately 1.7 litres per second ("l/s"). The depth to water level varied between 1.4mbgl and 65.2mbgl, with the majority of the boreholes indicating a water level depth of between 20mbgl and 30mbgl (GPT, 2020)
- Groundwater quality in the area is generally good with most of the water samples fit for human consumption. Isolated instances of nitrate concentrations exceeding drinking water standards were reported, likely to be attributed to pollution caused by pit latrines (in villages where poor sanitation facilities exist)
- Elevated fluoride concentrations were reported in some of the samples, but this is a known problem of groundwater present in the occurring geological formations
- Groundwater in the study area can generally be classified as Ca-Mg-HCO_3 type water (Africon, 2008).

The hydro-census map based on the 2008 Africon study is indicated in Figure 10-1 below.

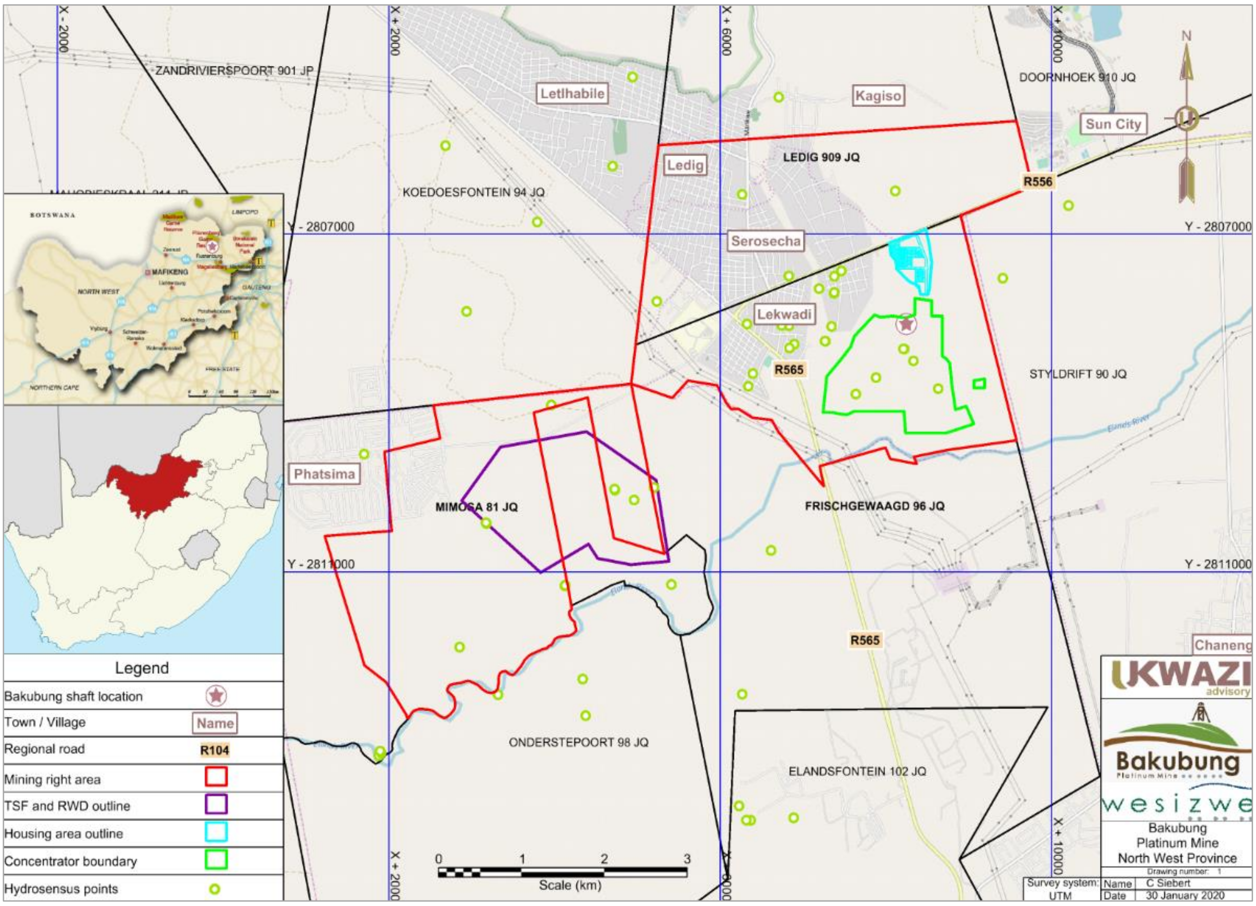

Figure 10-1: Hydro-census map (Africon, 2008)

10.1.2. Water test and monitoring

Groundwater monitoring was conducted since 2010 as per the IWUL conditions. Naledzi Environmental Consultants (Pty) Ltd ("Naledzi") was commissioned by Wesizwe to conduct water quality monitoring for both surface and groundwater at the BPM for a period of 12 months starting from May 2021 to April 2022. Prior to May 2021, Aquatico Scientific (Pty) Ltd ("Aquatico") was responsible for water quality monitoring at the mine. The mine's monitoring network consists of ten groundwater localities and four surface water localities on the Frischgewaagd and Mimosa farms, as indicated in Figure 10-2 below (Aquatico, 2019).

The mine monitors surface and groundwater monthly for five variables (pH, electrical conductivity, temperature, turbidity and total dissolved solids), while a broader suite of chemical and bacteriological analysis is included every quarter. Water quality results described below are from the December 2019 and September 2020 reports from Aquatico, as well as the May 2021 report from Naledzi. The Aquatico reports included an analysis of all the parameters, while the Naledzi report only addressed the five variables mentioned above.

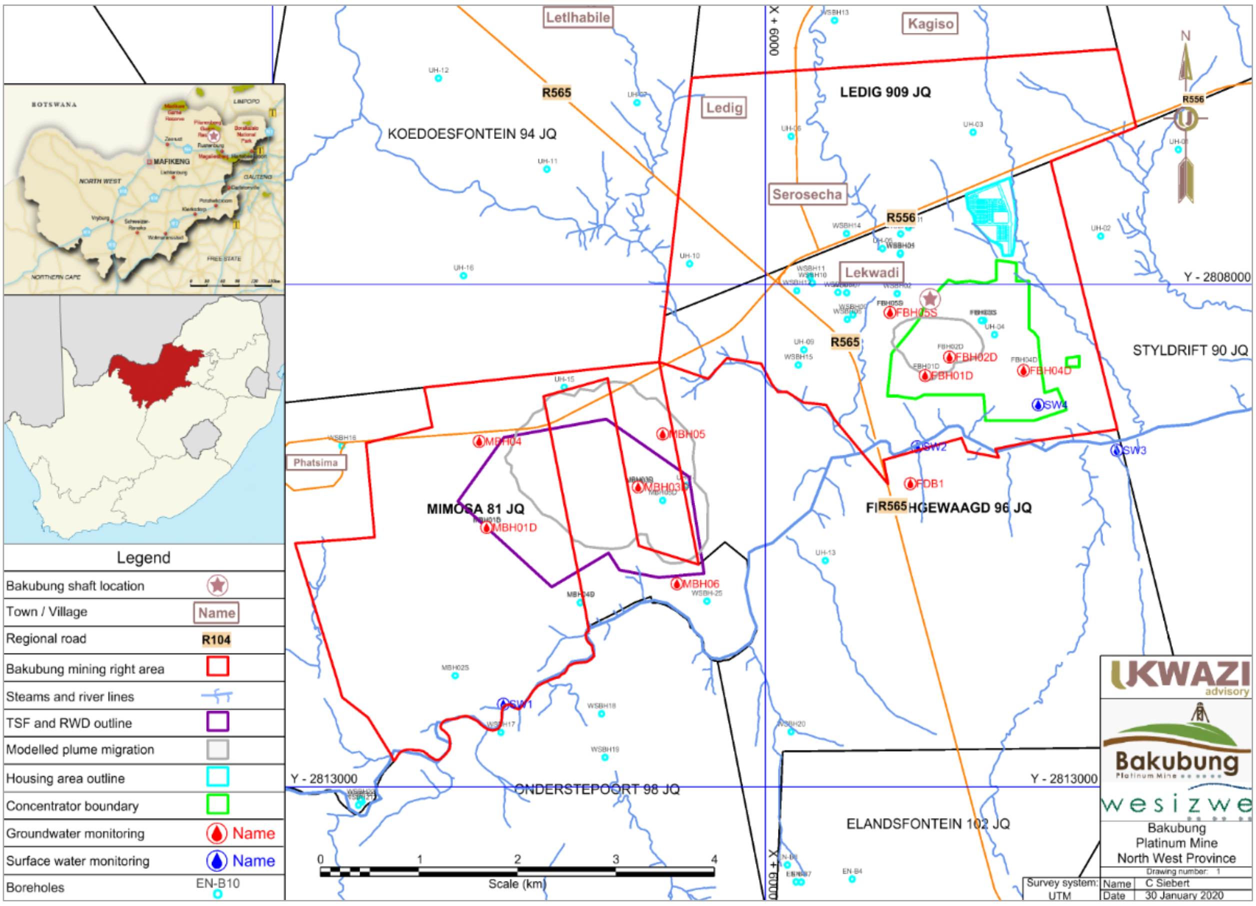

Figure 10-2: Location of water monitoring points (Aquatico, 2019)

Water quality results for the period of July 2018 to December 2019 and for the month of September 2020 were assessed and concluded the following (Aquatico, 2019; Aquatico, 2020; Naledzi, 2021d):

- Frischgewaagd
  - Groundwater quality in the Frischgewaagd area was good in 2018 and 2019, but in 2020 deteriorated to "marginal" (Class 02) at three of the four boreholes according to the Water Research Commission, Quality of Domestic Water Supplies guidelines ("QDWS") (1998). The water at FBH05S, located upstream of the mine and close to the community of Ledig, was classified as being 'Unacceptable'.
  - Average groundwater total dissolved solids ("TDS") concentrations for the 2018/ 2019 monitoring year were within the maximum permissible South Africa National Standard ("SANS") limits of 1200 milligramme per litre ("mg/l") for all boreholes and varied between ±460mg/l and 670mg/l. The 2020 water monitoring results still complied with SANS and varied between 526mg/l and 692mg/l, while May 2021 results varied between 510mg/l and 840mg/l
  - The sulphate ("SO_4") content measured in the monitoring boreholes were within the maximum permissible SANS limits of 500mg/l and displayed averages of between ±2mg/l and 32mg/l throughout the period under investigation
  - All inorganic parameters were within the permissible SANS limits for drinking water, except iron ("Fe") that was marginally above the 0.3mg/l SANS threshold at 0.311mg/l at FBH05S in September 2020
  - No impacts from the concentration plant were observed from the monitoring information
  - The nitrate ("NO_3") content measured in the monitoring boreholes were within the maximum permissible SANS limits of 11mg/l and displayed averages from below detection limits to 9.18mg/l. The groundwater nitrate concentrations in FBH04D remain below the maximum drinking water limit, displaying an increasing trend over the period (Figure 10-2)
  - *Escherichia coli* ("*E. coli"*) was present in all boreholes in 2018 and 2019, but not at FBH02D and FBH05S in 2020, rendering the groundwater unsuitable for domestic purposes. Extremely high total coliforms levels were detected at FBH05S in 2020. The source of the total coliforms and *E .coli* bacteria is unknown and must be investigated
  - Turbidity levels were elevated at all boreholes, however, by far the highest turbidity levels were detected at FBH05S upstream of the mine next to the Ledig community. This borehole showed elevated turbidity

of 28 turbidity units ("NTU") in December 2019 that increased further to 192NTU in September 2020 but decreased in May 2021 to 130NTU. This is much higher than the SANS drinking water limits of 1NTU. Turbidity was between ±2NTU and ±4NTU at the other three boreholes in September 2020. In May 2021, turbidity varied from undetectable at FBH01D, to between 3NTU at FBH04D and 16NTU at FBH02D.

- Mimosa
  - Groundwater quality in the Mimosa area is mostly good when considering inorganic content (except for MBH03D) (Figure 10-2)
  - Average groundwater TDS concentrations for the monitoring period under consideration were within the maximum permissible SANS limits and varied between ±400mg/l and 950mg/l. The TDS concentration predominantly displayed an overall constant concentration trend, except for MBH03D, which showed an increase in TDS over the reporting period
  - The SO_4 content measured in the monitoring boreholes were within the maximum permissible SANS limits of 500mg/l and displayed averages of between ±1.5mg/l and 20mg/l
  - The NO_3 concentration measured in the monitoring boreholes were within the maximum permissible SANS limits of 11mg/l and displayed averages of below detection limits to 2.36mg/l. The groundwater NO_3 concentrations in MBH05 increased slightly from 2018 to 2019 but was below detection in 2020
  - The maximum permissible concentrations for Fe and manganese ("Mn") were both exceeded in borehole MBH03D from 2018 to 2019, rendering the water unsuitable for human consumption. Mn was still elevated in September 2020, however, Fe decreased to below detection at all boreholes. It is unlikely that these elevated concentrations originate from mining activities as these would have been present in the more conservative macro element indicator parameters
  - Elevated *E. coli* bacteria content renders the groundwater in boreholes MBH05 and MBH06 unsafe for domestic purposes. *E. coli* was however not found at MBH06 in September 2020. The sources of the *E. coli* are unknown and should be investigated
  - Turbidity levels were elevated at all boreholes. The highest turbidity levels were detected at MBH03D in the centre of the site. This borehole showed elevated turbidity of 358NTU in September 2020 but decreased to 127NTU in May 2021. The other two boreholes showed levels of between ±3NTU and ±20NTU over the monitoring period, which is also higher than the SANS drinking water-limited of 1NTU
  - Groundwater is dominated by magnesium cations, while bicarbonate alkalinity dominates the anion content
- Water levels: The average water levels over the 2018 to 2020 monitoring period varied between 8 meters below surface ("mbs") and 42mbs. Overall, the water level trend remained relatively constant over the analysis period and did not show any major deviation. Results confirm that no dewatering is currently taking place.

10.1.3. Groundwater impact zone – contamination transport and mine dewatering

Three numerical groundwater models were developed for the project. The initial model was completed for the shaft, waste rock dump, concentrator plant and smaller TSF by Africon in 2008. The model was updated in 2016 for the larger TSF footprint area on the farm Mimosa 81 JQ by DTM Mining Project and Services, and again in 2020 by GPT for the new TSF proposed on the farm Frischgewaagd 96 JQ. Groundwater will generally flow from north to south towards the Elands River (Africon, 2008).

Indicative waste profiling, considering the total and leachable concentrations of inorganic contaminants, was undertaken based on the national norms and standards for the assessment of waste for landfill disposal (GN 635 of 2013).

The data indicated that the total concentrations of barium ("Ba"), Cu and Ni classify the tailings deposited on the farm Mimosa 81 JQ as a type 3 waste, although both Cu and Ba were only marginally over threshold limits. Leachable concentrations were well above the level for chemically inert materials (Knight Piésold, 2016).

The tailings to be deposited on the farm Frischgewaagd 96 JQ were also classified as a type 3 waste, since the total concentration threshold was exceeded for cobalt, Cu, Mn, Ni and vanadium. The leachable concentrations were also within the level for chemically inert materials (GPT, 2020).

All the samples submitted for acid-base accounting returned net neutralising capacity, suggesting that the tailings will not produce acidic leachate. Mobilisation of other, non-pH dependant contaminants (salts) are however possible (Africon, 2008). The initial numerical model was formulated utilising Modflow groundwater modelling software and the following conclusions were made with reference to the zone of influence ("ZOI"):

- Lowering (>6m) of the groundwater table will be confined to an area of approximately 700m around the shaft area (Figure 10-4)
- Due to the flat hydraulic gradient and low hydraulic conductivities, plume migration from the Mimosa TSF is expected to range between 2m and 200m per year. This wide range is due to uncertainties in the distribution

of fractured systems in the hard rock aquifer. The modelled results indicate a plume migration rate of approximately 300m over 15 years (approximately 20m/annum) (Figure 10-3)

- Plume migration in the shaft area is expected to be slightly less than in the TSF area (approximately 220m over 15 years or 15m/year). The slightly slower rate of migration can be attributed to the low hydraulic conductivities found in the area
- Plume movement from the Frischgewaagd TSF is expected to be very slow due to the low hydraulic conductivity and flat groundwater level. Plume migration is expected to be at approximately 2m/annum on average for a minor leak in the liner and 4m/annum for a major leak. Models were compiled that show seepage from the facility for deposition over a 10-, 25-, 50- and 100-year period. The scenarios over 50 and 100 years were considered irrelevant as the life of the facility will be much shorter. The 10- and 25-year deposition scenarios show that the plume migration will not reach the Elands River even without a liner.
- No groundwater users were identified within the ZOI. The plume migrates towards the south away from the Ledig area towards the PCD area and Elands River.

The Knight Piésold design report (2016) proposed a 1.5mm high-density polyethylene ("HDPE") (double textured) geomembrane to serve as the liner for the Mimosa TSF. GPT also proposed that the Frischgewaagd TSF facility and its PCDs should be lined with an approved Class C or general large landfill liner.

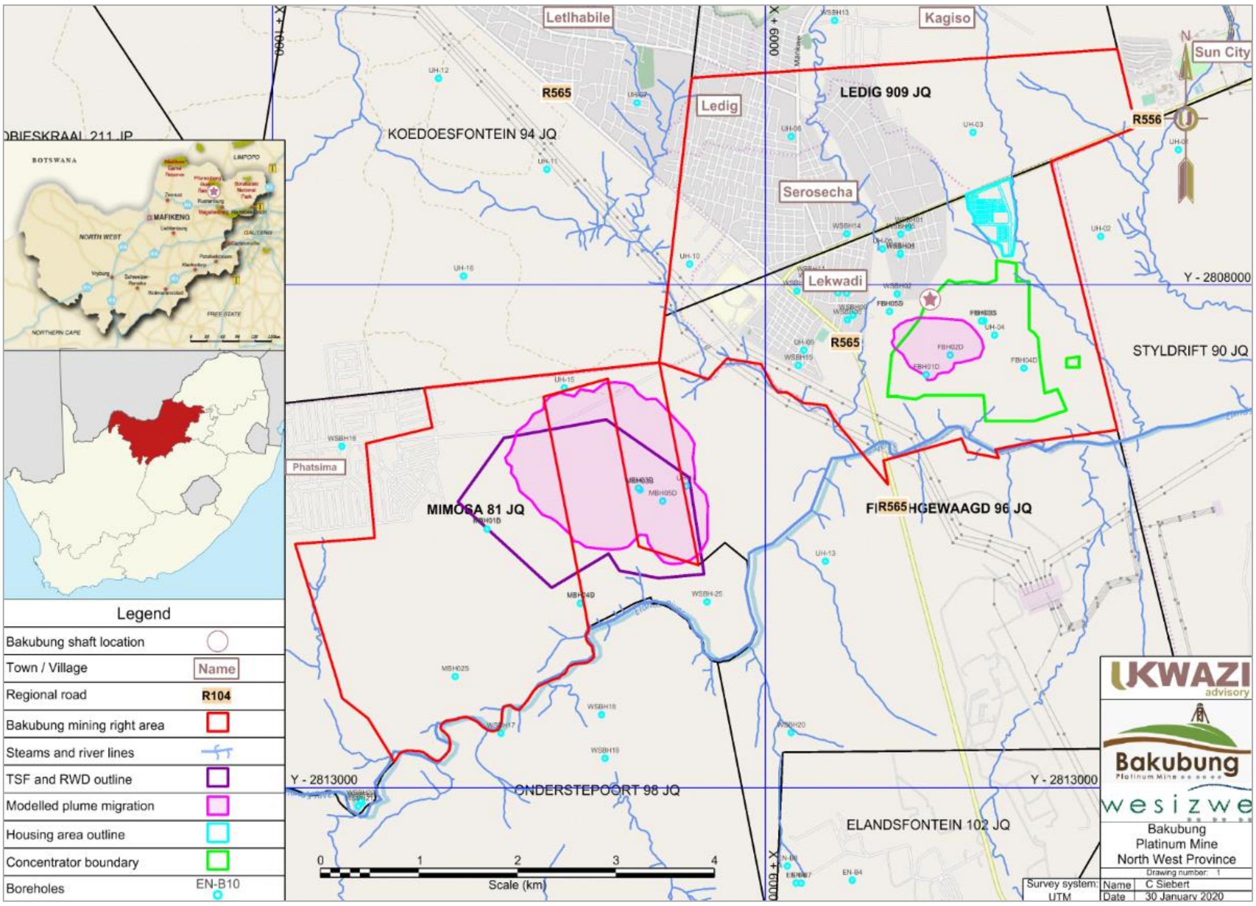

Figure 10-3: Plume migration after 15 years – Mimosa TSF and Frischgewaagd shaft area (Africon, 2008)

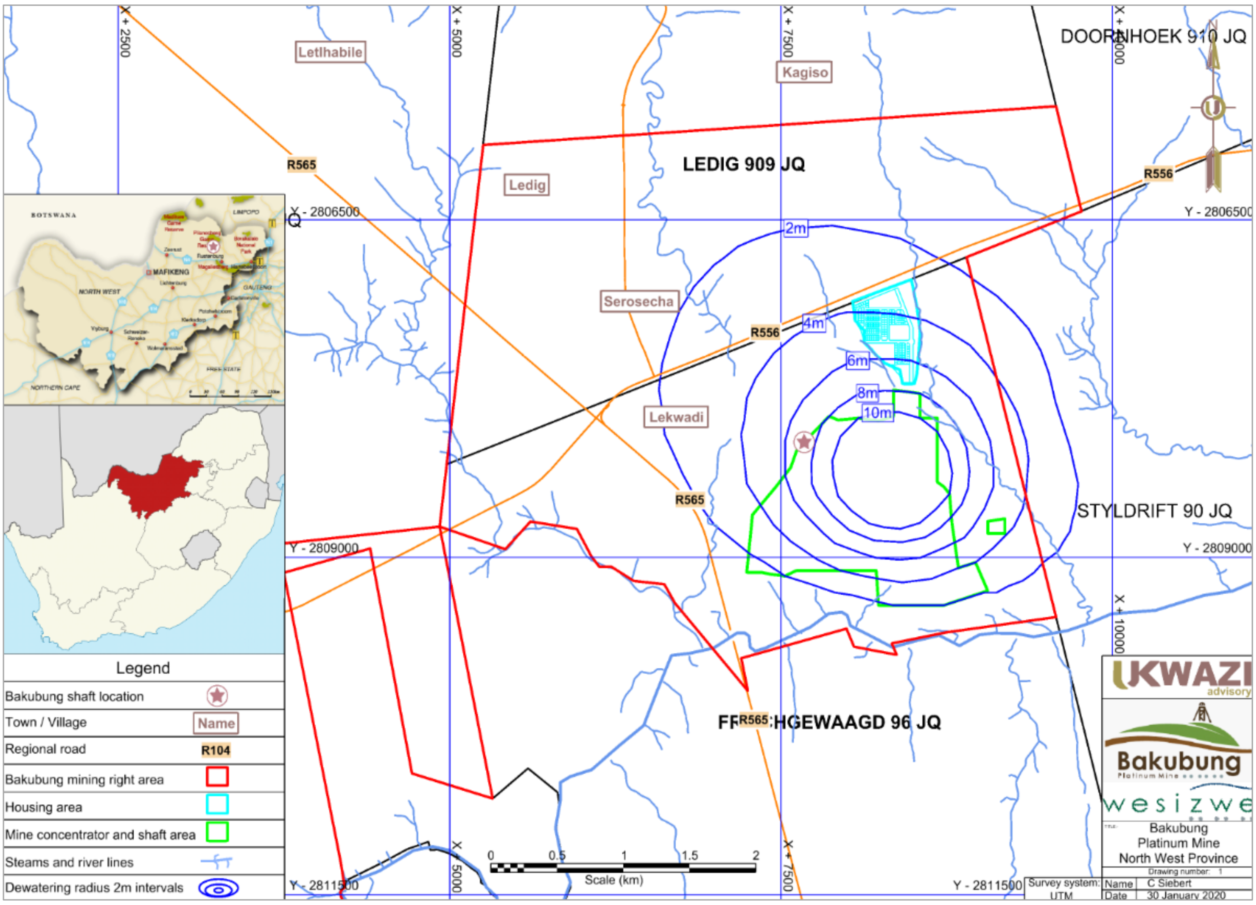

Figure 10-4: Radius of influence as a result of mine dewatering (Africon, 2008)

10.2. Hydrology

SR 1.1(ii)

10.2.1. Topography and drainage

The area around the mine is relatively flat with an average elevation of approximately 1 060m amsl and is intersected by drainage lines with the mountainous Pilanesberg Alkaline Complex occurring in the north of the area. The mining right area is located within the A22F quaternary catchment. Drainage in the area generally takes place in a southerly direction through minor tributaries of the Elands River, which flows in an easterly direction. The area is located near the Elands River and Sandspruit and an unnamed tributary of the Elands River, ephemeral drainage lines, un-channelled and channelled valley bottom wetlands. The delineated watercourses range from having high to very high ecological importance and sensitivity.

10.2.2. Floodlines

A 1:100-year recurrence flood line analysis was compiled by EnviroSource (EnviroSource, 2016). None of the mine infrastructure is located within the 1:100-year flood line, the only exception is the tailings pipeline that was authorised to cross a tributary of the Elands River between the Frischgewaagd and Mimosa sections. Consequently, a number of section 21 (c) and (i) (impeding and diverting) water uses were included in the WUL for river crossings or for being within 100 metres from a drainage line or river (Knight Piésold, 2021).

10.2.3. Wetlands and drainages

The seasonal wetland area occurs to the south-western area of the Mimosa site along the Elands River as indicated in Figure 10-5. Ecological function of this community is moderate to high (Golder Associates, 2007).

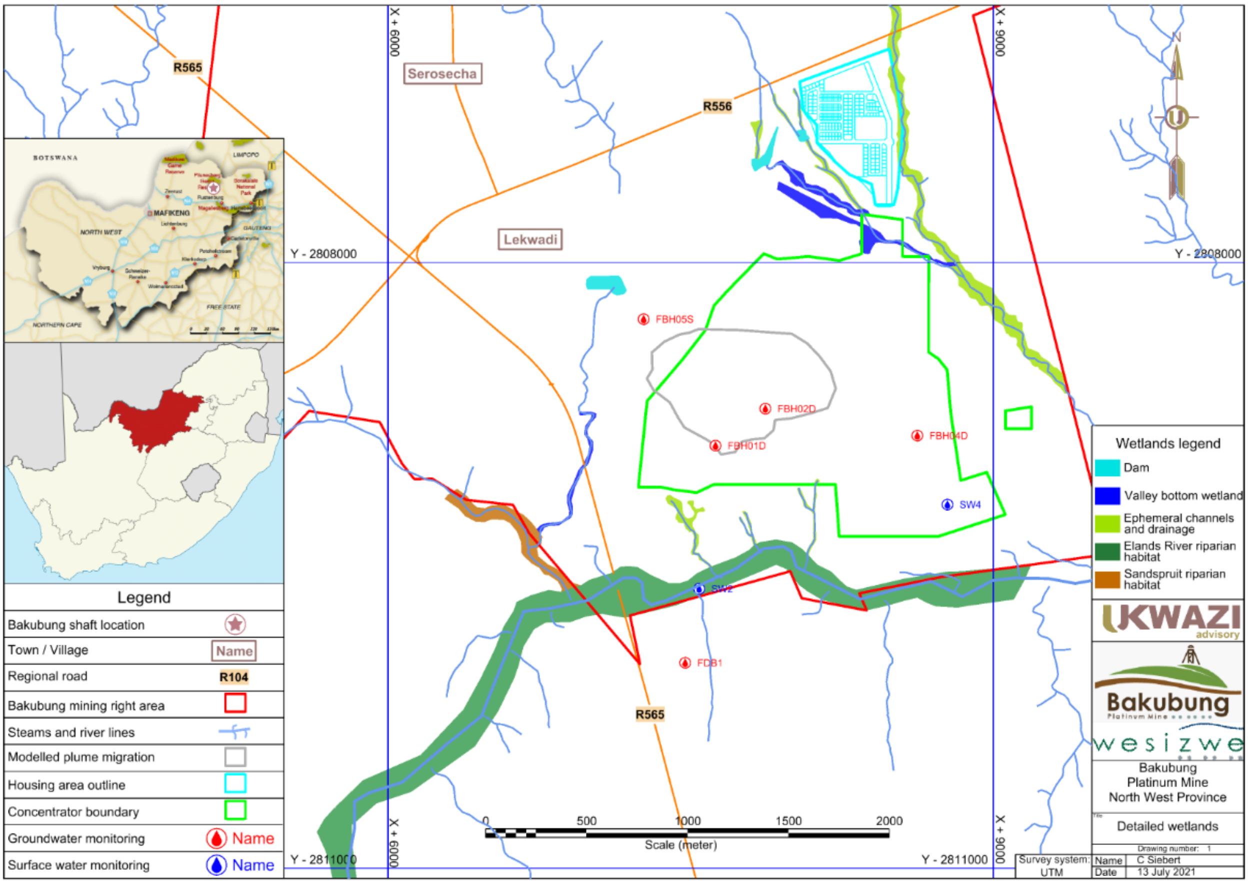

Figure 10-5: Wetland area around the Elands River

10.2.4. Surface water quality

Surface water monitoring in the Elands River takes place upstream (SW1) and downstream (SW3) of the mine, and at a site located approximately midway (SW2) between SW1 and SW3. Surface water monitoring is also undertaken at the PCD (SW4). The June 2019 monitoring results of the Elands River categorised the physical water quality as neutral, non-saline and moderately soft to slightly hard. The samples collected had high counts of *E. coli* and total coliforms. The turbidity, microbiological counts, aluminium ("Al") and Fe at SW1 make the Elands River water unsuitable for consumption. All the monitoring points in the Elands River were dry during the December 2020 monitoring campaign (Aquatico, 2019).

The September 2020 monitoring results in the Elands River categorised the physical water quality of SW1 as neutral, moderately soft and non-saline, while the water quality at SW3 was neutral, slightly hard and non-saline. The Elands River at SW2 was dry at the time. It should be noted that the Elands River is known to be dominated by low flow conditions (Aquatico, 2020).

The water quality mostly complied with the WUL guidelines as well as the general authorisation limits in terms of all variables analysed, except for Fe that exceeded the general authorisation limits for SW1 and SW3. Fluoride and pH exceeded the WUL and general authorisation limit at SW3 and SW4 respectively. The water at SW1 and SW3 could be classified as unacceptable for domestic use. The turbidity levels at both sites exceeded the QDWS guidelines, while the guidelines were also exceeded in terms of total coliform and *E. coli* counts at SW3. The Resource Quality Objectives ("RQO") for the Mokolo-Crocodile West Catchment were exceeded in terms of Al, Fe, and turbidity at SW1 and for Al, Fe, Mn and *E. coli* at SW3 (Aquatico, 2020).

The May 2021 water monitoring results found the water to be neutral to alkaline. The measured concentrations of all the parameters analysed (pH, electrical conductivity, temperature, turbidity and TDS) were found to be below the WUL water quality limit and general authorisation discharge limits (Naledzi, 2021d).

Biomonitoring is conducted twice a year in the summer and winter months. Data collected from the winter period biomonitoring by Scientific Aquatic Services (2019) indicated that the seasonal flows and lack of permanent flow largely constrains and shapes the aquatic communities present at the respective monitoring points. Flow variability and lack of flow, result in long-term variability in electrical conductivity, dissolved oxygen and macro-invertebrate integrity. The Elands River is in a largely modified condition prior to any potential impact of the BPM operations. Impacts observed on the Sandspruit and the unnamed tributary of the Elands River are likely the result of catchment-wide impacts associated with cattle farming activities and rural settlements in the greater area (Scientific Aquatic Services, 2019).

The biomonitoring assessment by Knight Piésold (Pty) Ltd ("Knight Piésold") in February 2020, found the Elands River in the vicinity of Frischgewaagd to be in a moderately modified ecological category, based on the macroinvertebrates present in the river (Knight Piésold, 2020).

10.3. Stormwater management

A stormwater management plan was completed by TWP-ES as part of the conceptual designs, indicating clean and dirty water management areas. An update of the stormwater management plan was completed by EnviroSource in April 2016. A further update was included in the TSF design report, completed by Knight Piésold in 2021.

10.3.1. Clean water diversion structures

A system of diversion berms and trenches were implemented according to the approved stormwater management plan. This prevented clean surface water runoff, from the catchments upslope of the mining areas, from entering the dirty water management areas. The diverted clean runoff is then returned to the non-perennial drainage lines.

10.3.2. Dirty water controls

All contact or dirty water is conveyed towards the PCD complex. The waste rock dump ("WRD") is enclosed with stormwater management measures (trench and berm systems) and affected runoff from the WRD is conveyed, via these trenches, to the PCD complex from where the water is re-used within the concentrator plant. Water from the Mimosa TSF will report to the RWD and pumped to the PCD complex at the plant for re-use. Stormwater from the Frischgewaagd TSF will report to the existing PCD. A GN 704 audit was completed in 2019 and the findings indicate a 100% compliance with the requirements of the regulation.

10.3.3. Mining and water balance

10.3.3.1. Underground dewatering

Currently, no fissure water was intersected. The water balance did not consider any fissure water as part of the water supply strategy as underground water is pumped to the settling dams for recycling (BPM, 2019).

10.3.3.2. Water balance

A high-level water balance was developed for the BPM. According to the water balance (BPM, 2019), the total water requirement for the mine during full production is 11.8 megalitres per day. Of this, 10.2 megalitres per day will be consumed by underground operations and 1.65 megalitres per day will be consumed by surface infrastructure. Approximately 2.7 megalitres per day of make-up water is required from an external source. A water agreement with Magalies Water is currently in place for the provision of 2 190 megalitres per annum, with an estimated maximum seven-day design requirement of 52.5 megalitres. The daily provision from 2017 onwards is 6 megalitres per day. The potable water is stored in four, 3 megalitre capacity holding tanks, situated to the north of the shaft area (Mechanical Design Calculations-Water Balances, 2019).

The remaining 8.7 megalitres per day will be recovered from recycling processes in various operations from the refrigeration plant, sewerage treatment plant and underground operations. During the discussion with on-site personnel, it was stated that the sewer treatment works cannot be operated currently as the minimum treatment capacity is higher than the current sewerage load. The water balance must be updated to accommodate this change and should be calibrated with flow meter data once the TSF is operational.

The assumed mine water usage is indicated in Figure 10-6.

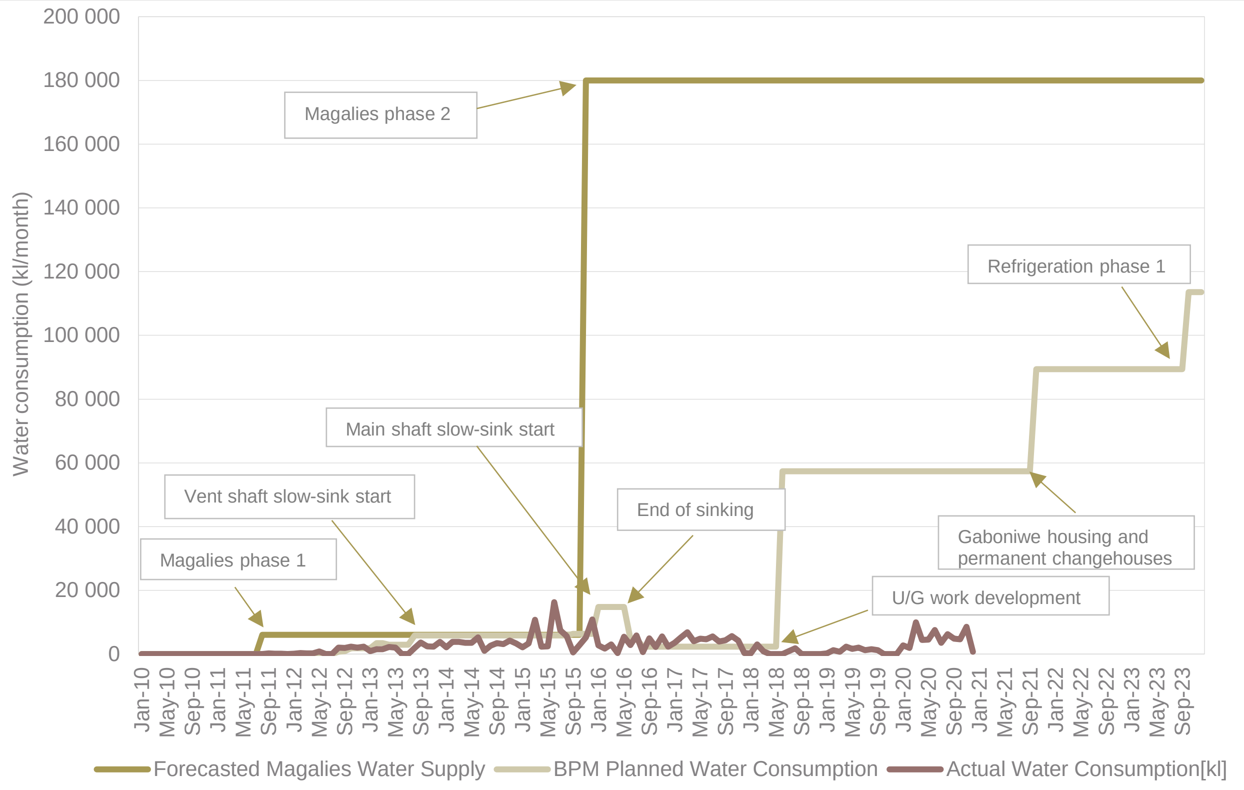

Figure 10-6: Assumed mine water usage chart (Mechanical design calculations, 2019)

10.3.3.3. Salt balance

Lambani Engineering Projects ("Lambani") compiled a salt balance for the mine in May 2021 to quantify the amount of salt deposited from fissure water onto the surface dams and the potential impact this could have on the Elands River. The focus of the salt balance was based on TDS, electrical conductivity ("EC") and nitrate in the fissure water. Data from the existing boreholes were used to determine the mine salt balance, no samples were taken from the settling ponds. The results indicated that the impact from TDS, EC and nitrate on the Elands River is negligible and the contribution will be well within the acceptable limits (Lambani, 2021).

11. Mining engineering

SR 4.3(ii); 5.2(i); 5.2(ii); 5.2(iv); 5.2(v); 5.2(ix) / SV T1.10 / JSE 12.10(h)(vii)

The mining engineering work as basis for the Mineral Reserve estimate was conducted on an appropriate LOM level of accuracy and detail as defined in The SAMREC Code and based on The SAMREC Code, Table 2 guidelines. A structured and tested process was followed to consider mining and non-mining related modifying factors:

- Mining model
- Mining cut definition
- Mine design and planning criteria
- Mine design
- LOM schedules
- Mining related equipment
- Mineral Reserve estimation.

The initial BFS was completed in 2009 by TWP Projects ("TWP"). Subsequent mine optimisation studies were done by WorleyParsons (formerly TWP) in 2014. The basis of the current mine design is primarily based on the BFS and subsequent optimisation studies, with some local and regional design updates by Ukwazi in 2020 and 2021.

11.1. The modelling processes

The 2D geological model as the basis for the Mineral Resource estimate was constructed in Datamine™. This model with the application of mining related modifying factors was used as basis for the LOM schedules and Mineral Reserve estimate. Table 11-1 shows a summary of the model attributes used. The listed attributes are specific to the model and constitute the minimum elements required.

Table 11-1: Summary of the model attributes

Attribute name	Unit	Description
Density	m³/t	Relative density
Ptgt	g/t	Pt grade
Pdgt	g/t	Pd grade
Rhgt	g/t	Rh grade
Augt	g/t	Au grade
4Egt	g/t	3 PGE (Pt, Pd, Rh) + Au grade
Cu%	%	Cu percentage grade
Ni%	%	Ni percentage grade
THICK	m	Resource cut (channel width)
Pt_fw	g/t	Pt grade in the immediate FW
Pd_fw	g/t	Pd grade in the immediate FW
Rh_fw	g/t	Rh grade in the immediate FW
Au_fw	g/t	Au grade in the immediate FW
4E_fw	g/t	3 PGE (Pt, Pd, Rh) + Au grade in the immediate FW
Cu%_fw	%	Cu percentage grade in the immediate FW
Ni%_fw	%	Ni percentage grade in the immediate FW
DEN_fw	m³/t	Relative density of the immediate FW
THICK_fw	m	Overbreak thickness in the immediate FW
Pt_hw	g/t	Pt grade in immediate HW
Pd_hw	g/t	Pd grade in the immediate HW
Rh_hw	g/t	Rh grade in the immediate HW
Au_hw	g/t	Au grade in the immediate HW
4E_hw	g/t	3 PGE (Pt, Pd, Rh) + Au grade in the immediate HW
Cu%_hw	%	Cu percentage grade in the immediate HW
Ni%_hw	%	Ni percentage grade in the immediate HW
DEN_hw	m³/t	Relative density of the immediate HW
THICK_hw	m	Overbreak thickness in the immediate HW
Geoloss	%	Unknown geological loss

11.2. Mining cut selection

11.2.1. Merensky reef

The geological description of the facies as described in Section 5.3 of this report and the resource best-cut parameters for the Merensky reef, are shown in Table 8-1. In addition to the geological definition, each facies exhibits a unique mineralisation profile/ grade histogram.

Figure 11-1 to Figure 11-4 shows the various Merensky reef facies, associated grade histograms and planned mining cuts relative to the defined, best-cut resource cuts. Figure 11-1 shows the planned mining cut, relative to the defined resource cut as contained in the geological model for the Normal Merensky reef facies. The mining cut was based on the defined resource cut, with the addition of a 5cm HW overbreak allowance and a 15cm FW overbreak allowance.

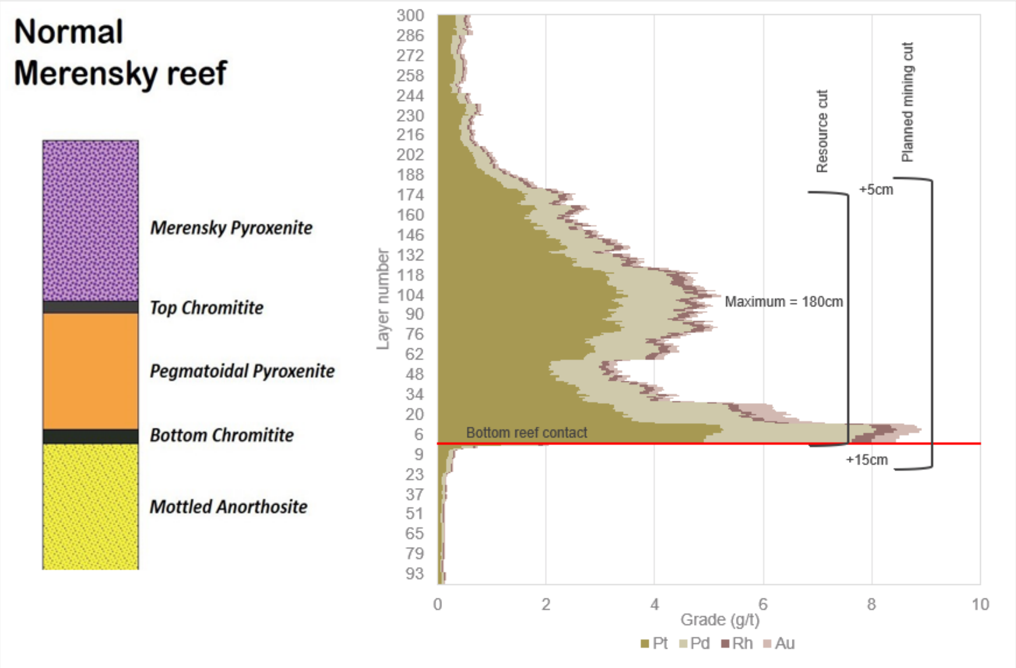

Figure 11-1: Normal Merensky reef facies - Planned mining cut

Figure 11-2 shows the planned mining cut relative to the defined best-cut resource cut, as contained in the geological model for the Normal FW Merensky reef facies. The mining cut was based on the defined resource cut with the addition of a 5cm HW overbreak allowance and a 15cm FW overbreak allowance.

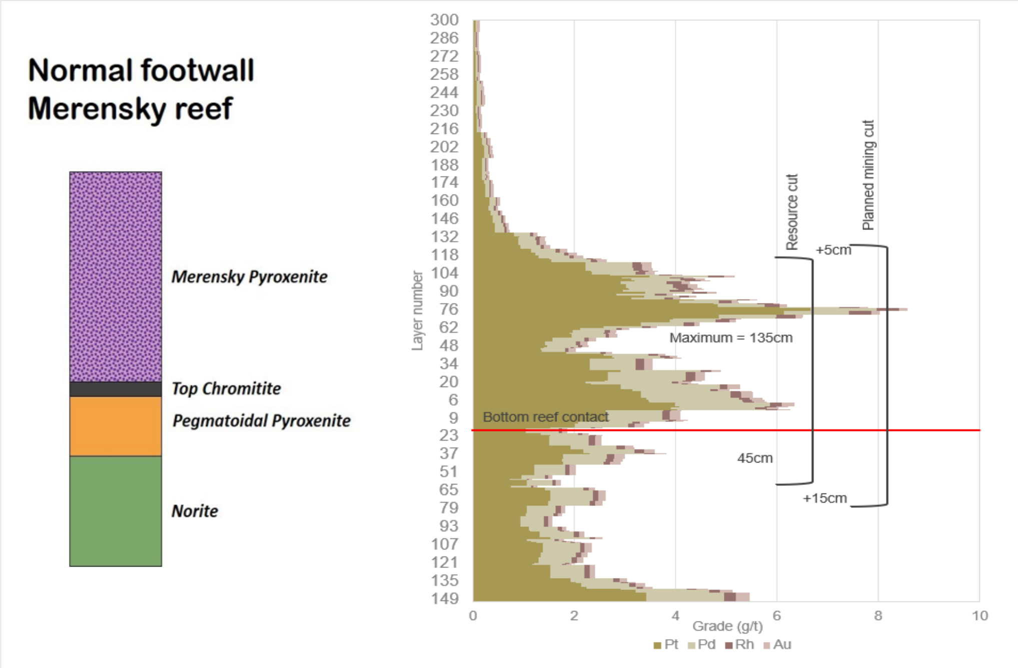

Figure 11-2: Normal FW Merensky reef facies - Planned mining cut

Figure 11-3 shows the planned mining cut relative to the defined best-cut resource cut as contained in the geological model for the Single Chromitite Merensky reef facies. The mining cut was based on the defined resource cut with the addition of a 5cm HW overbreak allowance and a 15cm FW overbreak allowance.

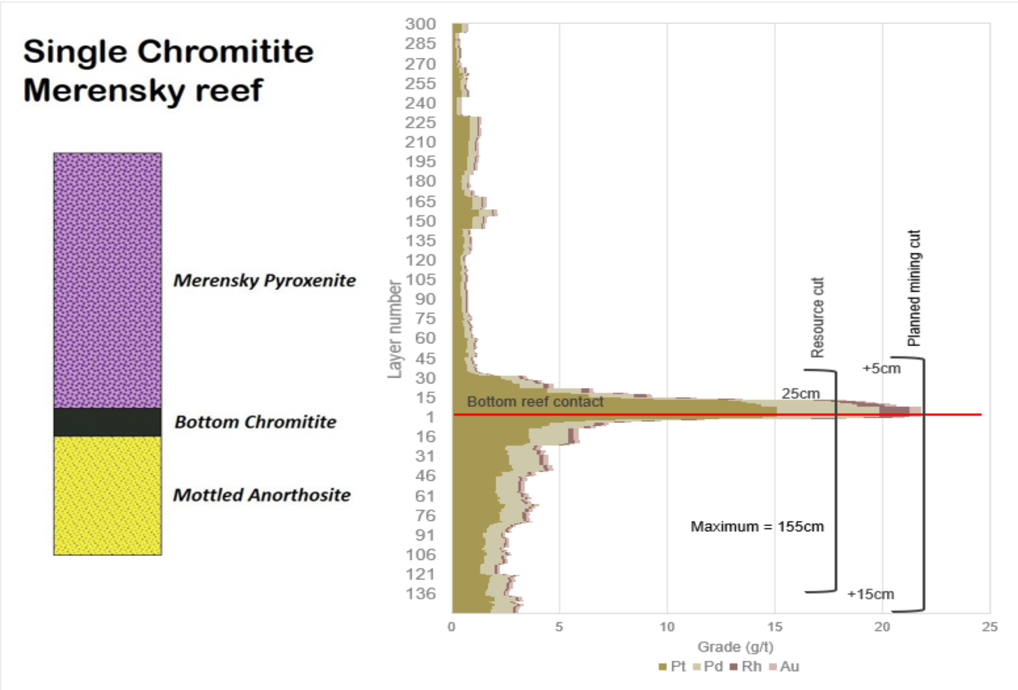

Figure 11-3: Single Chromitite Merensky reef facies - Planned mining cut

Figure 11-4 shows the planned mining cut relative to the defined best-cut resource cut as contained in the geological model for the Detached Merensky reef facies. The mining cut was based on the defined resource cut with the addition of a 5cm HW overbreak allowance and a 15cm FW overbreak allowance.

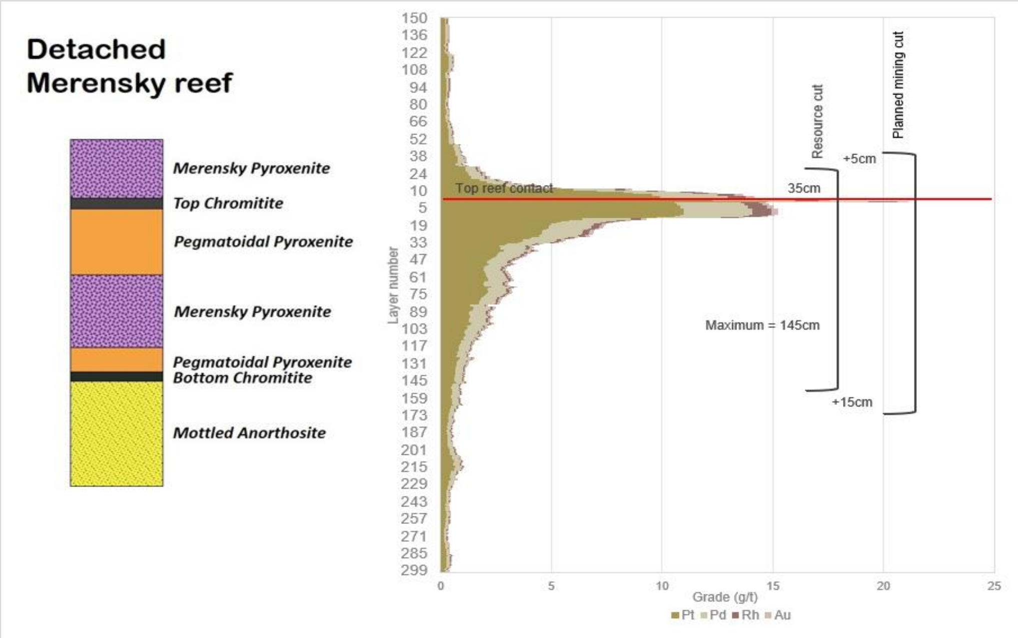

Figure 11-4: Detached Merensky reef facies - Planned mining cut

11.2.2.Upper Group 2 Chromitite layer

Two facies of the UG2 Chromitite layer were identified with the distinction between them, being the nature and thickness of the immediate FW. The identified UG2 facies include the Normal UG2 Chromitite layer facies and the Regional Pothole UG2 Chromitite layer facies. The Mineral Resource cut for the UG2 Chromitite layer was based on:

- Practical mining cut of a minimum of 0.9m and a maximum cut of 1.85m
- The grade distribution of the proposed cut considering that the main Chromitite layer is bottom-loaded
- Geotechnical constraints based on a minimum under-cut beam thickness/ parting width of 0.5m.

The critical factor in the UG2 cut selection was the consideration of geotechnical constraints. The UG2 main Chromitite layer is consistently overlain by three Chromitite layers (ranging from 10cm to 20cm in thickness), locally termed "the triplets" which can vary in their parting distance (between 0.25m and 0.75m) to the UG2 main Chromitite layer. Based on numerical modelling conducted, that considered the current mine design criteria and site-specific rock mass properties, a parting width of at least 0.5m is required between the main UG2 Chromitite layer and the triplets to safely undercut the triplets.

The mining cut for the UG2 Chromitite layer was based on the defined Mineral Resource cut that considered the practical mining aspects as listed above. Additional HW overbreak of 5cm and FW overbreak of 15cm was allowed for and incorporated in the planned mining cut.

11.3. Mine design

SR 5.2(vii); 5.2(viii)

A detailed mine design was completed as part of the LOM plan in Datamine™ Studio 5D planner version 14.26.83.0.

11.3.1. Overview of mine design and mining method

The main ore body access is facilitated through a vertical shaft system that comprises:

- An 8.5m diameter lined main shaft (depth 825m) equipped with men, material and rock handling facilities
- A 7.5m diameter lined service shaft for men and material (depth 825m).

These shafts were positioned within the constraints of the mining right area to effectively access each of the two reef horizons as indicated in Figure 11-5. The main shaft can hoist up to 250ktpm of ore and up to 15ktpm of waste during steady-state production.

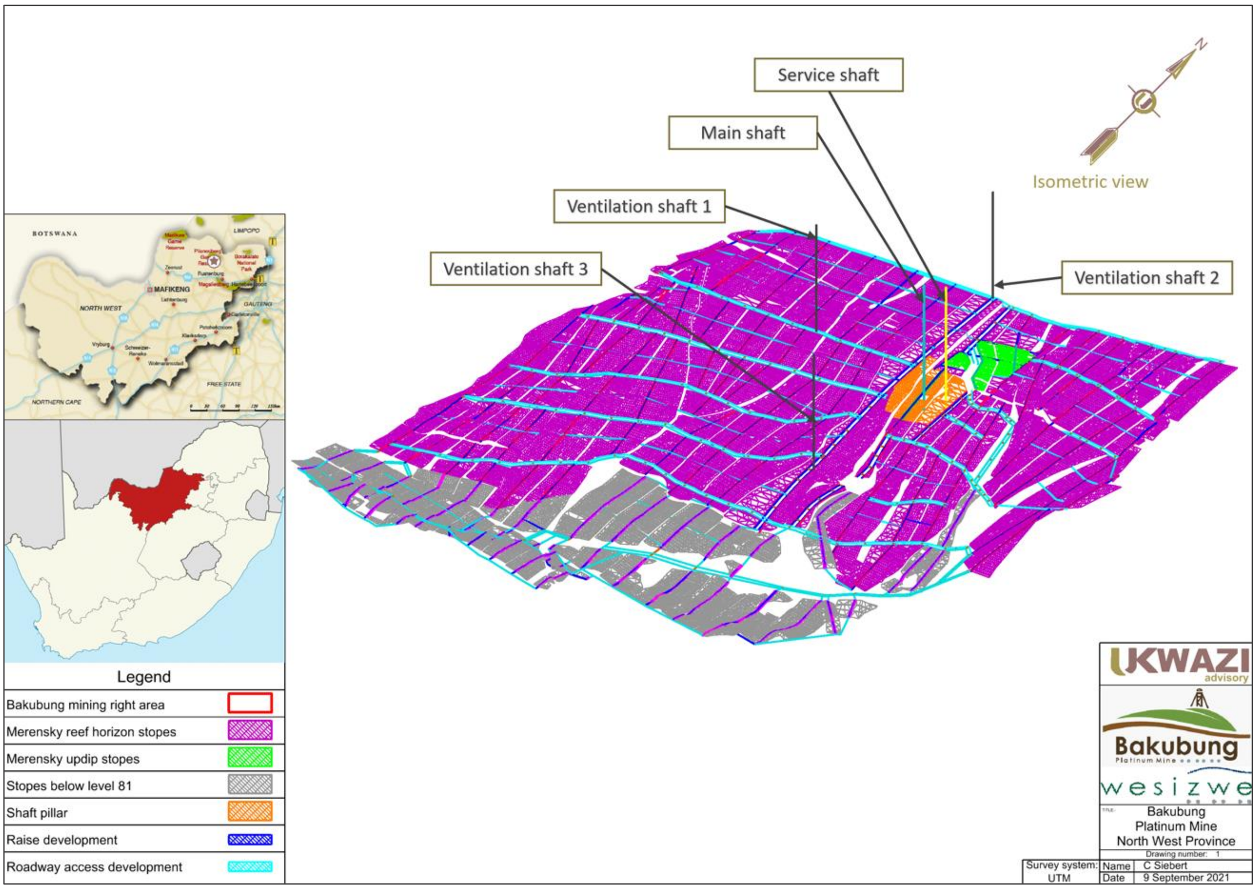

Figure 11-5: Isometric view of shaft locations relative to the Merensky reef mine design

The ore body is accessed with four station levels out of the main and ventilation shafts, namely 69L, 72L, 77L and 81L:

- 69L: The first station development located at a depth of approximately 690m below surface that includes critical station infrastructure and workshops
- 72L: Located at a depth of approximately 720m below surface, forming a critical part of the mine's rock conveying strategy. The Mezzanine - which is a sub-level, situated between 69L and 72L - is designed to receive waste and ore from the stoping sections via the conveyor belt systems (which will feed into the silos between 72L and 77L). Other critical infrastructure includes the workshops and the conveyor decline system
- 77L: The main conveyor level is located at a depth of approximately 770m below surface (which is the bottom of the silo system and the top of the dams) and hosts the loading station excavation at the main shaft. The 77L infrastructure was designed to access the southern block of the mine. Other critical infrastructure includes workshops and the conveyor decline system

- 81L: Located at a depth of approximately 810m below surface and forms the bottom of the mine's dam system. This level was designed to access the southern mining block and house the mechanical workshops.

The primary haulage development consists of on-reef twin access drives and inclined raises, intended primarily for the movement of personnel, logistics and to act as intake airways. Underground development of integrated shaft infrastructure includes the workshops, tips, ore passes, silos, belt level, skip tipping arrangements, dams, main chambers and shaft bottom. A chairlift system was designed in conjunction with the vertical shafts to facilitate reduced travelling times.

The twin RAD was designed for reef access orientated on strike across the mine. During initial production operations, rock will be transported directly to the main shaft until construction of the conveyor system is completed. The RADs raises and ASD will be developed by trackless, mechanised equipment consisting of a single boom drill rig, load haul dumper ("LHDs), dump trucks and two Autoroc bolters.

The initial stope production activities commence with ledging of the raise and subsequent establishment of a series of breast panels located on both sides of the ledged raise. The ASDs will be developed from the reef raise and maintained slightly ahead of the advancing stope panel to facilitate a free breaking face and the movement of rock, men and material.

Blasted rock will be scraped from the panel to the ASDs by 37kW face winches using two 0.9t effective scraper shovels connected in tandem. LHDs (9.5t low profile) will transport rock from the ASD to the truck loading point in the original raise. The truck (30t low profile) will tram rock to the station or the internal conveyor transfer tip. Each tip is equipped with a grizzly and peckers to control the rock lump size.

11.3.2. Mine design and planning criteria

The geotechnical parameters, as basis of the detailed mine design, are described in Chapter 9 of this CPR. The general mine design and mine planning criteria are shown from Table 11-2 to Table 11-6.

Table 11-2: General development mine design parameters

Parameters	Description	Unit	Value
General development design parameters	FW haulages	m	4.8 wide x 3.1 high
	RAD	m	4.8 wide x 3.1 high
	Raise	m	4.8 wide x 3.1 high
	ASD	m	4.0 wide x 2.4 high
	Shaft ore-passes	m (diameter)	2.8
	Shaft main silos	m (diameter)	7.5
	Section ore-passes	m (diameter)	2.4
	Section passes inclination (minimum)	Degrees	55
	Travelling way length (maximum)	m	40
	Travelling way dip (maximum)	Degrees	30
	Minimum distance between excavations (centre to centre)	m	2.5 x combined width
Maximum development rates scheduled	Waste haulages and RADs	m/month	50
	Inclined development	m/month	50
	Travelling ways	m/month	20
	Box holes	m/month	20
	ASD	m/month	9

Table 11-3: General development planning parameters

Description	Unit	Value
Planned production days	Number	26
Shifts per day	Number	2
Total no of shifts	Number	52
Development ends/ shift	Number	2
Blasting factor (Availability 90% Utilisation 80%)	%	72
Average advance per blast	m	3
Potential production per Rig per month	m	229
Planned production per Rig per month	m	200

Table 11-4: General stoping planning parameters

Description	Unit	Stoping width ≤ 1.45m	Stoping width > 1.45m
Shifts per month	Number	23	23
Strike rate	%	70	70
Blast per month	Number	16	12
Average face advance per blast	m	1	1
Average face length	m	29	29
Potential m²/crew/month	m²	464	348
Planned m²/crew/month	m²	450	330

Table 11-5: General mine design and scheduling parameters

Parameter	Description	Unit	Value
Shift details	Days per month (development)	Days	26
	Days per month (stoping)	Days	23
	Hours per day (development)	Hours	10
	Hours per day (stoping)	Hours	8.33
Available working face requirements	Development ends per crew	Number	4
	Stope panels per crew	Number	2
Mining layout	ASD design angle above strike	Degrees	5
In-stope pillars	Dip pillar width	m	10
	In-stope pillar dimension	m	3.0 (dip) x 4.0 (strike) (4m holing width)
Production	Stope face advance per blast	m	1
	Stope crew (stoping width < 1.45m)	m²/month	450
	Stope crew (stoping width > 1.45m)	m²/month	360
	Ledge crew (stoping width < 1.45m)	m²/month	450
	Ledge crew (stoping width > 1.45m)	m²/month	360
	Average raise back length	m	400
	Effective stope face length	m	29
	Panel length (skin to skin)	m	36
	Total panels per raise line	number	23
	Effective raise line spacing including regional dip pillar	m	150 to 275
	Merensky stope width (minimum and maximum)	m	1.1 to 1.8
	UG2 stope width (minimum and maximum)	m	1.1 to 2.0

Stope strike pillar holings were planned as part of the normal conventional stoping operations. Ore originating from these pillar holings was regarded as a mining gain and accounted for approximately 3.6% of the total stope tonnes.

Table 11-6 shows the construction delays applied as part of the mining schedule.

Table 11-6: Scheduled mining related construction delays

Description	Delay [Months]
Box front equipping and support installation	9
Station area equipping	3
Raise development completion to commencement of stoping activities	2

11.3.3.Merensky reef mine design

The development and stoping mine designs, used as basis for the Merensky reef LOM production schedule, are shown in Figure 11-6 and Figure 11-7.

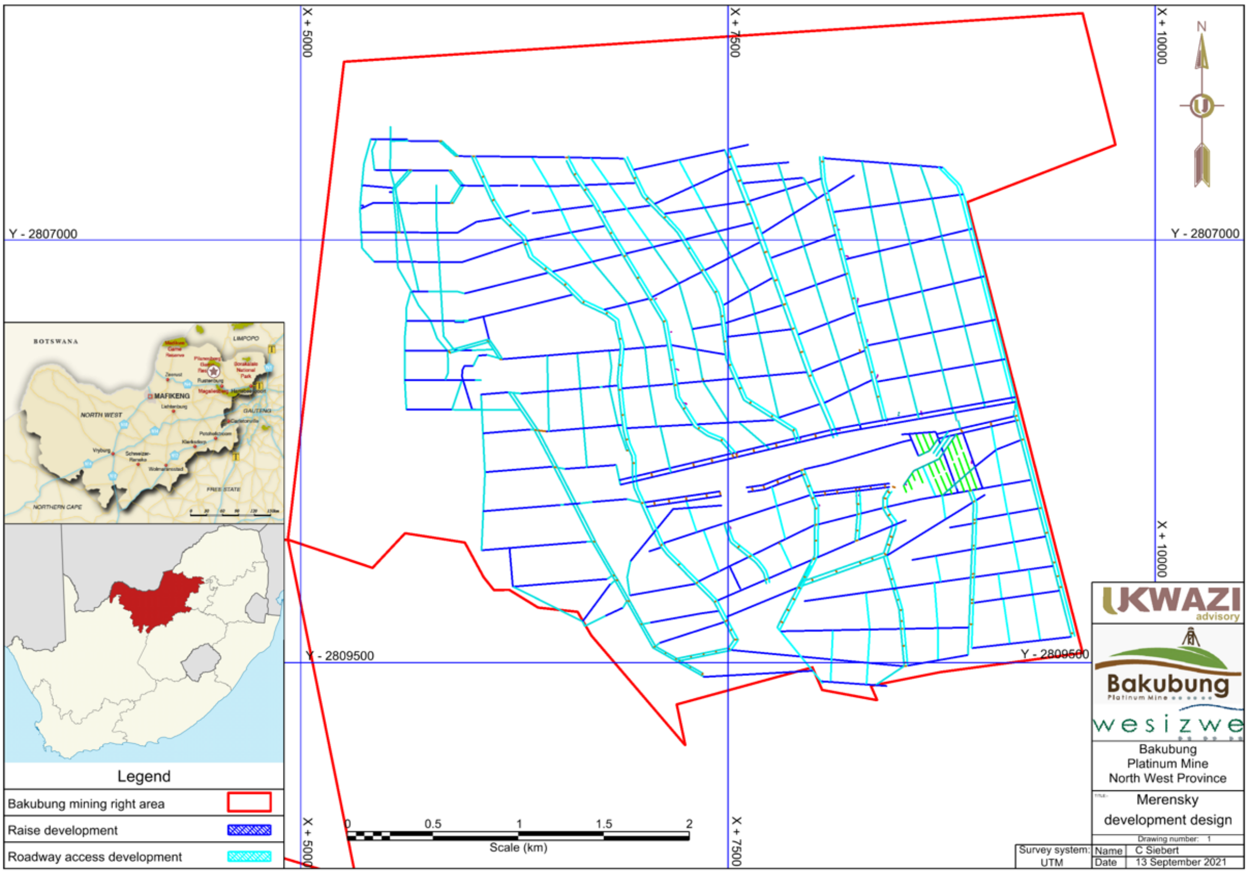

Figure 11-6: Plan view of the Merensky on-reef development mine design

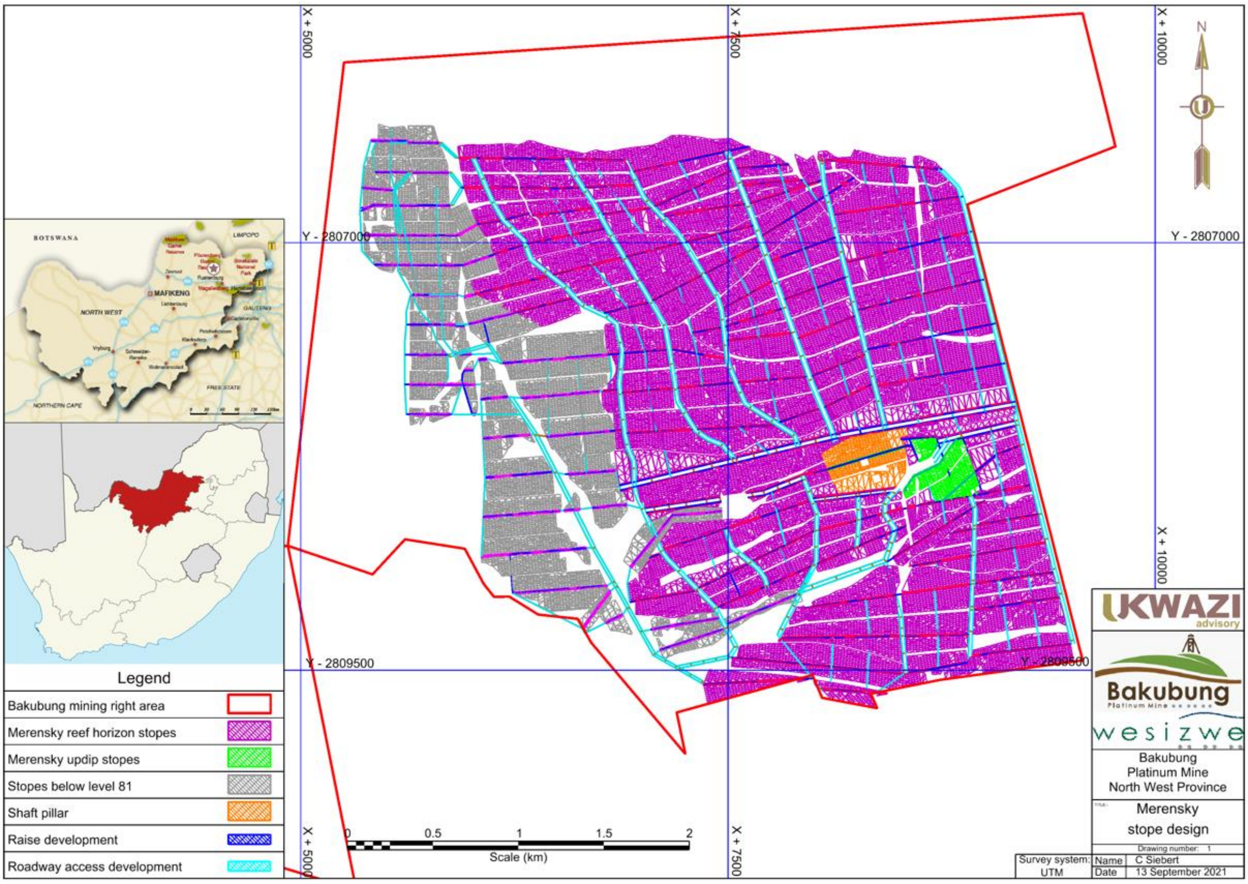

Figure 11-7: Plan view of the mine design for the Merensky reef horizon

11.3.4. Upper Group 2 Chromitite layer mine design

The development and stoping mine designs, used as basis for the UG2 LOM production schedule, are shown in Figure 11-8 and Figure 11-9.

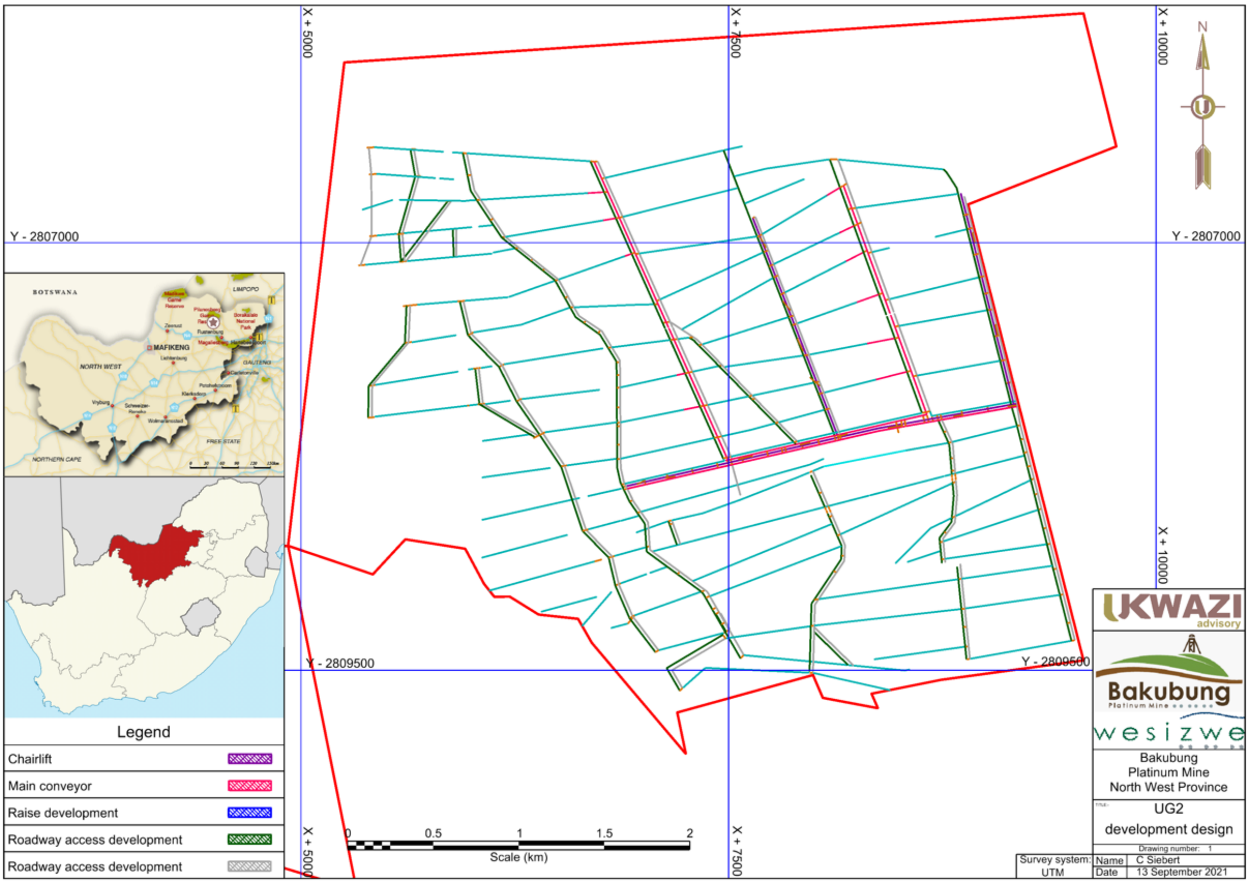

Figure 11-8: Plan view of the UG2 on-reef development mine design

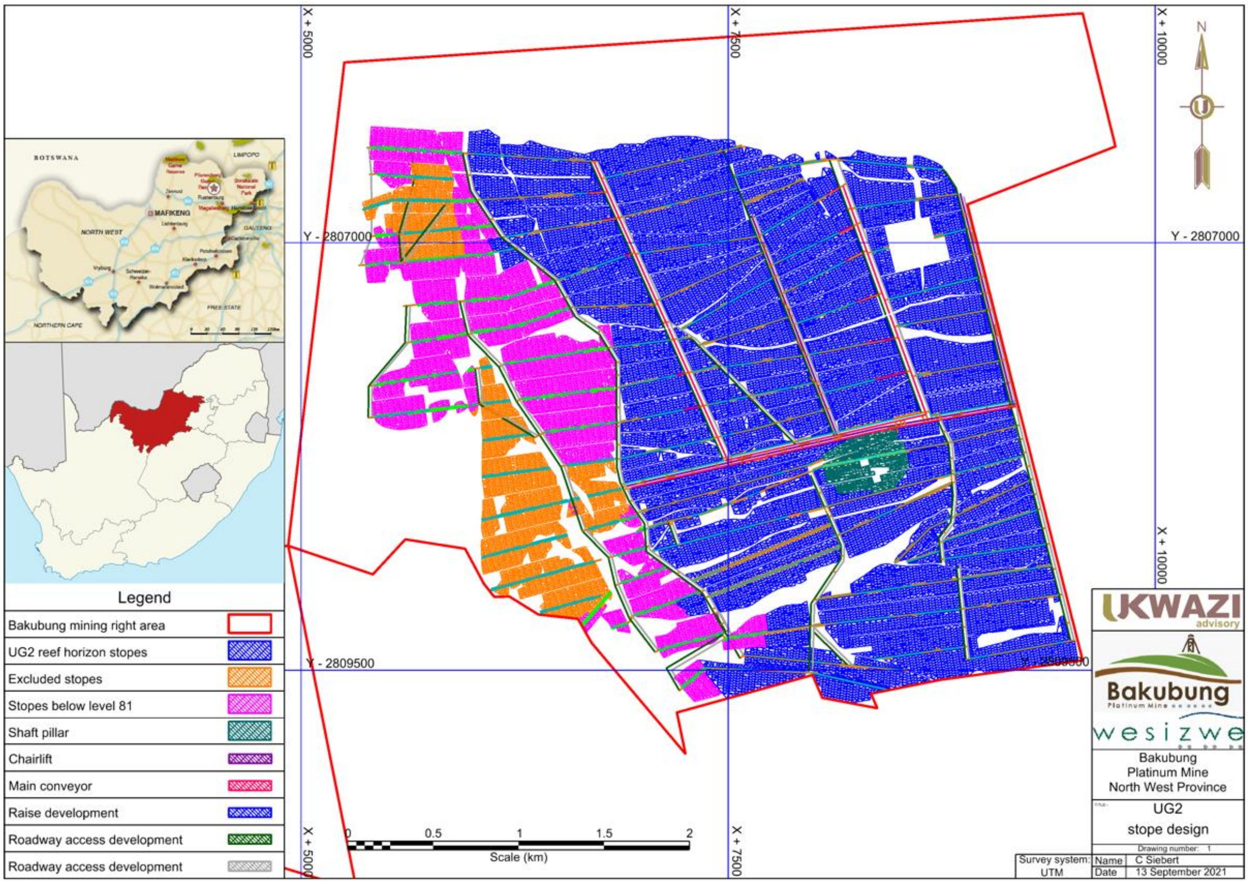

Figure 11-9: Plan view of the mine design for the UG2 reef horizon

11.4. Mining-related modifying factors

SR 5.1(ii); 5.2(viii) / SV T1.10

11.4.1. Geological loss

Geological loss is generally defined by the geologist and is an indication of Mineral Resource estimation error, modelling inaccuracies, the level of accuracy, or the structural complexity of the deposit. In the Mineral Resource modelling process, geological losses are characterised either as known losses, where sufficient data are available to allow reasonable definition or as unknown geological losses, where there is an expectation that geological features will be present with some statistical proportion.

The identified, known geological losses and un-minable areas associated with the geological features were excluded from the mine design, and are therefore, not applied as an additional modifying factor. Unknown geological losses and mining-related losses associated with the intersection of geological features were applied as an additional mining related modifying factor within the mine design. The losses were estimated by the Mineral Resource CP and applied per reef type and identified facies type. The applied losses are deemed appropriate based on the available data as shown in Table 11-7 below.

Table 11-7: Geological and mining related losses

Reef type	Facies type	Amount [%]
Merensky	Normal Merensky reef facies	13
	Normal FW Merensky reef facies	40
	Single Chromitite Merensky reef facies	25
	Detached Merensky reef facies	15
UG2	Normal UG2 reef facies	10
	Regional pothole UG2 reef facies	20

Based on the mine design and production schedule, the unknown geological loss and mining-related losses resulting from the intersection of geological features were on average 17% and 16% for the Merensky and UG2 reefs, respectively.

11.4.2. Planned dilution

Planned dilution is defined as the waste material or in some instances the surrounding uneconomical mineralised material added during the mining process. Planned dilution consisted of two main sources:

- Stope overbreak dilution consisting of a HW and FW overbreak allowance over and above the defined resource cut to cater for mining inefficiency during the extraction process
- Additional dilution as a result of re-development activities, blasting of winch beds and potential fall of ground occurrences.

11.4.2.1. Stope overbreak dilution

Drilling and blasting practices within the hard rock narrow tabular mining environment inevitably causes additional dilution resulting from HW and FW overbreak. An overbreak allowance of 5cm for HW overbreak and 15cm for FW overbreak was included over and above the defined resource cut, based on industry norms on similar operations.

The immediate FW and HW of the Merensky reef are mineralised. Sampled grades for the immediate FW and HW were contained in the geological model and used to estimate stope content and diluted grade. Based on the planned overbreak allowances, stope overbreak dilution varies from 18.2% for minimum best-cut resource cuts of 0.9m to 10.0% for maximum best-cut resource cuts of 1.8m.

11.4.2.2. Additional dilution sources

Additional dilution sources as a result of re-development activities, blasting of winch beds and potential fall of ground occurrences were allowed for, based on the information contained in the BFS completed. Benchmarked figures from similar operations showed the 10.8% additional dilution allowance was appropriate.

11.4.2.3. Reef in foot and reef in hang loss

Due to reef variability on the FW and HW contacts resulting in mining inefficiency during the extraction process, a reef-in-foot ("RIF") and reef-in-hang ("RIH") allowance of 1% was included. This allowance caters for mineralised material that is left behind either in the FW or HW that was planned to be extracted as part of the defined resource cut. The basis of estimate for this allowance is based on the BFS completed. The CP considers this allowance to be reasonable and in line with mining practices of similar operations.

11.4.3. Mining quality

A mining quality or off-reef mining allowance of 0.1% was included. During mining activities in close proximity to geological features, especially mining around potholes, additional waste material is normally exposed to adequately identify the extremities of the geological feature resulting in unwanted waste dilution. The CP considers this allowance to be appropriate and in line with industry observations.

11.4.4. Mine call factor

The theory of a mine call factor ("MCF") is a "ratio expressed as a percentage, which the specific product accounted for in recovery plus residue bears to the corresponding product called for by the mine's measuring method". This means that if a mine's evaluation method is without fault and sampling, assaying and tonnage measurements in the mine and plant are flawless and if no additional losses are identified along the logistics chain, then the MCF should be equal to 100%. A MCF can be viewed as a measure of the efficiency of all the processes in the mine value chain. Recorded MCFs of similar operations to the BPM are shown in Table 11-8.

Table 11-8: Recorded MCFs of similar platinum mines

Shaft	Reef type	Average MCF % [2016 to 2019]
A	UG2	93.0
B	UG2	93.0
C	UG2	95.4
D	UG2	94.8
E	UG2	94.8

Shaft	Reef type	Average MCF % [2016 to 2019]
F	UG2	98.0
	Merensky	91.8
G	UG2	99.1
	Merensky	91.6
H	Merensky	94.0
I	UG2	100.8
J	UG2*	99.8
	Merensky	97.1
K	UG2*	102.3
	Merensky	103.0
L	UG2*	89.7
	Merensky	94.3
M	UG2*	99.5
N	UG2*	94.0
Average	**UG2**	**96.5**
Average	**Merensky**	**95.3**

Note: *2019 data only

A MCF of 96% was incorporated in the LOM production schedules for the Merensky and UG2 reefs, in line with industry observed benchmarks.

11.5. Life of mine schedule

SR 5.2(viii); 5.2(ix)

Mine production scheduling is the process to assign physical mine production units to periods of time and to report the results by periods in terms of tonnes of ore and waste, grades and total operating costs. The process produces a LOM schedule that reports the mine production units per period from the start of the schedule, up to the depletion of the mine. The mine production schedule was completed in Datamine™ Enhanced Production Scheduler ("EPS") software version number 3.1.32.10209.

11.5.1. Production schedule drivers

Production schedule drivers were identified prior to commencing with the scheduling process. During this process, the targeted monthly rates were scheduled with the Merensky reef being the focus of the production build-up.

- An initial run of mine ("ROM") ramp-up to 1 million tonnes per annum ("Mtpa")
- Subsequent ramp-up to a targeted 3Mtpa ROM
- Target Merensky reef ratio of approximately 90% of the total ROM
- Achieve a consistent plant feed production rate throughout the LOM
- Maintaining a minable area of 18 to 24 months ahead of stoping operations throughout the LOM
- As Merensky reef depletes, focus on strategic changeover to UG2 Chromitite layer.

11.5.2. Mining strategy

A phased approach was followed to achieve the required ROM profile considering practical mining aspects, the processing plant construction status and processing strategy. During the initial production build-up phase, ore production was scheduled to ramp up to approximately 1Mtpa ROM by 2023. During the second production build-up phase, ore production ramp-up was scheduled from 1Mtpa ROM to steady-state ore production of 3Mtpa ROM by 2027.

The main shaft has a hoisting capacity of approximately 250ktpm of ore and 15ktpm of waste. The production schedule focused on ore production from the Merensky reef horizon at a steady-state production rate of approximately 230ktpm ROM. Production from the UG2 Chromitite layer was scheduled to make up the remainder of the ROM tonnes to maintain a consolidated production profile of approximately 250ktpm. Once ore production from the Merensky horizon declines, the corresponding deficit was scheduled from the UG2 Chromitite layer.

11.5.3. Life of mine production schedule

Production scheduling commenced from the actual surveyed face positions as at 31 May 2021. Table 11-9 provides a summary of the LOM production scheduling results.

Table 11-9: LOM schedule results

Reef type	Description	Unit	Financial year				
			*2021	2022	2023	2024	2025
Total waste	Waste hoisted	Mt	0.08	0.17	0.08	0.11	0.07
Merensky	Ore hoisted	Mt	0.13	0.59	0.79	0.91	0.93
	Ore content hoisted (3PGE + Au)	Million g	0.39	2.23	2.98	3.74	3.58
	Shaft head grade (3PGE + Au)	g/t	2.93	3.78	3.77	4.10	3.86
	Hoisted troy ounces (3PGE + Au)	Moz	0.01	0.07	0.10	0.12	0.12
UG2	Ore hoisted	Mt	0.03	0.13	0.16	0.17	0.18
	Ore content hoisted (3PGE + Au)	Million g	0.06	0.27	0.32	0.33	0.32
	Shaft head grade (3PGE + Au)	g/t	2.19	2.10	2.03	1.88	1.84
	Hoisted troy ounces (3PGE + Au)	Moz	0.00	0.01	0.01	0.01	0.01
Total	Ore hoisted	Mt	0.16	0.72	0.95	1.08	1.10
	Ore content hoisted (3PGE + Au)	Million g	0.45	2.50	3.30	4.06	3.90
	Average shaft head grade (3PGE + Au)	g/t	2.80	3.48	3.48	3.75	3.53
	Hoisted troy ounces (3PGE + Au)	Moz	0.01	0.08	0.11	0.13	0.13
Reef type	**Description**	**Unit**	**2026 to 2030**	**2031 to 2035**	**2036 to 2040**	**2041 to 2054**	**Total LOM**
Total waste	Waste hoisted	Mt	0.37	0.60	0.32	0.45	**2.23**
Merensky	Ore hoisted	Mt	12.70	13.65	10.80	3.27	**43.76**
	Ore content hoisted (3PGE + Au)	Million g	50.12	50.98	37.19	13.45	**164.65**
	Shaft head grade (3PGE + Au)	g/t	3.95	3.74	3.44	4.11	**3.76**
	Hoisted troy ounces (3PGE + Au)	Moz	1.61	1.64	1.20	0.43	**5.29**
UG2	Ore hoisted	Mt	1.33	1.38	4.21	35.79	**43.45**
	Ore content hoisted (3PGE + Au)	Million g	3.38	3.23	12.80	125.69	**146.62**
	Shaft head grade (3PGE + Au)	g/t	2.54	2.33	3.04	3.51	**3.37**
	Hoisted troy ounces (3PGE + Au)	Moz	0.11	0.10	0.41	4.04	**4.71**
Total	Ore hoisted	Mt	14.03	15.03	15.02	39.06	**87.21**
	Ore content hoisted (3PGE + Au)	Million g	53.50	54.20	49.99	139.15	**311.27**
	Average shaft head grade (3PGE + Au)	g/t	3.81	3.61	3.33	3.56	**3.57**
	Hoisted troy ounces (3PGE + Au)	Moz	1.72	1.74	1.61	4.47	**10.01**

Notes: 2021 production figures for the period between June 2021 to December 2021 only

Figure 11-10 shows the planned waste production tonnes hoisted per annum.

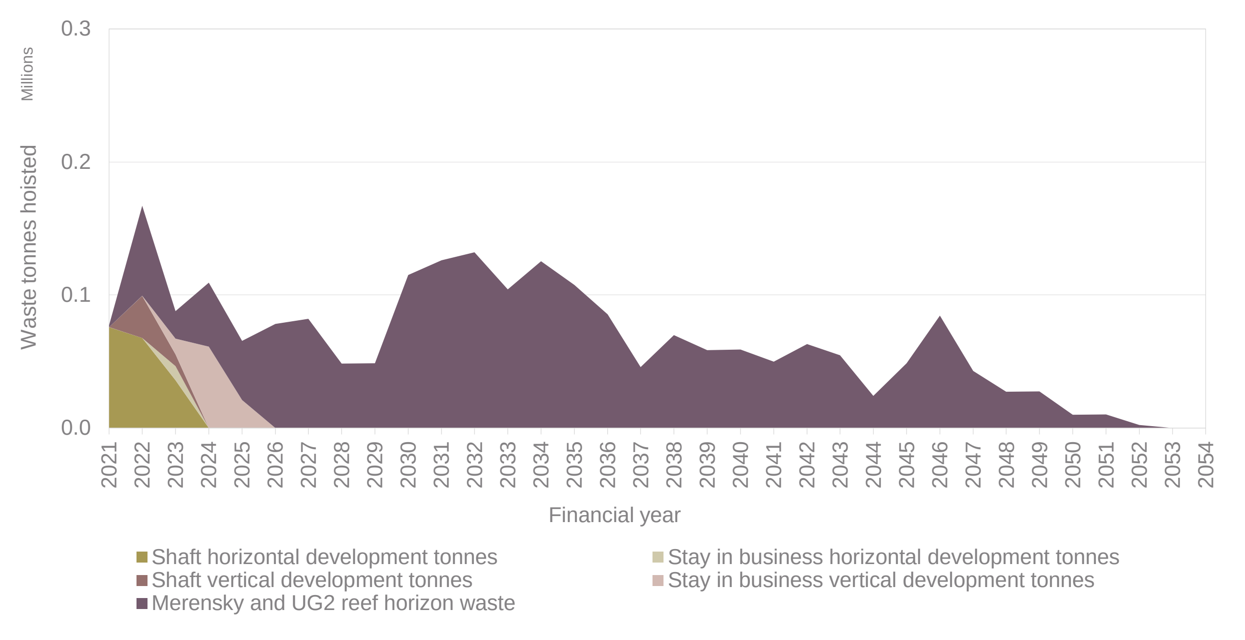

Figure 11-10: Planned waste tonnes hoisted

Figure 11-11 shows the planned ROM tonnes hoisted per annum and the average shaft head grade for the Merensky and UG2.

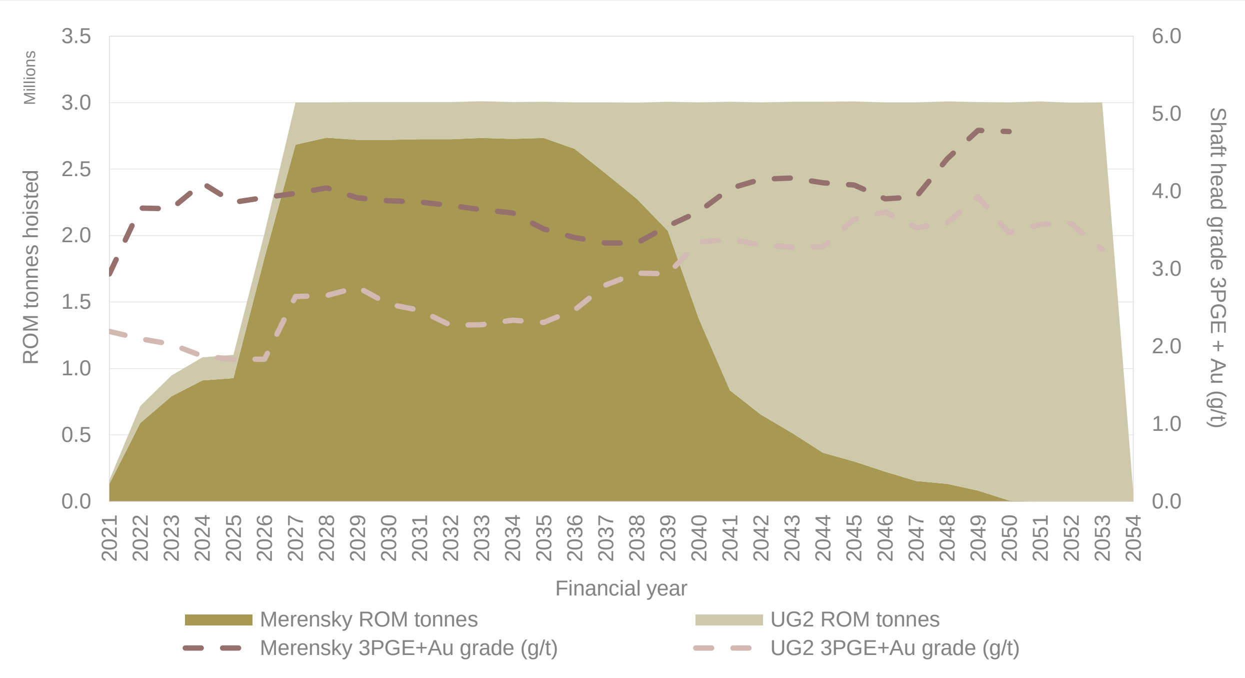

Figure 11-11: Planned ROM tonnes hoisted and (3PGE+Au) shaft head grade

Figure 11-12 shows the ROM tonnes hoisted per Mineral Resource classification. The contribution from Inferred Mineral Resources, specifically from the Merensky reef included as part of the LOM schedule is material.

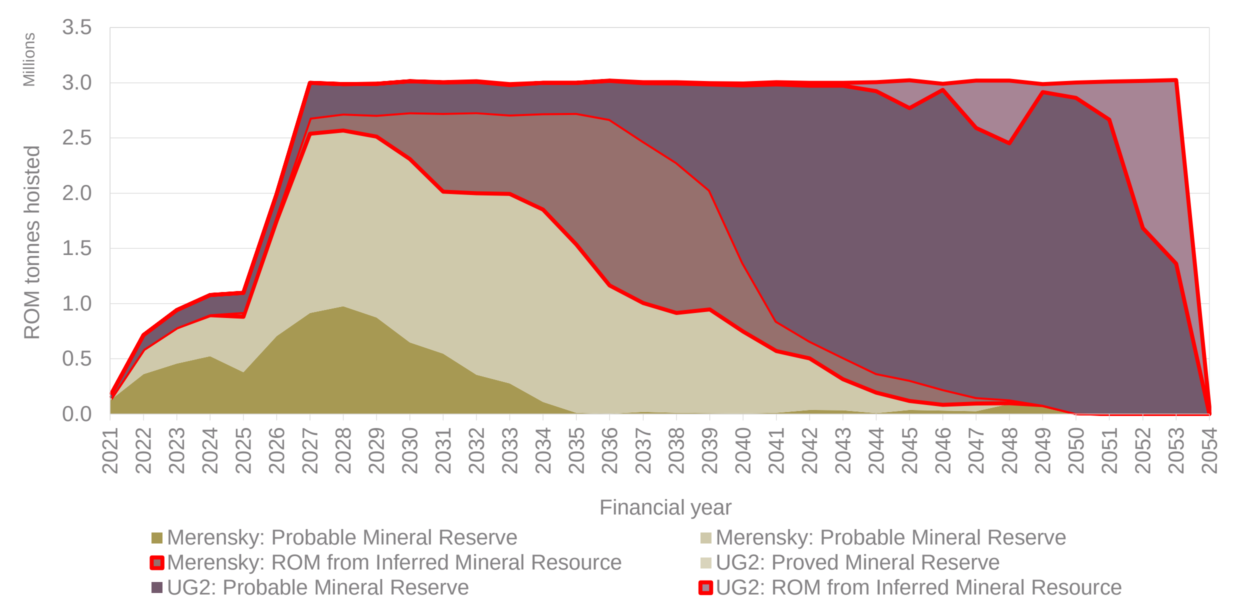

Figure 11-12: ROM tonnes hoisted per Mineral Resource classification

The LOM period progress plots for the Merensky reef and UG2 Chromitite layer are shown in Figure 11-13 and Figure 11-14 respectively.

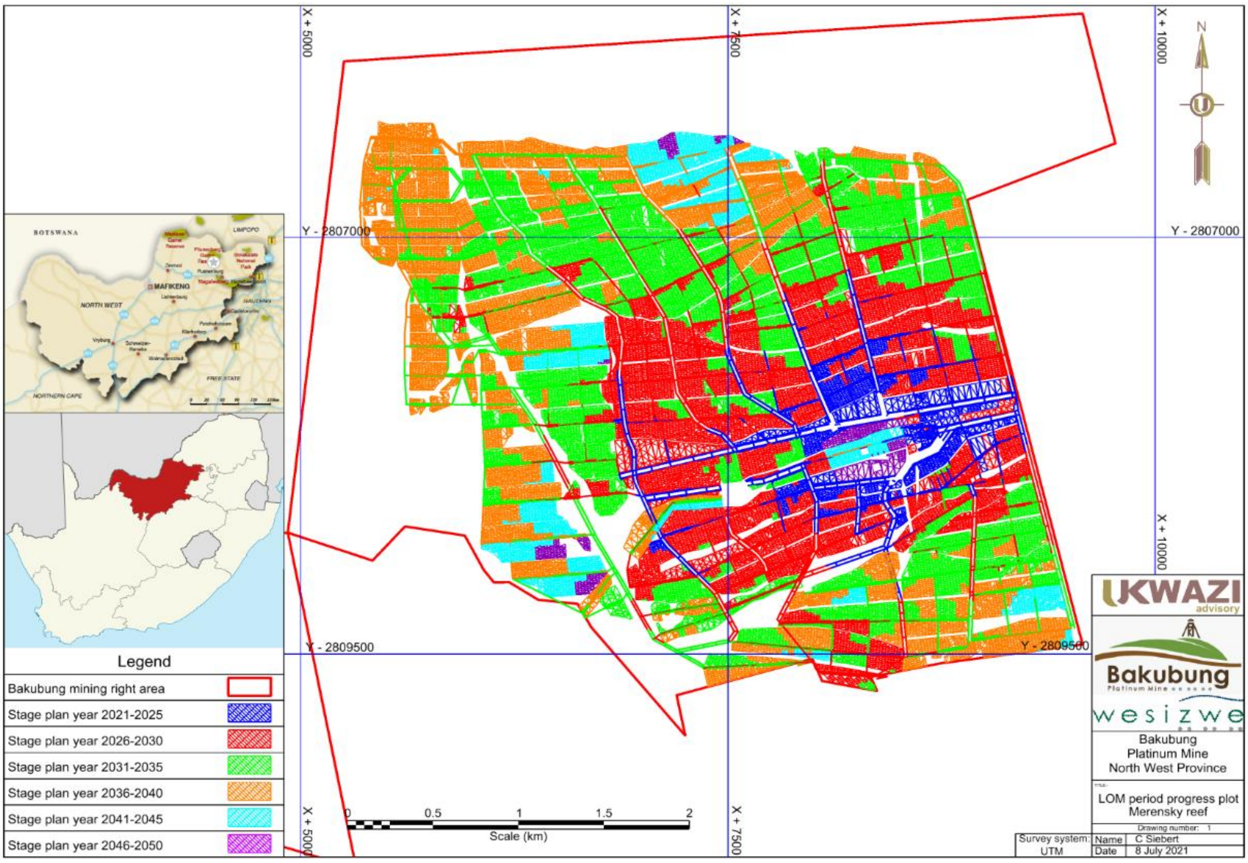

Figure 11-13: LOM period progress plot – Merensky reef

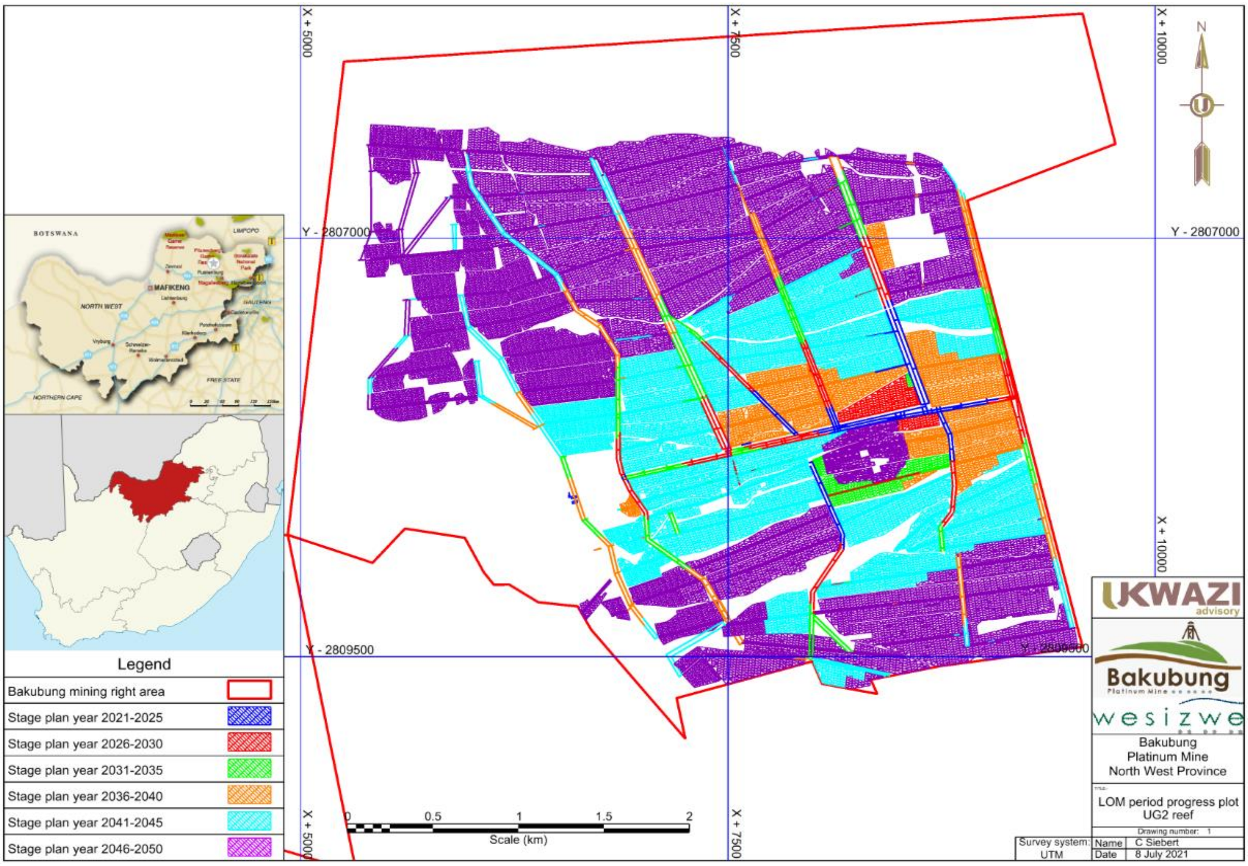

Figure 11-14: LOM period progress plot – UG2 Chromitite layer

11.6. Mining equipment

SR 5.2 (viii)

The selected mining method was based on trackless mobile machinery ("TMM") for all mining development activities. TMM will be used to clear blasted rock from stopes deposited by scrapers shovels and 37kW face winches in the ASD of each respective production panel.

During initial production operations, rock will be transported directly to the main shaft until construction of the conveyor system is completed. The RADs raises and ASD will be developed by TMM consisting of a single boom drill rig, LHDs, dump trucks and bolters.

Blasted rock will be scraped from the panel to the ASDs by 37kW face winches using 2 x 0.9t effective scraper shovels connected in tandem. A LHDs (9.5t low profile) will transport rock from the ASD to the truck loading point in the original raise. The truck (30t low profile) will tram rock to the station or the internal conveyor transfer tip. Each tip will be equipped with a grizzly and hydraulic rock breakers to control the rock lump size.

Appropriate workshop facilities are available for all equipment service and maintenance requirements. Major workshop facilities are situated on 69L and 81L and can perform all weekly, major servicing and rebuild work. The workshops include equipped service bays and overhead cranes.

Minor services (dailies) are carried out in the working sections to avoid the return of mining equipment to the centralised workshops. The mine may utilise satellite workshops or appropriate utility vehicles to assist with service and minor maintenance requirements.

Table 11-10 lists the capital-purchased TMM required to service the capital footprint and reach the planned steady-state production phase.

Table 11-10: TMM list

TMM	Total
Drill rigs	16
30t Trucks	26
9.5t LHDs	26
Supervision vehicles	38
Specialised vehicles	42

To minimise emissions, only vehicles equipped with EURO 3-rated engines or better are allowed for use underground.

11.7. Ventilation and refrigeration

SR 5.2(vii)

BBE Consulting ("BBE") was appointed by Wesizwe to optimise and re-design the planned ventilation and refrigeration system for the BPM in 2019. This section is based on the report submitted by BBE to Wesizwe entitled: *Wesizwe Platinum Bakubung Mine Optimisation and Re-design of Ventilation and Refrigeration System* with report number 18134-TR-001 Rev 02 dated 27 February 2019.

Two key periods were evaluated, the production ramp-up phase and the steady-state mining phase with all infrastructure in place. A number of models were constructed for the ramp-up phase and the steady-state mining phase. The go-forward options were based on solutions that do not require the relocation of critical ventilation infrastructure to optimise the ventilation system. This is in line with the original plan which utilises a main shaft and service shaft along with an additional dedicated ventilation shaft as downcast with two off ventilation shafts serving as return for the system. Of the options evaluated, two were used as verification of the approved plan to confirm the appropriateness of the ventilation strategy.

11.7.1. Ventilation design criteria

The applicable ventilation design criteria used are indicated from Table 11-11 to Table 11-20.

Table 11-11: Climatologic information

Description	Unit	Amount
Design surface ambient temperature (wet-bulb ("wb")/ dry-bulb ("db"))	°C (wb/db)	21/ 32
Surface barometric pressure	kPa	89

Table 11-12: Geological information

Rock geothermal properties	Unit	Norite	Merensky	UG2
Density	kg/m³	3 300	3 200	3 900
Thermal conductivity	W/m°C	2.0	3.3	3.3
Specific heat	J/kg°C	800	800	770
Virgin rock temperature gradient	°C	24°C + 0.02°C/m		
Fissure water influx	Insignificant			
Fissure water temperature	Virgin rock temperature			
Flammable gas intersections expected	Occasional pockets			

Table 11-13: Design airway velocities

Description	Amount [m/s]
Downcast shafts	10 to 12
Up-cast shafts	18 to 25
Intake airways	≤7
Return airways - dedicated	≤12
Return airways - service tunnel	<8
Belt ways	Maximum 4 (resultant velocity)
Raise-bore hole	<25
Main tipping areas	<0.5 (over tip)

Table 11-14: Airway friction factors

Description	Amount [Ns^2/m^4]
Equipped shafts	0.0250
Intake airways (equipped, irregular sides)	0.0120
Return airways (irregular sides)	0.0120
Production x/cuts	0.0160
Galvanised vent ducting	0.0037
Raise bore hole	0.0050
Beltways	0.0250

Table 11-15: Ventilation leakage allowance

Description	Amount [%]
In stope ventilation controls	20
Primary leakage	15 excluding commitments
Ventilation ducting	<20

Table 11-16: Stope ventilation parameters

Ventilation and environmental conditions	Unit	Amount
Minimum stope air volume	m^3/s	35
Stope panel face velocity	m/s	≥1.0
Average SCP at working faces	W/m^2	≥270
Stope face mean temperature	°C wb	27.5
Stope face reject temperature	°C wb	28.5
Maximum stope face temperature	°C wb	32.5
Maximum db temperature	°C db	37
Maximum strike control to face (backfill)	m	7.0 (after blasting)
Stope backfill	n/a	Nil
Mining parameters	**Unit**	**Amount**
Average stoping width Merensky	m	1.65
Average stoping width UG2	m	1.65
Average stope back length	m	200
Stope strike distance	m	200 (average 100 per side)
Average stope panel length	m	30
Average panel advance	m/month	13
Back stopes	n/a	Nil (special precaution areas)
Stoping configuration	n/a	Double-sided mining

Table 11-17: Development ventilation parameters

Ventilation and environmental conditions	Unit	Amount
Force quantity at face (minimum)	$m^3/s/m^2$	0.25
Exhaust quantity at face (minimum)	$m^3/s/m^2$	0.50
Force column distance from face	m	20 (after blasting)
Force column distance from face	m	20 (before blasting)
Planned development Wet KATA	$mcal/cm^2/s$	≥12
Planned development face temperature	°C wb	<27.5
Maximum development end temperature	°C wb	32.5
Maximum db temperature	°C db	37
Development fan installations (minimum)	m	9 (in through ventilation)
Fan bypass ventilation	m^3/s	1.5 x fan intake
Minimum velocity at long hole drills	m/s	0.35 (and air movers in place)

Table 11-18: Fixed underground services ventilation

Description	Notes
Beltways	Not ventilated to return (special precautions required)
Workshops	
Trackless equipment	Ventilated to return (volume as per layout)
Other	≥0.3m/s with sealing arrangements
Battery bays	≥0.3m/s with sealing arrangements
Stores	
Diesel, tyre and oil stores	≥0.3m/s ventilated to return
Other	≥0.3m/s with sealing arrangements
Electrical installations	≥0.3m/s with sealing arrangements
Main tipping areas	<0.5m/s (over tip)

Table 11-19: Diesel equipment ventilation requirements

Description	Unit	Amount
Ventilation at point of use	$m^3/s/kW$	0.06
Average diesel equipment heat production (Tier 3 or better)	kw/ rated kW	1.5
Diesel used (ultra-low sulphur)	ppm	10

Table 11-20: Ventilation infrastructure - shafts

Description	Size [m Ø]	Area [m^2]	Velocity [m/s]	Mass flow [kg/s]
Main shaft (surface to 82L)	8.5	56.7	12	720
Service shaft (surface to 81L)	7.5	44.2	12	560
V3 dedicated downcast shaft (planned)	6.1	29.2	18	560
Vent shaft (V1) up-cast (planned)	6.1	29.2	20	620
Vent shaft (V2) up-cast (planned)	6.1	29.2	20	620

The mine will have 2 x 6.1m diameter up-cast raise-bore shafts in close vicinity at the northern boundary of the mining right area. Both shafts will be equipped with trifurcation fan installations, of which, one fan will be a standby at each shaft.

Table 11-21: Main ventilation fans

Ventilation shaft (V1) surface fans	Description
Installation	Trifurcation (two fans operating)
Fan design duty	250m^3/s @6.2kPa
Installation duty (planned)	650m^3/s @3.7kPa
Ventilation shaft (V2) surface fans	**Description**
Installation	Trifurcation (two fans operating)
Fan design duty	250m^3/s @6.2kPa
Installation duty (planned)	650m^3/s @3.7kPa

The primary ventilation design strategy included:

- No controlled recirculation
- Ventilation will be returned through worked-out areas to up-cast shafts
- Extensive re-use of ventilation strategy will be followed.

Refrigeration strategy included:

- Mine cooling to be supplied by surface bulk air coolers
- No planned underground refrigeration.

11.7.2. Primary ventilation

Various phases were developed to ensure that sufficient ventilation will be supplied during each operational phase, to meet development and production requirements before all the required ventilation infrastructure is available. Infrastructure intended for downcast infrastructure during final design will be used as return infrastructure as is the case with the service shaft. The various phases are explained in more detail below.

11.7.2.1. Initial phase

The initial phase is maintained until the service shaft is temporarily equipped as an up-cast shaft through the installation of the fan station consisting of three fans each with a duty of 250 kilograms per second ("kg/s") operating at six kilopascals ("kPA"). During this phase only equipping and main development will be conducted.

Through ventilation during this phase will be established by the isolation and installation of fan clusters, consisting of 75kW axial flow fans installed in tight circuits on the 69L, 72L, 77L and 81L service shaft station areas. A minimum of 425m^3/s of ventilation is circulated during this phase.

11.7.2.2. Interim up-cast facility phase

The booster fans on 69L, 72L, 77L and 81L can be removed once the service shaft is equipped with the fan station. Two of the three surface fans will be operational with the third fan serving as standby fan. The total volume circulated during this phase is 650m^3/s. The main development activities and initial mining will be conducted during this period.

This phase is maintained until both the return ventilation shafts are established and equipped with the permanent fan stations consisting of three fans each with a duty of 250kg/s operating at 6kPa. The service shaft will only be used as a second outlet in case of an emergency.

11.7.2.3. Permanent up-cast system

The service shaft can be converted back into a downcast facility once both return ventilation shafts are established and equipped with the permanent fan stations, consisting of three fans, each with a duty of 250kg/s.

The third ventilation shaft will be established as a downcast facility, which allows for the main shaft and the third ventilation shaft to carry the majority of the required downcast air, while the service shaft can be regulated on the shaft station areas on each level.

With both ventilation shafts equipped and commissioned as up-cast facilities, the volume circulated was estimated at 1 000m³/s, which will satisfy main development and planned mechanised mining operations.

11.7.3. Ventilation simulation

Both the production ramp-up and the steady-state mining models indicated adequate ventilation infrastructure and conditions based on the current mine design. The production ramp-up model indicated a 5.1 kilogram per second per kilo tonne ("kg/s/kt") mined ventilation factor while the steady-state model indicated a ventilation factor of 4.0kg/s/kt.

This is in line with industry best practice for both phases as additional ventilation is used during the development phase at lower output for the ramp-up phase while the steady-state period is subsidised by the introduction of refrigeration, which assists in satisfying the ventilation and cooling requirements at a higher production output. The ventilation approach is considered appropriate for the current design.

12. Metallurgy and processing

SR 4.3(ii); 5.3(i) 5.3(ii); 5.3(iii); 5.3(iv); 5.3(v); 5.3(vi) / SV T1.10

12.1. Introduction

Extraction of platinum group metals and gold from the Merensky reef and UG2 Chromitite layer will be achieved using a sulphide flotation concentrator plant. The proposed process involves the crushing, milling and selective flotation of precious metals, in association with Cu and Ni that occur in varying grades in the feed ore. The final concentrate will be thickened and filtered prior to shipping to toll treatment facilities in the vicinity of the mine. The flotation residue will be thickened and stored on the TSF.

This section considers the metallurgical aspects and includes a discussion of the geological characteristics of the deposit that may influence the metallurgical design and performance. Extensive mineralogical analyses of the deposits were conducted. A summary is provided of the laboratory characterisation test work and the laboratory variability test work. A comprehensive pilot plant test work campaign was conducted to validate the recommendations of the laboratory test work and produce a typical concentrate for off-take negotiations.

In the analysis of the Merensky reef, four facie types were identified, based on the geological and mineralogical characteristics. The classification of the UG2 Chromitite layer was much simpler and essentially two facie types were identified. In the selection of the metallurgical test work samples, the geological team ensured that all the composite samples adequately described the geological variability of the deposit.

Recent changes in the legislation surrounding the lining in the construction of the TSFs introduced a major capital cost component. Originally, the TSF was located approximately 4.5km from the concentrator plant. The planned tailing pipeline would have had to cross a perennial river and a provincial road. The scheduled ramp-up in the LOM plan provided the opportunity to construct a Module 1 TSF adjacent to the plant for use during the ramp-up period (Bakubung Project, 2019).

12.2. Metallurgy

SR 3.8(i) – (iv)

An understanding of the geological characteristics of the deposit was developed in discussion with the geological team to understand the mineral distribution and possible alteration in the ore body. Detailed mineralogical analyses were conducted of the two ore bodies to determine the inherent modes of occurrence of the precious and base metal sulphides. This provided a fundamental understanding of the liberation characteristics of the minerals, both from a precious mineral and a gangue mineral perspective (WorleyParsons, 2014a).

A flotation plant was regarded as the optimal beneficiation process. The recovery process of precious and base metals from the Merensky and UG2 ore bodies is well documented in the industry and the test work requirements are appropriately defined within the various research institutions.

Preliminary laboratory test work was conducted at the SGS laboratory in South Africa in 2004, followed by further test work in 2009 and 2013 at the Mintek research facility. A pilot plant campaign and associated laboratory test work were conducted at Mintek in 2016. Both the abovementioned institutions are internationally recognised and accredited (ISO17025). A vast amount of laboratory test work was conducted on samples from both the Merensky and UG2 reef types. The basis of the test work campaign was:

- Determination and classification of the comminution characteristics
- Determination and classification of the flotation response
- Variability of the comminution and flotation characteristics
- Determination of thickening and filtration characteristics of the tailings and final concentrate
- Development of the primary process design criteria and flow sheet.

Tests were conducted to determine the effect of blending the ores on the comminution and flotation characteristics. In conjunction with an analysis of the proposed mining plan, a number of tests were conducted at varying blends of UG2 and Merensky ores to estimate the impact on the milling and flotation response.

Various configurations were considered in the laboratory to determine the impact on PGE + Au recovery and final concentrate grade. A bulk sample of Merensky and UG2 ore was delivered to Mintek for pilot plant test work to confirm the proposed circuits and generate sufficient concentrate samples for thickening and filtration test work and detailed analysis (Mintek, 2016).

12.2.1. Samples utilised in test work

Three sets of samples were considered in the test work ((WorleyParsons (2014a), Mintek (2016), TMC (2008)), namely:

1. Composites of drill hole cores for characterisation test work
2. Samples from drill hole cores for variability test work
3. Bulk samples of Merensky and UG2 ores from early workings for pilot plant test work.

With reference to the map shown in Figure 12-1, the characterisation and variability samples were selected from the following defined zones:

- Frischgewaagd 11 (referred to in the source documents as WF)
- Frischgewaagd 3 and 4 (referred to as WAF)
- Ledig East (referred to as WL1)
- Ledig West (referred to as WL2).

Various core and composite core samples were prepared during the test work campaign to gain a better understanding of the ore characteristics. A detailed description of the sample collection, preparation and test work campaign was summarised in the Mintek external report number 6351. The location of the areas identified for the various composite samples is shown in Figure 12-1 (TMC, 2008). The characterisation test work focused mainly on the WF sample (Sample A) as this will be the predominant ore type fed to the concentrator plant during the initial periods of the LOM.

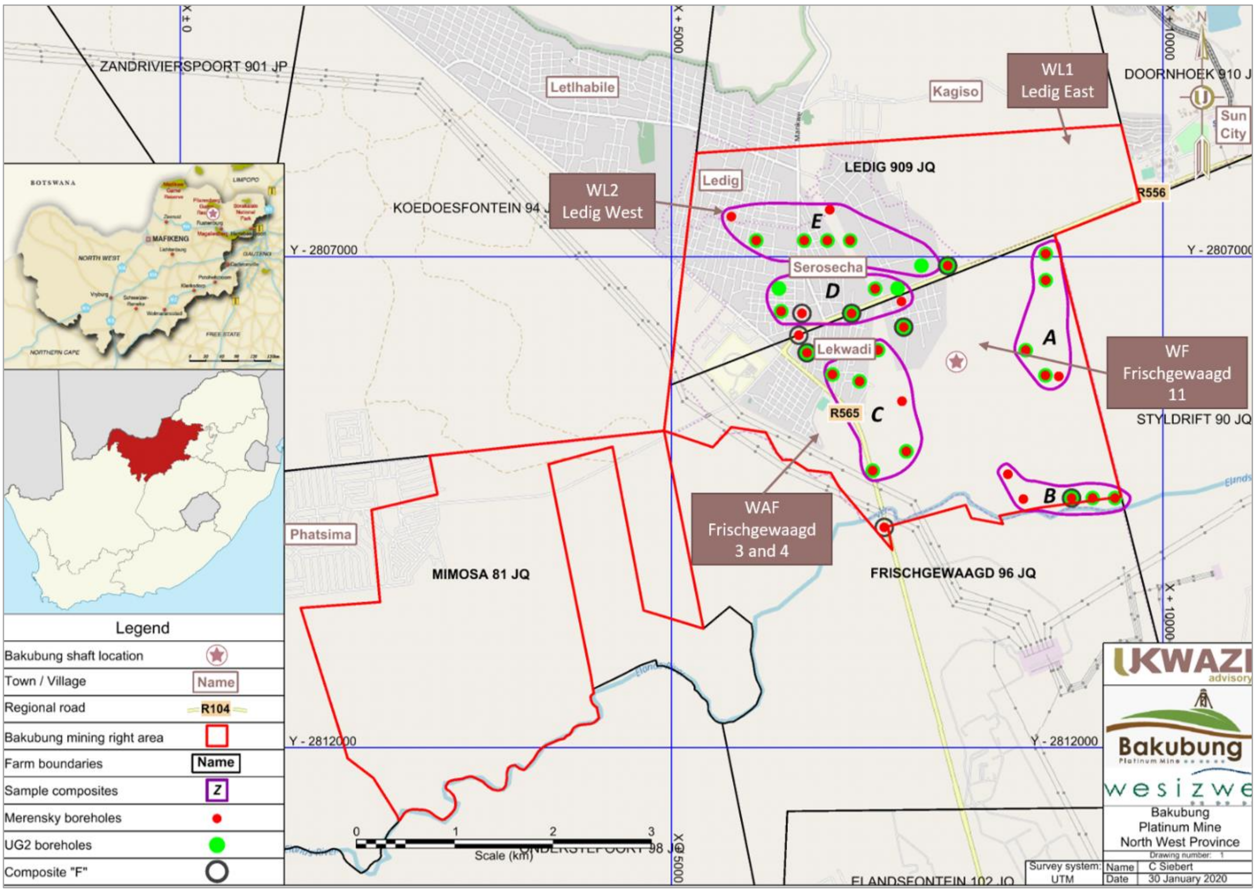

Figure 12-1: Major defined ore types and location of composite samples

Sample E consisted of composites drill cores near the Caldera fault to understand the potential impact of hydrothermal alteration on the metallurgical response.

The bulk sample delivered for the pilot plant test work was obtained from the underground workings excavated during shaft sinking activities in 2016. Samples were delivered in bulk bags and included 327t of Merensky and 173t of UG2 ore. A sub-sample was removed to cater for the drop-weight and comminution test work with the balance of the sample crushed to -6mm. The ore was dried, blended and crushed according to standard Mintek procedures.

12.3. Mineralogical analysis

SR 3.8(iii); 3.8(iv)

Mineralogical analysis was conducted on the composite samples (Mintek (2007d), SGS (2007b)) and the bulk sample delivered for the pilot plant test work (Mintek, 2016).

12.3.1. Merensky mineralogy

Mineralogical analysis of the Merensky characterisation samples using QemScan analysis, mainly focused on the Frischgewaagd 11 WL samples that were geologically classified as Normal Merensky reef facies. Analysis of the other samples from Ledig and Frischgewaagd indicated a low variance.

Approximately 38% of the PGE + Au species were Pt and Pd sulphides, approximately 33.4% were Pt and Pd semi-metal compounds (such as Pt, Pd-BiTe) and 27.8% of the PGE + Au species were predominantly Pt and Pd alloys.

As illustrated in Figure 12-2, approximately 64% of the PGE + Au was liberated with a further 8% associated with liberated base metal sulphide. The particle sizes of the liberated PGE + Au and the liberated base metal sulphide averaged approximately 3 micron and 10 micron, respectively. Approximately 5% of the PGE + Au present was locked in silicate gangue with a further 20% locked in base metal sulphide, locked in silicate gangue. The balance of the PGE + Au was attached to gangue minerals as free PGE + Au or locked in base metal sulphide attached to silicate gangue.

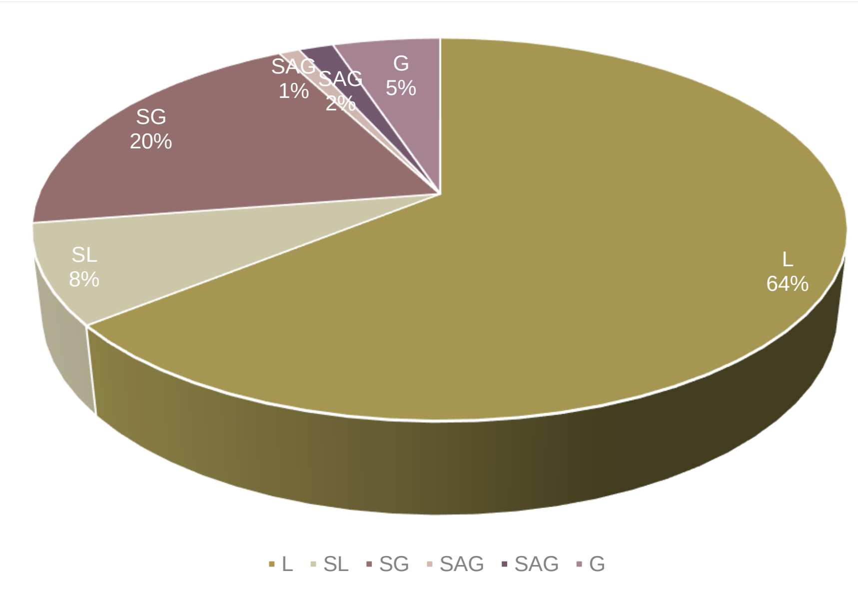

Figure 12-2: Mode of occurrence of PGE+AU in Frischgewaagd WL sample

The abbreviations used in Figure 12-2 are:

- L – Liberated PGE + Au
- SL – PGE + Au associated with liberated BMS
- AG – PGE + Au attached to silicate or oxide gangue particles
- SAG – PGE + Au associated with BMS attached to silicate or oxide gangue particles
- SG – PGE + Au associated with BMS locked in silicate gangue particles
- G – PGE + Au locked within silicate gangue particles.

Even though the grind applied to the samples was considered normal for Merensky ores at 60% passing 75 micron, a significant proportion of the PGE + Au was locked and will require a finer grind to expose the mineral for recovery through flotation.

A comparison of the mineralogical analyses for the Frischgewaagd WL composite sample and the bulk Merensky sample for the pilot plant test work indicated a significant variance in the PGE + Au mineral species (Figure 12-3 and Figure 12-4). The variance in the mineral species implies faster flotation kinetics for the Frischgewaagd WL sample.

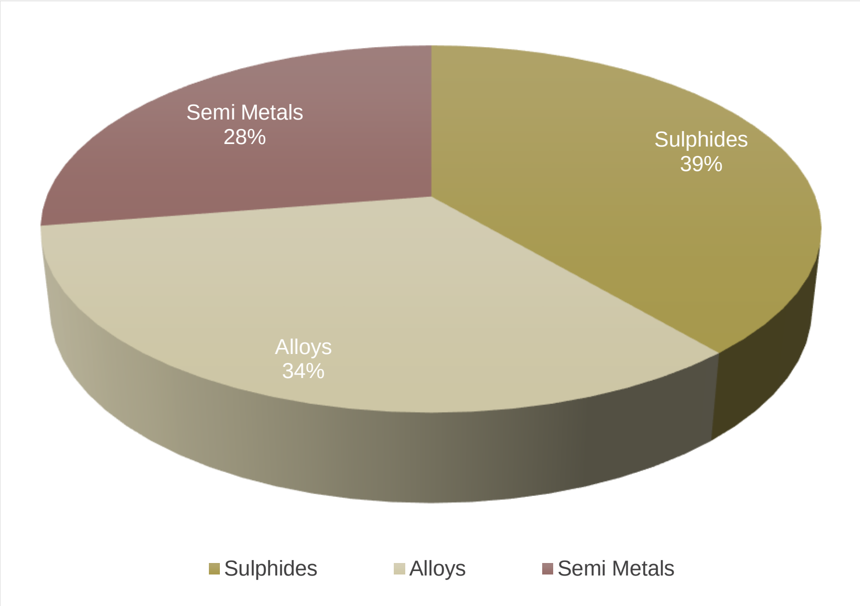

Figure 12-3: Frischgewaagd WL composite Merensky sample

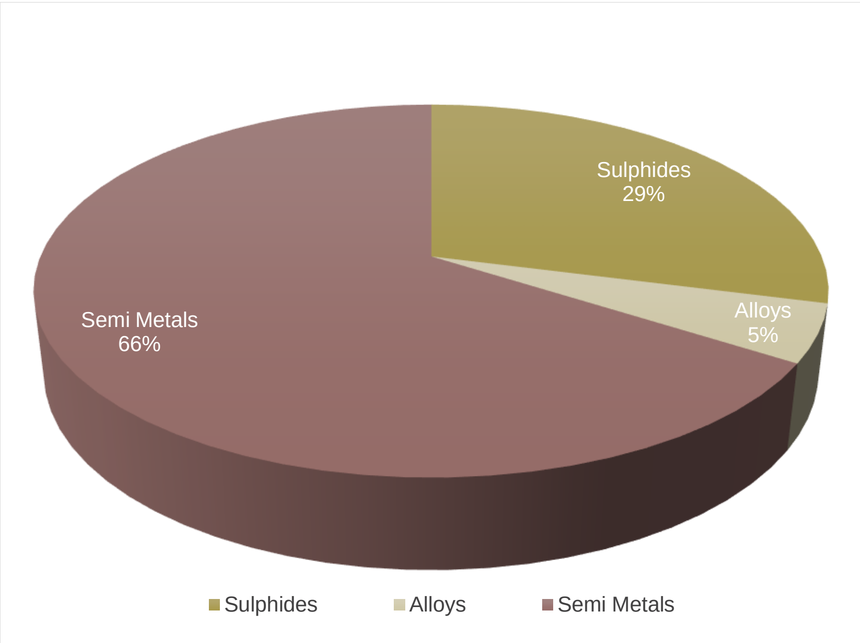

Figure 12-4: Pilot plant bulk Merensky sample

12.3.2. Upper Group 2 Chromitite layer mineralogy

Samples from both the Ledig and Frischgewaagd areas were analysed by QemScan Analysis. A significant variance in the PGE + Au species was identified for the two areas, as shown in Figure 12-5.

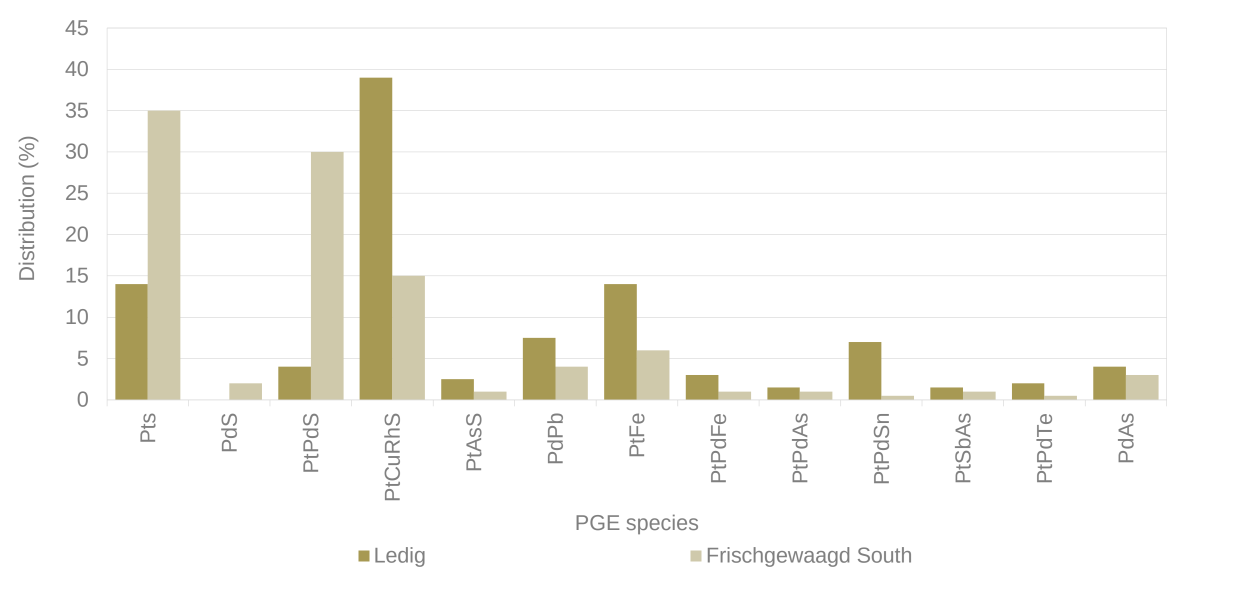

Figure 12-5: Comparison of PGE + Au species in the UG2

It appears that a significant amount of the PGE + Au in the Frischgewaagd ore occurs as predominantly sulphide species (circa 85% by volume), with only 10% occurring as PGE + Au alloys. The balance as semi-metal compounds containing Te and Sn, as shown in Figure 12-6.

The Ledig UG2 (Figure 12-7) has a lesser proportion of the PGE + Au species (63%) occurring as sulphides, more PGE alloys (20%) and the balance made up of semi-metal compounds containing As, Te, Sb, etc. This will imply that the PGE + Au from the Frischgewaagd deposit will have a faster kinetic response in the flotation plant, but optimisation of the reagent suite and flotation circuit will address any recovery challenges.

The samples were only milled to 60% passing 75 micron, that is significantly lower than the industry norm for UG2 ore of 80% passing 75 micron. It was found that the Ledig samples indicated slightly less liberation than the Frischgewaagd samples at the same grind.

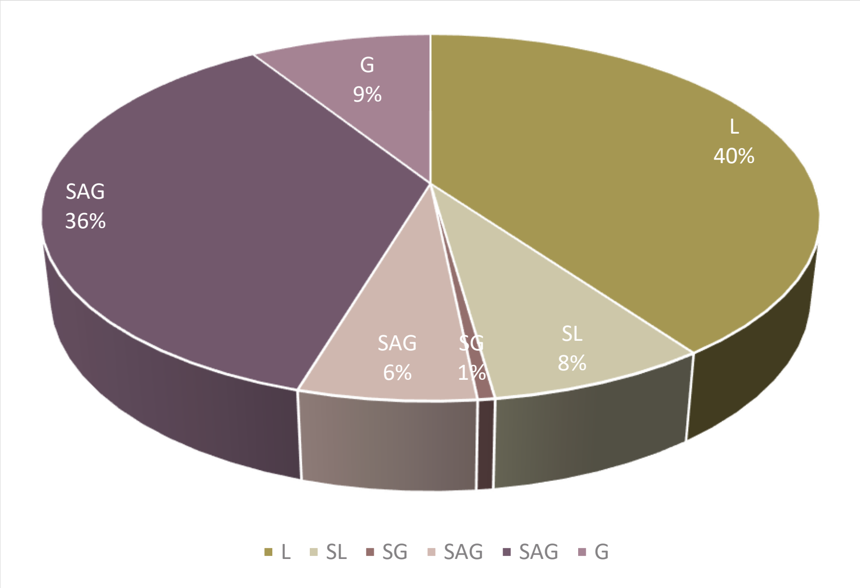

Figure 12-6: Mode of occurrence of the PGE + Au – Frischgewaagd area

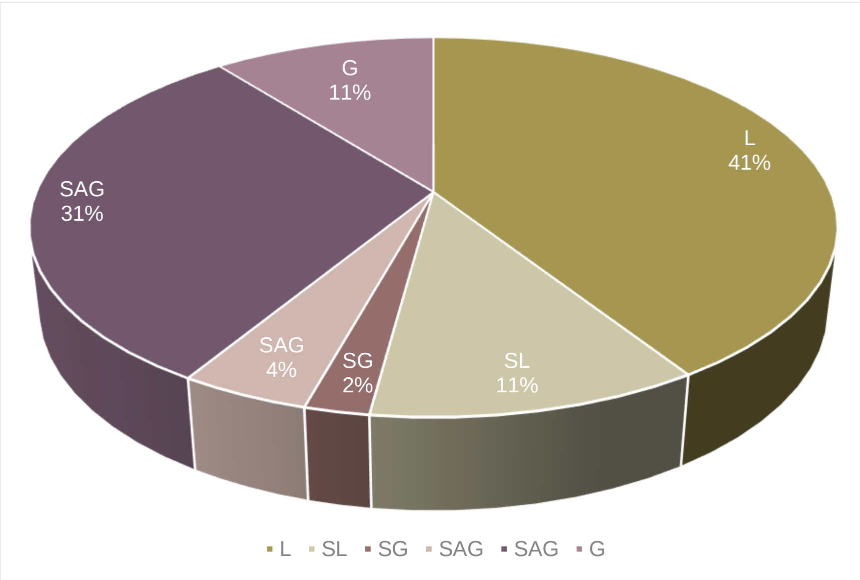

Figure 12-7: Mode of occurrence of PGE + Au – Ledig area

A comparison between the Sample A composite and the pilot plant bulk UG2 sample is illustrated in Figure 12-8 and Figure 12-9.

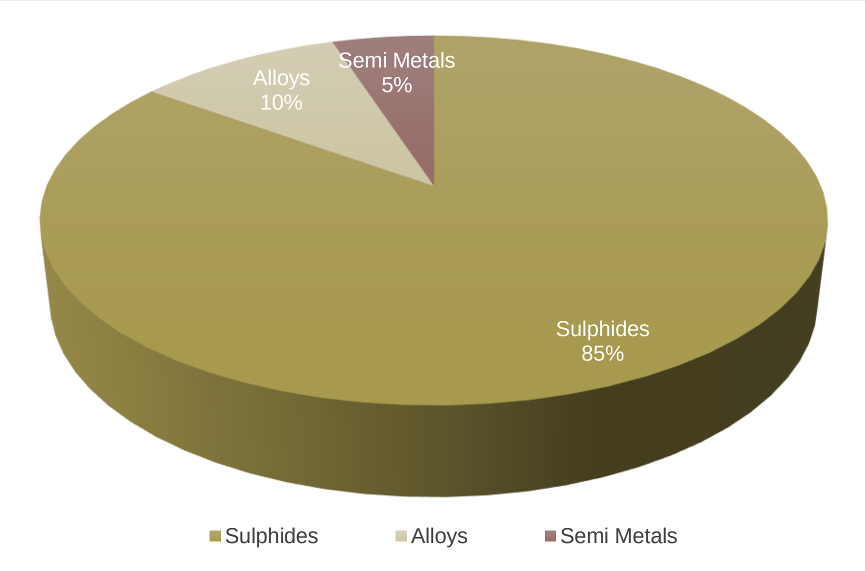

Figure 12-8: Frischgewaagd sample A - UG2 composite

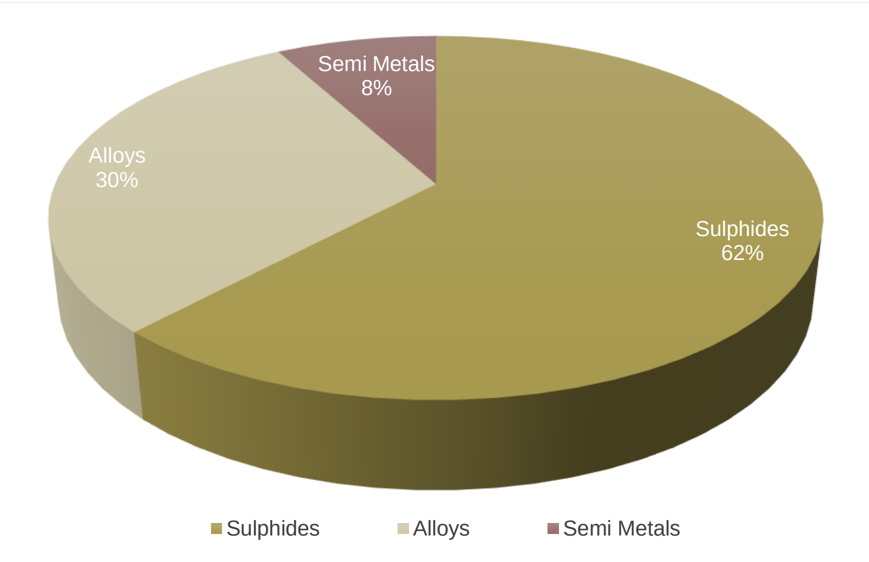

Figure 12-9: Pilot plant bulk UG2 sample

As observed for the Merensky samples, there is a difference in the PGE + Au species in the two samples. The higher proportion of sulphides in the Frischgewaagd sample imply a greater proportion of hydrophobic species. The Sample A composite present faster flotation rates than the bulk sample composite.

12.4. Metallurgical test work

SR 3.8(iii); 3.8(iv)

12.4.1. Introduction

In conducting the metallurgical test work, various aspects were considered such as the overall circuit configuration, the configuration of each of the stages and the fundamental design criteria for each unit stage. Appropriate test work was conducted in the laboratory and pilot plant that included (Mintek (2007a-d, 2009a-d, 2013, 2016), SGS (2007a)):

- Identification of the optimum grind for each ore type

- Identification of optimal overall circuit configuration i.e. mill-flotation ("MF1") or mill-flotation-mill-flotation ("MF2")
- Test work and simulation of various comminution circuits
- Optimisation of the rougher and cleaner flotation circuit configuration
- Determination of the fundamental design criteria for the selection of the individual unit processes
- Variability test work to determine the range of design parameters that must be included in the design.

Additional test work was done to:

- Identify the possible application of an upfront upgrading technology to increase the head grade by removal of excessive dilution with siliceous gangue mineral
- Assess the application of a novel flotation process for the recovery of PGE + Au from the cleaner tailing stream
- Assess the potential recovery of chromite as a by-product.

12.4.2. Identification of optimum grind

The mineralogical analysis identified that both the Merensky and UG2 ores will benefit from fine grinding to approximately 80% passing 75 micron. This was confirmed in the laboratory and pilot plant test work for Merensky ore, as illustrated in Figure 12-10.

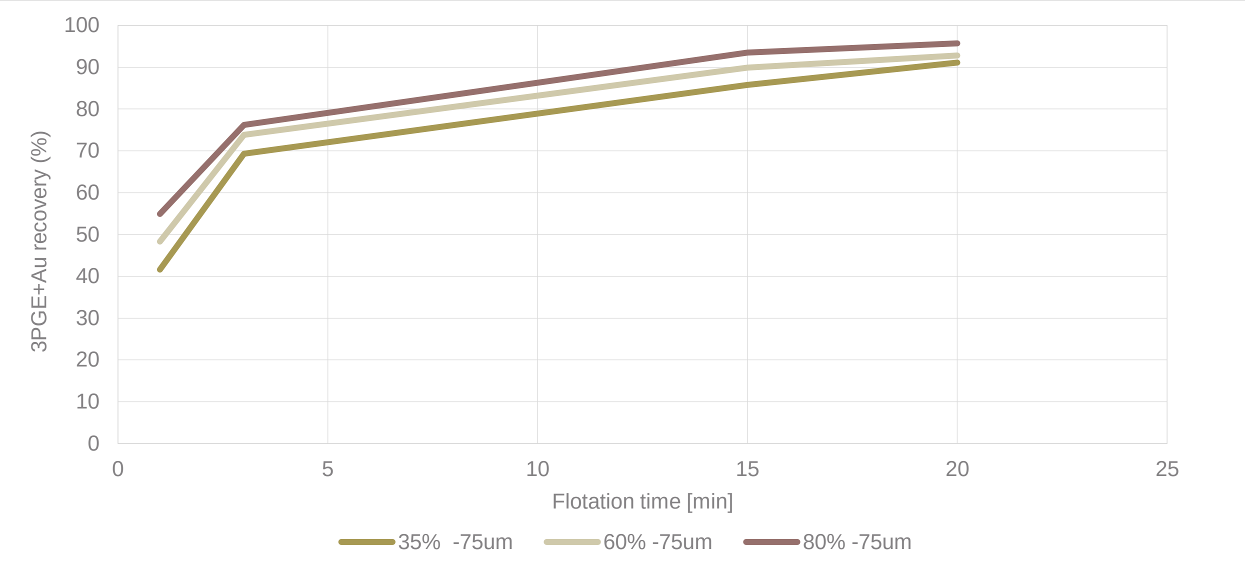

Figure 12-10: Determining the optimum grind for Merensky

The increase in grind from 60%, -75micron to 80%, -75 micron resulted in an increase of approximately 6% in metal recovery with a concomitant increase in the concentrate grade. The recommendation to design the plant to mill to a finer grind of 80% -75 micron is supported. This is further supported through assay by size analysis of the flotation tailings, which established that the major losses occurred in the coarser fractions.

12.4.3. Variance in ore hardness

Early work in characterising the ore types considered the point load indices of the various composites (TMC, 2008). The test results for the composite samples discussed earlier are illustrated in Figure 12-11.

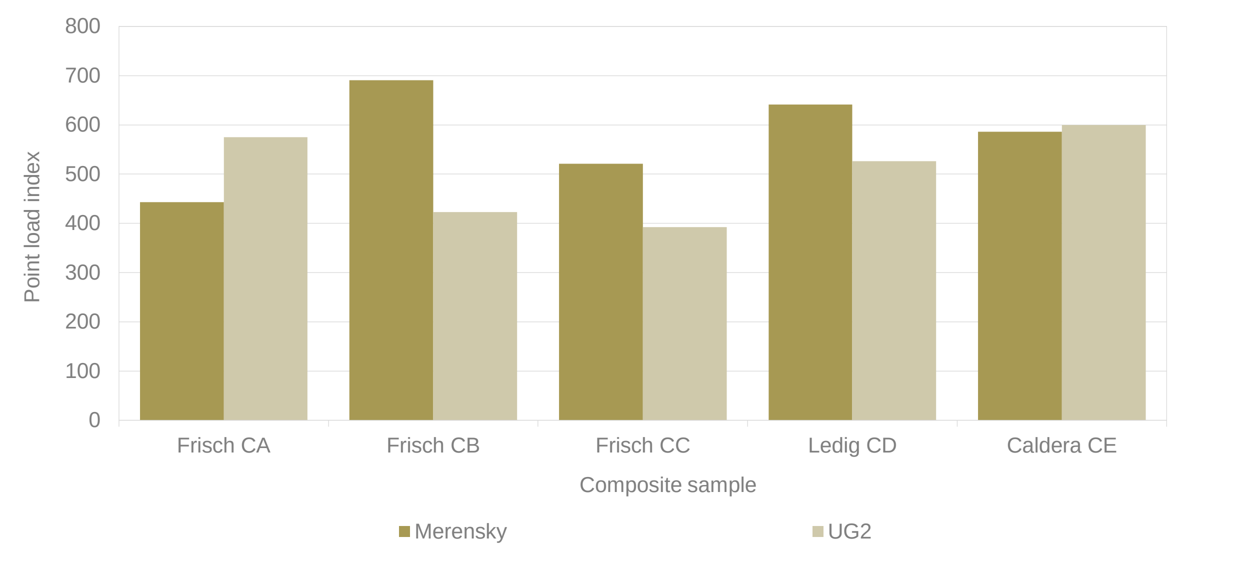

Figure 12-11: Point load indices for five composites samples

The point load test ("PLT") has been used in geotechnical analysis for over 30 years. It is an accepted rock engineering testing procedure used to characterise rock strength. The PLT is intended as an index test for the strength classification of rock materials. It is, therefore, indicative of the crushing of the coarser ore.

From a milling perspective, bond rod and bond ball mill work indices were determined. Further tests were conducted to determine the parameters for the sizing of autogenous and semi-autogenous mills as developed by the JK Centre in Australia. The bond ball mill indices ("BBMI") were determined at two limiting screen sizes, namely 212 micron and 106 micron, to determine the indices for the primary and secondary mills (Mintek, 2007a, 2013). The BBMI values for the primary mill at a limiting screen size of 212 microns are presented in Figure 12-12.

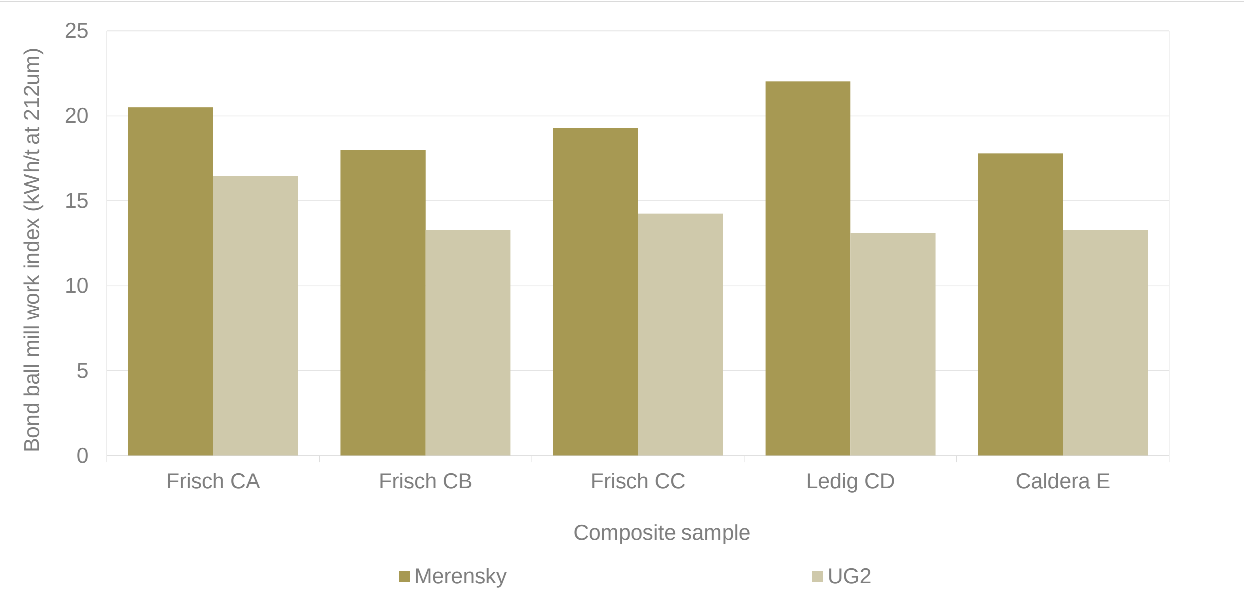

Figure 12-12: BBMI for five ore composite samples

The test work indicated that the Ledig Merensky samples were significantly harder than the Frischgewaagd Merensky samples. The bond rod mill indices were significantly higher than the BBMI, indicating that primary autogenous or semi-autogenous mills are prone to generate a critical size within the mill that will build up and overload the mill. This potentially requires the installation of a pebble crusher within the circuit.

The data were shared with the comminution group at the University of Cape Town and the various crusher-milling circuits were simulated. Considering the potential of a pebble build-up within the primary mill and the variability in the primary mill work indices, the report recommended that a classical crusher-ball mill circuit be considered.

12.4.4. Variability in flotation response

Rate flotation tests were conducted on the composite samples. The variability in flotation response for the Merensky and UG2 ores are illustrated in Figure 12-13 and Figure 12-14 (Mintek 2007a-d, 2013).

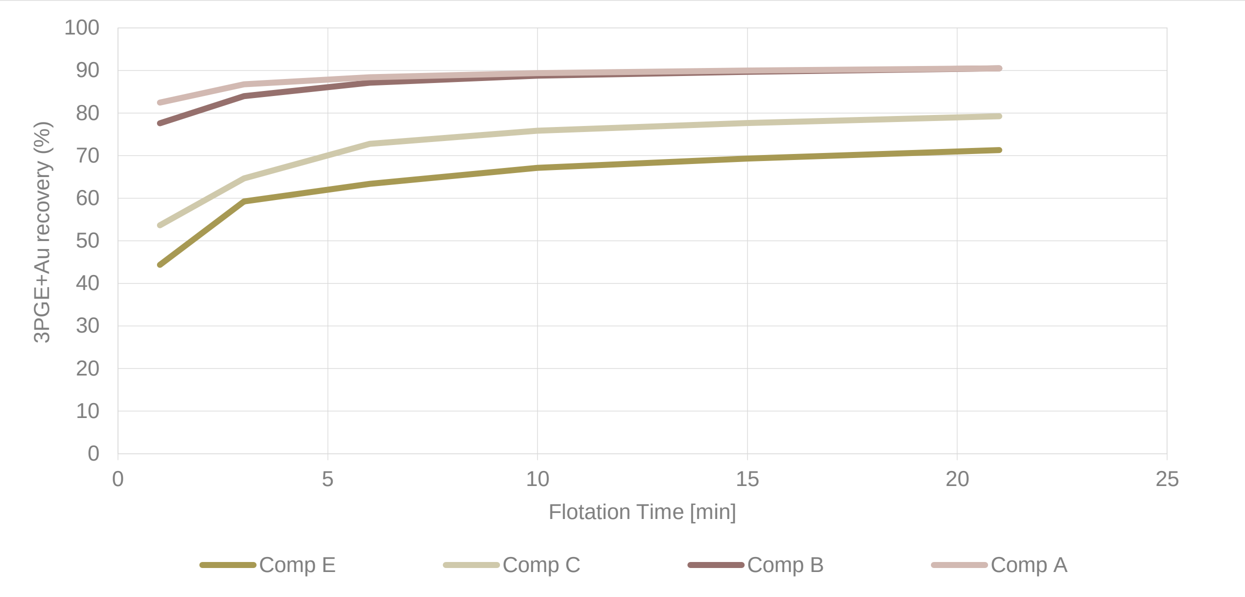

Figure 12-13: Effect of alteration on Merensky flotation response

There is a significant variance in the flotation response for the Merensky drill core composite samples, both from an ultimate recovery perspective and from a flotation kinetics perspective. Composite sample C indicated a lower recovery, even though it is not located on the main section of the Caldera fault. Cognisance must be taken of the extended residence time required for the altered ore bodies to achieve appropriate recoveries.

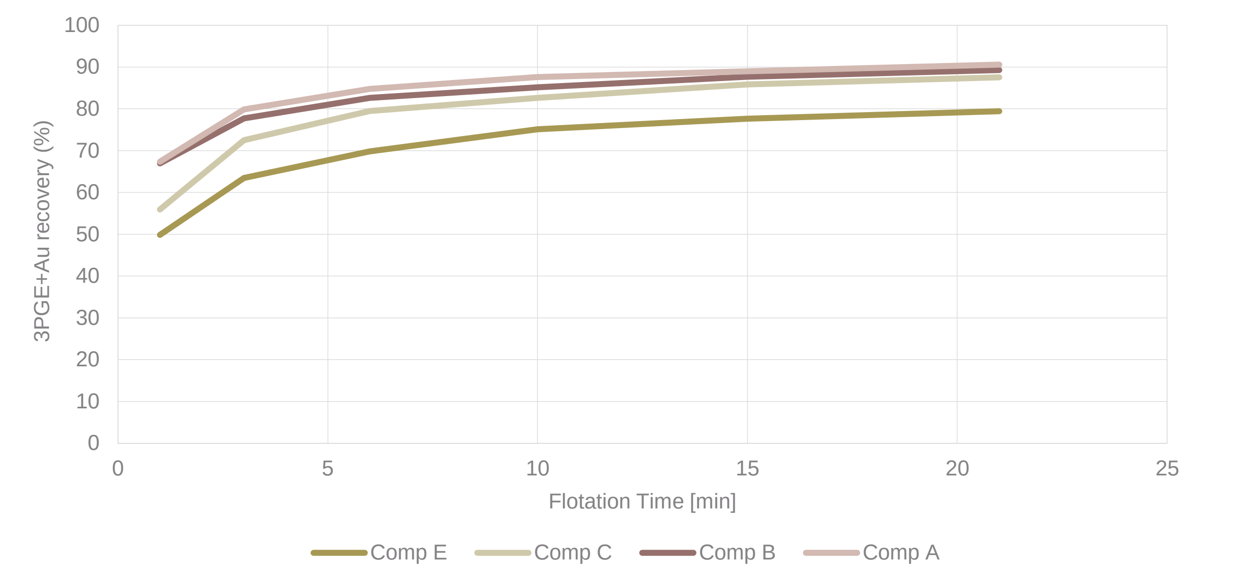

Figure 12-14: Effect of alteration on UG2 flotation response

The slower kinetics can be addressed by increasing the residence time, although the flotation response in Composite C is slower than that for Composites A and B, as shown in Figure 12-14. The Composite E result from the Caldera fault area is significantly lower than that for the unaltered ores and the flotation kinetics is slower, indicating the need for increased residence time. After extensive test work, a circuit was developed for the comparison of the flotation response of the various composites generated from the drill cores, as illustrated in Figure 12-15.

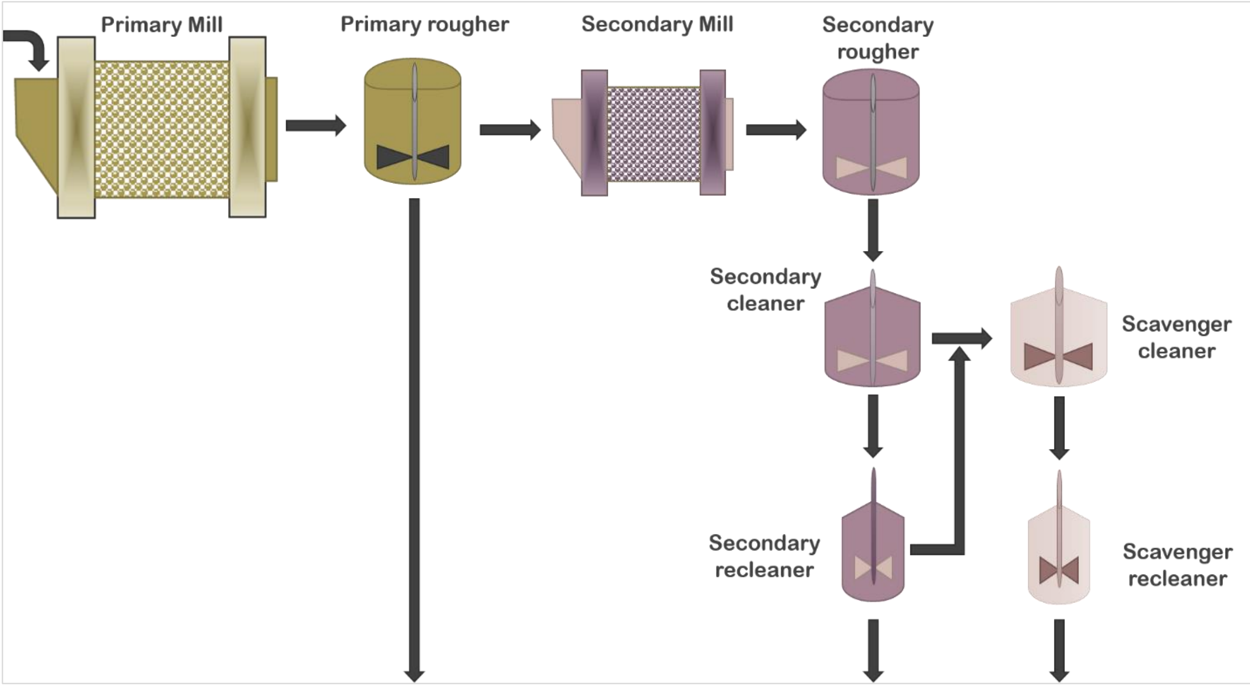

Figure 12-15: Laboratory circuit used for composite comparison

The lower recovery for Composite E is evident from the results. Adequate residence time addressed the variance in recovery as compared to the other samples. These tests were conducted at a secondary grind of 70% passing 75 micron, slightly lower recoveries than previously observed. A repeat test of the Merensky sample of Composite C was conducted at a grind of 80% passing 75 micron and yielded a recovery of 91%.

The 3PGE+Au recoveries for the various composites using the proposed circuit, are illustrated in Figure 12-16.

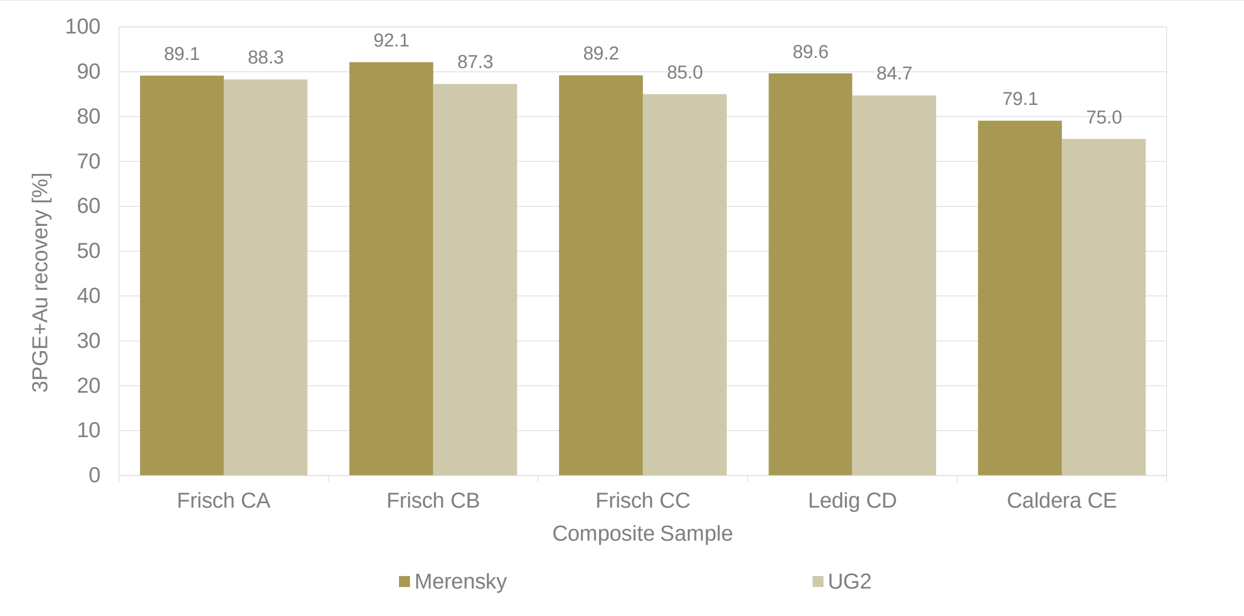

Figure 12-16: 3PGE+Au recovery achieved with proposed laboratory circuit

12.4.5. Configuration of the comminution circuit

Initial comminution test work on the composite samples yielded consistent results. The application of a primary crusher followed by a SAG/ ROM ball mill was considered as the preferred option. Subsequent variability test work on individual drill core samples found that there was the potential for a critical size build-up in the primary mill.

Further test work was conducted and the results of the Julius Kruttscnitt Mineral Research Centre ("JKMRC") drop-weight tests were submitted to the comminution centre at the University of Cape Town for process simulation of the primary comminution circuit. The simulations confirmed the initial concerns and it was recommended that the primary comminution circuit must consist of a conventional three-stage crusher circuit, followed by a grate-discharge ball mill.

12.4.6. Configuration of the milling and flotation circuits

Test work in both the laboratory and pilot plant found that the application of what is commonly known as a MF2 circuit will benefit the recovery and concentrate grade of the PGE + Au in the circuit for both the Merensky and UG2 ores.

Two stages of milling are required to achieve the 80% -75 micron grind, particularly with the harder Merensky ore. It was found that even for the Merensky ore that has a single distinct gangue mineral type, the production of an intermediate concentrate between the two milling stages was beneficial from a concentrate grade perspective. In addition, losses due to over-grinding of the liberated valuable species will be minimised with the production of primary flotation concentrate.

12.4.7. Merensky pilot plant

Based on the findings of the mineralogical analysis and the laboratory test work, the milling and flotation circuit illustrated in Figure 12-17 was used in the pilot plant test work. The primary grind was 40% passing 75 micron and the secondary grind was 80% passing 75 micron. Seven, eight-hour pilot plant runs were completed to generate seven mass balances and sufficient samples for analysis.

Two Merensky and UG2 blends were tested on this circuit to study the effect of UG2 on the flotation performance and quality of the concentrate produced. The circuit and reagents used were identical to those used for the Merensky test work.

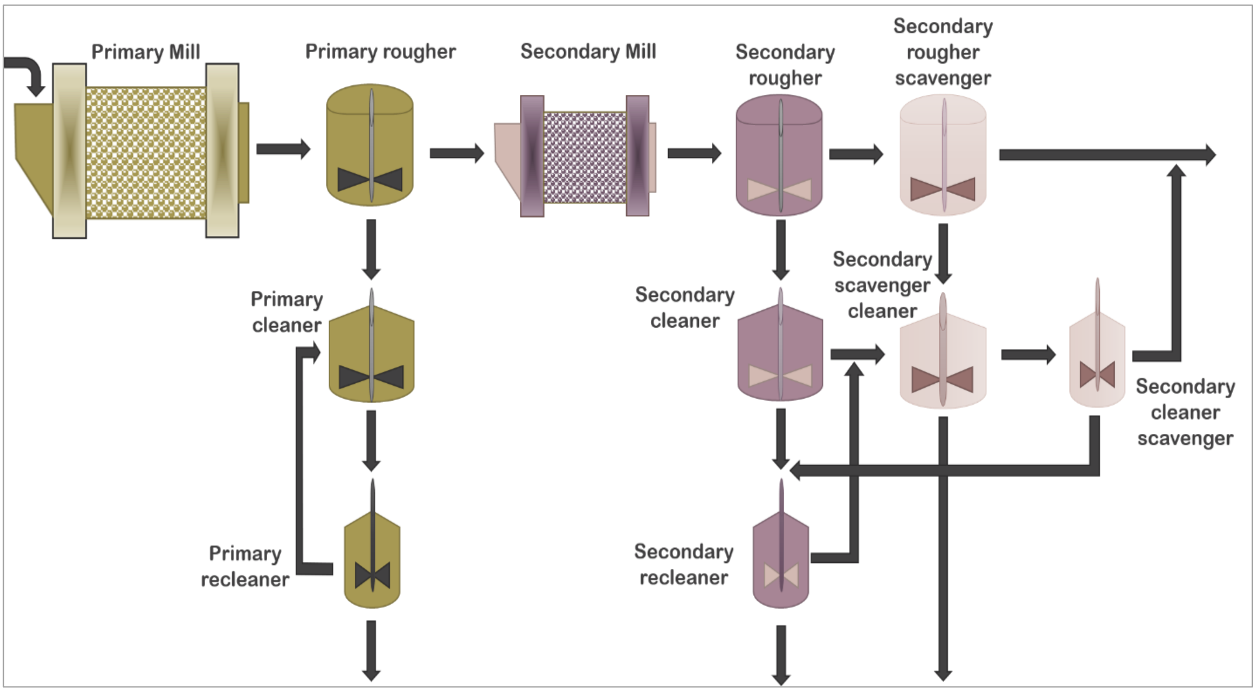

Figure 12-17: Merensky MF2 circuit

The residence times in the various stages of the circuit is shown in Table 12-1.

Table 12-1: Merensky pilot plant and residence times

Flotation stage	Residence time [min]
Primary rougher	11
Primary cleaner	16
Primary recleaner	18
Secondary rougher	8
Secondary cleaner	15
Secondary recleaner	19
Secondary rougher scavenger	20
Secondary scavenger cleaner	6
Secondary cleaner scavenger	24

The total reagent consumption used for the Merensky pilot plant is summarised in Table 12-2.

Table 12-2: Merensky reagent suite

Reagent	Consumption [g/t]
$CuSo_4$	30
SiBX	150
KU92	100
XP200	117

12.4.8. Upper Group 2 Chromitite layer pilot plant

The configuration of the UG2 cleaner circuit as illustrated in Figure 12-18 differs from that of the Merensky circuit (Mintek, 2016). The objective is the production of a high-grade primary concentrate that allows for the production of a low-grade secondary concentrate. The primary grind was 40% passing 75 microns and the secondary grind was 80% passing 75 microns. Seven, eight-hour pilot plant runs were completed to generate seven mass balances and sufficient samples for analysis.

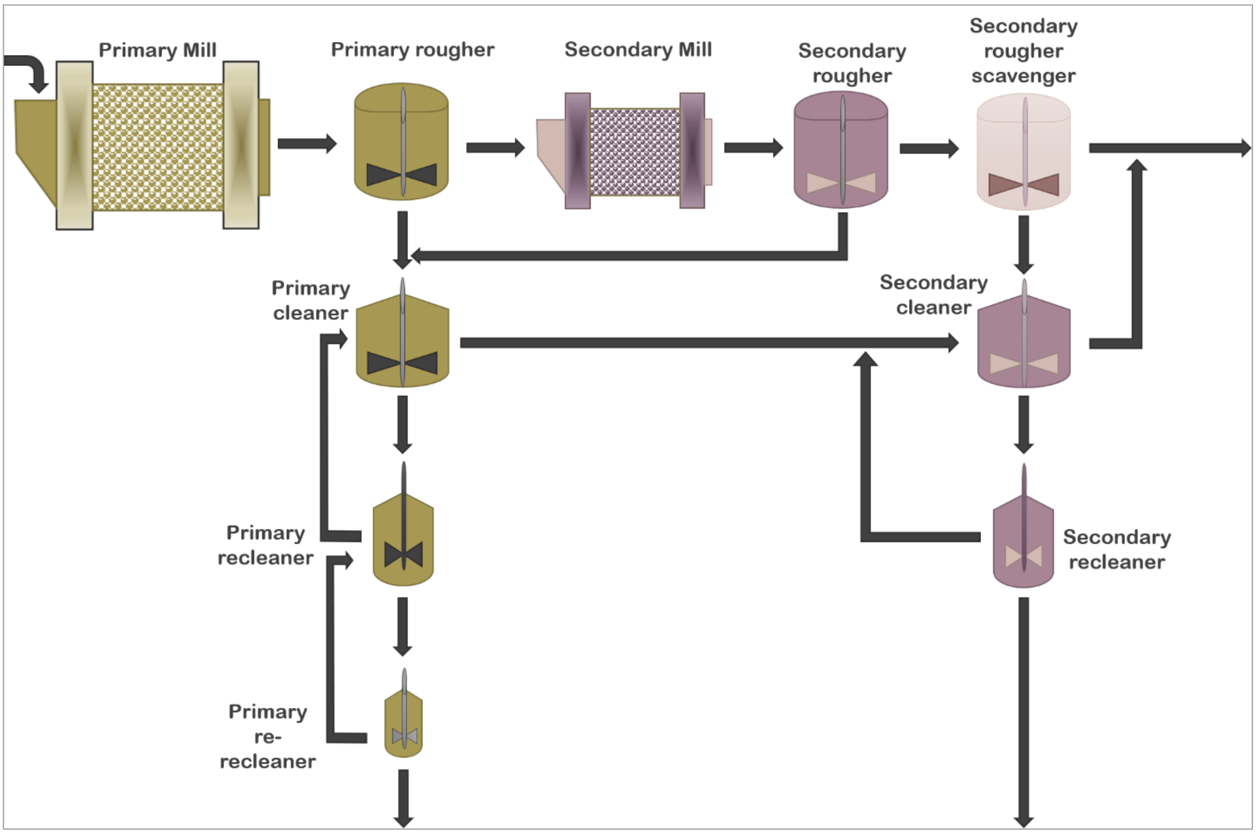

Figure 12-18: UG2 pilot plant flotation circuit

The residence times used in the pilot plant were very long as shown in Table 12-3.

Table 12-3: UG2 pilot plant residence times

Flotation stage	Residence time [min]
Primary rougher	31
Primary cleaner	16
Primary recleaner	18
Primary recleaner	51
Secondary rougher	44
Secondary cleaner	108
Secondary recleaner	226
Secondary cleaner	17
Secondary recleaner	177

The total reagent additions across the primary and secondary circuits are summarised in Table 12-4.

Table 12-4: UG2 pilot plant reagents

Reagent	Consumption [g/t]
$CuSO^4$	N/A
SiBX	300
KU5	330
XP200	65

12.4.9.Mass pulls and recoveries for pilot plant

The average mass pulls to concentrate and the 3PGE+Au recoveries to the concentrates are summarised in Table 12-5 (Mintek, 2016).

Table 12-5: Pilot plant recoveries and mass pulls

Concentrate	Merensky [Pure]		Blend 1 [90% Merensky]		Blend 2 [80% Merensky]		UG2 [Pure]	
	Mass pull	3PGE+Au Recovery	Mass pull	3PGE+Au Recovery	Mass pull	3PGE+Au Recovery	Mass pull	3PGE+Au Recovery
	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]
Primary	1.6	67	1.5	69	2.0	76	0.9	74
Secondary	1.5	21	1.2	19	0.6	8	0.1	2
Scavenger	0.5	2	0.6	2	1.0	4	0	0
Combined	3.6	91	3.3	89	3.5	88	1	76

Blending of the UG2 with the Merensky at levels of up to 20% does not affect the flotation response of the Merensky significantly. There is a reduction in the overall recovery of approximately 3%, equivalent to the weighted average of the Merensky and UG2 recoveries.

12.4.10. Detailed concentrate analysis: Merensky

A detailed analysis was conducted of the Merensky concentrate. The results of the analysis are summarised in Table 12-6 (Mintek, 2016).

Table 12-6: Comprehensive Merensky concentrate grade

Concentrate	3PGE+Au [g/t]					5PGE+Au [g/t]							Acid Soluble [%]		
	Pt	Pd	Rh	Au	4E	Pt	Pd	Rh	Au	Ru	Ir	6E	Cu	Ni	Co
	[ppm]	[ppm]	[ppm]	[ppm]	[ppm]	[ppm]	[ppm]	[ppm]	[ppm]	[ppm]	[ppm]	[ppm]	[%]	[%]	[%]
PRCC	111.0	44.2	8.1	7.3	170.6	116.0	48.5	8.7	5.0	15.8	1.5	195.4	3.0	4.2	0.1
SRCC	22.9	18.8	3.1	2.3	47.1	17.7	18.1	3.4	1.5	4.9	1.0	46.5	0.6	2.1	0.1
ScavC	5.0	3.7	0.6	0.7	9.9	9.9	5.1	0.7	0.5	1.4	0.5	18.1	0.2	0.5	0.0
Combined	59.6	28.0	5.0	4.3	96.8	60.3	29.8	5.4	2.9	9.3	1.2	108.7	1.6	2.8	0.1

Concentrate	ICP [%]												
	Cu	Ni	Cr	Al	Ca	Co	Fe	Mg	Mn	Pb	Si	Ti	V	Zn
PRCC	3	4.2	0.2	1.2	1.8	0.1	19.9	10.2	0.1	<0.05	16.4	0.1	<0.05	<0.05
SRCC	0.6	2.1	0.2	1.3	2	0.1	15.9	12.9	0.1	<0.05	20.7	0.1	<0.05	<0.05
ScavC	0.2	0.5	0.2	3.2	3.4	<0.05	9.8	12.5	0.1	<0.05	22.8	0.1	<0.05	<0.05
Combined	1.6	2.8	0.2	1.5	2.1	0.1	16.8	11.6	0.1	<0.05	19.1	0.1	<0.05	<0.05

No comprehensive analysis was done of the concentrates produced from the blend tests or the UG2 test. All the elements analysed fall within the specifications of the major toll smelters. The combined concentrate for the 10% UG2 blend, yielded a Cr_2O_3 grade of 0.7% and that of the 20% blend yielded a Cr_2O_3 grade of 1.0%, both of which are below smelter specification.

13. Mineral processing

SR 4.3(ii); 4.3(iii); 5.2(ii); 5.3(iii); 5.3(iv); 5.6(viii) / SV T1.5; T1.10 / JSE 12.10(h)(vii)

13.1. Introduction

This section considers the design proposed for the concentrator plant. The process design criteria, mass balance and equipment sizing were reviewed with reference to the findings of the metallurgical test work. The plant layout, ancillary equipment and associated infrastructure were reviewed from a safety, operational and efficiency perspective.

Based on the mine production ramp-up profile and the cost of constructing a full-scale TSF, it was proposed that the concentrator be constructed in two phases, as Module 1 and Module 2. This will allow the mine to delay infrastructural capital during the initial ramp-up period. Module 1 was designed to process 1Mtpa of ore with Module 2 commissioned approximately five years later. Module 2 will be capable of processing an additional 2Mtpa of ore. With the commissioning of Module 2, the tailings from the two modules will be thickened and deposited on a larger TSF located approximately 4.5km from the plant. An interim TSF will be constructed during the initial operation of Module 1 located close to the planned concentrator plant.

13.2. Summary of the design

SR 5.4(i); 5.4(ii)

The design was proposed to meet the processing target of 3Mtpa of ROM ore. Both modules have identical process flow sheets and the crusher circuit is common to both modules. The comminution circuit took cognisance of the findings of the test work and the possibility of a critical size build-up in the primary mill. Based on the test work findings, a three-stage crusher circuit with associated secondary and tertiary screens were incorporated into the plant design.

Adequate steel detection and belt magnet were included ahead of the primary crusher for the removal of tramp steel ahead of the crusher circuit. A single tertiary crusher feed bin, feeder and crusher arrangement will cater for the 1Mtpa throughput and with the increase to 3Mtpa, two further tertiary crusher bins, feeder and crushers will be installed. The tertiary crushers were selected to produce a P80 of 8mm. The product is conveyed to two 500t live capacity silos; one for Merensky ore and the other for UG2 ore. The system was designed to process the Merensky and UG2 ores separately.

The crusher design allowed for dust suppression and extraction with the moist dust reintroduced to the circuit ahead of the metal accounting system. Two weightometers were included in the design of the mill feed conveyors to provide a measure of the total feed to the primary mill.

A classical primary ball mill circuit design was proposed for the primary mill with a scats screen, de-chipping cyclone cluster, screen and classification screen. Water will be added to the mill feed, the mill discharge and the three-screen in the circuit as spray water. The mill circuit was designed to produce a grind of approximately 40% passing 75 micron. An automated steel addition system was included that is integrated with the plant control system to maximise mill efficiency. The classification screen undersize gravitates to the primary rougher feed surge tank.

The secondary mill circuit is a classical secondary mill circuit with the feed to the circuit (the primary rougher tailing) pumped to the mill discharge sump with the addition of the required dilution water. From the mill discharge sump, the pulp is pumped to the secondary mill classification cyclones, from where the cyclone underflow returns to the mill and the overflow gravitates to the secondary rougher feed surge tank.

The flotation circuit proposed in Figure 13-1 is a combination of the Merensky and UG2 circuits tested in the Mintek pilot plant.

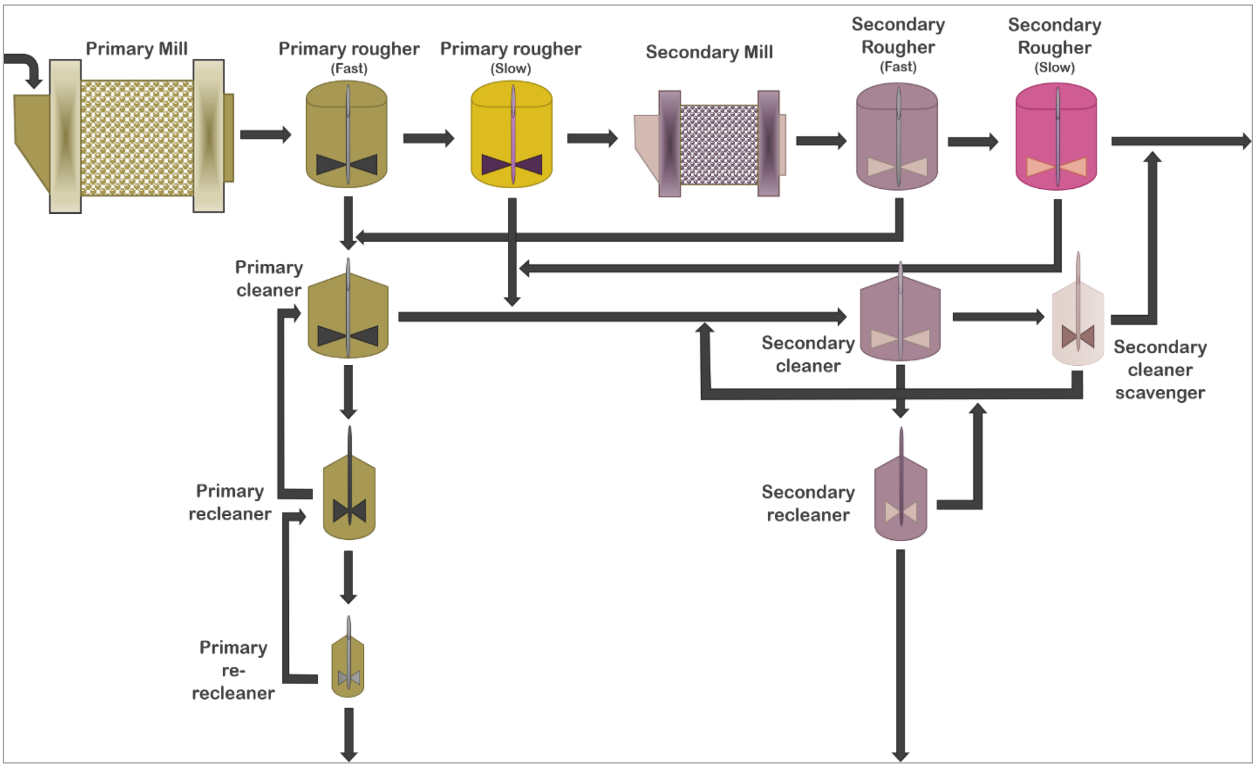

Figure 13-1: Proposed plant circuit

The proposed circuit was mainly based on the outcome of the test work completed. A design concern was identified that the cleaner scavenger concentrate is returned to the secondary cleaner. The mineralogical analysis of the cleaner tailings did reveal that the PGE + Au species liberated were very fine and would be prone to slow floating. There is a high probability that this material will be lost to the tailings circuit.

The combined final concentrate from the primary re-recleaner and secondary recleaner are pumped to the separate concentrate thickeners for Module 1 and Module 2. This arrangement is ideal in that different concentrates can be produced from the two thickeners. Two separate concentrate filters were provided for the two modules.

Tailing from the flotation plants is pumped to two tailing thickeners for Module 1 and Module 2. Thickener underflow from Module 1 is pumped to belt filters during the first five years. During this period, the filtered tailing is mechanically deposited on the TSF located close to the plant. Once permitting and construction of the main TSF, some 4.5km from the plant, is complete, the tailing from the tailing thicker will be pumped to the main TSF.

The installation of a Cr recovery plant is not viable in the early years of operation due to the high ratio of Merensky in the plant feed. A space allowance was made in the plant design for a Cr recovery plant when the ratio of UG2 ore in the plant feed reaches appropriate volumes.

13.2.1.Process design criteria

The effective running time of 62% and 92% for the crusher plant and mill-flotation circuit respectively, are accepted norms in the industry for the purpose of sizing equipment. Based on this, the design tonnage throughput was considered appropriate.

The selection of the bond work indices for the sizing of the mills took cognisance of the variability of the ore hardness and that the mills must be adequately sized to cater for excessive dilution and harder ore from the northern regions of the mining right area. The primary mill was specified as an overflow mill and not a grate discharge mill. The reason for this decision is unclear as an overflow mill in this application may result in over-grinding early in the process and is contrary to the recommendations made by the University of Cape Town.

It was indicated that the flotation cells must all have a power density of 3kW/m^3. This can be achieved by installing mechanisms rated one size higher in the flotation cells. Experience has shown that at the optimum pulp densities of less that than 30% solids by mass, the flotation cells will still not be able to draw much above 2kW/m^3. The cells cannot achieve the higher power draw without causing premature failure to the lining on the wear parts.

The residence times for the various stages in the circuit are compared in Table 13-1 for the Merensky pilot plant and the proposed new circuit. In all the stages significantly more residence time was catered for. This will potentially ensure that recovery targets are met. Achieving requisite concentrate grades may prove to be a challenge.

Table 13-1: Comparison of stage residence times

Flotation stage	Merensky pilot plant residence time [min]	Proposed residence time [min]
Primary rougher	12	30
Primary cleaner	16	25
Primary recleaner	18	25
Primary re-recleaner	n/a	25
Secondary rougher + scavenger	28	50
Secondary cleaner	15	20
Secondary recleaner	19	35
Secondary cleaner scavenger	24	40

In all the flotation stages, the pulp density specified and used in the sizing of the flotation banks, were in line with industry-accepted norms. The estimated cell capacities should be adequate. The design included a frother dosage of approximately 120g/t of ore milled. This is above the industry norm, and no more than 35g/t milled will be required. The capacity of the frother installation was over-designed.

An allowance of 0.8m^3 of water per tonne milled was specified in the design criteria. This may be conservative from a design perspective, especially in times of high ambient temperatures during the summer months. Once the main TSF is commissioned, there will be a significant amount of water locked up during the initial operational period. WorleyParsons conducted a study that showed that at least 1.0m^3 of water per tonne milled was required.

13.2.2.Forecast plant performance

The major findings of the mineralogical analysis and metallurgical test work (Mintek, 2016) were captured in the design of the proposed concentrator plant. The design criteria of the proposed plant exceeded the specifications of the pilot plant and it appears that the planned concentrator plant will be able to match the efficiencies achieved during the test work conducted. The estimated metal recoveries, based on the proposed plant design are shown in Table 13-2.

Table 13-2: Forecasted plant metal recoveries

Description	Recovery [%]	
	Merensky	UG2
Pt	92.5	82.0
Pd	93.0	80.0
Rh	91.0	81.0
Au	68.5	80.0
Ru	81.0	79.0
Ir	78.0	67.0
Cu	86.0	80.0
Ni	55.0	50.0
Cr_2O_3	N/A	39.0

The Cr recovery will apply to a UG2 only plant operation. The Module 1 plant will be able to meet the tonnage throughput of 1Mtpa with a blend of approximately 90% Merensky ore and 10% UG2 ore. The second module will be able to process a similar blend at the increased throughput of 2Mtpa, as adequate comminution capacity was catered for.

13.2.3. Metal accounting design

The plant design catered for the installation of industry-best practice metal accounting samplers and weightometers for the quality control of the plant feed. No indication was provided of the sampling process and type of samplers planned in the process description. The review of the process flow diagrams indicated that the two final concentrates are sampled individually and then again as a combined stream. The individual rougher tailing and cleaner scavenger tailing samplers were illustrated as two-stage samplers, as is the combined final tailing sampler. It was assumed that these samplers meet industry best practice standards.

No mention was made of the sampling of the final concentrate filter cake prior to dispatch. Although it is common practice to use the values reported by the toll smelter, it is important from a security perspective to have a comparative value. Process control samplers were mentioned but not specified.

13.2.4. Operability and maintainability

The plant design considered industry best practice from an operability and maintainability perspective. The design did not include a plant roof and adequate wind protection must be provided. Mobile cranes will be used for the lifting of heavy equipment. Appropriate access was provided to all equipment with suitable headroom.

Conveyor belts to the various comminution units will be installed at an angle of no more than 15° and all conveyors will be covered with dog-house sheeting. A single walkway will be installed on one side of each conveyor. A wood picking station was included on the ROM feed conveyor feeding the primary crusher. Metal detection was included in the design for manual intervention by the operating staff.

The flotation cells selected are cylindrical tanks cells, each located on a separate plinth. The cells will be installed in a cascade with individual level control with step height between plinths of 900mm for the rougher flotation cells and 600mm for the cleaner flotation cells.

Access to the flotation cells and sumps were placed so that operators will be able to take manual samples for metallurgical test work. Access to the flotation cell drives and concentrate launders will be provided to ensure a safe working environment. All flotation cell drives and mechanisms were designed so that they could be locally disconnected and locked out to facilitate removal during routine maintenance.

All process pumps and tanks will be installed above the bund level to ensure access during stoppages. The spillage areas will have a minimum valley angle of 5°, except for the mill area that will be specifically designed to facilitate coarse particle flow.

Slurry sumps were sized to have a minimum residence time of 90 seconds and a minimum valley angle of 45°. The mill sump will have a residence time of 120 seconds. All pipelines are single line pipelines with dual pump redundancy. All slurry lines were designed to be self-draining and equipped with flushing and drainage fixtures. A minimum slope of 12° for rubber-lined pipes and 8° for HDPE lines was specified.

Slurry lines will be fabricated from rubber-lined mild steel. HDPE lines may be considered for lines with a diameter of less than 200mm. Slurry lines will be sized to ensure a slurry velocity of 3.6m/s in the milling circuit and 2.9m/s in the flotation circuit.

13.3. Processing related infrastructure

SR 5.4(i); 5.4(ii)

The following plant-specific infrastructure was included in the plant design.

13.3.1. Personnel infrastructure

The following infrastructure was included in the design for the use by the management, maintenance and operational personnel:

- Dedicated car park
- Security perimeter and access control
- Male and female change houses
- Management offices
- Boardroom
- Training room.

13.3.2. Maintenance workshops and store

A fully equipped maintenance workshop was included for fitters, boilermakers, electricians and instrumentation technicians. A lockable store was provided for regular maintenance items.

13.3.3. Storage of metallurgical consumables

Storage capacity close to the work area allows for large volume metallurgical consumables such as steel balls and reagents. The reagent storage area was properly designed with the required roof cover and fire protection systems. A lay-down area was provided for the mill liners and large metallurgical spares, like conveyor belting and spare flotation cell mechanisms.

13.3.4. Metallurgical support infrastructure

A fully equipped metallurgical laboratory was included where routine metallurgical test work can be conducted.

13.3.5. Reagents make-up and dosage

Reagent storage and make-up facilities were included in the plant design with due consideration of safety requirements relating to the reagents. Suitable capacity was allowed for in the various type of depressants that will be used, depending on the Merensky to UG2 feed ratio.

13.3.6. Water reticulation

The process description indicated that only 24 hours' worth of water will be stored on site. Experience shows that this may not be adequate, particularly in the hot summer months and when the TSF is undergoing structural or operational changes. As previously indicated, the allowance of 0.8m^3 per tonne of ore milled was considered inadequate. The mine intends to develop a comprehensive water management plan for the operation detailing the water management methodologies and standard operating procedures required to facilitate responsible water usage in the concentrator plant. The water reticulation system in the plant will consist of:

- Mill circuit water
- Process water
- High-pressure hosing and flushing water
- Reagent water
- Firewater
- Gland seal water and
- Potable water.

13.3.6.1. Process water storage tank

The process water storage tank will receive water from the raw water, final tailings clarifier overflow, concentrate thickener overflow and tailings dam return water. The storage tank will distribute to the:

- Process water supply
- High-pressure water for line flushing and spillage hosing
- Mill circuit water.

13.3.6.2. Clean water storage tank

The clean water storage tank will receive water from the process water storage tank via a sand filter to produce clean (filtered) water. This tank will receive raw water for make-up. The storage tank will distribute to the:

- High-pressure gland service water
- Plant gland service water.

13.3.6.3. Potable water

The potable water system consists of a water storage tank and three pumps, each dedicated to its distribution point. The water tank will receive make-up water from the Magalies municipal supply. Potable water will be required for:

- Offices
- Change houses
- Safety showers
- Reagent make-up.

Potable water for human consumption and ablution facilities will be supplied directly from the main municipal water header and not via the potable water tank.

13.3.6.4. Stormwater management and pollution control dam

Two PCDs cater for the containment of rainwater and bunded area overflow. Stormwater run-off is channelled to a concrete-lined silt trap, where solids are mechanically recovered. Overflow from the silt trap is diverted into a concrete-lined dam and subsequently into the polyvinyl chloride ("PVC") lined dam. The dams share a submersible pump, returning water to the tailings thickener at a controlled flow rate.

13.3.7. Compressed air reticulation

Compressed air is generated at approximately 800kPa using dedicated screw-type compressors (three running and one on standby) for both plant and instrument air.

13.3.7.1. Plant air

The discharge from the compressors is filtered before storage in the plant air receiver for distribution. Plant air is required for:

- Maintenance utility
- Gas reduction in the reagents area.

13.3.7.2. Instrument air

The discharge from the compressors is filtered before passing through two of three air-drying systems (two operating, one standby). Each drying system consists of pre-filters, desiccant dryers and outlet filters prior to being stored into the instrument air receiver. Instrument air is required for:

- Actuated control valves
- Actuated on/ off valves
- Baghouse reverse pulse filters.

13.3.7.3. Low-pressure blower air

All tank type flotation cells are forced draught machines and require a consistent, low-pressure air supply. The design will ensure pressure stability through use of dedicated rougher and cleaner manifold blow-off systems, each equipped with silencers. Airflow to each cell is monitored and controlled. Low-pressure air requirements are specified by the flotation cell suppliers and blowers form part of the flotation cell supply package.

14. Infrastructure

SR 4.3(iii); 5.2(ii); 5.4(i); 5.4(ii) 5.4(iii) / SV T1.5; T1.10 / JSE 12.10(h)(vii)

The general infrastructure requirements were assessed in accordance with the following structure:

- Surface facilities
- Shaft configuration
- Winding systems
- People transportation
- Rock handling
- Underground services
- Underground facilities.

Details of each area are provided in the sub-sections below. The assessment was based on information obtained during the site visit and from reports supplied by the BPM, dated 2004 to 2013, as prepared by TWP, TMC and WorleyParsons.

14.1. Surface facilities

14.1.1. General infrastructure layout

The existing infrastructure, with all required roads, security and access control, is operational and in good working order. The permanent surface infrastructure of the mine is shown in Figure 14-1 below.

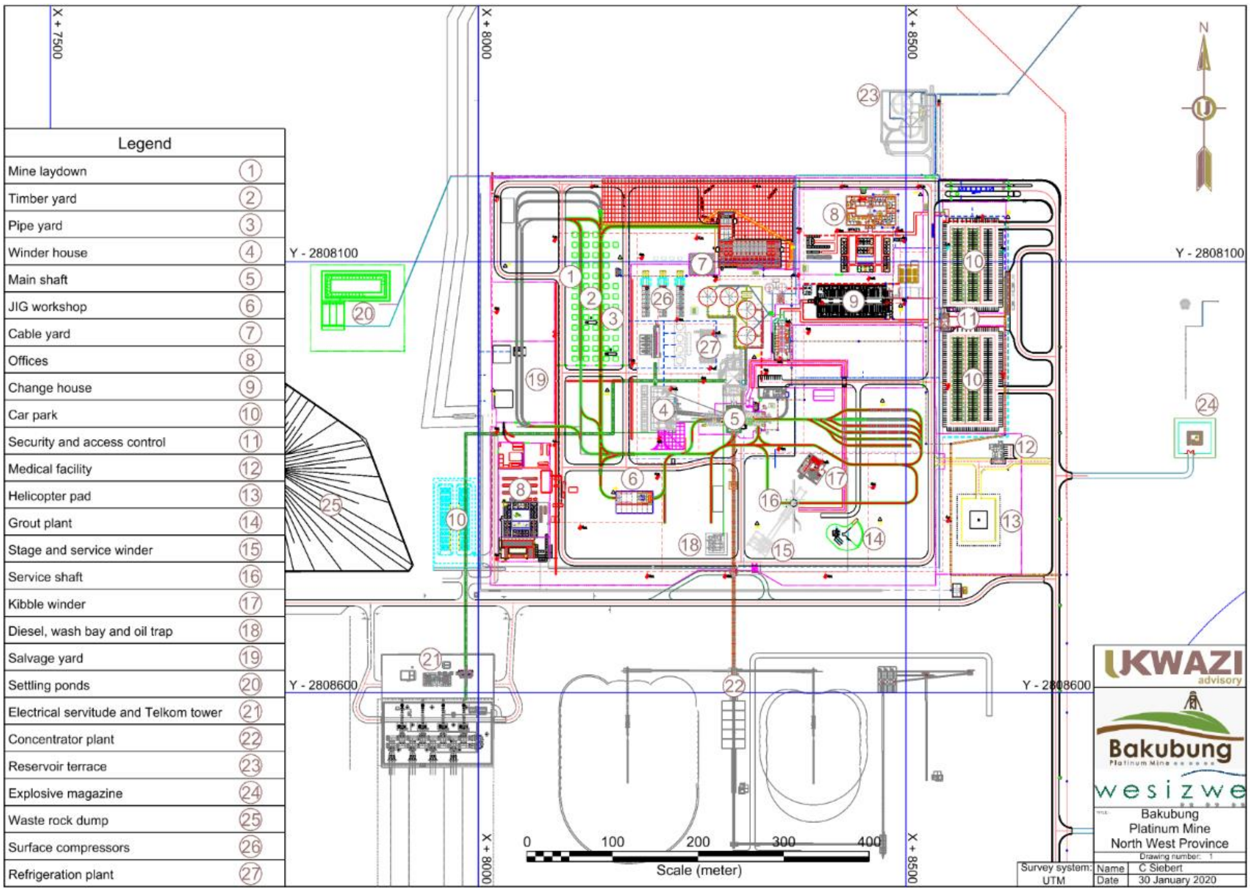

Figure 14-1: General infrastructure layout

14.1.2. Earthworks and access roads

The earthworks design process was carried out in accordance with the latest applicable codes of practice ("COP"), specifications, Acts and regulations governing the surface and subsurface infrastructure required for the mine and concentrator to function.

Earthworks were designed following the recommendations obtained from the geotechnical and environmental investigations, together with the input of a professional engineer or engineering technologist.

14.1.2.1. Earthworks

Material from site clearing and surplus excavated material was removed to designated spoil areas. Where overburden or material from site clearance was acceptable for use as topsoil, it was stockpiled adjacent to the site for later use on embankment slopes or elsewhere where topsoil was required.

14.1.2.2. Access roads

The mine is located on the R556 provincial road near Sun City in the North West Province. Traffic to and from Rustenburg and from the eastern direction is affected by the increased levels of traffic on the roads as a result of the mining operation. The North West Provincial Road Authorities ("NPRA") contracted consultants to upgrade the roads passing through and around the Ledig area. The BPM was in discussions with these consultants regarding the inclusion of intersections and road upgrades.

Access to the mining and plant operations is via a double lane tarred road. This road is monitored by a guardhouse located at the end of the public road. The road is designed to cater for traffic that includes haulage trucks and light vehicles.

Limited numbers of surfaced roads are located on the plant and shaft terraces. These are used to service the main areas of activity or those where high volumes of traffic are expected. These areas include the main shaft bank, the concentrate loading and delivery points for major consumables. Additional access to areas on the shaft and plant terraces are made by demarcated gravel tracks.

Allowance was made for the construction of a jointly functioning taxi and bus stop near the entrances of both the plant and shaft areas. This stop includes covered waiting terminals, a limited amount of seating and adequate space to allow vehicles to pass. There is adequate space for buses to turn.

Private vehicle parking is available and includes provision for 750 cars in two parking lots located at the shaft and plant areas.

14.1.3. Stormwater and pollution control

The mine was designed to capture any run-off contaminant inside the mine or plant area (rain or spillage). The pollution water dams were sized to accommodate the run-off. The dams were lined with a 2mm HDPE liner to prevent water seepage and possible contamination of groundwater.

Stormwater is prevented from entering the site by the construction of a series of strategically placed earth berms of nominal compaction from black turf. The water is directed around the shaft and allowed to enter the natural watercourses in the area. Stormwater falling on the shaft bank is considered polluted water. This water is directed to the PCD for settling and evaporation. The PCD is sized to absorb the run-off from a one in 50-year (24 hours) event. The PCD was constructed in a series of modules to minimise upfront capital and sized to accommodate stormwater on the developed portions.

14.1.4. Surface structures

14.1.4.1. Structural design

Structural steelwork was designed in accordance with SANS: 10162 Parts 1 and 2 "The Structural use of Steel", Limit State Design and SANS: COP 10208 Parts 1 to 4 "Design of Structures for the Mining Industry". Nominal permanent and imposed loads were in accordance with SANS: 10160. Equipment loads were obtained from the manufacturers.

14.1.4.2. Existing structures

The existing headgear structure appears to be in good condition, apart from visible oxide formation on some of the members. The existing winder house is in good condition and appears well-maintained with all maintenance and inspection planning and records of mechanical equipment in place. A geotechnical investigation on the shaft bank, access roads and tailings site, was conducted by Geopractica. The investigation included the excavation of numerous test pits across the area and the drilling and logging of drill holes under all proposed major structures. Information obtained suggests that the ground conditions can be variable, with weathering depths varying from 2m to 10m below ground level.

14.1.4.3. Security and access control

The mine adopted a comprehensive security plan to limit access to mine activities and authorised persons. Unintentional access to the property is prevented by suitable fencing, signage and controlled access points. The main access road is closed, using booms during normal operations and lockable gates when deemed necessary.

Access to the shaft area is limited by security fencing, with guards, booms and lockable gates at the main entrance. All other roadways remain closed off for normal operational activities and are controlled by guards when access through these roads is required. A full communication and access control system is installed and used to monitor personnel entering and leaving the mine property.

14.1.4.4. Offices

The main operational office site consists of a mobile office camp located to the west of the main shaft, which provides office space for all personnel. There are mobile ablution/ change-house facilities and a laundry room available.

14.1.5. Waste management

14.1.5.1. Sewage handling and treatment plant

A sewage treatment plant, capable of treating approximately 420m³/day of sewage was provided for. Sewage reticulation is installed throughout the mine site with a surface transfer point where underground waste can be dumped and piped to the plant.

14.1.5.2. Solid waste

Temporary domestic and industrial waste disposal facilities were constructed on-site, in accordance with current regulations. All domestic and industrial waste is collected from appropriately designated areas, sorted and removed by a registered contractor for disposal at an approved landfill site.

14.1.5.3. Hazardous waste

All hazardous waste is collected on-site at a temporary storage facility. The hazardous waste is collected by a registered hazardous waste carrier and disposed of at a registered site. A certificate for the safe disposal of hazardous waste is then supplied to the mine.

14.2. Bulk electrical supply

Bulk electrical supply to the mine was established by Eskom in 2013. As part of a contractual agreement, Eskom provided equipped bays of 3 x 40 megavolt amperes ("MVA") (88/33 kilovolts ("kV")) transformers to supply the BPM, that included a premium supply of 40MVA. The 33kV, three-phase, 50 hertz ("Hz") supply is derived from an Eskom 88/33kV yard adjacent to the mine. These transformers are operated in parallel. The mine may collaborate with Eskom to determine how partial load curtailment may be affected. This can be achieved, inter alia, through Eskom's demand market participation initiative, or under-frequency load-shedding scheme or by other agreed means.

14.2.1. Electrical design

The main electrical supply is taken from the 88kV Eskom substation situated at the mine. To ensure adequate supply capacity, 4 x 20MVA, 33/6.6kV transformers were installed. Two were installed at the 33kV main consumer substation and two at the concentrator plant substation. The main load components on the mine are shown in Table 14-1.

Table 14-1: Demand loads of the mine

Area	Energy consumption [MVA]
Underground load	17
Surface load (mining)	18
Total mining load	**35**
Concentrator load	40
Total mine load	**75**

All load values indicated are approximate loads. Eskom can provide the mine with 120MVA (3 x 88/33kV) transformers. Harmonic filter/ power factor correction was installed at appropriate locations in the distribution systems to ensure compliance with the power quality requirements and to minimise kilovolt amps reactive hours consumption.

The underground power supply is fed from the 6.6kV main consumer substation and distributed by feeder panels, consisting of an appropriate number of cables installed in the shaft. All surface substations are constructed from brick and mortar. Each substation consists of three sections:

1. Medium voltage room (switchgear)
2. Light voltage room (control room)
3. Programmable logic controllers ("PLC") room.

Dual battery tripping units were supplied for the main intake substation (Eskom) and consumer substations. All surface substations have forced ventilation (no air conditioning was allowed). Localised fire detection is provided on a double knock system to allow for carbon dioxide ("CO_2") flooding of the substation (this will replace the temporary system currently installed).

Protection systems were designed to provide the fastest possible clearance of fault conditions while only affecting the areas concerned. They are graded to clear faults as close as possible to their locations. A metering monitoring system was installed and the earthing system design provides a uni-potential system, with all equipment effectively earthed.

Lighting systems were designed to provide adequate illumination based on the minimum average illumination levels. Surface lighting is facilitated through high masts and bulkheads, underground haulages are lit with Edison screw fittings and conveyors with fluorescent fittings.

Emergency power and voltage requirements were defined based on a risk assessment. The equipment design, specification and selection focus on the safety of personnel and equipment and complies with standards, regulations and COPs. If emergency power is required, it will be provided using a diesel-powered generator. Critical items such as underground pumps, ventilation fans and winders will require emergency supply in the event of a power failure.

14.2.2. 33kV electrical distribution from consumer substation

All 33kV switchgear is of the gas-insulated indoor ("GIS") type and housed in the substation building. The switchgear used at the 33kV main consumer substation is of the double busbar design, with a busbar coupler.

The rock and man/ material converter fed winders and the concentrator mills with 6 megawatts ("MW") converter fed variable speed motors, are connected at 33kV. Two, 33/6.6kV substations provide power to the mine and planned concentrator plant respectively.

The mine substation has two, 20MVA transformers and the concentrator plant substation has two, 20MVA installed. Single-core cross-linked polyethylene ("XLPE") insulated, unarmoured, Cu tape screened, blue stripe, 19/33kV cables are used to connect the indoor switchgear to the overhead lines. Dual feeds were provided to all 33kV busbars.

14.2.3.6.6kV electrical distribution

The 6.6kV main consumer substation is situated on the shaft terrace and is of the double busbar type, with both busbars being continuous. The two incoming supplies were connected to separate busbars, allowing the loads to be distributed by switching the feeders onto either of the busbars. Dual feeds were provided to all 6.6kV busbars.

14.2.4.Electrical equipment selection

The 33kV switchgear is vacuum metal clad, indoor, fixed pattern switchgear, with a rated voltage of not less than 36kV in accordance with International Electrical Code ("IEC") 60298. The switchgear is rated for 25 kilo ampere ("kA") short circuit current, for three seconds. Metering is allowed for on all feeders and incomers.

Switchgear of 6.6kV for the surface substations, the main underground substation and the main underground pump station are of the extensible metal clad, fully withdrawable pattern indoor type using either vacuum or sulphur hexafluoride ("SF_6") gas as the arc quenching medium and are rated for a short-circuit current of 25kA. Compact, fixed pattern, SF_6 insulated, extensible switchgear is used for all other underground substations. On spur feeds, the transformers are supplied using a circuit breaker only. For fixed pattern switchgear, no remote tripping/ closing panels were allowed. Self-powered relays were allowed for so no battery tripping units will be provided.

Motor control centres ("MCCs") underground are of a fully withdrawable metal-clad type. No programmable overloads or PLC are used to control the stopping and starting of motors, the operator will do this manually.
Dual battery tripping units are supplied for the 33kV main intake substation and the 6.6kV consumer substation. All other 6.6kV and 550V metal-clad withdrawable switchgear use single battery tripping units. The battery tripping units are designed with sealed low maintenance batteries.

All distribution transformers are oil insulated, double wound, three-phase, 50Hz, Dyn11 and ONAN cooled in compliance with SANS 780. Transformers larger than 1 000kVA are free breathing with a conservator tank. The conservator is fitted with an oil gauge and a silica-gel breather. Transformers rated between 1 000kVA and 3 150kVA are fitted with an oil temperature thermometer with contacts for alarm and tripping. The transformers are fitted with a Buchholz reservoir and relays.

Transformers rated at more than 3 150kVA have an overpressure alarm and a winding temperature measurement. An outdoor weatherproof control panel contains all auxiliary wiring. The oil level, oil temperature, Buchholz relay, explosion vent and winding temperature have potential-free contacts for trip and alarm signals. Transformers that operate in parallel are of the same vector group and the variance in impedances will not exceed 10%. Neutral earthing resistors/ transformers are fitted to all transformers to limit earth fault current.

14.2.5. Electrical cables

All cables (medium voltage, low voltage and control) are the low halogen, blue stripe type. Cables were distributed across the site utilising above-ground racks and were not buried unless necessary. If buried, installations were set up in concrete cable ducts or PVC sleeves with draw box face lifters.

14.2.6. Electrical motors

Motors of 550V supply are cast iron, totally enclosed fan cooled ("TEFC") IP55 designed to South African Bureau of Standards ("SABS") specifications. As a rule, motors up to and including 315kW are 550V supply and motors above 315kW are at 6.6kV. Motors of 6.6kV supply will be TEFC or closed air circuit air ("CACA") cooled as appropriate. Mining winches, fan and pump motors are fed from 550V MCCs. On load isolator stations are located at each motor location with a rating of IP55 for the construction of the isolators.

14.3. Bulk water supply

The mine is located in an area where water is generally in short supply. Exacerbating this is the fact that the main water authority supplying the mine is only able to supply potable water. Potable water is expensive and therefore the base philosophy for water handling is to conserve and recycle as much water as possible. There are three primary water users at the mine:

1. The refrigeration plant
2. Underground mining activities
3. The concentrator plant.

All of these systems were designed to recycle as much water as possible. The storage of make-up water was provided by 2 x 3 megalitre capacity reservoirs. The reservoirs could supply water to the operation for up to 24 hours if the bulk water supply were interrupted. Two electrical pumps were installed with surface water delivered to the relevant consumers via a ring main.

14.3.1. Overall water balance

The overall mine water balance is shown in Table 14-2. Approximately 6 megalitres/ day of municipal makeup water is required. A water agreement with Magalies Water is currently in place for 2 190 megalitres/ annum with an estimated maximum seven-day design requirement of 52.5 megalitres. The daily provision from 2017 onwards was 6 megalitres/ day.

Table 14-2: Overall water balance

Consumption		Supply [Water sources]	
Description	**Quantity [Megalitres/day]**	**Description**	**Quantity [Megalitres/day]**
Underground water demand	5 846	Water recycled from operations	14 181
Surface water demand	3 277	Fissure and borehole water	0
Concentrator plant water demand	11 018	Municipal makeup water	5 960
Total	**20 141**	**Total**	**20 141**

Table 14-3 summarises the overall mine water balance. It must be noted that this was estimated for the wet season (summer) when surface evaporation from dams is at its highest due to relatively higher humidity and all four refrigeration units are running to combat the higher surface ambient temperatures. During the wet months, more water from the tailings dam is anticipated for return than in the dry months. Following the same reasoning and estimations as stated above and applying them to assumed varying climatic changes experienced through a typical year, allows for the derivation of the data contained in the table below:

Table 14-3: Annual water consumption

Month	Refrigeration machines running [Number]	Slimes dam return estimate [%]	Daily water consumption [Megalitres]	Monthly consumption [Megalitres]
January	4	50	5.42	167.9
February	3	45	5.75	160.9
March	3	45	5.75	178.2
April	3	43	5.97	179.0
May	2	35	6.62	205.3
June	0	20	7.83	234.9
July	0	20	7.83	242.7
August	1	30	6.95	215.6
September	2	35	6.62	198.6
October	3	40	6.29	195.1
November	3	45	5.75	172.4
December	4	50	5.42	167.9
Total annual consumption (megalitres)				**2 318.4**
Average daily consumption (megalitres)				**6.35**

14.3.1.1. Firewater

An adequate fire main, dedicated only to firefighting was installed at the shaft and concentrator plant area. This is indicated in the SANS 10400 COP, which requires that the water must be free from suspended solids and high chloride contents to prevent undue corrosion and blockage of nozzles. The fire system contains potable quality water, derived directly from the incoming municipal mains and stored in a dedicated, adequately sized reservoir.

14.4. Shaft configuration

The main ore body access is facilitated through a vertical shaft system that comprises:

- An 8.5m diameter lined main shaft (depth 825m) equipped with men, material and rock handling facilities
- A 7.5m diameter lined service shaft for men and material (depth 825m).

These shafts were positioned within the constraints of the mining right area to effectively access each of the two reef horizons. The main shaft can hoist up to 250ktpm of ore and up to 15ktpm of waste during steady-state production.

The ore body is accessed with four station levels out of the main and ventilation shafts, namely 69L, 72L, 77L and 81L. The primary haulage development consists of on-reef twin access drives and inclined raises, intended primarily for the movement of personnel, logistics and intake airways.

Underground development of integrated shaft infrastructure includes the workshops, tips, ore passes, silos, belt level, skip tipping arrangements, dams, main chambers and shaft bottom. The centralised workshops on 69L and 81L were one of the first infrastructure excavations developed during sinking. These workshops are fully equipped to meet the servicing and rebuild requirements of all fleet and underground equipment.

An overview of the shaft design criteria is indicated in Table 14-4.

Table 14-4: Shaft design criteria

Detail	Description	Unit	Value/ description
Level naming and elevations	Surface	Name	Shaft bank (1 046m amsl)
	69L	Name	693m below collar elevation (353m amsl)
	72L	Name	723m below collar elevation (323m amsl)
	77L (loading)	Name	771m below collar elevation (275m amsl)
	81L (pump chamber)	Name	813m below collar elevation (233m amsl)
	82L (shaft bottom)	Name	825m below collar elevation
Production (dry tonnes)	Ore tonnes – Merensky	kt	230
	Ore tonnes – UG2	kt	20
	Note: When Merensky is no longer able to provide 230ktpm it will be mined to depletion and UG2 will be mined to make a total of 250ktpm.		
	Waste (worst case)	kt	15
	Total	kt	265
Winders	Main shaft: men and material	Type	Double drum
	Main shaft: rock	Type	Koepe
	Main shaft: service	Type	Single drum
	Ventilation shaft: service	Type	Single drum
	Service shaft: men and material	Type	Double drum, single drum used
Shaft details	Main shaft	Description	8.5m diameter, concrete-lined steel buntons and guides Men, material and rock Down-cast ventilation
	Ventilation shafts	Description	6m diameter Not equipped Up-cast/ down-cast ventilation
	Service shaft	Description	7.5m diameter, concrete lined Rope guides Men and material Down-cast ventilation

There are two major underground workshops for all equipment servicing requirements. These workshops are situated on 69L and 81L and can perform all weekly, major servicing and rebuild work. They are equipped with service bays and overhead cranes. Minor servicing (dailies) is carried out in the mining sections or satellite workshops.

14.5. Winding systems

A kibble and stage winder were purchased second-hand, refurbished, installed and free-issued to the sinking contractor. A second kibble winder was supplied by the sinking contractor. The mine purchased and commissioned all winders for the permanent phase.

Men and material are transported underground utilising a double drum winder. Rock is transported through a friction winder with extra service personnel transported using a single drum service winder. All these winding engines share the same main shaft and headgear structure.

A summary of the winders is shown in Table 14-5.

Table 14-5: Summary of winders

Item no.	Winder	Description	Size
1	Main shaft man and material kibble winder	Double drum, second-hand ex Deelkraal, 33kV 2 x off DC motors	3 970kW, 15t kibble, 150 persons, 12t material
2	Main shaft rock winder	Ground-mounted koepe, second-hand ex Nieu Monopol, Germany, 33kV 2 x off AC motors	6.5m drum, 4 rope, 3 500kW motor, 20t skips
3	Main shaft service winder	Single drum, 6.6 kV, AC motor, 21 men	2.5m single drum, 690kW motor, 2.5t payload
4	Ventilation shaft kibble winder	10t kibble, second-hand ex-President Brandt, 6.6kV DC, MG-set for DC motors	14ft double drum, 3 170kW
5	Ventilation shaft stage winder	4 Canadian winches, 6.6kV	Winches ex Canada
6	Ventilation shaft service winder	Single drum ex Ermelo/ Coilmech, 6.6kV DC (geared)	2.3m single drum, 280kW motor, 1.5t

14.5.1. People and material hoisting

There are two considerations in the selection of winders for a mine's operational phase:

1. Transporting labour underground
2. Hoisting material (rock) and the underground mechanised fleet, into the mine.

The cross-sectional dimensions of the main shaft dictate the physical size of the conveyance. Specified dimensions allow a complement of 160 people per trip based on SANS 0208:3 (eight people per m^2 per deck at a design mass of 75kg per person). The cage was ultimately designed to accommodate 150 people. This provides for a maximum man-payload of 12t in a single deck conveyance. The actual conveyance self-mass was estimated at 16.2t compared to the specialist winder consultants, Dowding Reynard and Associates Technical Services ("DRATS"), designed conveyance self-mass of 17t, with a material payload of 12t.

The physical dimensions of the cage (2.7m wide x 7.5m long x 3.5m high) determined the maximum size of the material payload. Examination of equipment indicated that it can be dismantled into components with masses of below 10t that will fit into the cage. A winder was sourced by DRATS from the Harmony Group, specifically the man and material winder from the number two ventilation shaft at Deelkraal Gold Mine. This winder was refurbished, installed and commissioned for use during the sinking phase by the sinking contractor. Given the shaft depths of wind, the rope velocities and accelerations/ retardations, it was estimated that approximately 2.5 hours is required for transporting the production shift underground, with support staff transport assisted by the service cage.

14.5.2. Rock hoisting

Estimated production volumes of approximately 265ktpm will be hoisted on a 26-day cycle, resulting in approximately 10 200t hoisted per day. A study conducted by DRATS indicated that the use of a double drum winder for this duty will require a large machine (4 300kW rated, with a 60mm diameter rope). The operational costs of such a winder will exceed those of a friction type winder, which is more suited to single-station repetitive hoisting. A friction winder was proposed with the winding cycle adjusted to 18 hours per day, 26 days per month, to minimise the skip size and motor power draw.

The headgear is a steel structure of the "A" frame type, the winder is ground-mounted and housed in the same winder house as the man and material winder. The specified winder and ropes are summarised in Table 14-7.

All rock discharged from the headgear bin is via diverter chutes through a radial door and vibrating feeder, to the main ore transfer conveyor and finally to the stockpiles. Transfer towers divert material to the Merensky or UG2 stockpiles, or the waste rock dump. Feeders located under the Merensky and UG2 stockpiles load material onto the mill feed conveyor system for transport to the mills.

14.5.3. Service winder

The production shift will take approximately 2.5 hours to transport. The man-carrying capacity of the service cage will, therefore, be maximised. Shaft space allows for a cage floor area sufficient for 11 people per deck. A three-deck conveyance will allow for 33 people to be transported underground per cycle. The estimated mass of this conveyance is 3.5t and the corresponding payload is estimated at 2.55t.

14.5.4. Winding engines design criteria

The double drum winder was designed to transport 150 people or 12t of material. Table 14-6 indicates the design parameters for the double drum winder.

Table 14-6: Double drum winder design

Winder duty	
Drum diameter	4.88m
Drum width	1.83m
Motor rated power	3 970kW
Motor rated speed	67.27RPM
Mean rope speed	15m/s
Cyclic acceleration/ deceleration	0.7m/s^2
Single drum braking torque (1.75m/s^2)	1 590kNm
Double drum braking torque (2.3m/s^2)	1 811kNm
Counterweight mass	18.2t
Cycle time (to shaft bottom)	569.5s
Rope details	
Diameter	51mm
Construction	Proprietary
Mass	11.78kg/m
Tensile grade	1 960MPa
Estimated breaking force	2 283.3kN

The friction winder's design was conducted by DRATS, with Table 14-7 indicating the design to achieve the maximum designed production tonnage per annum.

Table 14-7: Friction winder design

Description	Measurement
Payload	20t
Skip self-mass	18t
Drum diameter	4.5m
Motor rated power	3 500kW
Motor rated speed	63.7RPM
Tension ratio	1.91
Mean rope speed	15m/s
Cyclic acceleration/deceleration	0.7m/s
Cyclic time	119.8s
Rock transport rate	601t/h
Head ropes	-
Number of ropes	4
Diameter	39mm
Construction	15-strand "Fishback"
Mass	6.77kg/m
Tensile grade	1 800MPa
Estimated breaking force	1 131kN
Tail ropes	
Number of ropes	4
Diameter	39mm
Mass	7.02kg/m
Tensile grade	1 600MPa
Estimated breaking force	1 031kN

The service winder was designed to convey 33 persons per cycle split between three decks of 11 people each. DRATS designed the man winder (single drum) that uses the same shaft as the double drum and friction winder. The design parameters are shown in Table 14-8.

Table 14-8: Single drum winder design

Winder duty	
Drum diameter	2.5m
Drum width	1.5m
Motor rated power	650kW
Motor rated speed	1 000RPM
Gear reduction ration	22.6:1
Mean rope speed	6.5m/s
Cyclic acceleration/ deceleration	0.7m/s^2
Single drum braking torque (1.75m/s^2)	377kNm
Cycle capacity	330 persons/h
Ropes	
Diameter	26mm
Construction	6 x 13∆/F
Mass	3.06kg/m
Tensile grade	1 800MPa
Estimated breaking force	490kN

The winding engines are in good condition with all the relevant safety equipment in working order. All the winders were licensed to operate by the DMRE with appropriate logbooks and certificates. The maintenance and scheduled inspections were planned for the entire year taking into consideration production targets. These are displayed in the winder house. The required backup generators are still in the procurement phase. The current generation arrangement only allows for the service winder to operate. This will take considerably longer to evacuate persons from underground in the event of a prolonged total power failure.

14.6. People transportation

The transportation of resources to, and from operational mining areas is crucial for optimum mining efficiencies. A chairlift system was designed in conjunction with the vertical shafts to facilitate reduced travelling times. Chairlifts designed for 900 people per hour were planned on 72L. The chairlifts will travel down declining haulage to 81L and up to 69L. During shift hoisting, the vertical conveyance delivers people at a rate of 1 800/h to a single level (72L) from where the chairlift system transports persons to other operational levels.

14.7. Rock handling system

Blasted rock is scraped from the panel to the ASDs by 37kw face winches using 2 x 0.9t effective scraper shovels connected in tandem. LHDs (9.5t low profile) will transport rock from the ASD to the truck loading point in the original raise. The truck (30t low profile) will tram rock to the station or the internal conveyor transfer tip. Each tip is equipped with a grizzly and peckers to control the rock lump size.

To prevent contamination of ore types or waste joining ore streams, the process is entirely interlocked. Interlocking arrangements are provided for skips, bins, chutes and conveyors to avoid cross transfer of ore types or waste. The process is controlled by an integrated rock management system, that uses an electronic monitoring and control system. In addition to controlling cross-contamination, this system forms the backbone of the entire mining reporting and fleet management process.

14.7.1.Conveyor schedule

The rock winder duty cycle specifies the design capacity of the skip loading conveyor at 1ktph. This must be matched by the capacity of the conveyor from the headgear to the stockpile transfer tower. This capacity is valid for all other conveyors, including the Merensky stockpile feed conveyor; transfer conveyor; and UG2 stockpile feed conveyor. Table 14-9 summarises the conveyor schedules.

Table 14-9: Conveyor schedules

Conveyor 161-CV	Design capacity [tph]	Belt speed [m/s]	Belt width [mm]	Belt length [m]	No. piles	Class	Motor size [kW]
001	1 000	1	1 200	324	4	400	45
002	1 000	2	1 200	265	3	800	110
003	1 000	2	1 200	107	4	400	37
004	1 000	2	1 200	265	3	800	110
005	800	1	1 050	862	4	400	250

14.7.2.Underground conveyors

An appropriate underground conveyor system was designed. The details are listed in Table 14-10 and Table 14-11 below.

Table 14-10: 72 level conveyors

Description	Design capacity [tph]	Belt speed [m/s]	Belt length [m]	Loading points	Belt width [mm]	Motor size [kW]
72L CV001	950	1	40	1	1 200	100
72L CV002	950	1	70	1	1 200	100
72L CV001	950	1	1 081	2	1 200	500
72L CV002	950	1	844	1	1 200	450
72L CV003	950	1	880	1	1 200	450
72L CV004	950	1	200	1	1 200	100
72L CV005	950	1	460	1	1 200	125
Total	**-**	**-**	**3 575**	**-**	**-**	**1 825**

Table 14-11: 77 level conveyors

Description	Design capacity [tph]	Belt speed [m/s]	Belt length [m]	Loading points	Belt width [m]	Motor size [kW]
77L CV001	1 000	1	803	2	1 200	450
77L CV002	1 000	1	803	1	1 200	450
77L CV003	1 000	1	464	1	1 200	125
77L CV004	1 000	1	1 002	2	1 200	500
77L CV005	1 000	1	1 002	1	1 200	500
77L CV006	1 000	1	280	1	1 200	100
Total	**-**	**-**	**4 354**	-	**-**	**2 125**

14.7.2.1. Level conveyor

The capacity (601tph) of the main skip loading conveyor is dictated by the skip cycle. The belt is fed by vibrating feeders and isolated by radial doors at the bottom of each silo. The high-sided feeders specified have a stroke of 10mm at 1 000RPM, with a deck angle of 8° and are driven by two 1.6kW unbalanced motors.

The skip loading conveyor was designed to convey 950tph of mixed feed material to the headgear transfer conveyor. The minimum expected feed mass of 601tph provides a design factor of 1.67, which considers the belt length and feed rate to be maintained. The conveyor design speed of 1.6m/s was selected to minimise spillage at all chute transfer points.

14.7.2.2. Shaft spillage

The main and service shaft spillage is loaded at shaft bottom using a LHD. The LHD loads the spillage onto a truck that transports the spillage via a ramp from 81L to the south conveyor tip.

14.7.3. Overland conveying

The rock winder duty cycle specified in the design capacity of the skip loading conveyor is 1ktph. This capacity is valid for all other conveyors, including the Merensky stockpile feed conveyor; transfer conveyor and UG2 stockpile feed conveyor. The details of the overland conveyors are indicated in Table 14-12.

Table 14-12: Overland conveyors

Conveyor	Design capacity [tph]	Belt speed [m/s]	Belt width [mm]	Belt length [m]	No. piles	Class	Motor size [kW]
001	1 000	1	1 200	324	4	400	55
002	1 000	2	1 200	265	3	800	110
003	1 000	2	1 200	107	4	400	55
004	1 000	2	1 200	265	3	800	110
005	1 000	1	1 050	862	4	400	250
006	1 000	1	1 050	-	3	800	55

14.8. Underground services

14.8.1. Ventilation

The mine ventilation design and other technical parameters are discussed in Chapter 11.

14.8.2. Refrigeration

The refrigeration system provides for bulk air cooling via the main downcast shaft. Initially, 18MW of cooling will be provided. The underground service and return water dams must be designed to contain sufficient capacity for one day's production. The bulk of the production occurs during the day shift. The cold-well must be sized to hold the 5.5 megalitres required for the day's production.

The hot and cold-wells must be full at the start of the day shift. As the return water pumping will only begin during off-peak electrical demand (i.e., mid-afternoon through night shift), the hot-well will remain empty until the main shaft dewatering pumps are started and the clarified underground return water is pumped to surface. As the primary role of the hot-well is to replenish the cold-well (the hot-well holds the same volume of water).

14.8.3. Compressed air

Compressed air is primarily used to power pneumatic rock drills in underground workings. The second major consumer of compressed air is the planned concentrator plant, where the air is mainly used for frother process and flotation cells. Minority consumers exist in the surface workshops.

Reticulation systems are evaluated in terms of the mass flow rate through the various branches and loops. As air flows vertically down shaft columns, it auto compresses. A suite of 24 surface compressors (three banks of eight compressors each) housed in a common shed was included in the design. Six compressors are currently available on site. Compressed air reticulation piping was designed so that the air pressure at the top of the raise line is a minimum of 500kPa.

The typical hand-held rock drill used in SA for hard-rock mining uses approximately 55l/s of air at a pressure of between 350kPa and 550kPa. Combining this figure with the number of drills required results in a drill-related air consumption requirement of approximately 32.2m³/s, including losses estimated at 30%. In production terms, this is equivalent to 0.148kg/ktpm.

14.8.4. Electrical supply

The underground electrical supply is fed from the 6.6kV consumer substation and distributed utilising four feeders. Each feeder consists of an appropriate length and number of 185mm^2 XLPE Cu cables installed in the shaft and terminating at underground substations, one cable per circuit breaker. The mining operations are fed by mini substations rated at 630kVA and situated at the reef crosscuts. In-stope distribution is accomplished utilising distribution boxes, with each winch supplied with a local winch starter panel. A ring feed was established from the underground pump station to the main underground substation. All shaft feeder cables were designed to carry the entire load of their respective rings.

14.8.5. Water distribution and pumping

The water supply design to underground workings includes:

- Service water gravitate down the shaft in pipes to the various levels within the mine
- Pipe pressures at the exits from the shaft columns to the working levels are controlled by pressure-reducing valves ("PRV") stations
- Production service water flows from the PRV stations, FW drives, RADs and into raise lines feeding the ASD
- Used service water gravitates along panel FWs into sumps fitted with vertical spindle pumps. Where water cannot gravitate from production areas, pneumatic diaphragm pumps and temporary sumps are used to transfer water to the main sumps. The water/ solids slurry is pumped to boreholes on the respective levels and gravity-fed in a cascade fashion to settlers located at the shaft
- Vertical flow high-rate clarifiers ("HRCs") are used to clarify the slurry arriving from the production areas Suitable flocculating equipment is installed to control the clarity of the water and increase the settling speed solids. The treated water is gravity fed into two inclines developed from the top of the settlers to the main pump station. Storage space for settled underground water allows for one full day of production water
- All clean settled water is pumped directly to a surface hot-well dam. Pump capacities were designed to clear the dams during off-peak periods, making use of the lower electricity tariff. One complete spare clear water pump and a pipe column were installed. Due to the total volume of water to be pumped both pipe columns are in use
- Settler underflow (slurry) is pumped directly to surface settling ponds using mud pumps. A total of four pumps (three running and one standby) were installed and a 150NB column transports the slurry to surface
- The clear water pumped to surface is treated and diluted with potable makeup water, cooled and transferred to the surface cold well dam for return underground.

14.8.5.1. Section service water return pumping and drainage

All access tunnels on the mine were designed to upgrade from the shaft stations to the mine boundary. Water from stoping and development operations is pumped from the working faces into HDPE pump columns. Pump columns are fitted with galvanised piping at 100m intervals to serve as fire breaks.

The pumping of drill water and wash water in stope panels and development ends are done by low air consumption double diaphragm pumps. All pumps are fitted with strainers on the suction side and non-return valves on the delivery side. Pump column diameters vary from 50mm in stope panels, increasing to 100mm in raises and 150mm in main development ends.

Water pumped into the column gravitates down the pipe system to the shaft station. On each shaft station, twin drain holes (230mm in diameter) are drilled to transfer water to the main settling facilities on 81L.

14.8.5.2. Return water settling and shaft pumping

Approximately 10 272m^3 of water will return to the shaft, considering various losses within the return process. The return water is clarified by HRCs, the clear water overflow is diverted to decline storage dams and the underflow sludge is diverted to the sludge tanks. HRC manufacturers estimated that the solids concentration from the clarifier is estimated at 35%. No mud-press was installed; slurry is pumped directly to surface settling ponds using mud pumps. In the settling ponds, water is recovered and recycled back to the mine as service water.

Simulation of the flow in vertical shaft columns from the discharge of the clear water dams between 77L and 81L to the hot water dam indicated a static head of approximately 880m. Inlet conditions will vary from approximately 25m to 5m, depending on water levels within the clear water dams. Appropriate pumps are available to address this duty, absorbing 2 600kW at a claimed 73% efficiency (2 598kW motors, four-pole speed). A single pump is required to run for approximately 13.4 hours per day under normal conditions. Provision to allow the discharge of two pumps into a single column to cater for peak and emergency flow conditions were included, which will reduce the overall pumping time. A complete (third) pump and second column are maintained on standby for emergency and maintenance conditions.

14.8.5.3. Underground potable water

A total of 35m^3/day of potable water is required. Drinking water is a critical health and safety provision, the philosophy is to store this water in a suitable tank located near the shaft bank from where it will gravitate to the underground workings. The design philosophy for potable water piping was:

- Potable water will gravitate down a 50mm shaft column to the shaft stations, from where it is piped to a PRV station before continuing down the shaft. This philosophy was adopted to reduce the pressure in the shaft column pipes and allow for the selection of thinner-walled piping
- The PRV station duties were designed for LOM delivery lengths and elevations of piping, at envisaged flow rates
- Steel galvanised piping is used in all access ways to provide potable water at the entrance to each raised line
- Pipe selection was based on designing to withstand any transient water-hammer pressure spikes
- The pressure reducing station duties were designed to provide water at a minimum pressure of 400kPa at each level. Water transport to the various production levels within the mine is achieved by using the inherent gravitational head available from the shaft column.

One complete shaft column and pressure reducing station are allowed per level. The spare PRV station is connected in parallel to the operating system but isolated by valves. This allows each PRV station to be taken out of service for maintenance, as required, with minimal disruption to the potable water supply.

14.8.6. Communication and control

Instrumentation is used to minimise production downtime and provide operation automation, efficiency, monitoring and control. The selection and implementation of control and monitoring system components are governed by the need to balance technology, equipment availability, skills availability and practical application in the achievement of the desired result. Control and instrumentation systems are outlined below:

- Surface control room, equipment and engineering room for the shaft and surface
- PCS (PLC, SCADA or DCS) control monitoring system. Areas monitored include compressed air and water systems, ventilation system, fridge plant and rock handling systems
- Field instrumentation includes in general level, pressure and flow instruments supply, cables to connect them and installation and accessories. For surface conveyors, only safety instrumentation is provided for
- Instrument air used for pneumatic final control elements like valves and monitoring thereof
- Voice communication system underground
- The surface voice communication system consists of handheld radios and voice over internet protocol telephony
- Time and attendance/ access control system
- Communication backbone fibre optics include routes to mine offices, change houses, fridge plant, workshops, ventilation and compressors. The underground seismic and groundworks monitoring cabling and networking was included.

15. Socio-economic and human resources

SR 4.3(v); 5.5(iv); 5.5(v); 5.6(ix) / SV T1.10 / JSE 12.10(h)(vii)

15.1. Sensitive receptors

The closest sensitive receptor to the mine is the town of Ledig. Other areas close to the mine include residential, tourism, farming and the proposed housing facilities for mine employees. Other mining activities are taking place to the south of the site. The closest sensitive receptor to the Mimosa TSF site is the Phatsima community. Figure 15-1 shows the potential sensitive receptions surrounding the BPM.

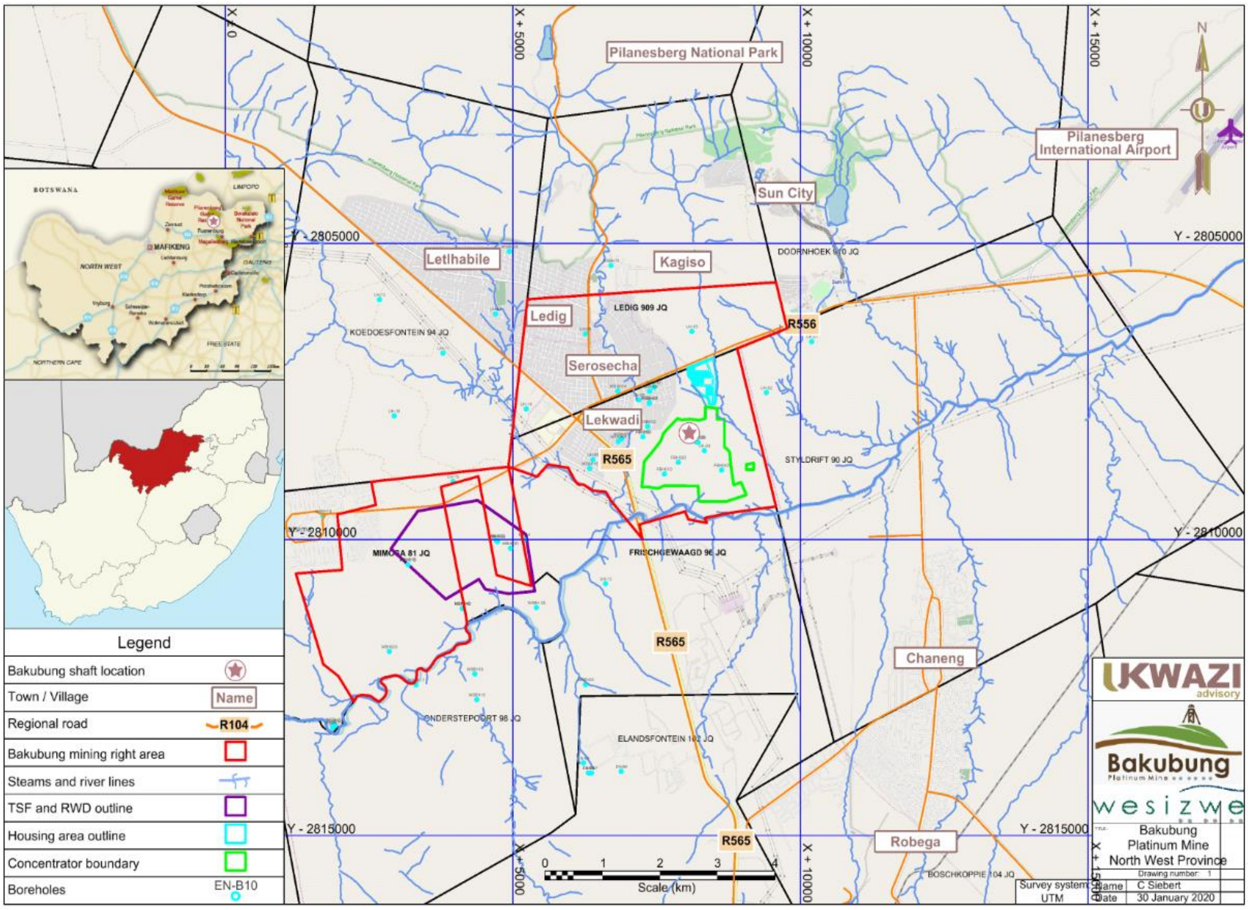

Figure 15-1: Map indicating potential receptions surrounding the BPM

15.2. Social matters

The receiving environment was demarcated as the area under jurisdiction of the Bakubung Ba Ratheo traditional council, namely wards 14, 28 and 30 of the Moses Kotane Local Municipality and the area east of the Phatsima settlement in ward 1 of the Rustenburg Local Municipality. Full-time operational employees will be sourced from the Bakubung Ba Ratheo (primarily located in Ledig of Moses Kotane Local Municipality), as well as from other settlements in the immediate area (i.e., Phatsima). The labour required at full production was anticipated at approximately 3242 employees (SLP, 2019).

Land use in wards 14, 28 and 30 of the Moses Kotane Local Municipality can be divided into settlement areas, communal grazing areas and communal horticultural areas. There is a marked difference between the settlement patterns in the Sun City Complex in ward 14 and the settlements in the Ledig and Mahobieskraal. The only people who reside in areas not formally demarcated as settlement areas are a small number of cattle owners who have settled in approximately 12 homesteads in the grazing areas on the farms Koedoesfontein and Zandrivierspoort, to the west-north-west of the Ledig settlement.

The demographics of the receiving environment were extensively described in terms of the area's indigenous people, population statistics, social capital, social infrastructure, land-use systems and status of economic development (Perisseuo Consulting, 2008).

The impact associated with an influx of people and the management of expectations was rated as high and required mitigation. The expectation for work opportunities can lead to the influx of job seekers to an area, which can cause an increase of people moving through the area, pressure on the capacity of existing communities and possibly the development of informal settlements (SLR Global Environmental Solutions, 2016). The EMPs (2008, 2016 and 2021) included mitigation and management measures to adequately address these aspects.

The loss of grazing for cattle owners on Frischgewaagd was a contentious issue for the cattle owners as well as the Ipopeng-Hlanganani Farmers Association. The Ipopeng-Hlanganani Farmers Association has clearly stated that there is no more grazing available in the other Bakubung grazing areas, as 12.2% of the total area of Moses Kotane Local Municipality is degraded due to overgrazing. Since replacement grazing land may not be available, addressing this issue should become one of the initiatives to be considered as a development priority (Perisseuo Consulting, 2008).

The impact of nuisance factors and appropriate mitigation measures were adequately addressed through specialist studies and commitments made in the EMPs (2008, 2016 and 2021).

Ownership is a requisite instrument to effect meaningful integration of historically disadvantaged South Africans ("HDSA") into the mainstream economy. The original shareholding of the Bakubung Ba Ratheo community was 33% and after a series of share disposal transactions, the equity shareholding is at 4.52% held for the community by African Continental Resources Venture (SLP, 2019).

There is high level of unemployment in the nearby communities. According to the socio-economic study, the unemployment status in the area is around 31% (Desai, 2016). In terms of the initial SLP, the BPM committed to employ 30% of its workforce from the local communities. A skills audit (2011) identified a critical skills gap within the community. To address this gap, a skills transfer programme was developed and implemented during the construction phase.

There is a strategy to recruit experienced scarce skills locally and implement a training and development programme. As part of the training and development plan, the mine has appointed a skills development facilitator and plans to appoint a learning and development manager. They will be responsible for driving skills development and training in accordance with the workplace skills plan and skills development plan. The human resource development strategy will aim to achieve employment equity and gender equity targets in line with the Mining Charter.

According to the Wesizwe IAR of 2018, the SLP for the period 2014 to 2018 was successfully concluded. During this time, various community projects were initiated, some of which, are completed. The benefit to the local economy will be indirect and direct employment as well as capacity building. The SLP approved for the period 2019 to 2023 allowed a financial provision of ZAR235 million, for ten projects identified:

1. Human resources development
2. Host community daily water delivery
3. Investment into the bulk water infrastructure
4. Public transport support
5. Zwartkoppies agricultural farm
6. Enterprise development
7. Community schools' infrastructure
8. Community environmental projects
9. Community multi-purpose sports court
10. Gabonewe housing development.

The largest component of the investment will be allocated to the Gabonewe housing development. The total budgeted amount for 2019 to 2023 is ZAR180 million for the delivery of single unit rental accommodation for employees and deserving community members (70% employees and 30% community members).

The mine has implemented an appropriate structure to address stakeholder, environmental and governance aspects. The community liaison team has regular stakeholder meetings. Protest marches from the host community took place during 2018. All memorandums received were responded to and followed up with meetings to resolve demands. The main grievances were focused on employment and procurement opportunities.

16. Environmental

SR 4.3(v) / SV T1.10 / JSE 12.10(h)(viii)

16.1. Summary of environmental studies

SR 5.5(i)

The following environmental studies as listed in Table 16-1 was used as basis for this chapter.

Table 16-1: Environmental studies

Report/ study description	Compiled by
EIA and EMP report for changes to the BPM, 2016	SLR
EIA for the proposed transformation of undeveloped and vacant land to establish a township, situated on portion 11 of the farm Frischgewaagd, 96 JQ, North West Province, 2014.	AB Enviro-Consult
EIA and EMP for a platinum mine and associated infrastructure, 2008	TWP-ES
Amendment of environmental authorisation and waste management licence Bakubung Platinum Mine TSF, 2021	Knight Piésold
Air quality impact assessment report for the BPM, 2016	Airshed Planning Professionals
Air quality specialist report for the Bakubung Platinum Mine TSF Project, 2021	Airshed Planning Professionals
Geohydrological Bakubung TSF impact assessment, 2016.	DTM Mining Project and Services
Groundwater Impact Assessment Bakubung Platinum Mine TSF Impact Assessment, 2021	GPT Consulting
Bakubung Platinum Mine technical report - salt balance calculations, 2021	Lambani
Wesizwe Platinum Limited geohydrological evaluation, 2008	Africon Engineering International (Pty) Ltd
BPM additional works noise impact Assessment 2016	Jongens Keet Associates
Socio-economic impact assessment, 2016	Kerryn Desai
TSF: waste classification, containment barrier system design and associated structures, 2016	Knight Piésold
Visual impact assessment Wesizwe Platinum Mine, 2007	MetroGIS
Bakubung Platinum Mine amendment project final visual impact assessment report, 2021	Green Tree Environmental Consulting
Annual closure costs and rehabilitation plan, and financial guarantee submission letter to DMRE, 2020	Bakubung Platinum Mine
Integrated water and WMP (operational management version)	I-CAT Environmental Solutions
Heritage impact assessment: Proposed changes to infrastructure at the BPM, Ledig, Bojanala District Municipality, North West Province - Remaining extent and Portions 1, 3, 4 and 11 of the farm Frischgewaagd 96 JQ and the remainder of the farm Mimosa 81 JQ, 2016	Professional Grave solutions
SLP 2019-2023	BPM
Baseline aquatic ecology assessment for Bakubung Platinum Mine, 2020	Knight Piésold
Winter biomonitoring report, 2019	Scientific Aquatic Services
Bakubung Mine quarterly water monitoring report, December 2019	Aquatico Scientific (Pty) Ltd
Monthly air quality monitoring, 2020	Skyside South Africa (Pty) Ltd
Monthly dust deposition monitoring, 2020	Skyside South Africa (Pty) Ltd
Bakubung monthly water quality report, 2020	Aquatico Scientific (Pty) Ltd
External environmental audit report Bakubung platinum mine, 2020	Naledzi Environmental Consultants (Pty) Ltd
Bakubung water quality monitoring water quality monitoring report, May 2021.	Naledzi Environmental Consultants (Pty) Ltd
Bakubung air quality monitoring dust fallout monitoring report, May 2021	Naledzi Environmental Consultants (Pty) Ltd
Bakubung air quality monitoring passives monitoring report, May 2021	Naledzi Environmental Consultants (Pty) Ltd
Bakubung air quality monitoring PM_{10} monitoring report, May 2021	Naledzi Environmental Consultants (Pty) Ltd
Bakubung water quality monitoring water quality monitoring report, May 2021	Naledzi Environmental Consultants (Pty) Ltd

16.2. Permitting and authorisations

SR 1.1(ii); 1.5(ii); 1.5(iii); 1.5(v); 1.7(i); 4.3(iv); 5.5(i); 5.5(ii); 5.5(iii)

In 2008, TWP ES conducted an EIA process for the development of the project. The BPM received EA in 2009, in terms of both the NEMA (Act 107 of 1998) and MPRDA (Act 28 of 2002). A WUL was issued in terms of the National Water Act (Act 36 of 1998) ("NWA") in 2010. In 2014 a basic assessment process was conducted by AB Enviro-Consult T/A (ABEC, 2015) for the development of mine housing on site. Authorisation for Phase 1 of the Gabonewe Estate mine housing was received in 2015.

In 2016, the BPM proposed to make several changes to the approved mine layout. The changes were required to cater for an increase in ore processing capacity, optimise the layout and operation of the mine and additional support infrastructure (SLR). The changes were authorised by the DMRE in 2017. A WUL was issued for the proposed changes in 2017.

A 166ha TSF was approved on the farm Mimosa 81 JQ. An interim phase was proposed with a smaller TSF on the farm Frischgewaagd 96 JQ. EA in terms of the NEMA (Act 107 of 1998) as amended and NEM:WA, 2008 (Act 59 of 2008) as amended will be required as well as a WUL. The authorisation process has commenced to amend the existing EA and WML granted in 2017 – (NW/30/5/1/2/3/2/1/(339) EM) with approval still pending. The following EAs are relevant and approved for the operations:

- Approval of the EMPR in terms of section 39 (4) of the MPRDA, 2002 (Act 28 of 2002) (Ref number: NW30/5/1/2/3/2/2/339 EM)
- Amended integrated EA in terms of the NEMA Act, 1998 (Act 107 of 1998) as amended and NEM:WA, 2008 (Act 59 of 2008) as amended read together with the EIA Regulations, 2014 for the construction and expansion of the TSF, RWD, PCDs, relocation of crusher, reprocessing of the waste rock dump, erosion control measures, noise reduction berm, roads, ventilation shaft, storage of general and hazardous waste, construction of Phase 1A housing, solar power plant, stockpiles, pipelines and other associated infrastructure
- EA in terms of the NEMA, 1998 (Act 107 of 1998) as amended for the development of Phase 1 of the Gabonewe Estate mine housing on site (2015)
- South African Heritage Resources Agency – Case ID: 8148 final comments in terms of Section 38(8) of the National Heritage Resources Act (Act 25 of 1999).

16.2.1. Water use license

The following WUL was issued:

- A WUL was issued in terms of the NWA (Act 36 of 1998) in 2010 - License number: 26064730
- An additional WUL was approved in 2017 in terms of the NWA - License number: 07/A22F/CGI/5132.

16.2.2. Waste management license

The waste facilities were approved as part of the amended integrated EA (Ref number.: NW 30/5/1/2/3/2/1/339 EM). Waste management at the salvage yard must comply with the norms and standards for the storage of waste in terms of GN 926 of November 2013 and possibly the norms and standards for the sorting, shredding, grinding, crushing, screening or baling of general waste, GN 1093 of 11 October 2017. The current salvage area on site is temporary as the salvage yard is still in process of being constructed. The norms and standards will apply to the new facility.

16.2.3. Pending environmental authorisations

Existing authorisations are based on the 2014 optimisation study and associated project descriptions contained in the 2016 EMPR. A new application for amendment of the EA was undertaken in terms of the NEMA (Act No. 107 of 1998) and WML in terms of NEM:WA, 2008 (Act No. 59 of 2008) as amended. The listed activities triggered are (Knight Piésold, 2021):

- GN 984 (1): Additional water uses will be triggered by the additional dry stack TSF
- GN 921 Cat B (7): Proposed new dry stack TSF.

An IWULA in terms of the NWA (Act 36 of 1998) and GN 267 (2017) is required and will run in parallel to the EA and WML amendment processes. The water uses to be additionally applied for are:

- 21 (g): New TSF
- 21 (c) and (i) for activities (TSF, evaporation ponds) within 500m of a wetland.

The final EMPR amendment was submitted by Knight Piésold to the DMRE on 19 May 2021 and approval is currently pending. The WUL application forms for the TSF were submitted on 31 May 2021. The process will now progress to the next phase, where the DHSWS will determine whether a site visit is required and will confirm the technical documents that must be submitted as part of the application.

16.3. Potential environmental and social impacts

SR 1.1(ii); 5.5(iii)

The 2008, 2016 and 2021 EMPRs summarised all the impacts per mining phase. The impacts discussed below include impacts rated high or moderate, prior to the implementation of mitigation measures.

16.3.1. Impacts on the biophysical environment

The following impacts were rated high without mitigation in the 2016 and 2021 EMPRs (SLR Global Environmental Solutions, 2016 and Knight Piésold, 2021):

16.3.1.1. Soil and land use impact

The following impacts related to soil and land use were identified:

- Loss of soil resources and land capability through contamination
- Loss of soil resources and land capability through physical disturbance.

Soil is a valuable resource that supports a variety of ecological functions and is the key to re-establishing post-closure land capability. Soil and related land capability can be compromised through pollution and physical disturbance through compaction, removal and erosion. The soils study by Rehab Green CC in 2007 found that high potential arable land, drainage lines and wetland soils prone to erosion are found on the site and are classified as sensitive soil resources; these occur along the majority of the pipeline route, the eastern edge of the PCDs and the southern edge of the Phase 1A mine housing. The areas of the pipeline crossing are considered high sensitivity (SLR Global Environmental Solutions, 2016). Related mitigation measures focus on pollution prevention, maintenance of infrastructure, the implementation of soil conservation procedures and limiting site clearance.

16.3.1.2. Biodiversity impact

The physical and general destruction of biodiversity and habitat fragmentation was identified as impacts. The mine falls within the Marikana Thornveld vegetation type that is categorised as a Vulnerable Ecosystem, according to the National List of Threatened Ecosystems (GNR. 1002 of 9 December 2011). It also falls within a critical biodiversity area, with some areas hosting protected species. The BPM cumulatively has the potential to impact biodiversity through both physical destruction (mainly during infrastructure establishment) and general disturbance during all project phases. Related mitigation measures focus on limiting the operational footprint area, shifting infrastructure layouts and operation controls to limit ongoing disturbance.

16.3.1.3. Air quality

The unmitigated impacts of the operations are likely to result in exceedances of the National Ambient Air Quality Standards ("NAAQS") for Particulate Matter ("PM") $PM_{2.5}$ and PM_{10} at nearby sensitive receptor areas. Assessing the unmitigated cumulative impacts, there is the possibility of exceedances of the NAAQS outside the mine boundary and at the sensitive receptor areas due to possible elevated concentrations from current and future sources at the mine. With mitigation measures in place – water sprays on unpaved roads and at materials handling points and enclosure of crushers and screens with fabric filters – ambient pollutant concentrations, as a result of the operations, will reduce significantly although cumulative $PM_{2.5}$ concentrations are still likely to be in exceedance at the mine housing site as indicated in Figure 16-1. The air quality impact of the proposed Frischgewaagd TSF was rated as being of low significance before mitigation and was therefore not indicated in Figure 16-1. The climate change impact was rated to be of medium significance but could be reduced to low significance after mitigation.

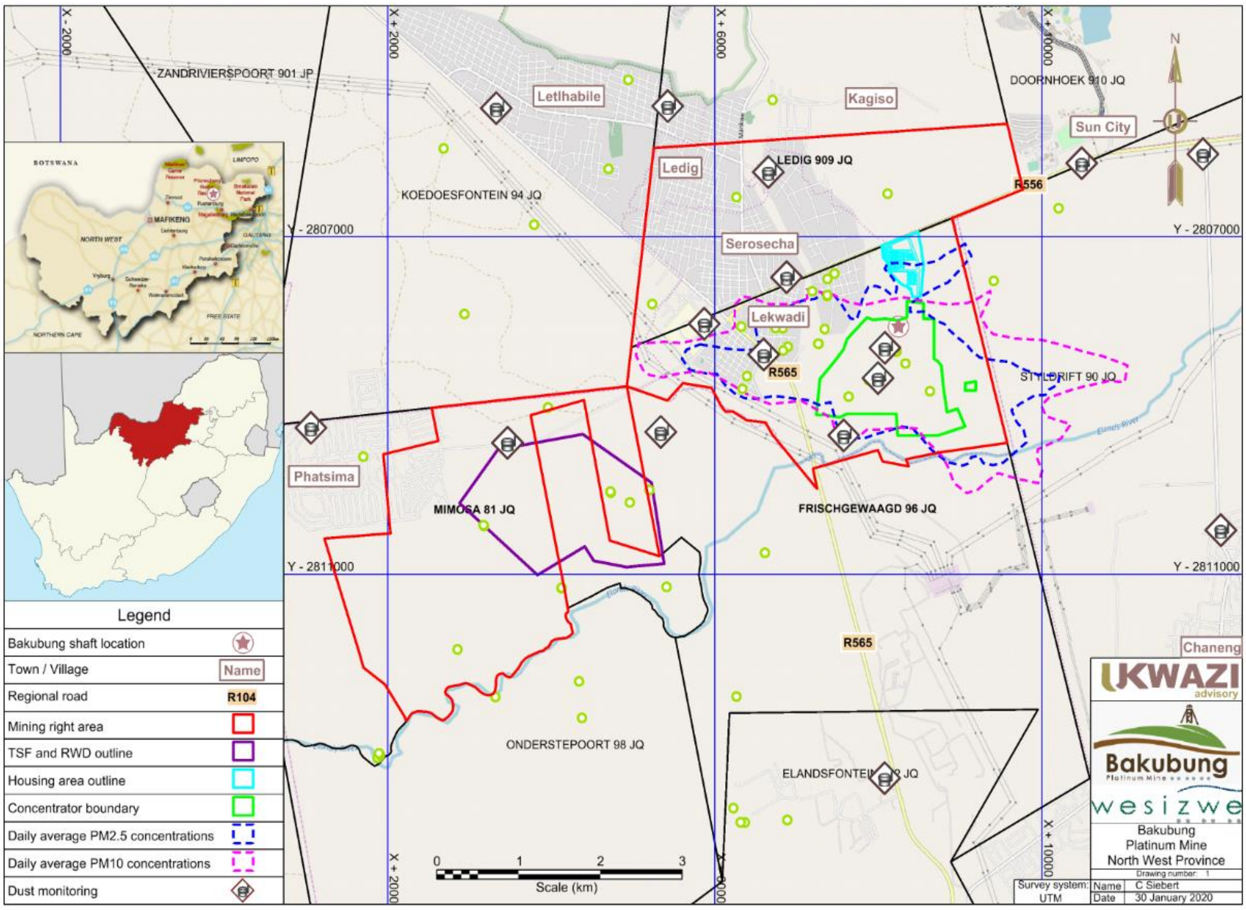

Figure 16-1: Map showing dust monitoring stations and daily average $PM_{2.5}$ and PM_{10} concentrations

The environmental significance of the operations is rated "medium" for fine particulates and "low" for dust fall, sulphur dioxide ("SO_2"), nitrogen dioxide ("NO_2"), carbon monoxide ("CO"), diesel particulate matter and volatile organic compound(s) without mitigation applied; and, "medium to low" for $PM_{2.5}$ and "low" for PM_{10} and dust fall with design mitigation applied.

16.3.1.4. Surface water and wetlands

There are several watercourses draining the mine site. Most of these are ephemeral in nature with the Elands River the more significant watercourse. In the unmitigated scenario, project components can alter drainage patterns in the following ways (this takes into consideration changed approved facilities):

- The RWD will impact an ephemeral drainage line on the farm Mimosa
- The Gabonewe Estate Mine housing area will transact with ephemeral channels
- The tailings and return water pipelines will cross over ephemeral drainage lines, an ephemeral drainage channel and the Sandspruit
- A bridge must be constructed between the mine housing
- An existing bridge must be refurbished north of the mine housing site
- A road must be constructed crossing over an ephemeral channel and drainage lines
- The Magalies Water Board pipeline will cross the unnamed tributary of the Elands River
- Erosion control measures must be implemented along the unnamed tributary of the Elands River.

In the unmitigated scenario, the severity is considered high. With mitigation that focuses on realigning infrastructure where possible to avoid drainage lines/ channels, and caters for the appropriate design of watercourse crossings, the severity reduces to medium.

16.3.1.5. Groundwater

The groundwater impacts are discussed in Chapter 10 of this report. The studies concluded that through the implementation of mitigation measures, the impact on sensitive receptors will be low. An increase in nitrates was observed in one borehole (borehole number FBH04D), located within the concentrator plant area. Concentrations are still within the SANS drinking water limits. *E coli* was observed in all boreholes and potentially originated from faecal pollution from inadequate sanitation in the community. The elevated *E. coli* content renders the groundwater unsuitable for domestic use purposes.

16.3.2. Potential social and heritage impacts

16.3.2.1. Socio-economic impacts

Social impacts detailed in the EMPRs included:

- Economic impact (positive)
- Inward migration of people who are looking for employment opportunities
- Skills development (positive)
- Management of expectations.

These aspects will have a significant impact on the mine's social license to operate ("SLO") and appropriate forums must be maintained. An appropriate grievance mechanism will ensure that potential issues can be identified and managed timeously, in line with International Finance Corporation Standards ("IFC").

16.3.2.2. Noise impacts

Although the operation will introduce some new sources of noise into the study area, noise control/ mitigating measures are effective to reduce the impact to acceptable levels (Jongens Keet Associates, 2008).

16.3.2.3. Heritage impacts

The heritage study was conducted by PGS Heritage ("PGS") in 2016 and identified various heritage resources within the study area. The most important heritage resources discovered in the area were cemeteries, graves and stone cairns, which might be graves. Of relevance to the project components are sites named MHC003, MHC005, MHC018, MHC019, MHC020, MHC021, MHC025, MHC026 and MHC027. As part of the 2008 project, permits were received for the destruction/ mitigation of two sites (MHC002 and MHC004). Iron age and middle age sites of importance included sites MHC003, MHC005, MHC018, MHC019, MHC020, MHC021 (Figure 16-2).

Graves and potential gravesites include, sites MHC025, MHC026 and MHC027. The graves and cemeteries are of medium/ high significance. They occur within the return dam area, the TSF pipeline route and the Phase 1 housing area (fenced off previously). These sites are important in terms of emotional, religious and historical significance and are protected by national legislation. Any disturbance of these sites requires the necessary permits and further assessment work. No sites of heritage significance were identified within the footprint area of the proposed Frischgewaagd TSF.

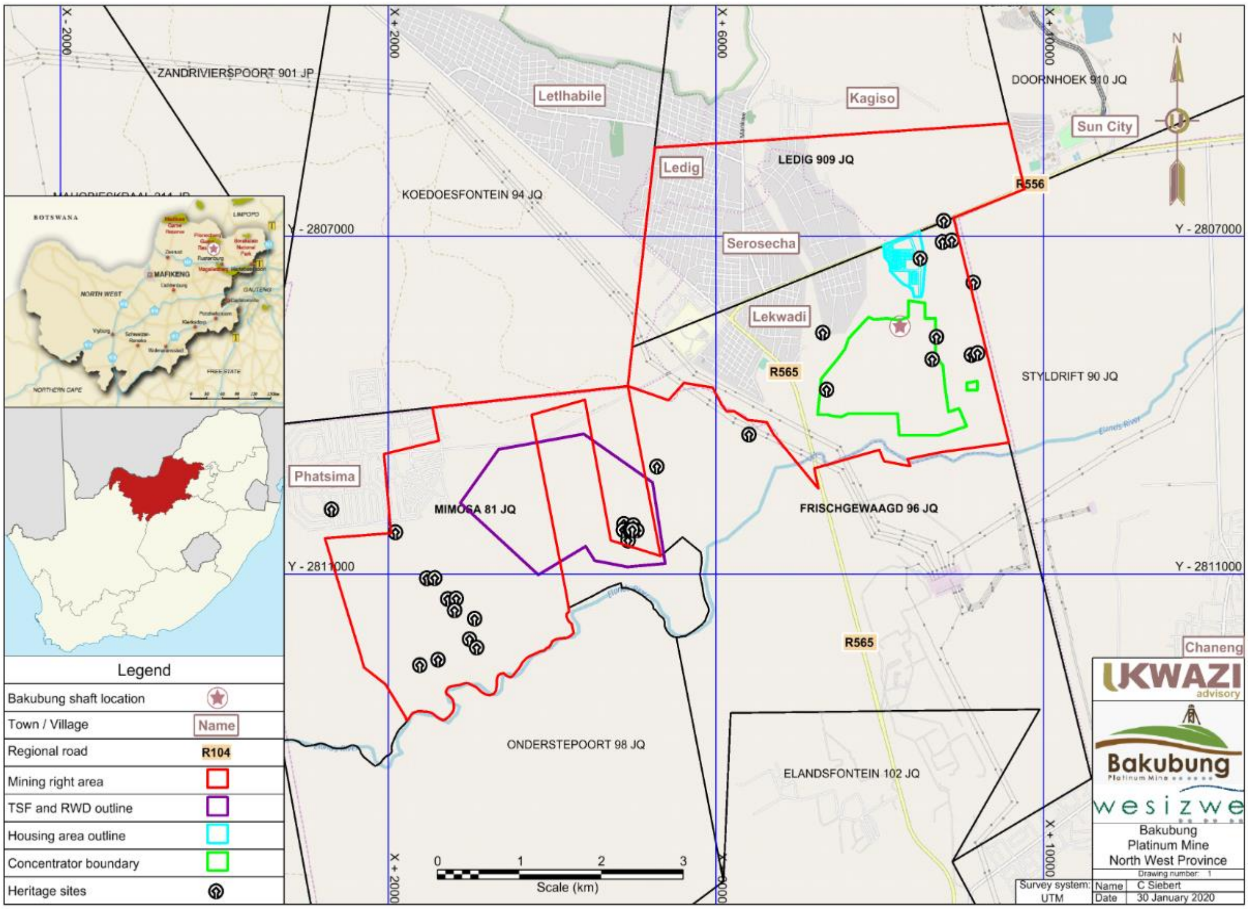

Figure 16-2: Map showing the sensitive heritage sites

16.4. Environmental impact management

SR 5.5(i); 5.5(iii)

The following monitoring actions apply to the mine according to the EMPRs and WULs:

16.4.1. Air quality

Monthly dust fallout monitoring commenced in August 2008. The current monitoring network consists of 16 single dust buckets at sensitive receptors, eight at non-residential sites and eight at residential sites. A map showing the dust monitoring locations is provided for reference in Figure 16-3.

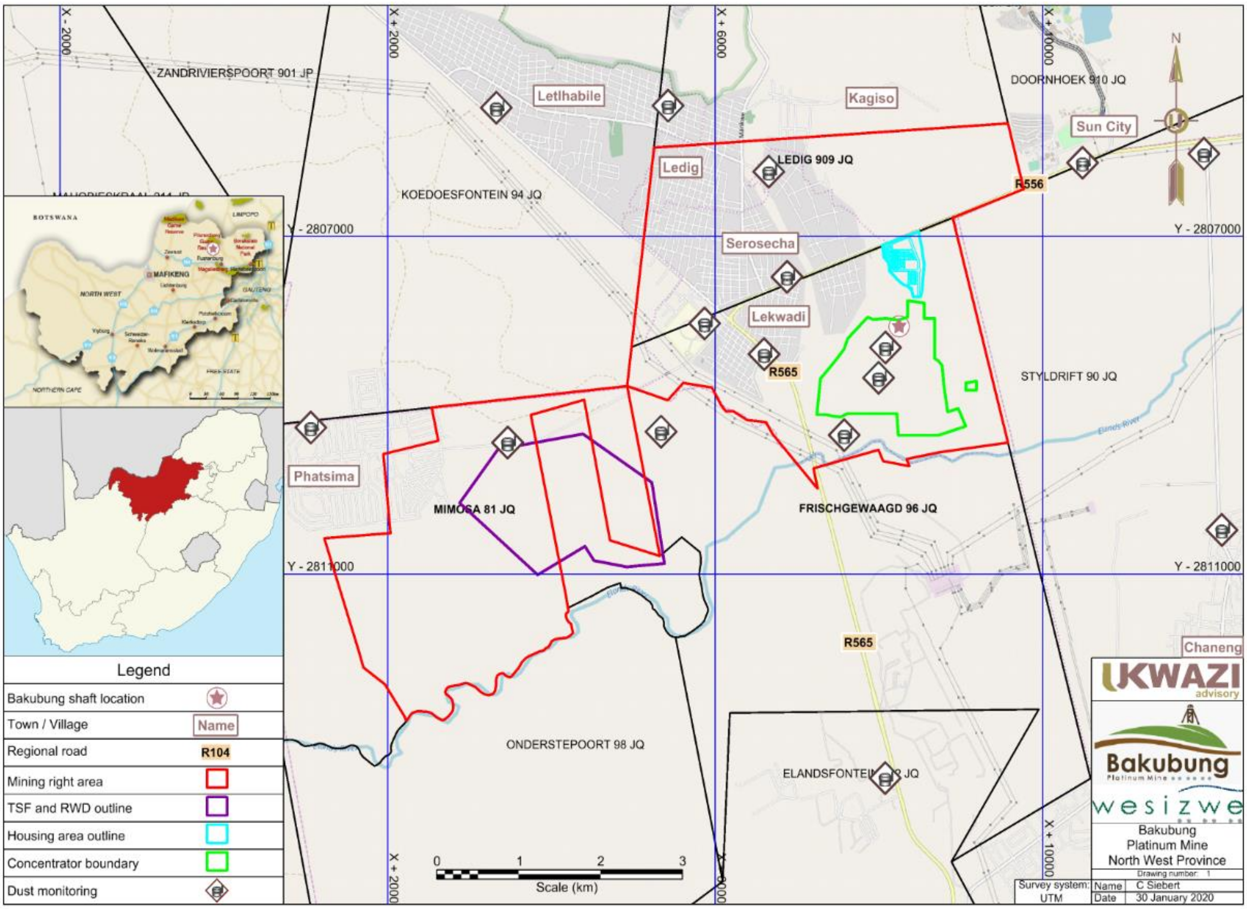

Figure 16-3: Map showing the dust monitoring locations

According to the National Dust Control Regulations ("NDCR") (GNR 827 of 1 November 2013), the threshold for non-residential areas is 1 200mg/m² per day and 600mg/m² per day for residential areas. The threshold can be exceeded twice per year if the exceedances do not fall on sequential months. Table 16-2 below, summarises the monitoring points and dust monitoring results.

The dust monitoring results between September 2008 to December 2019 indicated six exceedances of the residential limit and four exceedances of the non-residential limit. The mine was still in compliance with the NDCR as there were no exceedances recorded of more than twice per year or for consecutive months at a specific site (Airshed, 2020). Since January 2020, no exceedances (residential and non-residential thresholds) were reported according to the dust monitoring results (see Table 16-2) (Naledzi, 2021a).

Monthly dust monitoring must continue through the LOM as per the recommendation of the specialist study (Airshed, 2016). Additional air quality monitoring includes on-site meteorological monitoring and passive monitoring. The current passive monitoring network comprises four *Radiello*® passive monitors for NO_2 and SO_2 (SGS, 2019). Two of these sites are in the local communities (Moses Kotane Hospital and Khayalethu High School), while the other two are located on-site at the Frischgewaagd section (Naledzi, 2021a).

The annual average guideline for SO_2 according to NAAQS, as published in Government Gazette No. 32816; 24 December 2009 (NAAQS) is 19 parts per billion ("ppb") or 50µg/m^3. The annual average guideline for NO_2 according to NAAQS is 21ppb or 40µg/m^3. There are also limits in the NAAQS for a one-hour other averaging period for both SO_2 and NO_2, as well as limits for ten minutes and 24 hours for SO_2. Monitoring according to the 10 minutes and hourly standards cannot be undertaken with passive monitoring technology. Results obtained during the period under review were significantly below the annual average standards (Naledzi, 2021b).

The PM_{10} monitoring is conducted using a Met One E-Sampler at the cable yard on Frischgewaagd. Results provided for sampling, conducted on 23 and 28 April 2021, showed that PM_{10} concentrations were well below the 24-hour limit (75µg/m^3) as published by the NAAQS (Naledzi, 2021c). No air quality impacts were observed from the monitoring results.

Table 16-2: Dust monitoring positions

Name of the site	Latitude	Longitude	Site classification	Pre-Jan 2020 average dust fall [mg/m²/ day]	Jan 2020 dust fall results [mg/m²/ day]	Aug 2020 dust fall results [mg/m²/ day]	April 2021 dust fall results [mg/m²/ day]	May 2021 dust fall results [mg/m²/ day]
Amtel	-25.427556	27.080278	Non-residential	58	71	28	310	91
Tshaneng	-25.400972	27.121111	Residential	65	53	125	237	222
Sun City	-25.360722	27.118889	Non-residential	45	ND	57	10	54
Frischgewaagd	-25.390861	27.075278	Non-residential	86	67	61	175	105
Opposite Sun City sewage works	-25.361694	27.104167	Non-residential	36	60	28	342	241
Kagiso	-25.362667	27.066111	Residential	76	88	115	169	229
Explosives magazine/ Cable yard	-25.381472	27.080278	Non-residential	380	26	134	41	79
Ledig East	-25.373917	27.068333	Residential	84	72	145	165	153
Main shaft - substation	-25.384722	27.079444	Non-residential	54	53	66	203	100
Lekwadi section	-25.382194	27.065556	Residential	175	101	179	225	224
Moses Kotane Hospital	-25.378917	27.058333	Residential	107	12	79	47	93
House 1492	-25.355611	27.053889	Residential	82	27*	92	113	239
Bakgofa Primary School	-25.355833	27.033056	Residential	72	230	96	54	170
Khayalethu High School	-25.390067	27.010556	Residential	66	54*	35	303	283
Tailings dam	-25.390500	27.053056	Non-residential	162	151	155	124	279
Tailings north	-25.391667	27.034444	Non-residential	249	32*	Not sampled	216	940

* Sample was overexposed or compromised

16.4.2. Soil management

According to the 2016 EMPR (SLR, 2016), soil monitoring should be undertaken as follows:

- Soil compaction is inspected every three months during construction and upon completion of construction
  - Inspection of compacted areas using a penetrometer or similar instrument
  - A soil scientist must recommend whether ripping off the soils must be done after a year of monitoring. This decision must be based on the monitoring data
- Quarterly visual inspections of stockpiles, TSF and disturbed areas to ensure adherence to the soil conservation plan and rehabilitation plan
- Soil erosion
  - Soil erosion visual inspection must be done every month during the rainy season and every three months during the dry season
- Chemical composition
  - Chemical composition is to be monitored annually to ensure that soil maintains fertility.

16.4.3. Fauna and flora

The 2016 EMPR (SLR, 2016) indicated the following monitoring to be undertaken:

- In terms of Flora
  - Monitoring those activities are restricted to infrastructure footprints and that impacts such as setting of fires, cutting of trees and collection of firewood are not occurring
  - Implementation of a simple vegetation monitoring programme that focuses on the use of repeatable fixed-point photography and must include:
    - Monitoring remaining Marikana Thornveld and other untransformed vegetation within the study area (including sampling where necessary), emphasis is on the untransformed vegetation situated near infrastructure (particularly areas around the TSF and tailings/ return water pipelines)
    - A brief evaluation of the success of any future rehabilitation activities must be included in monitoring
  - Monitoring of the medicinal plant *Hypoxis henorocallidea* and all subpopulations of plant 'species of conservation concern' recorded within the study area in future. Emphasis must be placed on monitoring any threatened or near-threatened species that may be recorded in future. Monitoring must include counts or estimates of the number of plants present and the age structure
- In terms of Fauna
  - Monthly inspections of all untransformed areas to assess whether habitat is being disturbed or damaged through illegal operations
  - Monthly inspections of fence lines to assess breaches/ deterioration of the perimeter
  - Quarterly monitoring and reporting on species of conservation concern through a monitoring programme.

16.4.4. Wetlands and aquatic ecology

Biomonitoring is conducted in the summer and winter. The monitoring includes a survey of the physio-chemical water quality, habitat integrity, macro-invertebrate integrity, diatom community assessment and whole effluent toxicity ("WET") testing of the aquatic resources in the vicinity of the BPM. The description of the biomonitoring sites is summarised in Table 16-3.

Table 16-3: Biomonitoring positions

Site	Description	GPS co-ordinates	
		Latitude	Longitude
SW1	Upstream of the BPM. Located approximately 1km upstream from the original SW1 site.	25°25'14.45"S	27° 1'26.39"E
SW2	The site is representative of the Elands River upstream of the mining area.	25°23'35.10"S	27° 4'27.78"E
SW3	The site is located downstream of the BPM.	25°23'33.00"S	27° 5'44.10"E
SW4	PCD on the property of the BPM	25°23'21.40"S	27° 5'11.83"E
BK1	Located on the Sandspruit, upstream of the proposed pipeline crossing.	25°23'32.54"S	27° 4'2.31"E
BK2	Located on the Sandspruit, downstream of the proposed pipeline crossing. Any impact on the aquatic ecology as a result of the pipeline construction will be evident at this point.	25°23'38.41"S	27° 4'7.59"E
BK3	Located on the unnamed tributary of the Elands River, upstream of the proposed road crossing.	25°22'10.16"S	27° 5'3.70"E
BK4	Located on the unnamed tributary, downstream of the proposed road crossing. Any impact on the aquatic ecology as a result of the pipeline/ road construction will be evident at this point.	25°22'56.01"S	27° 5'26.34"E
BK5	This ephemeral pan is located within the area of the proposed pipeline, road crossing and berm construction.	25°22'26.01"S	27° 4'40.70"E

The 2016 EMPR (SLR, 2016) proposed that fix point photography of wetlands and other watercourses must be undertaken. The monitoring must include sediment control and stormwater control measures to be monitored and maintained. Pipeline leak monitoring must be undertaken and the monitoring of proliferation of alien and invasive species.

16.4.5. Surface water and groundwater monitoring

Monitoring was conducted on ten groundwater localities and four surface water localities on the Frischgewaagd and Mimosa farms (Figure 10-2). The WUL of 2017 included 12 groundwater points and four surface water points. Two groundwater monitoring points (FBH-03-D and WSBH-25) are not currently monitored. The FBH-03-D site is in the shaft area and WSBH-25 is located upstream of the Mimosa TSF (the TSF is not yet constructed).

The 2010 WUL included only surface water points. The 15 points cannot be monitored as the positions were incorrectly indicated and located in the Free State Province. These site co-ordinates will require amendment in the license. Table 16-4 indicates the water monitoring points to be monitored according to the WUL of 2017. All the sites must be monitored quarterly, with more frequent sampling on some of the constituents taking place on specific sites. The 2016 report included a HDPE liner underneath the TSF to avoid any groundwater contamination plumes.

Table 16-4: Water monitoring sites

Site	Type	Description	WUL 2016 GPS co-ordinates		Real Monitoring points	
			Latitude	Longitude	Latitude	Longitude
MBH-01-D	Groundwater	Borehole on Mimosa farm, downgradient	25.40058°	27.03158°	25.40059	27.03159
FBH-05-S	Groundwater	Borehole on Frischgewaagd, down gradient	25.38103°	27.07217°	25.38098	27.07233
FBH-01-D	Groundwater	Borehole on Frischgewaagd, down gradient	25.38672°	27.07589°	25.38673	27.07585
FBH-02-D	Groundwater	Borehole on Frischgewaagd, downgradient	25.38494°	27.07831°	25.38498	27.07824
FBH-03-D	Groundwater	Boreholes inside the shaft area	25.38186°	27.08158°	not monitored	
FBH-04-D	Groundwater	Borehole on Frischgewaagd, down gradient	25.38609°	27.08575°	25.38625	27.08576
MBH05D	Groundwater	Borehole on Mimosa farm, downgradient	25.39212°	27.0492°	25.39201	27.04928
MBH06D	Groundwater	Borehole on Mimosa farm, downgradient	25.40555°	27.05075°	25.40556	27.05078
FD-81	Groundwater	Borehole on Mimosa farm, upgradient	25.39650°	27.07442°	25.39648	27.07429
MBH-04-D	Groundwater	Borehole on Mimosa farm, downgradient	25.40717°	27.04103°	25.39277	27.03087
WSBH-25	Groundwater	Tailings Mimosa upstream	25.40058°	27.03158°	not monitored	
MBH-03-D	Groundwater	Borehole on Mimosa farm, downgradient	25.39689°	27.04694°	25.39686	27.04689
SW1	Surface water	Elands River upstream of mine	25.41029°	27.05324°	25.41648	27.03318
SW2	Surface water	Elands River midstream along mine	25.39297°	27.07472°	25.39313	27.07504
SW3	Surface water	Elands River downstream from mine	25.39258°	27.09544°	25.39337	27.09493
SW4	Surface water	Mine water pond (PCD)	25.38895°	27.08709°	25.38927	27.0872
S1	Surface water	Elands Upstream River	Co-ordinates in the 2010 WUL plot in the Free State province and should be amended		Cannot be monitored as the co-ordinates in the WUL is incorrect	
S2	Surface water	Tributary from the north				
S3	Surface water	Elands River downstream tributary				
S4	Surface water	Elands River upstream tributary				
S5	Surface water	Tributary from south				
S6	Surface water	Elands River downstream				
S7	Surface water	Elands River downstream Sandspruit				
S8	Surface water	Elands River upstream tributary				
S9	Surface water	Sandspruit downstream Matlhogaabone				
S10	Surface water	Elands River downstream Sandspruit				
S11	Surface water	Tributary from the north				
S12	Surface water	Elands River upstream tributary				
S13	Surface water	Elands River upstream Bonwakgokgo				
S14	Surface water	Bonwakgokgo				
S15	Surface water	Elands River downstream Bonwakgokgo				

Four new groundwater monitoring boreholes with a depth of 40m were recommended in the Frischgewaagd TSF EMPR, one upgradient of the facility and three downgradient. The location of the boreholes is shown in Table 16-5 below.

Table 16-5: New groundwater monitoring sites proposed

ID	Site*	Type	Description	Latitude	Longitude	Depth [m]
1	MONBH1	Groundwater	Borehole on Frischgewaagd, upgradient	-25.3853117	27.0727191	40
2	MONBH1	Groundwater	Borehole on Frischgewaagd, downgradient	-25.3882390	27.0753810	40
3	MONBH1	Groundwater	Borehole on Frischgewaagd, downgradient	-25.3887834	27.0777840	40
4	MONBH1	Groundwater	Borehole on Frischgewaagd, downgradient	-25.3879949	27.0736156	40

*The sites were all named "MONBH1" in the EMPR

16.5. Mine closure

SR 1.7(i); 5.2(ii); 5.6(ix)

The proposed rehabilitation plan as per the approved mine EIA (TWP ES, 2008) stated the main objective of a rehabilitation plan for a mine is to restore the land pre-mining land capabilities and to create a self-sustaining land surface, in this instance to grazing and wilderness. Other key aims of the plan are to:

- Ensure the successful re-establishment of a range of indigenous species
- Manage the natural and rehabilitated vegetation to avoid the loss of species diversity and habitats within the stipulated mine infrastructural areas
- Ensure that rehabilitated land is stable in the long term, both from soil erosion and self-sustaining vegetation cover.

The closure liability for the operation was updated in December 2020 as per the Guideline Document for the Evaluation of the Quantum of Closure Related Financial Provision by a Mine as published by the DMRE, dated January 2005. The 2020 update referred to the lights out scenario as at December 2020. The cost of ZAR39.8 million (excluding VAT) was estimated and included the demolition and rehabilitation of the infrastructure located on the mine at the time of the assessment. At the time of assessment, the construction of the TSF with associated RWD, solar plant, housing and concentrator plant had not yet commenced and was therefore excluded from the annual update report.

Items excluded from the bill of quantities were:

- Removal of temporary shaft sinking structures that form part of the responsibility of the appointed contractor. The cost of this was already included in the shaft sinking contract for the removal of all temporary shaft sinking structures
- The earth berm placed on the western side of the main terrace which will be left in place
- Scrap value of material removed from the mine (the cost of removal is included). The cost-benefit will be realised by Wesizwe at the time of resale. This was done to keep the report conservative and realistic.
- Removal of the various contractors' site establishments. All cost associated with contractors' site de-establishment were catered for in their respective contracts
- All Eskom property, which includes the Eskom yard, fencing, building, structures, etc. will be removed by Eskom at their own cost. Pylons and overhead lines up to the Elands River were also excluded
- The concrete of the service duct, winder house basement, shafts and all other concrete not protruding above the ground level surface, will be left in place.

A letter of guarantee was submitted on 25 February 2021 to the DMRE for an amount of approximately ZAR41.1 million to execute rehabilitation commitments detailed in the EMPR.

16.6. Environmental systems and management plans

The mine must comply with the conditions as set out in the approved EMPRs, EAs and WULs.

16.7. Environmental legal compliance audits

SR 7.1(i); 7.1(ii)

16.7.1. Latest NEMA and EMPR audit (performance assessment)

Naledzi conducted the 2020 EMPR and environmental performance assessment ("EPA") audits. The mine achieved 88% compliance to the 2009 EMPR and 81% compliance for the 2017 integrated environmental authorisation ("IEA"). The audit found that there was generally good housekeeping and overall good environmental management across the mine.

The IEA contained 108 conditions, of which, 38 conditions were not yet applicable at the time of the audit, and therefore, 70 conditions were to be complied with. The mine was fully compliant with 53 of these, partially compliant with 11 and non-compliant with six conditions.

Conditions in the IEA that required attention, due to non-compliance, included ensuring that construction of the boundary fence is completed, erecting signs warning the public about hazards, placing signs in three different languages at the mine entrance, conducting an environmental audit every two years and lastly, notifying the South African Heritage Resources Agency and the North West Provincial Heritage Resources Authority when graves are encountered.

The mine was non-compliant with only one of the conditions in the EMPR, that related to not monitoring and reporting on species of conservation concern. One condition was rated as partially compliant, while the rest were all fully compliant or not applicable (Naledzi, 2020).

16.7.2. Latest water use license audit

The audit by Naledzi dated October 2020 on License number 26064730 had a 96% overall compliance rate with the 2010 IWUL conditions (Naledzi, 2020). The mine achieved 96% compliance with the 2010 WUL and 91% compliance with the 2017 WUL. The audit found that the mine could improve in terms of monitoring, invasive species management, reporting, communication with employees and subcontractors, stormwater management and access control.

Results of the GN 704 audit dated March 2020 (Geomarub, 2020) showed that the mine achieved 100% compliance with the GN 704 requirements.

16.8. Environmental directives and/or compliance notices

The BPM did not indicate that any directives were issued. It must be noted that the mine is still being constructed.

17. Marketing and logistics

SR 4.3(vi); 5.6(i); 5.6(vi) / SV T1.10

17.1. Market overview

SR 5.6(ii)/ SV T1.18

17.1.1. Introduction

The Merensky reef and UG2 Chromitite layer will be mined and milled separately, whereafter it will be blended for physical product/ waste separation through a MF2 beneficiation process. The plant design envelope allows for 100% feed of either reef types, with an initial targeted Merensky: UG2 feed ratio of 9:1.[1]

The beneficiation plant was designed with an initial throughput capacity of 1Mtpa (83ktpm) ROM, expanding to the nameplate capacity of 3Mtpa (250ktpm) ROM by 2027/ 2028. The plant was designed for a PGM concentrate production of 2 086tpm initially and a 6 258tpm post-expansion[2]. The estimated Merensky 3PGE+Au concentrate grade is 90g/t to 120g/t and UG2 concentrate grade is 170g/t[3].

The average grade of the concentrate over the LOM is 162g/t (3PGE+Au) at a combined mass pull of 2.29% and a chromite content of less than 3%[4], making it suitable for PGM matte production in downstream smelters. PGM concentrates from the mine will be transported via road and sold as filter cake to third parties for downstream value addition aimed at the extraction of precious and commercial base metals.

17.1.2. Geographical setting

The Amplats Waterval smelter in Rustenburg is 55km via road south of the BPM and its Mortimer smelter 75km to the north near the town of Northam. The Implats smelter north of Rustenburg is the closest to the BPM at less than 30km from the mine, whilst Amplats' smelting complex at Polokwane is the furthest at 350km via road and 420km via rail. The smelters of Northam Platinum at Northam and Sibanye-Stillwater at Marikana near Rustenburg are respectively located 85km and 70km from the mine.

A greenfields PGM smelting and refining complex is being promoted by the Limpopo Economic Development Agency for development in the proposed Tubatse Special Economic Zone near Steelpoort in the Limpopo Province. This envisaged facility, approximately 450km via road and 560km via rail from the BPM, will be located within the Eastern Limb of the BC, SA's major chromite mining and smelting region and will prioritise PGM production from UG2 concentrates. The closest rail siding to the mine is 12km, situated at Boshoek, with the Pilanesberg International Airport approximately 15km away.

[1] Updated process description, Bakubung Platinum Mine Project, 2A19X45PXA0401-05 (June 2019)
[2] Mass balance – Module 1, Bakubung Platinum Mine Project, 2A19C45PC0401-03 (June 2019)
[3] Integrated annual report 2018, Wesizwe Platinum Limited, (2019)
[4] Mass balance – Module 1, Bakubung Platinum Mine Project, 2A19C45PC0401-03 (June 2019)

Figure 17-1 depicts the geographical location of the BPM within the Western Limb of the BC and its position relative to the major operational and proposed greenfields PGM smelting facilities within SA.

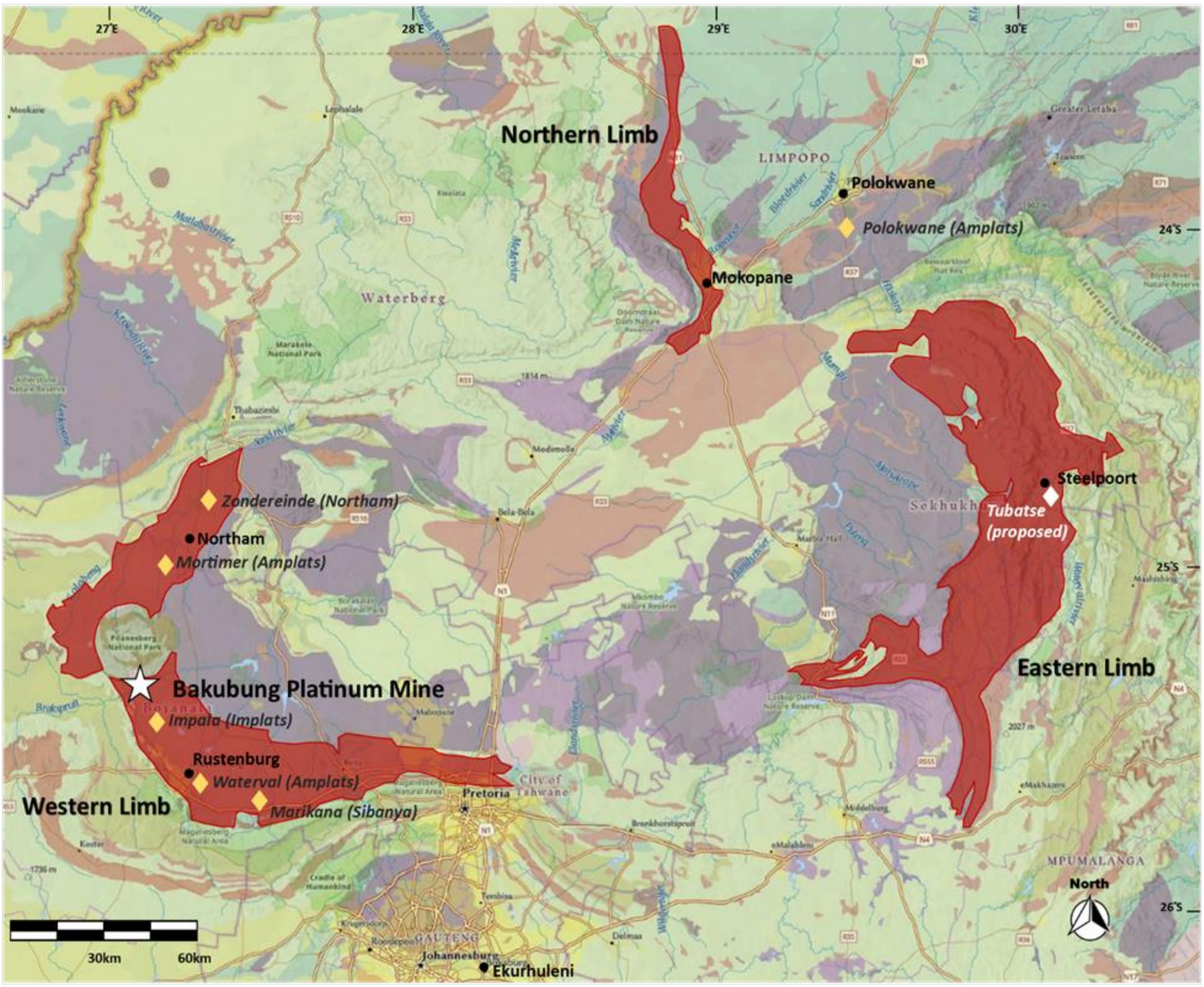

Figure 17-1: Geographical location of BPM and the major South African PGM smelters

17.1.3. Target markets

The mine aims to produce a flotation concentrate that is sold to third parties within SA for downstream value addition through both PGM and base metal extraction. The BPM does not intend to market its refined PGM itself, thus will not be negotiating any toll smelting or refining agreements for either the precious metals or base metals contained within the PGM concentrate product.

The competitive quality of the BPM concentrate and the mine's proximity to major existing smelting operations hold substantial market penetration potential, when compared to existing deeper regional mines and emerging or potential pureplay PGM concentrates projects – the majority of which, are located in the Northern and Eastern Limbs of the BC.

To date, no formal smelting, refining or marketing offtake contracts for the BPM concentrates have been concluded. This represents a material project risk that must be addressed, aligned with concentrate production ramp-up.

17.1.4. Concentrate basket price

Chromite reporting to the final concentrate product will be managed to less than 3% by mass, making the merchant product suitable for matte smelters and comparable in grade to other UG2-rich PGM concentrate blends. Chromite in UG2 ROM constitutes around 30% of the total mass, while it is negligible in Merensky ROM. As such, it will only require special attention during the latter stages of the LOM production schedule.

The basket price received for the merchant PGM concentrates sold to third-party smelters depends on a number of factors such as the Merensky: UG2 ratio of the concentrate, contractual offtake duration, tonnage of concentrate treated and the prevailing market prices and market dynamics. Revenue from PGM concentrate for 3PGE+Au can range as high as 85% of the precious metals' market prices, while base metal payables will typically range up to 75%. The balance of market prices less smelter payments cover the downstream smelting, converting, refining and marketing costs incurred by third parties and all attributable capital recovery cost and profit margins.

The BPM concentrate is forecast at an average net payablility of 81% for their cumulative PGMs and base metals[5]. Table 17-1 summarises the average 2020 market-related precious and base metals commodity prices and indicates the anticipated smelter payable price for the BPM concentrates. For completeness, the prices for chromite are indicated in the table below, although it is not included in the PGM concentrate sales revenue.

Table 17-1: Average 2020 market prices versus expected smelter payable price for the BPM PGM concentrate

Metal	Symbol	Unit	Market price[6 7]	Concentrate price	Estimated payable [%]
Platinum	Pt	USD/oz	893	750	84
Palladium	Pd	USD/oz	2 214	1 860	84
Rhodium	Rh	USD/oz	11 621	9 762	84
Gold	Au	USD/oz	1 777	1 493	84
Ruthenium	Ru	USD/oz	288	158	50
Iridium	Ir	USD/oz	1 651	826	55
Nickel	Ni	USD/t	14 250	10 688	75
Copper	Cu	USD/t	6 181	4 327	70
Chromite (future)	*Cr_2O_3*	*USD/t*	*107*	*54*	*50*

Figure 17-2 shows the basket price contribution associated with the metals contained within the BPM merchant concentrates, based on 2020 precious and base metals market prices (real) and indicates the following:

- 3PGE+Au contributes around 93% to the overall revenue stream on an annual basis - an increase of nearly 5% over the 2019 forecasts attributable mainly to the USD7 717/oz rise in the Rh price in 2020
- Ni, at an average revenue contribution of 3.7%, is consistently the 4th highest contributor to the concentrate basket value
- Au and Cu are minor revenue drivers, combinedly contributing an average of 2.6% of the smelter payable revenue over the LOM.

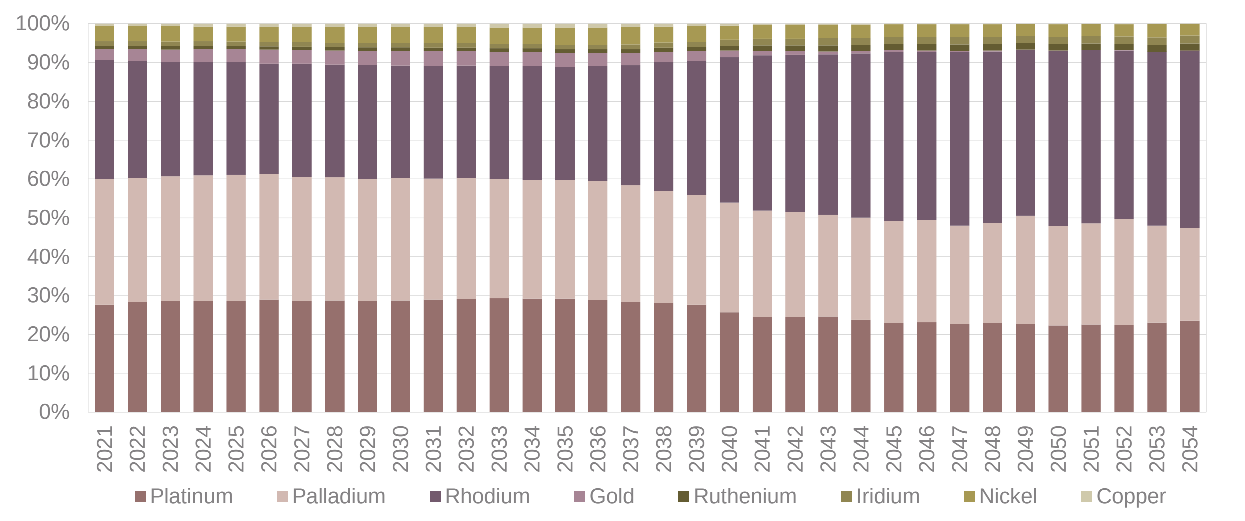

Figure 17-2: Basket price value drives of BPM concentrates (real, 2021 metal prices)

[5] Financial model 2019 Rev 06, Bakubung Platinum Mine Project (2019)
[6] 2019 Annual results presentation, Anglo American Platinum (2020)
[7] Precious metals forecast 2021, Heraeus Precious Metals (2021)

Figure 17-2 also depicts the variance in basket price contribution of the metals contained in the concentrate product over time as BPM transitions from an initial primarily Merensky ROM to a pure UG2 ROM at the end of the LOM.

Figure 17-3 provides a summary of the average basket price contribution of the metals contained within the BPM merchant concentrate product over the LOM, based on 2020 precious and base metals market prices (real).

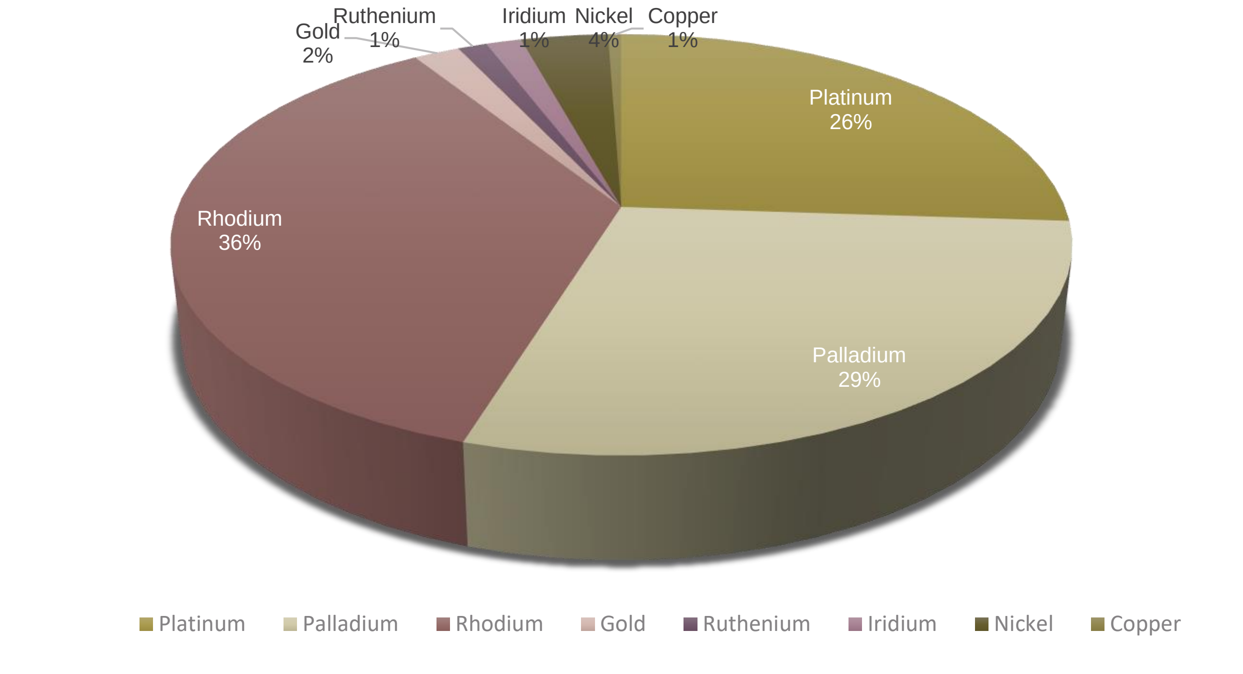

Figure 17-3: Average basket price value drives of BPM concentrates over LOM (real, 2020 metal prices)

Over the LOM, an estimated 96.7% of the BPM concentrate revenue (2020 real market prices) is expected to be derived from 3PGE+Au and Ni.

17.2. Global market analysis

SR 5.6(ii)/ SV T1.18

17.2.1. Commercial product applications

17.2.1.1. Platinum group elements

PGEs, consisting of Pt, Pd, Rh, Ir, Ru and osmium ("Os"), possess excellent catalytic and stable electrical properties. These elements are highly resistant to wear, tarnishing and chemical attack and can withstand high temperatures. The unique physical, chemical, catalytic and electrical properties of PGEs make them indispensable to many industrial applications, including:

- Auto catalysts – used as catalysts for oxidation and reduction reactions that decrease hydrocarbon, carbon monoxide and nitrous oxide emissions in automobile exhaust emissions
- Nitric oxide – produced by the chemical industry using either Pt or Pt-Rh alloy and used in the manufacturing of explosives, fertilisers and nitric acid
- Silicates – production of speciality silicones for use in applications such as coatings on automobile airbags, water repellent coatings and adhesives for sticky notes
- Petroleum – use of Pt-supported catalysts to refine crude oil and in the production of high-octane petroleum and aromatic compounds
- Crucibles – applied as an exceptionally hard and durable coating to industrial crucibles for use in the manufacturing of chemical and synthetic materials, such as high-purity single crystals used in the production of light-emitting diodes ("LEDs")
- Glass – used in the production of fibreglass and flat-panel and liquid crystal displays
- Electronics – used in computer hard disks to increase storage capacity and in the production of electronic devices, hybridised integrated circuits, and multilayer ceramic capacitors

- Medical industry – Pt used in medical implants, such as pacemakers, due to its corrosion resistance and rare occurrence of allergic reactions, while PGEs are used in cancer-fighting drugs
- Other industrial uses include, gas sensors, spark plug tips and additives to superalloys.

The white colour, strength and resistance to tarnishing make Pt alloys sought-after in the jewellery industry. Pt, Pd and Rh are furthermore used for investment in the form of physical or financial assets:

- Physical assets include Pt and Pd as collectable coins, or as bullion coins, bars, or wafers
- Financial assets include stocks, mutual funds and exchange-traded funds which enables investors to own Pt, Pd and Rh without the difficulties associated with physically holding the metal.

A high-potential future market is the use of PGEs in the emerging hydrogen economy, with applications as catalysts in both fuel cells (to produce zero-emission electricity from hydrogen) and water-splitting electrolysers (to produce zero-emission hydrogen from water). Fuel cell and electrolyser catalysts contain up to three times the PGM content of automotive catalysts and hold the potential to emerge as an indispensable component in the future global green energy mix for electric transportation, including passenger vehicles, commercial and off-highway trucks, planes, trains and ships. For many of the highlighted applications, such as automotive catalysts, there are no viable commercial substitutes for PGEs at present. The demand for PGEs remains broad-based and robust.

17.2.1.2. Gold

Au is associated with the PGM-rich BPM ores, averaging quantities of 0.19g/t in Merensky ROM and 0.02g/t in UG2 ROM. As with PGEs, Au is a relatively rare noble metal that is resistant to corrosion and oxidation. It is classified as a precious metal, with applications mainly in jewellery (50%), investment (40%) and industry (10%). Au is not specifically mined at BPM but is recovered along with the PGEs to form the basket price sold to downstream concentrate smelting and precious metals refining operations.

17.2.1.3. Base metals

Base metals associated with the ROM ore mined are classified into two groups:

1. Sulphide minerals, critical for matte production in downstream smelters, from which Cu and Ni are eventually extracted
2. Fe- and Cr-rich oxide minerals, belonging to the spinel group, from which pure chromite (Cr_2O_3) can be recovered.

The presence of sulphide minerals in PGM concentrates, especially those with high concentrations Ni without excessive total sulphur, is highly desirable to South African PGM smelters. It promotes matte production, enhances overall PGM recovery and contributes high-value base metals revenue streams whilst minimising environmental interventions required to reduce/ eliminate harmful SO_2 emissions (e.g., through the production of sulphuric acid and/or gypsum).

The desirable sulphide mineral content (4.3% Ni, 1.5% Cu and 6.7% total Sulphur ("S") average over the LOM) holds potential for the BPM product to be marketed as a premium PGM concentrate, especially suited for blending with lower-Ni UG2 concentrates from the Eastern Limb[8] or Platreef concentrates arising from the Northern Limb where the sulphur content can be as high as 19%[9].

Cu and Ni are extracted from PGM concentrate as matte arising from pyrometallurgical smelting and converting operations, harnessing primarily hydrometallurgical processes to refine the commercial base metals. Cu is a soft, malleable and ductile metal with very high thermal and electrical conductivity properties. Its main applications are electrical wire (60%), roofing and plumbing (20%), industrial machinery (15%) and surface-hardening alloys such as brass and bronze (5%). Ni is a hard and ductile, silvery-white lustrous transition metal. It oxidises slowly in air and is considered to be corrosion resistant. Ni is one of only four ferromagnetic elements. The main commercial use for Ni is as a ferroalloy in the production of stainless steel (68%), followed by applications in nonferrous alloys (10%), Ni plating (9%), alloy steels (7%), foundries (3%) and other industries including the fast-growing battery sector.

Ni is an excellent alloying element for PGEs, capable of fully collecting all 6 Element ("6E") (Pt, Pd, Rh, Au, Ru and Ir) PGEs from concentrates during pyrometallurgical extraction and partially collecting the contained Au in the smelter feedstock. This makes Ni a desirable element within concentrates for the South African PGM smelting- and refining operations.

[8] An overview of Southern African PGM smelting, R.T Jones (Mintek) (2005)
[9] Waterberg Project definitive feasibility study and Mineral Resource update, Waterberg JV Resources (Pty) Ltd (2019)

The chromite content of BPMs PGM concentrates, limited to 3% for matte production in downstream smelters, is too low for commercially viable extraction and is discarded as smelter- and converter slag prior to base metals refining. PGM concentrates from the BPM will only be credited for contained Cu and Ni, whilst smelter penalties will be levied if the threshold-grades of chromite and sulphur, both with zero smelter payable values, are exceeded.

17.2.2.Global platinum group metal supply

The BC in SA contains an estimated cumulative 72 200t of PGMs (Pt, Pd, Rh, Ru, Ir and Os) plus Au contained within 21 700Mt of PGM Mineral Resources[10]. This represents approximately 73% of the known global PGM resources.

Figure 17-4 depicts a world map showing the locations of the main PGM-containing deposits globally and identifies the BC in central SA, flanked by the Stella and Uitkomst intrusions located in SA and situated south of the Great Dyke in Zimbabwe.

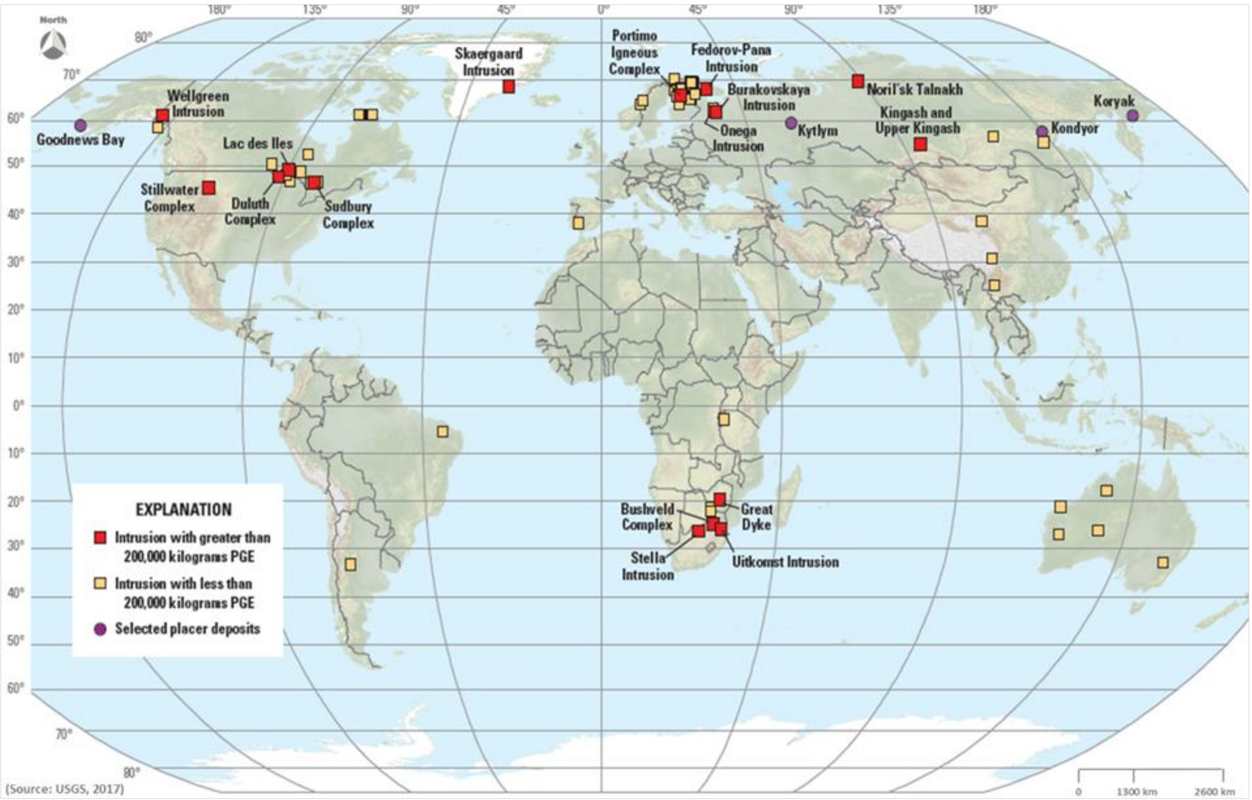

Figure 17-4: Igneous intrusions and intrusive complexes that contain most of the world's PGM deposits

In 2020, a total of 11.7Moz primary 3E PGEs were supplied into the market, comprising 4.9Moz Pt, 6.2Moz Pd and 609koz Rh. This represents a 15.6% decrease in production compared with 2019 and can be attributed to the impact of COVID-19. The market is expected to recover in 2021, with a 3E PGE production forecast of 13.6Moz.

South African mines are forecast to produce approximately 57% of the total primary 3PGE supply in 2021 (compared to 48.5% in 2020), with South African refinery output (which includes PGMs from Zimbabwe) accounting for approximately 63% of global primary supply (compared to 56% in 2020).

Figure 17-5 depicts the global primary 3PGE production profile per geographical region and volume growth over the past 45 years, noting the following:

- The production profile of the Southern African Development Community ("SADC") depicts the cumulative primary 3PGE output of SA and Zimbabwe as these countries utilise the same refineries

[10] Critical Mineral Resources of the United States, USGS (2017)

- A global peak of nearly 16Moz per annum cumulative 3PGE production occurred for a brief period between 2003 and 2007, but on average, the sustainable primary production output appears to be around 14Moz since 1998
- The sustainable 3PGE output of the refineries in the SADC-region appears to be around 8.5Moz per annum, with a flattening in production capacity growth since 2006
- The impact of the COVID-19 global pandemic on primary PGE production, across all regions, is noticeable.

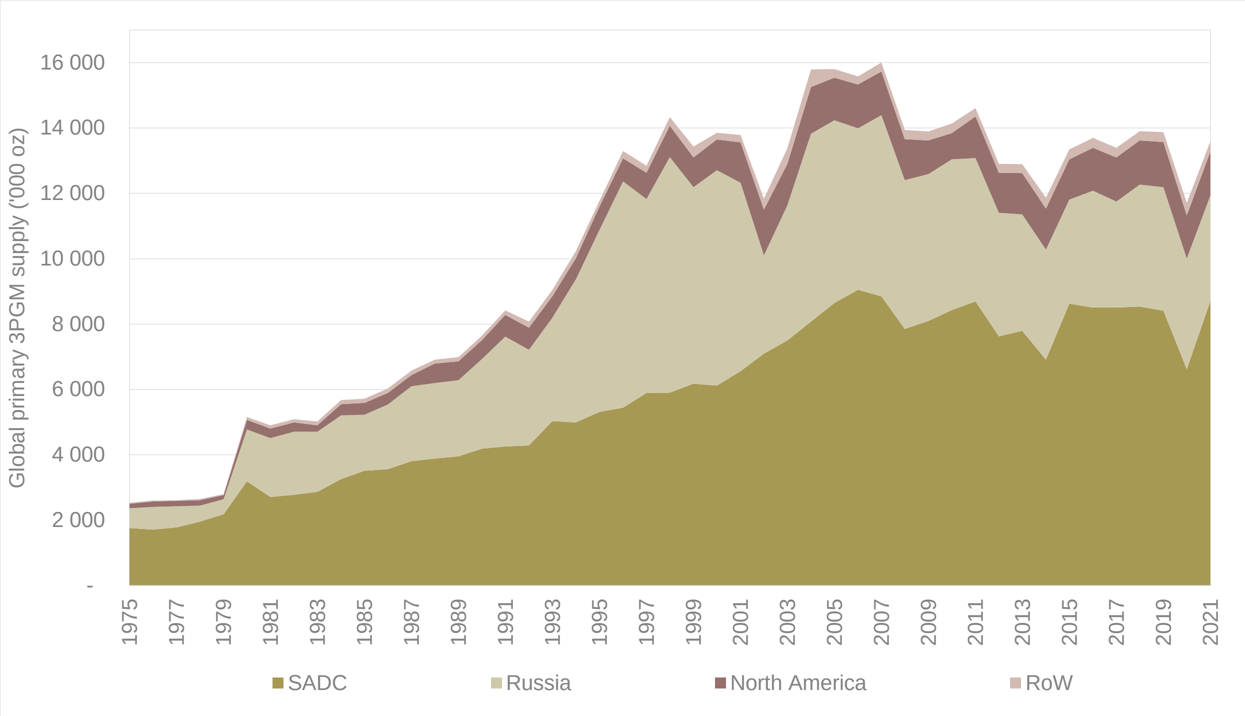

Figure 17-5: Global primary production of 3PGE (Pt, Pd, Rh)

The cumulative market demand maintained a steady growth trajectory, whereas global primary PGM production remained fairly constant over the past 25 years, at approximately 14Moz per annum, as indicated in Figure 17-6.

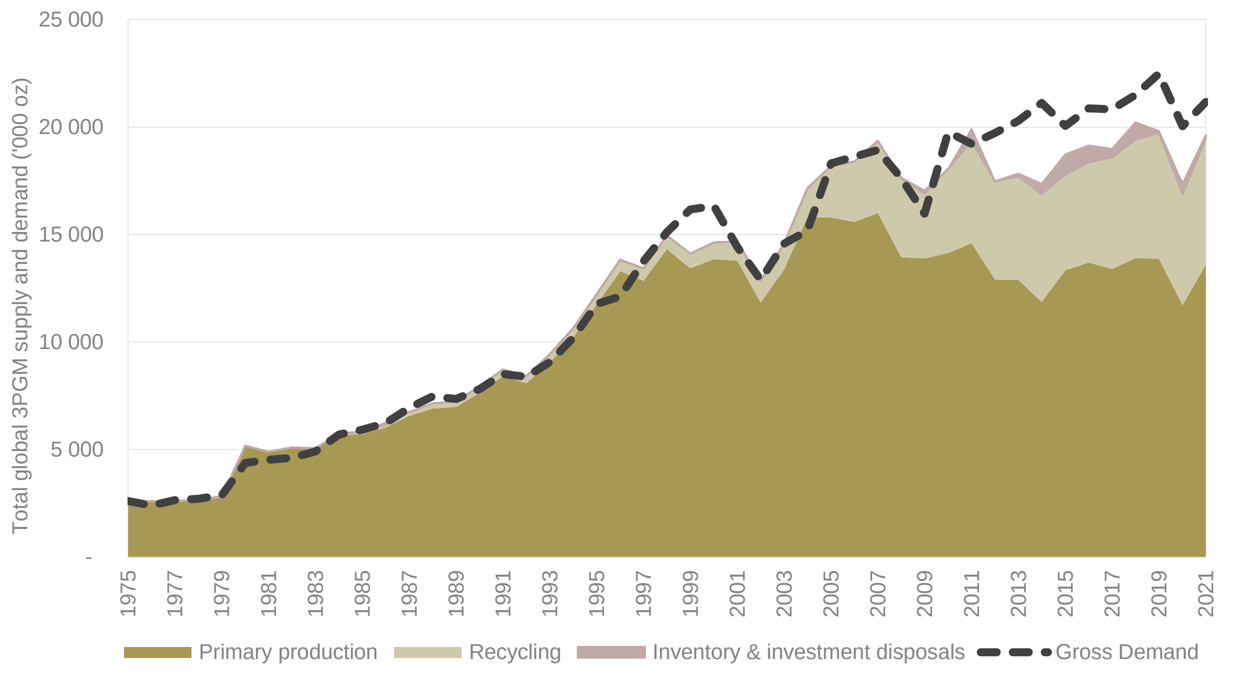

Figure 17-6: 3PGE market demand vs. cumulative primary and secondary supply

Since 2011/2012, the global demand for PGMs exceeded the total primary and secondary PGM supply. The shortfall in the market can be attributed to commodity demand fluctuations of individual PGMs, which primary PGM producers struggle to address given the fixed PGM ratios of their mineral feedstocks. This individual commodity supply risk, in conjunction with the increased availability of PGM-rich scrap and improvements in PGM recovery from discarded auto-catalysts and electric/ electronic products, gave rise to a significant secondary PGM recycling supply sector.

Figure 17-7 depicts the contribution of the separate PGM sources to the total annual supply and highlights the following:

- SADC's share of global 3PGE production remained relatively constant at 40% to 50% over the past 15 years, with the supply from Russian operations steadily decreasing while the North American supply remained flat
- The market share of recycled PGMs continue to grow, reaching 6Moz in 2019 – 31% of the global supply
- The 2008/9 and 2015/16 downturns in the financial markets caused some PGM disinvestments, impacting the supply/ demand balance.

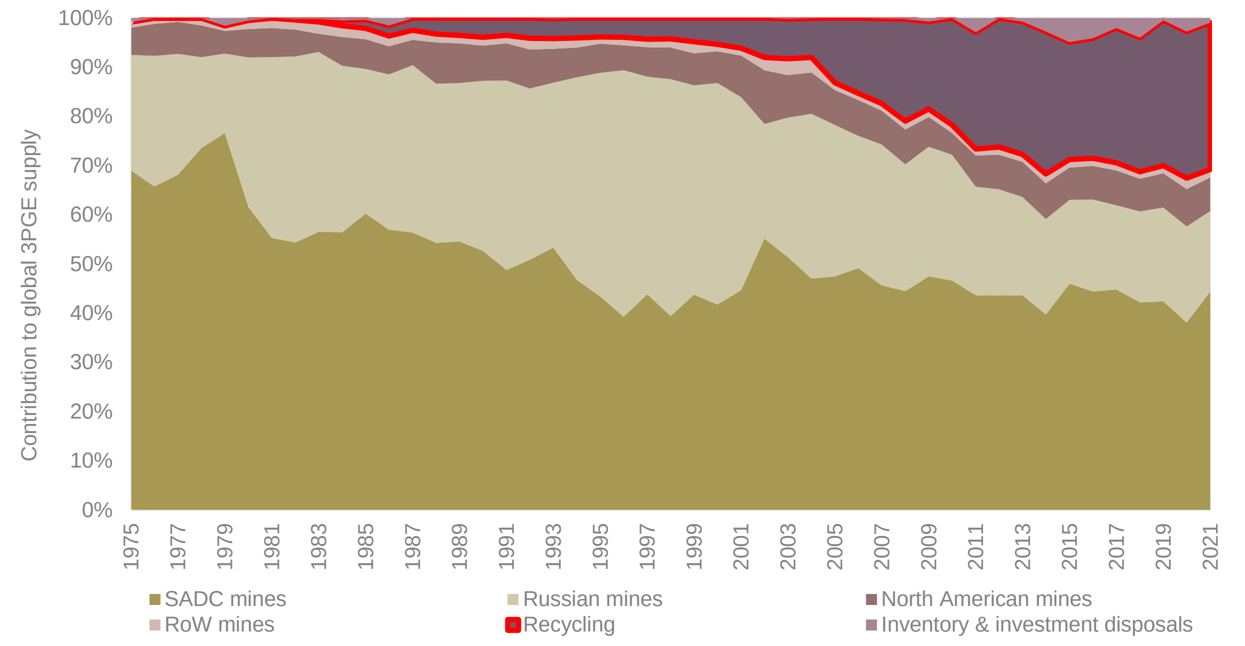

Figure 17-7: Percentage of contribution to total 3PGE market supply

The long-term impact of global 3PGE supply on the BPM represents a substantial risk for the following reasons:

- It is expected that secondary PGM production from recycled auto-catalysts and electronics will continue to increase, further encroaching on the market share of primary PGM producers
- As the "inventories" of recyclable PGMs are concentrated mainly within the larger PGM consuming regions, the international demand for primary PGMs from SA is likely to reduce overtime
- The high price and supply volatility of individual PGMs are likely to fuel accelerated research and development for PGM substitutes and improved PGM recycling efficiencies
- South African PGM producers must deal with a diminishing market demand due to recycling, a change in the 3PGE-ratio's required by the market - not necessarily supported by the available local mineral resources, resulting in potential inventory accumulation - and the resulting downward pressure on the long-term dollar PGM prices
- Primary PGM producers will undoubtedly prioritise their production sustainability and market share before making smelting and refining capacity available to concentrates-only producers like the BPM, even to the extent where their pyro- and hydrometallurgical are operated at lower capacities to minimise oversupply
- There is a real possibility that concentrates-only producers will attain lower smelter payables for their PGM and base metal contents than typically contracted by similar operations in the past.

It is of utmost importance that the BPM negotiates and concludes a favourable long-term product offtake agreement that considers the evolving PGM supply dynamics.

17.2.3.Market dynamics

PGM markets are influenced by a combination of fundamental supply/ demand economics, global macro commodity drivers, commodity exchange futures, physical investment, over the counter sales and purchase transactions and movements of stockpiles across the value chain from mine to market. PGM supply and demand dynamics in 2020 primarily reflected the negative impacts of COVID-19 on the market, including:

- A reduction in both primary and secondary PGM supply exceeding the decrease in global PGM demand, resulting in continued Pt, Pd and Rh market shortfalls
- A reduction in auto-catalyst PGM demand triggered by plant closures due to global lockdown restrictions
- A 20-year low slump in Chinese jewellery PGM demand due to COVID-19 lockdowns and reduced consumer spend
- A primary PGM supply decrease of 16% from SA resulting from processing plant outages and COVID-19 restrictions.

On the positive side, the record-high prices of Pd and Rh contributed to an increase of 42% in the 6E, USD basket price of the BPM-equivalent PGM concentrate in 2020. In addition, long-term industrial PGM demand was strengthened by the construction of new petrochemical and glass fibre capacity in China.

Strong medium-term industrial demand growth is forecasted for Pt, driven by nascent hydrogen and fuel cell technology adoption, while tightening in the markets for Pd and Rh is expected to support the higher pricing in the short- to medium term.

17.2.3.1. Platinum

The global net supply (primary production plus recycling less inventory sales) of Pt in 2020 was 6.9Moz, down from 8.1Moz in 2019 as a result of COVID-19. Pt supply is expected to rapidly return to pre-pandemic levels by 2021. Figure 17-8 shows the specific Pt supply sources and volumes over five years, from 2017 to the 2021 forecast ("2021f") against the market demand for the precious metal and indicates the following:

- The five-year average cumulative global Pt supply vs demand is balanced at 7.95Moz per annum, with increased primary production in 2021 forecasted to claw back on the 2019 and 2020 supply deficits
- SADC produced 3.7Moz of Pt in 2020, down from 4.8Moz in 2019, and represents 53% of the cumulative global primary and secondary Pt supply
- The 2020 reduction in primary Pt supply is attributable primarily to production outages and COVID-19 restrictions in SA, with the pandemic having a negligible impact on other global primary PGM producers
- COVID-19 lockdowns resulted in an 18% reduction in secondary PGM supply in 2020
- Sources of recycled Pt contribute on average 25% to the global Pt supply.

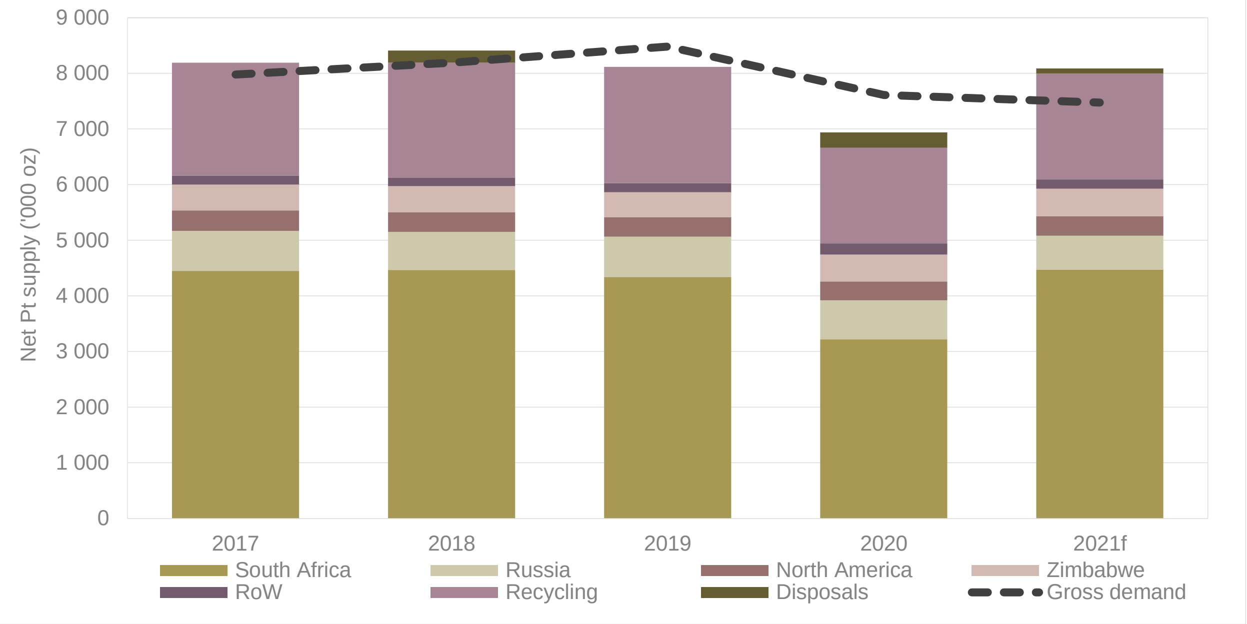

Figure 17-8: Cumulative market supply for and gross demand of Pt, 2017 to 2021 (forecast)

Over the period 2017 to 2021f, the largest commercial use for Pt was auto-catalysts for pollution control in diesel vehicles (37%), followed by the jewellery market (26%) and the chemical industry (8%). Figure 17-9 provides a five-year overview of the global Pt market demand and indicates the following:

- The steady decline in light diesel vehicle sales, which started following the Volkswagen emissions scandal in late 2015, showed signs of levelling out in 2018/ 2019
- Jewellery demand for Pt continues to shrink, especially in China
- Growth in Pt demand for industrial use appears to be driven by the emergence of the fuel cell industry, especially within China
- The global financial markets in 2019 and precious metals hedging in 2020 drove strong investment demand
- The automotive demand for Pt catalysts is aligned with new diesel vehicle sales and is unlikely to gain in the medium-term through the substitution of higher-priced Pd with Pt catalysts in petrol vehicle catalytic converters
- Vehicle manufacturers appear cautious about making changes to their catalyst formulations, providing some medium-term reprieve from any PGM substitute in diesel emission converters
- Average year-on-year growth of 2% is seen in industrial applications, with the demand in the chemical and petrochemical sectors expected to continue to increase.

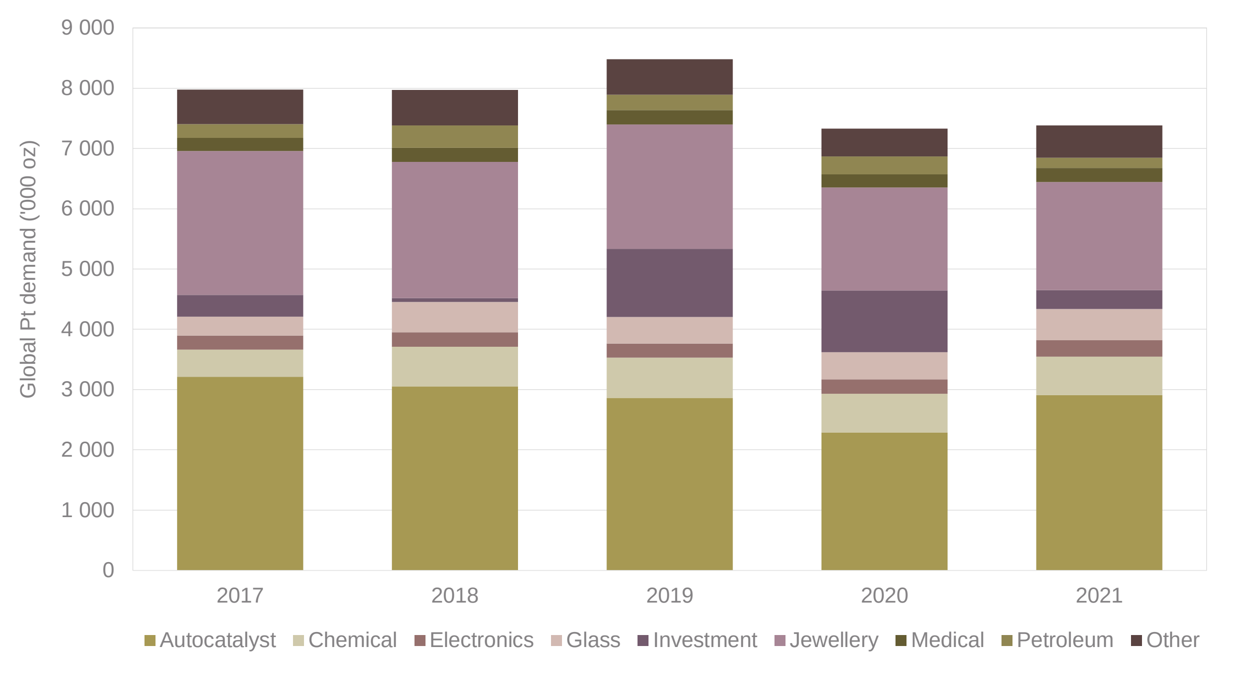

Figure 17-9: Global Pt demand per sector, 2017 to 2021f

Over the period 2017 to 2021f, China represents the largest single market for Pt (28%), followed by Europe (26%) and North America (16%), as depicted in Figure 17-10.

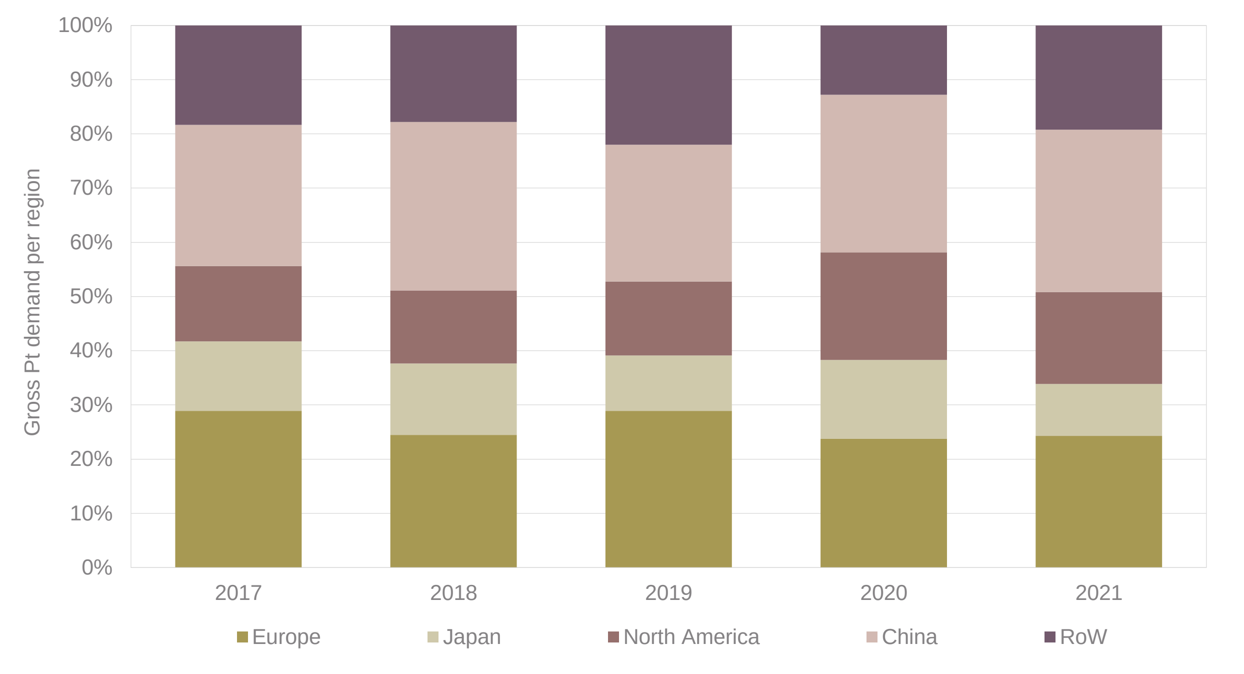

Figure 17-10: Gross Pt demand per region, 2017 to 2021f

As shown in Figure 17-11, industrial Pt fuelled the European demand during the period 2017 to 2021f, while the Chinese demand was primarily focused on the jewellery market.

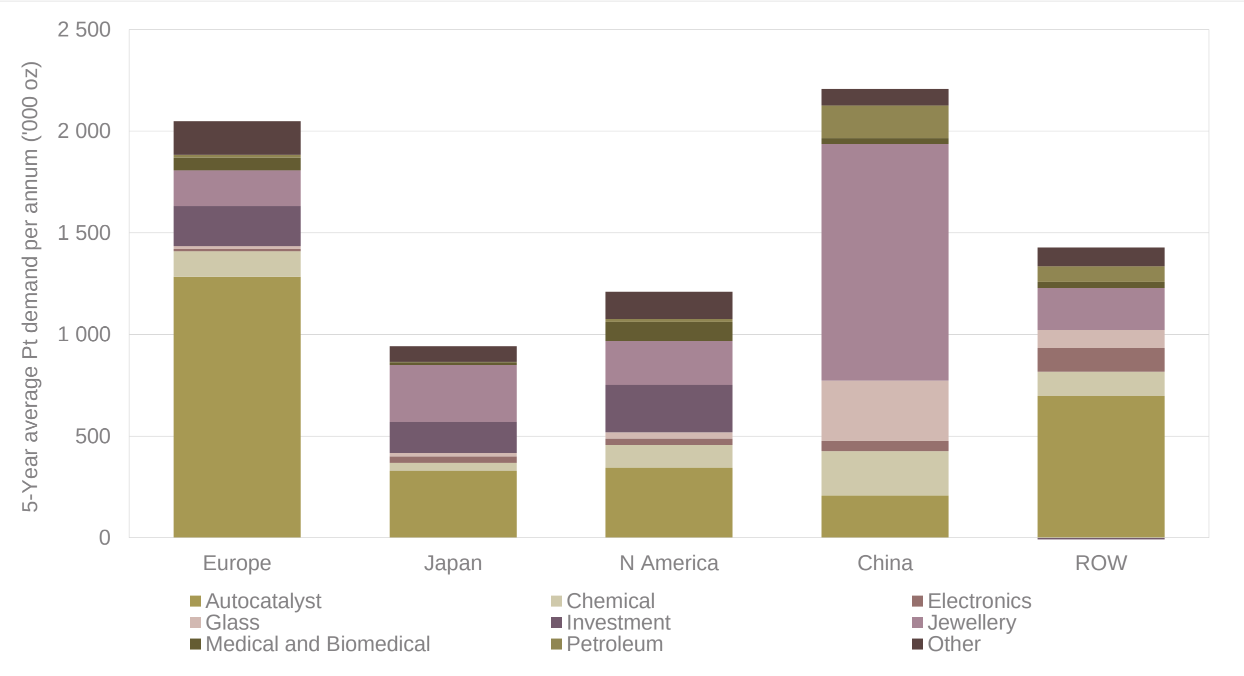

Figure 17-11: 5-year average annual regional Pt demand per application, 2017 to 2021f

The dynamics of the Chinese market has shifted towards industrial applications over the past two years, with jewellery demand declining from an average of 1.3Moz (2017-2019) to 960koz (2020-2021), as highlighted in Figure 17-12.

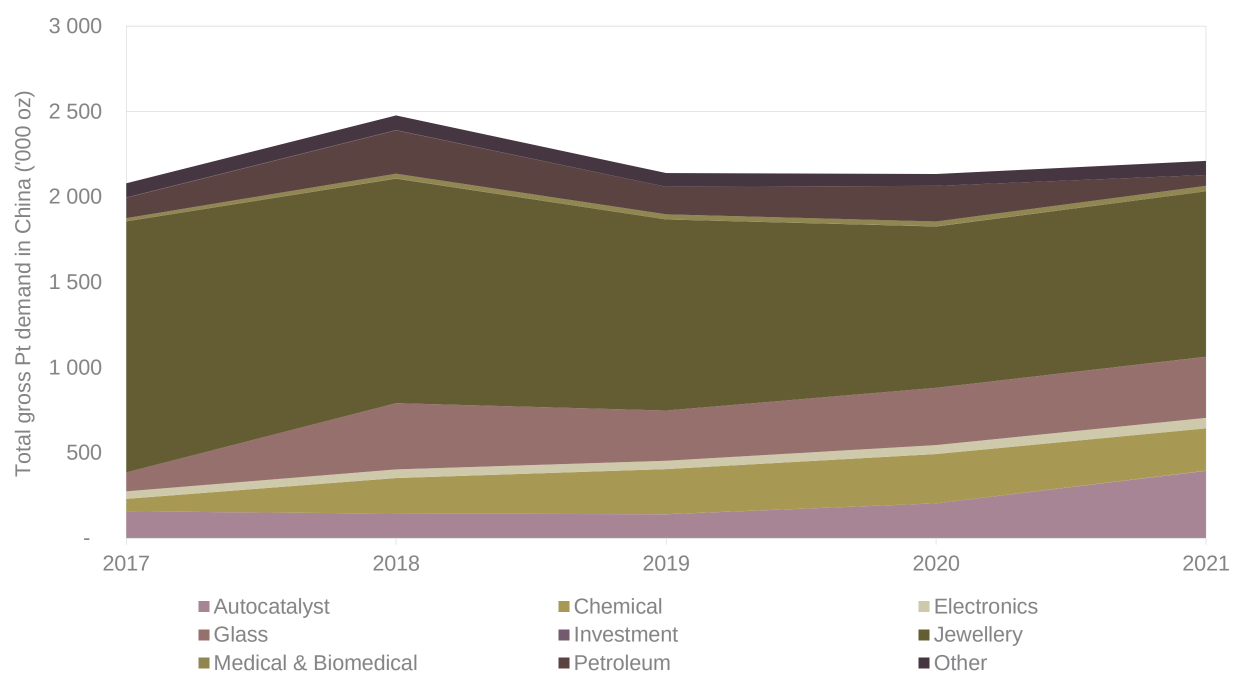

Figure 17-12: Cumulative Chinese gross Pt demand per sector, 2017 to 2021f

Overall, the market consensus is that the automotive and industrial demand for Pt will drive post-COVID-19 market recovery in 2021, augmented by investment demand. The medium-term demand outlook for Pt is improving on a year-on-year basis, with investors interested due to the metal's relative value despite persistent market oversupply. An increase in the USD Pt price is anticipated in 2021, as highlighted in Table 17-2.

Table 17-2: Pt price forecast, 2021 (Source: Heraeus Precious Metals)

Year	Average [USD/oz]	Low [USD/oz]	High [USD/oz]
2019	864	790	993
2020	893	615	1 075
2021 forecast	-	850	1 200

17.2.3.2. Palladium

In 2020, the total global supply of Pd was 9.5Moz, down from 10.6Moz in 2019. This supply comprised of 6.2Moz primary production, 3.1Moz recycled secondary production and 193koz investment disposals. Recycling remained the largest single contributor to Pd supply (33%), followed by primary production from Russia with 28% of global supply. Production outages and COVID-19 restrictions relegated SADC (SA plus Zimbabwe) to third place in 2020 at 29%, although it is expected to surpass Russia in 2021 as the local economy recovers from the pandemic.

Demand for Pd exceeded total supply since 2012, with an average shortfall of 677koz per annum between 2017 and 2021f resulting in a cumulative 3.3Moz depletion of strategic stockpiles over the past decade. This stock depletion and persistent supply shortage undoubtedly contributed to the nearly 200% rise in Pd price over the past five years. Primary Pd supply is expected to increase by 20% in 2021, mainly as a result of increased refining capacity by Anglo American, thereby narrowing the demand gap to approximately 100koz per annum.

Figure 17-13 shows specific Pd supply sources and volumes over five years up to 2021f against the market demand for the precious metal.

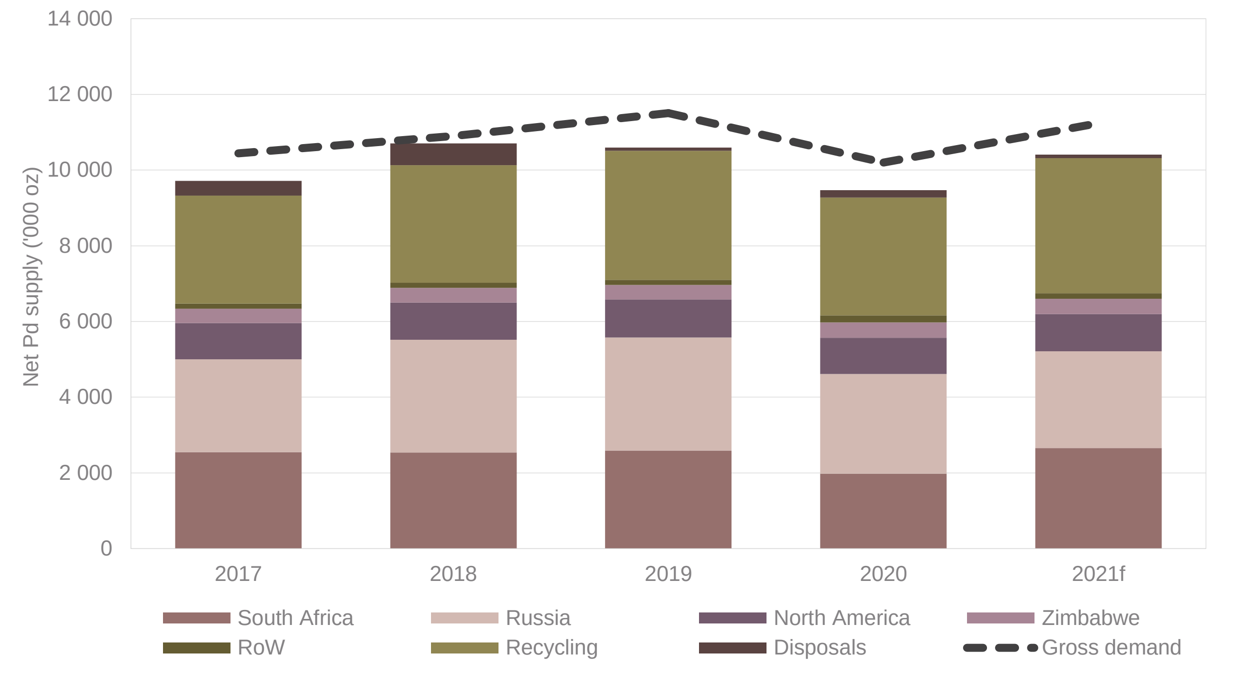

Figure 17-13: Cumulative market supply for and gross demand of Pd, 2017 to 2021f

The gross global demand for Pd in 2020 was 10.2Moz, down from 11.5Moz in 2019 resulting from the impact of COVID-19 on automotive and industrial consumption. Over the past five years, the Pd market was dominated by the demand for petrol vehicle auto-catalysts (85%), with consumption for electrical and electronic products a distant second at 6.8%, as shown in Figure 17-14 and Figure 17-15.

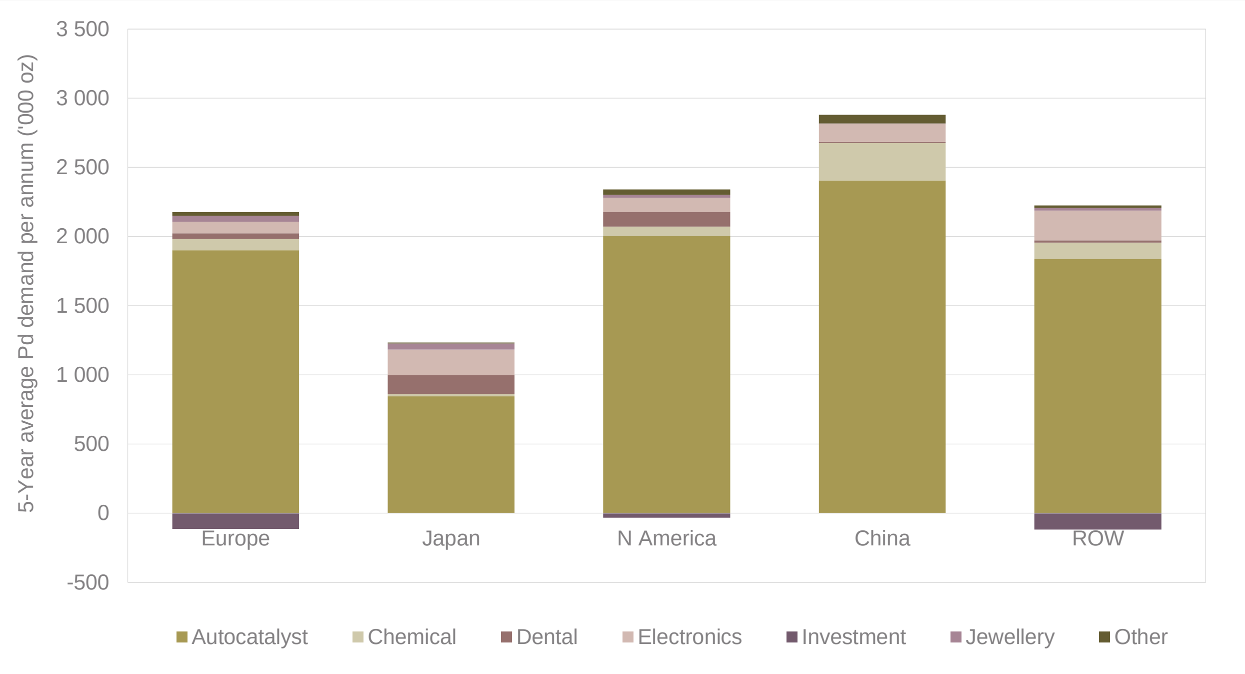

Figure 17-14: 5-year average annual regional Pd demand per application, 2017 to 2021f

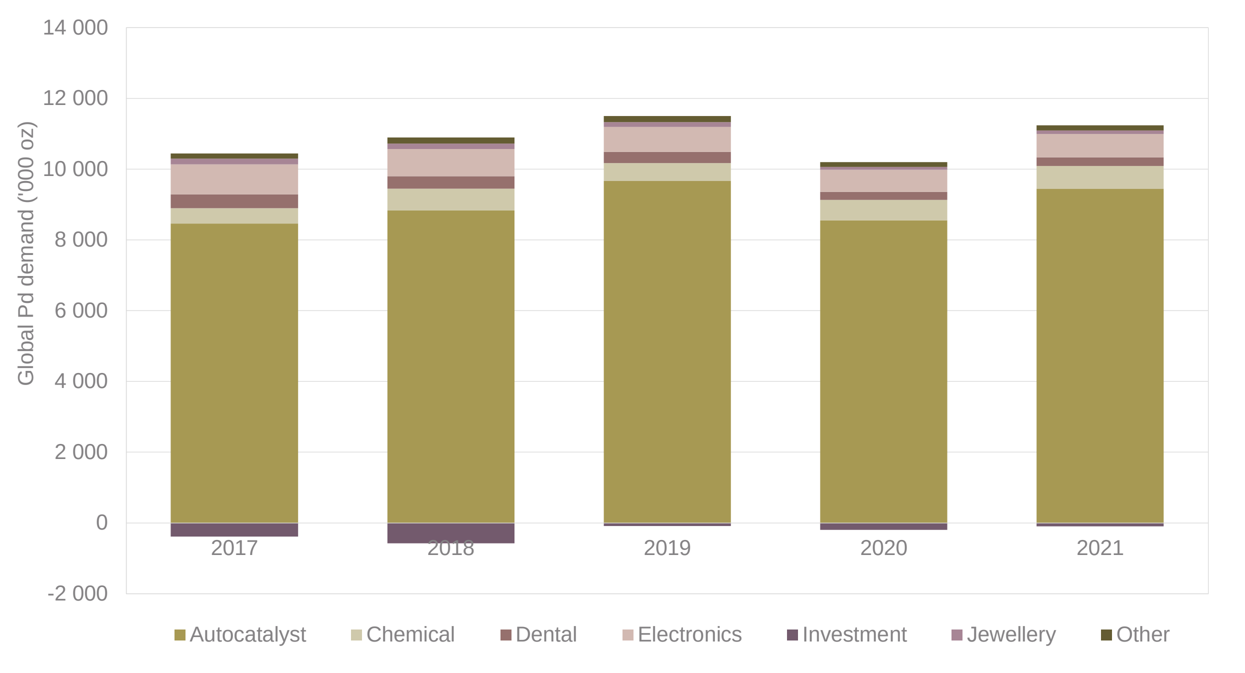

Figure 17-15: Annual global Pd demand per application, 2017 to 2021f

Pd is forecasted to remain in deficit for the short to medium-term with the potential of higher market prices. As the demand for this commodity is sustained almost exclusively by petrol vehicle sales, any deterioration in the vehicle sector will have a substantially negative impact on the Pd market and price. Table 17-4 provides industry guidance on potential Pd prices in 2021.

Table 17-3: Pd price forecast, 2021 (Source: Heraeus Precious Metals)

Year	Average [USD/oz]	Low [USD/oz]	High [USD/oz]
2019	1 538	1 270	1 991
2020	2 214	1 625	2 780
2021 forecast	-	1 900	2 900

17.2.3.3. Rhodium

The net global supply of Rh in 2020 was 947koz, down from 1.1Moz in 2019. Over the period 2017 to 2021f, the average Rh supply was 1.1Moz, with SADC contributing 55% from primary production and 32% sourced from recycled auto-catalysts.

With an estimated 81% of the total primary production of Rh occurring from the SADC region over the past five years, global supply risk exists in terms of security of electricity supply to the mines, remaining LOM of the operations and production stoppages. The impact of a slower COVID-19 vaccine rollout in SA and the anticipated recurring waves of infections add additional complexity to the supply forecast. Auto-catalyst recycling will continue to drive secondary supply growth.

Figure 17-16 shows the cumulative market supply for and gross demand of Rh from 2017 to 2021f.

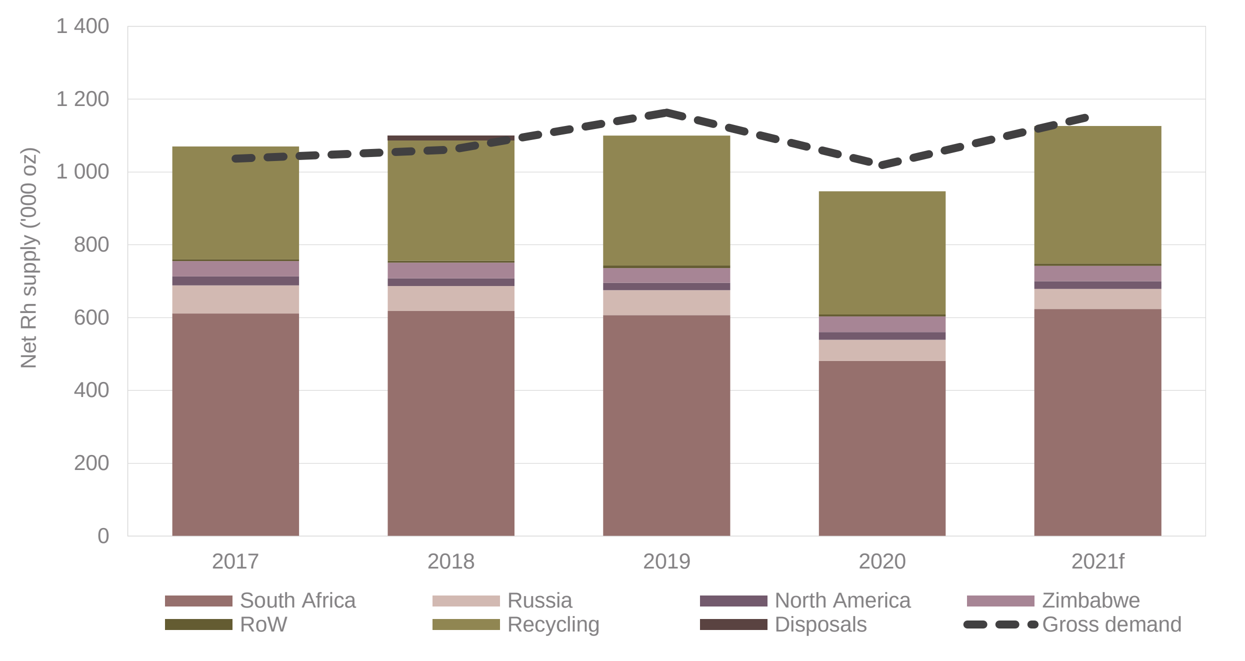

Figure 17-16: Cumulative market supply for and gross demand of Rh, 2017 to 2021f

Alongside Pd, the demand for Rh in petrol vehicles is supported by the implementation of stricter emissions legislation in Europe and China (the largest market for petrol vehicles). Higher PGM loadings in auto-catalysts are likely to outweigh the effect of stagnant car sales. Overall, demand growth will be limited by the limited industrial application of Rh, while the high metal price is likely to result in a substitution of Rh with Pt in fibreglass production.

The gross demand of Rh was 1.0Moz in 2020, down from 1.2Moz in 2019. An estimated 88% of the gross global Rh demand originates from auto-catalysts, which is expected to exceed 1.0Moz in 2021 as depicted in Figure 17-17.

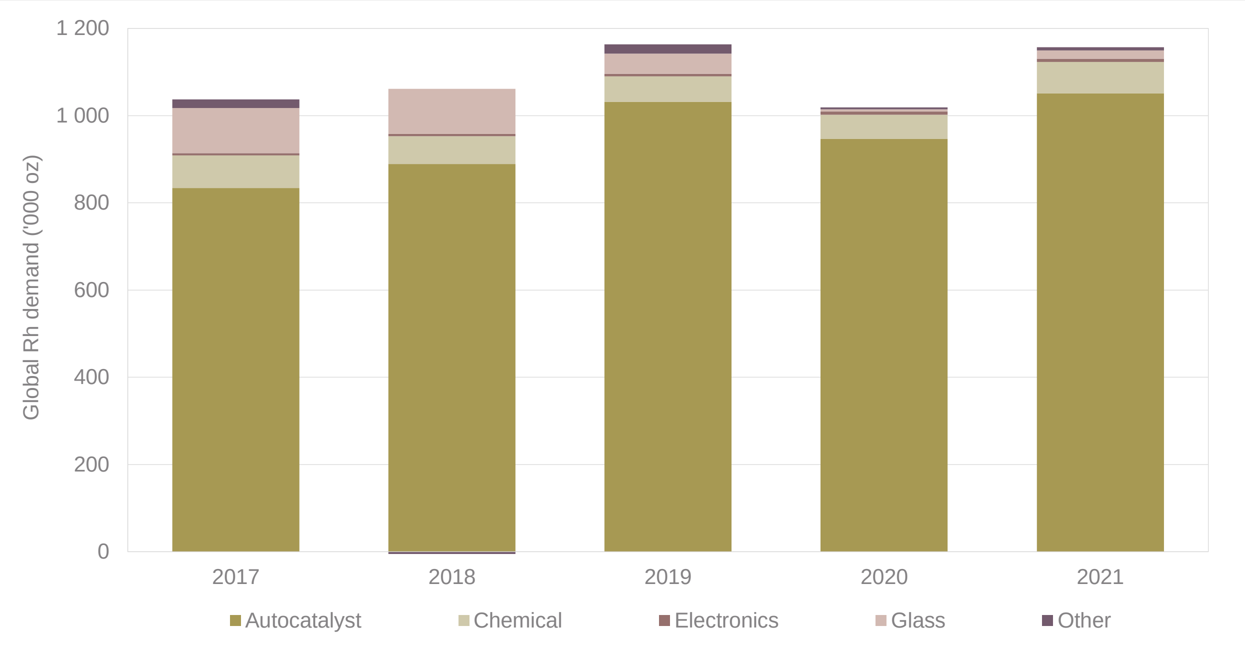

Figure 17-17: Global Rh demand per application, 2017 to 2021f

The market view is that extreme volatility will continue in the short-term to characterise the Rh price as the sustainability of primary production remains a concern. Rh supply is expected to return to 2019 levels in 2021, with increased refining capacity by Anglo American driving the recovery. Industrial demand recovery is forecast to be below 2019 levels, driven by increased glass and chemical production plant capacity in China, but hampered by the high commodity price.

Overall, the demand for Rh is sustained primarily by petrol vehicle sales, similar to the demand for Pd. Any deterioration in the petrol vehicle sector will severely impact both these metals. The high price of Rh makes it susceptible to Pt substitution in fibreglass fabrication, placing downward pressure on the industrial Rh market. Table 17-4 provides industry guidance on potential Rh prices in 2021.

Table 17-4: Rh price forecast, 2021 (Source: Heraeus Precious Metals)

Year	Average [USD/oz]	Low [USD/oz]	High [USD/oz]
2019	3 906	2 440	6 250
2020	11 621	5 960	17 350
2021 forecast	-	15 000	25 000

17.3. Product logistics

SR 5.4(iii)

The BPM is serviced by the R565 provincial road, leading to the primary PGM smelters in and surrounding Rustenburg. This road links via President Avenue to the R510 provincial road leading to the smelters near Northam in Limpopo Province, while it forms a semi-circular route that terminates at the N4 Platinum Highway within Rustenburg and Majakaneng (approximately 60km west of the town). From the N4, the national road network is accessed leading into Gauteng and beyond.

Figure 17-18 provides a geographical overview of the locations of the various primary and secondary PGM concentrate smelting and precious- and base metals refining operations within SA. It suggests that the BPM is likely to target smelters surrounding Rustenburg as offset-market for their concentrates to minimise logistical costs, although the national and provincial road network provides access to all smelting and refining operations.

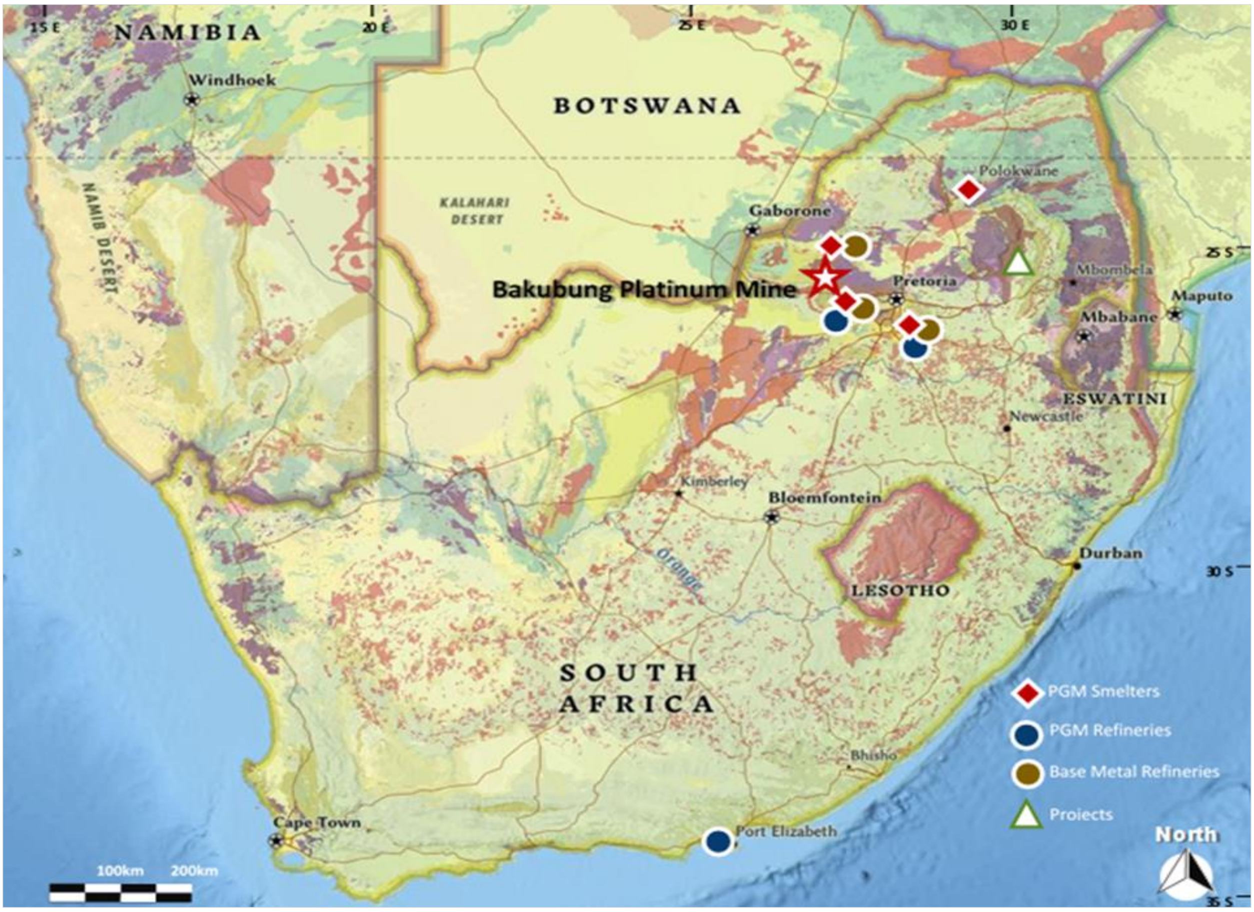

Figure 17-18: Locations of PGM concentrate smelters and precious- and base metals refineries in SA

The locations of the precious- and base metals refineries will only become important for the BPM if its product placement strategy changes to toll smelting and toll refining in the future. Should these toll treatment services not be available from the regional primary PGM producers, the closest existing secondary toll facility is the Heraeus refinery located in Gqeberha (Port Elizabeth), Eastern Cape, approximately 1 230km south of the mine, with the potential of a greenfields smelting- and refining complex in the Tubatse Special Economic Zone in Limpopo presently under evaluation.

It must be noted that, given the geographical clustering of the PGM mining operations, nearly complete reliance on road logistics from the mines to off-site smelters and the limited road infrastructure available within these clusters, the road networks are highly congested and not in a good condition.

Road logistics costs for PGM concentrate filter cake, typically transported in 36t interlink side-tippers, average at ZAR1.56/t/km, depending on the volumes, distance and contractual terms negotiated. Longer-distance transportation costs, e.g., supplying concentrates to Polokwane, Steelpoort or Gqeberha (Port Elizabeth), can be expected to be around ZAR0.90/t/km, similar to coal and manganese road logistics costs.

18. Capital expenditure

SR 4.3(vii); 5.6(iii); 5.8(i) - (iv) / SV T1.10

18.1. General

The capital expenditure ("Capex") estimate was based on a monthly mining schedule for the duration of the LOM and capital budget with annualised estimates applied in the financial model. The Capex estimate included support services and allowed for primary, engineering and sustaining capital as follows:

- Total direct project development Capex
- Other Capex
- Stay in business ("SIB") Capex.

The mining operation is primarily owner-operated. The magnitude of the mining capital spend is relative to the principal areas of spend relating to engineering, infrastructure establishment and maintenance activities.

18.2. Assumptions

18.2.1. Base date

The base date for this estimate is 1 June 2021. Real values from the capital budget estimate based on December 2020 ZAR were escalated to the model base date, using appropriate ZAR economic data.

18.2.2. Base currency

All estimates are presented in ZAR unless otherwise stated or indicated.

18.2.3. Accuracy range

The Capex estimate was developed at a feasibility level, +/-10% to 15% accuracy range, financial inputs and assumptions were based on recent cost forecasts, budget cost estimates and actual expenditure as provided by the mine and reviewed by Ukwazi. The estimate was based on the approved mine construction and design principles.

18.3. Primary capital

The Capex provisions were presented in the following categories:

- Direct project development costs
- Other Capex costs
- Pre-production Capex
- SIB Capex.

The estimate was prepared for each department (workshops, services, processing, EPCM logistics, mining, health, safety and environment ("HSE") and human resources ("HR")). It is important to note that the Capex estimate was prepared based on the assumption that the 2021 commodity pricing would remain at similar levels to those recorded in 2020. The estimate was based on the following Capex provisions:

- Direct project development Capex
  - Complex areas
    - Common and shaft surface infrastructure
    - Shaft sinking and development
    - Capital footprint development
    - Concentrator plant
    - Bulk supplies
    - Community projects
    - Indirect costs
  - Project reserves (contingency, savings, management reserve)
- Other Capex
  - Project (housing)
  - Asset acquisition (buildings, vehicles, equipment and other assets)
  - Capitalised costs (pre-production funding and asset decommissioning)
- SIB Capex
  - Mechanised drill jumbos
  - In-stope mechanised bolters
  - Explosives chargers

- LHDs
- Mining trucks
- Other mechanised equipment
- Conventional equipment.

18.3.1.Tenure

No provisions were incorporated in the Capex estimate for potential future land acquisitions.

18.3.2.Exploration cost

The mine has no current plans to do any further surface exploration. There were allowances for underground drilling included in the Opex estimate, that is normally completed for orientation and gas detection purposes. Significant cut sampling will be conducted as part of the Opex estimate once the on-reef development activities progress, however, this was not considered as exploration related costs.

18.3.3.Direct project cost

The direct project development cost was estimated at ZAR10 486 million (including project reserves, contingency, savings and management reserve) as set out in Table 18-1. ZAR5 583 million (53%) was spent by 31 May 2021.

Table 18-1: Direct project LOM Capex items

Description	ZAR Million								
	Spend to 31 May 2021	June to Dec 2021	2021	2022	2023	2024	2025	2026 to 2054	Total LOM
Common surface infrastructure	132	13	3	0	-2*	0	0	0	**146**
Shaft surface complex infrastructure	326	126	169	146	36	0	0	0	**803**
Production shaft sinking and development	1 158	31	38	64	43	0	0	0	**1 335**
Service shaft sinking and development	1 035	31	12	23	133	67	0	0	**1 301**
Capital footprint development	976	197	354	220	-5*	-84*	0	0	**1 659**
Concentrator plant	602	547	-31*	0	590	1 123	77	102	**3 011**
External bulk power and water	309	72	22	23	58	32	0	0	**517**
Community projects	156	21	17	18	6	0	0	0	**218**
Indirect costs	889	47	35	28	18	4	0	0	**1 020**
Project contingency	0	0	151	0	65	65	65	130	**477**
Total	**5 583**	**1 086**	**771**	**521**	**942**	**1 208**	**142**	**232**	**10 486**

Note: *Reallocation of Capex

The remaining, direct project Capex was estimated at ZAR4 903 million. The major, outstanding Capex to complete the project are:

- Concentrator plant: ZAR2 408 million
- Combined shafts and associated surface infrastructure: ZAR935 million
- Capital footprint: ZAR683 million
- Contingency: ZAR477 million, which is 4.8% of the total spend, or 10.8% of the remaining expenditure.

18.4. Acquisition of other assets

18.4.1. Employee housing scheme

The Capex estimate included ZAR453 million for the provision of an employee housing scheme, ZAR205 million (45%) was spent to 31 May 2021, with a further ZAR249 million expected to be incurred. The development is expected to be completed by 2023.

18.4.2. Other assets

Expenditure of ZAR355 million was included on various non-mining assets such as land, buildings, IT infrastructure and equipment. ZAR176 million was spent to 31 May 2021, with a further ZAR180 million expected to be incurred.

18.5. Stay in business capital

The Capex estimate captured items for production and development capital. SIB Capex was scheduled throughout the LOM at ZAR5 938 million (2021 terms). The selected capital items and budgeted costs appear reasonably sufficient to ensure the sustainability of the operation. No SIB Capex was planned during the last three years of the operation due to the ramping down of production activities towards mine closure. The SIB Capex included the following provisions:

- Mechanised drill jumbos: ZAR1 019 million
- Explosives chargers: ZAR96 million
- LHDs: ZAR1 383 million
- Mining trucks: ZAR854 million
- Other mechanised mining equipment: ZAR1 167 million
- Conventional mining equipment: ZAR1 416 million.

18.6. Concluding remarks

The Capex estimate was developed in sufficient detail. Table 18-2 shows a summary of the consolidated Capex estimate for the initial eight years of the LOM.

Table 18-2: Consolidated Capex schedule FY2021 – FY2028 (real terms)

Item	Annual cost [ZAR million]							
	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028
Total direct project cost	1 086	771	521	942	1 208	142	167	65
Other Capex	79	72	107	159	6	4	1	0
SIB Capex	0	2	11	24	90	68	98	194
Total	**1 165**	**846**	**639**	**1 125**	**1 304**	**215**	**266**	**259**

With ZAR13 162 million spent up to 31 May 2021, the total remaining Capex (including exploration, acquisition of property, plant, equipment and acquisition of other investments) was estimated at ZAR11 355 million (2021 terms) scheduled over the LOM as shown in Figure 18-1.

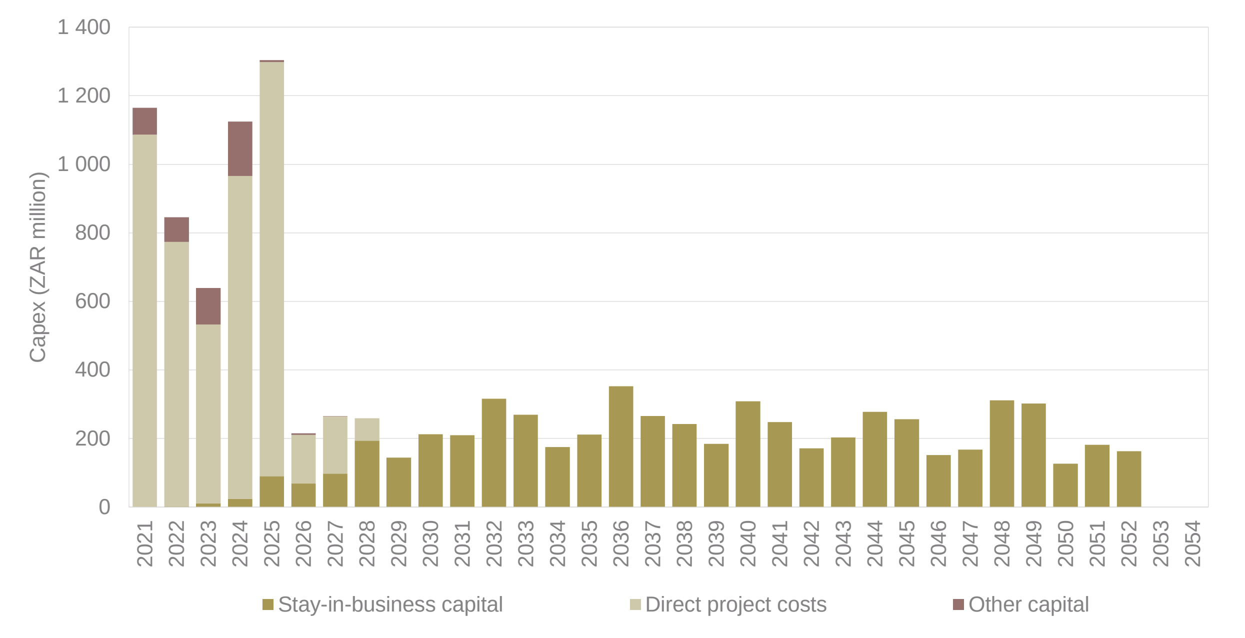

Figure 18-1: LOM Capex (2021 price base)

19. Operating expenditure

SR 4.3(vii); 5.6(iii); 5.6(vi); 5.8(i) - (iv) / SV T1.10

19.1. General

For valuation purposes, it was considered appropriate to use budget Opex for FY2021 as a basis for the estimation of future Opex, with certain exceptions, as noted in the following discussion of assumptions. The Opex estimate was based on actual expenditure to December 2020, budgeted expenditure FY2021 (escalated to the valuation date) and the planned production volumes as contained in the LOM plan. The Opex estimate includes both fixed and variable components, defined at a summary level for mining, processing and other indirect costs, detailed per sub-area that included:

- Mechanised waste development
- Conventional waste development
- Mechanised stoping: Merensky
- Mechanised stoping: UG2
- Conventional stoping: Merensky
- Conventional stoping: UG2
- Services (man and materials transport, rock breaking crushing and conveying, hoisting, road maintenance, equipment and infrastructure maintenance, pumping, ventilation and surface infrastructure)
- Management, technical and administration (assay samples, proto rescue team, surface cost, general office cost, exploration drilling and technical services).

19.2. Assumptions

19.2.1. Base date

The majority of the costs applied in the financial model were updated to December 2020 prices. Where data could not be updated, the cost was escalated by 2.48% (South African cost price index ("CPI"): December 2020 to May 2021) from December 2020 values. The base date for this estimate is 1 June 2021. All real values from the financial model were discounted using a rate deemed appropriate, based on current and forecast global financial considerations and estimated from first principles.

19.2.2. Base currency

All estimates are presented in ZAR unless otherwise stated or indicated.

19.2.3. Level of accuracy

The Opex estimate was developed at a feasibility level, +/-10% to 15% accuracy range, financial inputs and assumptions used were based on first principle budgeted cost estimates, recent cost forecasts and actual expenditure as provided by the mine and reviewed by Ukwazi. The estimate was based on approved mine construction and design principles.

19.2.4. Estimate methodology

The following technical documents formed the basis of the estimate:

- The financial model provided by the BPM and reviewed by Ukwazi
- The base financial model/s for the project based on the approved/ current mine construction and design principles indicating Capex and Opex as reviewed by the CV
- Discipline-specific design criteria and specifications
- Industry accepted engineering practice
- Review by discipline-specific consultants and engineers.

A regression analysis was performed on the mining Opex in the financial model to determine the fixed and variable mining unit costs per activity. Regression is a form of a predictive modelling technique that investigates the relationship between a dependent (target) and the independent variable/s (predictor). This technique is used when forecasting, time series modelling and finding the causal effect relationship between the variable based on appropriate drivers for costs e.g., advance, stoping panel area, volumes and ore tonnes mined.

19.2.5. Foreign exchange provision

No allowance was made for forwarding cover contracts in the estimated cost. Possible foreign exchange fluctuations must be absorbed based on exchange rates at the time of actual expenditure. Devaluation of the ZAR against the

USD was applied in the model based on the purchasing power parity theory, which assumes that over time currencies depreciate based on the differential in inflation rates.

19.2.6. Inclusions and exclusions

Mine closure and rehabilitation related costs were included in the estimate. Any future potential optimisation of existing logistics facilities and operations were excluded.

19.2.7. Battery limits

The battery limits were defined as the point of product ownership transfer and include all work in progress.

19.2.8. Basis of estimate

The financial model was constructed to estimate Opex costs, based on the following mining method and activities:

- The majority of the mining will be done using mechanised equipment, including single boom jumbos, 30t mining trucks, LHDs and explosive vehicles amongst the low bed cassettes
- All Merensky and UG2 stoping operations and, the portions of the development that are not mineable with mechanised equipment will be mined using conventional mining methods, including hand-held pneumatic drills and electric scraper winches. Stope ASD cleaning is facilitated by LHDs
- All broken rock will be trammed using diesel-powered LHDs and mining trucks to section ore passes from where it is conveyed to the main shaft complex.

The model accounted for all direct and indirect Opex associated with the delivery of ore and waste rock to surface, including main cost elements such as labour, utilities, stores, maintenance, engineering and equipment replacement.

19.3. Mining cost

19.3.1. Utilities

Table 19-1 shows the applicable rates applied for utilities.

Table 19-1: Utility rates

Description	Unit	Value
Diesel/ Fuel*	ZAR/litre	17.99
Power	ZAR/kWh	1.49
Water	ZAR/m^3	10.36

Note: *Fuel, at a cost of ZAR17.99/litre which included an anticipated fuel rebate and which also included a 15% provision for lubricants

19.3.2. Mining cost rates

Where applicable, input costs were linked to an appropriate production driver and determined from first principles. All costs directly and indirectly related to the mining activities were accounted for and represent approximately 67% of the total on mine Opex. All Opex mining activities were associated with owner mining operations. The mining costs for rock extraction and hauling were based on the first principles costing per mining method and process. Direct mining production areas were categorised as:

- Development drilling, blasting and support
- LHDs and trucks
- Stoping
- Conveyors, hoisting and logistics.

Non-mining related costs comprised approximately 33% of total Opex and included:

- Process plant
- Logistics
- Rehabilitation
- Management, technical and administration
  - Management and supervision salaries
  - Provision for labour turn-over
  - Environmental management.

The mining costs, shown in Table 19-2 to Table 19-10, consist of a fixed cost portion (excluding indirect cost e.g., supervision and management) which is incurred during that period if there is any activity, and a variable portion, which is the product of the unit cost and the quantity of the relevant physical driver. Some activities comprise several sub-activities that are driven by different physical quantities.

Table 19-2: Development drilling, blasting and support costs

Description	Fixed cost [ZAR million/annum]	Variable cost [ZAR/m]
Mechanised ends - drilling	1.6	4 715
Mechanised ends - blasting	4.7	1 936
Mechanised ends - support	3.8	3 738
Conventional ends (Box hole) - drilling, blasting and support	1.7	12 441

Table 19-3: Waste development cleaning and tramming cost

Description	Fixed cost [ZAR million/annum]	Variable cost [ZAR/m]
Cleaning and tramming	2.2	21 324

Table 19-4: On-reef development cleaning and tramming cost

Description	Fixed cost [ZAR million/annum]	Variable cost [ZAR/m]
Merensky	1.9	10 385
UG2	2.9	11 026

Table 19-5: On-reef development cost

Description	Fixed cost [ZAR million/annum]	Variable cost		
		Reef drive [ZAR/m]	Raise [ZAR/m]	Gully [ZAR/m]
Merensky - mechanised mining	5.2	11 139	10 986	9 116
Merensky - conventional mining	1.0	N/A	N/A	1 029
UG2 - mechanised mining	3.8	13 250	11 350	9 658
UG2 - conventional mining	0.8	N/A	N/A	945

Table 19-6: Stoping cost

Description	Fixed cost [ZAR million/annum]	Variable cost [ZAR/m^2]
Merensky	5.7	1 458
UG2	5.5	1 532

Table 19-7: Conveyors, hoisting and logistics cost

Description	Fixed cost [ZAR million/annum]	Variable cost [ZAR/t hoisted]
Ore crushing and conveying	9.8	12.30
Rock hoisting	12.5	19.90

Table 19-8: Service mining cost

Description	Fixed cost [ZAR million/ annum]	Variable cost					
		Total waste development [ZAR/t]	Merensky mechanised mining: on-reef development [ZAR/t]	Merensky stoping [ZAR/m²]	UG2 mechanised mining: on-reef development [ZAR/t]	UG2 stoping [ZAR/m²]
Man and materials transport	3.5	35.8	34.4	3.2	23.1	2.6
Maintenance labour - mobile mechanised equipment	N/A	139.5	20.4	N/A	17.1	N/A
Maintenance labour - other plant and equipment	29.5	N/A	12.2	N/A	12.0	N/A
Change house and lamp room	2.2	N/A	2.5	N/A	2.7	N/A
Surface infrastructure	4.6	22.7	0.6	N/A	0.6	N/A

Table 19-9: Piping, cabling and electrical cost

Description	Fixed cost [ZAR millions/ annum]	Variable cost				
		Waste development [ZAR/m]	Merensky on-reef development [ZAR/m]	Merensky stoping [ZAR/m²]	UG2 on-reef development [ZAR/m]	UG2 stoping [ZAR/m²]
Piping, cabling and electrical	N/A	10 285	7 325	17.10	1 991	16.00

Table 19-10: Pumping, ventilation and refrigeration cost

Description	Fixed cost [ZAR million/annum]	Fixed cost ramp-up [%]							
		2021	2022	2023	2024	2025	2026	2027	2028
Pumping, ventilation and compressors	252.6	59	90	91	92	93	96	100	100
Refrigeration	74.9	10	30	35	41	43	77	100	100

19.3.3. Mining cost summary

The total mining Opex represents on average 67% of the total on-mine Opex as summarised in Table 19-11 and the resultant unit cost summary is shown in Table 19-12.

Table 19-11: Total mining Opex summary (real terms)

Description	Annual cost [ZAR million]							
	2021	2022	2023	2024	2025	2026	2027	2028
Development drilling and blasting	10.5	29.2	18.1	23.5	22.1	30.7	31.3	23.1
LHDs and trucks	28.5	128.3	137.4	167.3	169.9	301.5	430.9	415.3
Stoping and on-reef development	40.8	200.1	269.6	324.8	319.8	583.2	863.7	871.5
Conveyors, hoisting and logistics	27.5	47.6	53.4	58.7	59.2	89.7	121.5	120.4
Services	223.8	423.6	433.5	452.5	467.3	606.8	702.6	636.6
Total mining cost	**331.2**	**828.8**	**912.1**	**1 026.9**	**1 038.3**	**1 611.8**	**2 149.9**	**2 067.0**

Notes: *Mining cost excludes depreciation and amortisation

Table 19-12: Total mining Opex unit cost summary (real terms)

Description	Unit cost [ZAR/ ROMt]							
	2021	2022	2023	2024	2025	2026	2027	2028
Development drilling and blasting	65	41	19	22	20	15	10	8
LHDs and trucks	178	179	145	154	154	150	144	138
Stoping and on-reef development	255	278	285	300	290	289	288	290
Conveyors, hoisting and logistics	172	66	56	54	54	44	40	40
Services	1 396	589	458	417	423	301	234	212
Total mining cost	**2 066**	**1 153**	**964**	**947**	**940**	**800**	**716**	**688**

Notes: *Mining cost excludes depreciation and amortisation

19.4. Processing cost

Based on the mine production ramp-up profile and the cost of constructing a full-scale TSF, it was proposed that the concentrator be constructed in two phases, Module 1 and Module 2. This will allow the mine to delay infrastructural capital during the initial ramp-up period. Module 1 was designed to process 1Mtpa of ore with Module 2 commissioned approximately five years later. Module 2 will be capable of processing an additional 2Mtpa of ore.

19.4.1. Basis of estimate

The basis of estimate of the processing cost included:

- Ore feed and conveying
- Milling
- Spares and operation services
- Utilities
- Tailings management
- Reagents
- Material handling
- Laboratories
- Capital replacement (mechanical cost)
- Labour.

19.4.2. Exclusions

The scope of the processing related Opex estimate was confined to the battery limits of the operations, with plant and infrastructure related costs allowed for as indicated.

19.4.3. Processing maintenance cost

The planned maintenance cost for the fixed processing plant was included in the plant maintenance steady-state cost estimate of ZAR21.9 million per annum (2021 terms). This comprised:

- Operational spares
- Mechanical equipment
- Workshop consumables
- Electrical and instrumentation tools and equipment
- Critical spares
- Lubricants
- Mechanical tools and equipment.

19.4.4. Processing cost summary

Key indirect processing costs drivers included:

- Fixed plant labour costs (e.g., superintendent, supervisors, operators)
- Other general operating costs
- Material handling
- Laboratories
- Capital replacement (mechanical cost).

The total processing Opex included all associated fixed cost, milling, tailings management activities and represents on average approximately 16.4% of the total on-mine Opex, as summarised in Table 19-13.

Table 19-13: Processing Opex (real terms)

Description	Annual cost [ZAR million]							
Total cost	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
Variable processing costs								
Ore feed and conveying	0	0.2	0.5	0.5	0.5	0.5	1.4	1.4
Milling	0	7.6	21.2	21.2	21.2	21.2	63.9	63.9
Spares and operational services	0	3.5	9.9	9.9	9.9	9.9	29.7	29.7
Utilities	0	25.8	72.1	72.1	72.1	72.1	217.2	217.2
Tailings management	0	2.4	6.6	6.6	6.6	6.6	20.0	20.0
Reagents	0	11.5	32.1	32.1	32.1	32.1	96.7	96.7
Fixed processing costs								
Material handling	0	2.7	6.5	6.5	6.5	6.5	6.5	6.5
Laboratories	0	2.7	6.4	6.4	6.4	6.4	6.4	6.4
Capital replacement (mechanical cost)	0	9.1	21.9	21.9	21.9	21.9	21.9	21.9
Labour	0	18.3	43.9	43.9	43.9	43.9	43.9	43.9
Total processing	**0**	**83.8**	**221.1**	**221.1**	**221.1**	**221.1**	**507.7**	**507.7**
Unit cost	**[ZAR/ROMt milled]**							
Variable processing	0	142.4	142.4	142.4	142.4	142.4	142.4	142.4
Fixed processing costs	0	91.5	78.7	78.7	78.7	78.7	26.1	26.1
Total processing	**0**	**233.9**	**221.1**	**221.1**	**221.1**	**221.1**	**168.5**	**168.5**

19.5. Logistics

Logistical costs, related to transporting concentrate to potential smelting facilities, are based on a geographical overview of the locations of the various primary and secondary PGM concentrate smelting and precious- and base metals refining operations within South Africa. It suggests that the mine is likely to target smelters surrounding Rustenburg as an offset-market for its concentrates to minimise logistical costs, although the national and provincial road network provides access to all smelting and refining operations.

19.5.1. Basis of estimate

The locations of the precious- and base-metals refineries will only become important for BPM if their product placement strategy changes to toll smelting and toll refining in the future. Should these toll treatment services not be available from the regional primary PGM producers, the closest fully integrated toll concentrate smelting facility is in Botswana at BCL Selebi Phikwe (currently under care and maintenance), while secondary matte refining is available at Heraeus refinery located in Gqeberha (Port Elizabeth) in the Eastern Cape, approximately 1 230km south of the BPM. A potential greenfields smelting and refining complex in the Tubatse Special Economic Zone in Limpopo is presently under evaluation.

It must be noted that, given the geographical clustering of the PGM mining operations, nearly complete reliance on road logistics from the mines to off-site smelters and the limited road infrastructure available within these clusters, the road networks are highly congested and not in a good condition.

19.5.2. Logistics cost

Road logistics costs for PGM concentrate filter cake, typically transported in 36t interlink side-tippers depend on the volumes, distance and contractual terms negotiated. Longer-distance transportation costs, e.g., supplying concentrates to Polokwane, Steelpoort, or Gqeberha (Port Elizabeth), can be expected to be similar to coal and manganese road logistics costs. The mine to market distribution cost was estimated at ZAR1.56/t/km. For the estimate, an assumed transport distance of 70km was used to transport the concentrate filter cake using road transport.

The annual average mine to market logistics cost is shown in Table 19-14.

Table 19-14: Average logistics cost (real terms)

Description	Unit	2021	2022	2023	2024	2025	2026	2027	2028
Distribution costs	(ZAR/annum)	0.0	1.6	4.0	4.2	4.3	4.5	12.6	12.8

19.6. Indirect and other production costs

SR 1.7(i); 5.6(ix)

All other Opex, excluding mining and processing related costs, was considered as fixed costs and forecasted from the LOM budget base. Key items included in the indirect and other production cost were:

- Supervision and management
- Management and supervision salaries
- Provision for labour turn-over
- Rehabilitation fund contributions
- Environmental management.

A provision for additional investment in the rehabilitation trust of ZAR271 million (ZAR8.5 million per annum) was incorporated in the Opex for valuation purposes, by the inclusion of a “sinking fund” investment obligation over the LOM to achieve a fully funded situation at the end of the LOM (refer to section 20.3.4). Table 19-15 shows the breakdown of the annual indirect and other production costs.

Table 19-15: Indirect Opex (real terms)

Description	Annual cost [ZAR million]							
	2021	2022	2023	2024	2025	2026	2027	2028
Management and supervision salaries	334.6	356.0	365.1	384.8	386.5	426.2	466.2	466.2
Provision for labour turn-over	1.4	4.8	5.7	6.6	6.7	11.8	17.1	16.9
Environmental management	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Rehabilitation fund contributions	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
Total indirect cost	**348.6**	**373.4**	**383.4**	**404.0**	**405.8**	**450.6**	**495.9**	**495.7**

19.7. Labour

SR 5.2(ii); 5.2(viii); 5.3(iii); 5.6(ix)

The mine is owner-managed and staffed. The labour complements were reviewed to assess if the mine is sufficiently staffed to maintain H&S and to meet planned production targets. Labour contributed the largest component of the indirect Opex, with the total mine labour bill (including provision for staff turnover) estimated at ZAR1 096 million per annum at steady-state production levels.

19.7.1. Owner's team

The owner's team comprised the following key roles:

- Company executives
- General mine management
- Mining operations management
- Owner mining supervisors, surveyors and operators
- Plant management
- Logistics and laboratory management
- Engineering maintenance management
- Technical services management
- Mine site safety management
- HR management
- Mine finance.

The total owners' on-mine labour complement amounted to an average of 3 211 employees at steady-state production. Table 19-16 provides a summary of the direct mine labour.

Table 19-16: Owner on-mine labour structure

Description	Complement							
	2021	2022	2023	2024	2025	2026	2027	2028
Conventional reef development and production - Merensky	0	327	396	445	580	1 031	1 445	1 590
Conventional reef development and production – UG2	0	9	18	18	18	113	167	154
Conventional waste development	0	37	30	0	0	37	30	0
Management, technical and admin staff	305	305	305	305	305	305	305	305
Mechanised reef development - Merensky	90	173	173	144	208	289	330	281
Mechanised reef development - UG2	58	58	58	69	69	69	112	101
Mechanised waste development	43	84	71	78	71	78	78	71
Services staff	163	250	257	255	301	419	519	503
Total	**659**	**1 242**	**1 308**	**1 314**	**1 553**	**2 341**	**2 986**	**3 004**

19.8. Operating expenditure summary

The various Opex items were developed in sufficient detail and accuracy. Increases in total production cost were driven by the planned increase in production volumes to a sustainable 3Mtpa ROM from FY2027. Table 19-17 shows the breakdown of the annual Opex per category for the initial eight years of the LOM.

Table 19-17: Opex summary (real terms)

Description	Annual cost [ZAR million]							
	2021	2022	2023	2024	2025	2026	2027	2028
Mining	331.2	828.8	912.1	1 026.9	1 038.3	1 611.8	2 149.9	2 067.0
Processing	0.0	83.8	221.1	221.1	221.1	221.1	507.7	507.7
Logistics	0.0	1.6	4.0	4.2	4.3	4.5	12.6	12.8
Overheads	348.6	373.4	383.4	404.0	405.8	450.6	495.9	495.7
Total	**679.7**	**1 287.7**	**1 520.6**	**1 656.3**	**1 669.5**	**2 288.1**	**3 166.1**	**3 083.1**

Table 19-18 shows the breakdown of the annual Opex per category stated on a unit cost basis. The LOM average Opex is ZAR1 064/ROMt.

Table 19-18: Opex summary (real terms)

Description	Unit cost [ZAR/ROMt]								
	% LOM	2021	2022	2023	2024	2025	2026	2027	2028
Mining	67.2	2 066	1 153	964	947	940	800	716	688
Processing	16.4	0.0	117	234	204	200	110	169	169
Logistics	0.3	0.0	2	4	4	4	2	4	4
Overheads	16.1	2 174	520	405	373	368	224	165	165
Total	**100.0**	**4 240**	**1 791**	**1 607**	**1 528**	**1 512**	**1 135**	**1 055**	**1 027**

19.8.1. Mining operating expenditure benchmarks

All costs, rates and tariffs were benchmarked as far as practically possible against cost data from similar operations (mining method, location and deposit). Recent project estimates as shown in Table 19-19.

Table 19-19: Benchmark shaft head Opex

Description	Unit	Mechanised XLP	Bord and pillar	Conventional mining
Operation 1	ZAR/ hoisted tonne	1 108	N/A	N/A
Operation 2		N/A	1 254	N/A
Operation 3		N/A	N/A	1 463

Operation 1 was based on a mechanised XLP shaft head cost of ZAR1 108/ ROMt. This operation compares favourably to the BPM, which is a hybrid operation with both mechanised and conventional mining methods. For benchmark purposes, and in the valuators' opinion, the BPM average LOM Opex of ZAR1 064/ ROMt is comparative considering the differences in mining methods.

20. Financial valuation

SR 4.3(vii); 5.6(iii); 5.6(iv); 5.8(i) - (iv) / SV T1.17 / JSE 12.10(d) - (f); (h)(xii)

This section of the CPR presents the financial valuation of the BPM. It was prepared in accordance with the SAMVAL Code and Section 12 "Mineral Companies" of the JSE Limited Listings Requirements. In compliance with paragraph 12.10 (d) of the JSE Limited Listings Requirements the appropriate sections in SAMVAL Table 1, SAMREC Table 1 and the JSE Limited Listings Requirements are referenced as SV, SR and JSE 12.10 respectively at the beginning of each section.

20.1. Introduction and scope

SR 1.1(i) / SV T1.0 - T1.10; T1.13 / JSE 12.10(a), 12.10(c), 12.10(e)

Ukwazi was commissioned by Bakubung to prepare a CPR for the BPM mineral asset. The CPR presents an independent financial valuation of the Mineral Resources and Mineral Reserve of the BPM, based on the technical and financial contents of the CPR. The CV neither holds any interest in Wesizwe, the BPM and the Mineral Assets nor has any association with them. The CV will not receive any benefit should the valuation assignment and report result in a transaction.

This financial valuation was prepared in accordance with the SAMVAL Code without any variations, with a valuation date of 1 June 2021. The valuation is restricted to the Mineral Asset itself and does not provide a valuation of any corporate securities or liabilities, which may be held by Wesizwe or Bakubung. Items T1.5 to T1.10 of the SAMVAL checklist are described in detail in other sections of this CPR, listed in Table 20-1.

Table 20-1: CPR sections complying with SAMVAL Table 1 items T1.5 to T1.10

Checklist item in SAMVAL Table 1	Chapter in CPR complying with requirement
T1.5 Identity, tenure and infrastructure	2
T1.6 History	4
T1.7 Geological setting	5
T1.8 Exploration results and exploration targets	6
T1.9 Mineral Resources and Mineral Reserve	8 and 21
T1.10 Modifying factors and key assumptions	Section 20.3 and 20.4

20.2. Valuation approaches

SV T1.12

The SAMVAL Code suggests three broad approaches to mineral asset valuation, which are the income, market and cost approaches. The SAMVAL Code requires the application of two of these methods to estimate the value of the Mineral Asset.

The income approach can be applied if there is a sufficient body of technical/ economic studies and/ or historical operational information to forecast production, sales, Capex and Opex for the asset, allowing the determination of the present value of asset cash flows to ascertain the estimated asset value. This method is widely used for development properties, production properties and economically viable dormant properties.

The market approach uses price and information from historical transactions for comparable mineral assets on the market to determine a range of values per resource tonne and applies this, sometimes modified for its attributes, to the Mineral Resources of the asset under valuation to estimate its value. This method is widely used for exploration assets and is a suitable supporting approach for development and production properties valued under the income approach.

The cost approach provides an indication of value by using expenditure on the asset to date, assuming this represents the value to a buyer who would pay no more for an asset than the cost to obtain an asset of equal utility, whether by purchase or by construction (International Valuation Standards 2017). Applied to mineral assets, exploration and development expenditure is assumed to enhance the value of the assets and used as a basis for valuation. The value added by this expenditure can be enhanced, for example, if it results in a resource being declared. This method is widely applied to early and advanced stage exploration projects.

The BPM is a development project, with substantial development of its surface and mining infrastructure in progress. A BFS was completed in October 2009 and an updated optimisation feasibility study was completed in February 2014, providing the basis for the development that has taken place to date. The proposed mining schedule was updated by Ukwazi, resulting in a LOM plan that takes the project through to 2054. There is a high degree of confidence in the forecasts produced in the studies, making the income approach suitable. Some information on comparable platinum resource transactions is available, so the market approach was selected as the second method to be applied in the valuation of the BPM. Although the cost approach is not needed and was not applied in this valuation, information regarding the development expenditure on the project so far, is presented.

20.3. Income approach

SR 5.6(vii); 5.6(ix) / SV T1.10; T1.12; T1.14; T1.15

20.3.1. Discounted cash flow methodology

The detailed financial model developed to implement the DCF methodology uses forecasts of production based on the LOM plan and technical studies to drive revenue and Opex, supported by Capex (both establishment and sustaining) required to maintain those production forecasts. The model calculates further cash flow items such as taxation (corporate taxation and mineral royalties) and working capital requirements, resulting in the free cash flows which were discounted to the valuation date to provide the net present value ("NPV") of the Mineral Asset. The free cash flow included all operating and sustaining investment cash flows and excluded financing activities.

The model runs from the valuation date of 1 June 2021 to the end of the LOM in 2054 to allow for unwinding of working capital. The model is based on the LOM plan produced by Ukwazi and the detailed Capex and Opex budgets and supporting information produced by the BPM.

20.3.2. Inflation, exchange and discount rates

Since 2012, the United States ("US") Federal Reserve Bank ("FED") targeted an inflation rate of 2%. Analysis of US CPI data shows an average year-on-year increase of 2.1% for the years 2016 to 2019.

The impact of the COVID-19 pandemic and the result of stimulus packages reflect in the low value of 1.2% for 2020. Recently, there is evidence within the broad US economy that this has turned aggressively upwards, and while the FED has acknowledged this, they have stated clearly that they see it as only transitory as a 'bounce' off the low caused by the pandemic. The International Monetary Fund ("IMF") have adjusted forecasts upwards from 2.1% to 2.3% for 2021. Thereafter, in the CV's opinion and based upon the latest available central bank guidance, the expectation that US inflation could revert to the target of 2% in the short- to medium term is reasonable.

The South African Reserve Bank ("SARB") inflation target is to maintain headline CPI inflation in a range of 3% to 6%. Analysis of CPI data supplied by the SARB shows an average inflation rate of 5.1% for the years 2016 to 2019, with a low of 3.3% for 2021. The IMF forecasts have similarly adjusted upwards to an inflation rate of 4.3% for 2021. In the opinion of the CV, based upon the latest available central bank guidance and available commercial/ investment banking sectoral analysis, a rate of the mid-range of the SARB target of 4.5% average is expected beyond 2021. The historical and forecast inflation rates are shown in Figure 20-1.

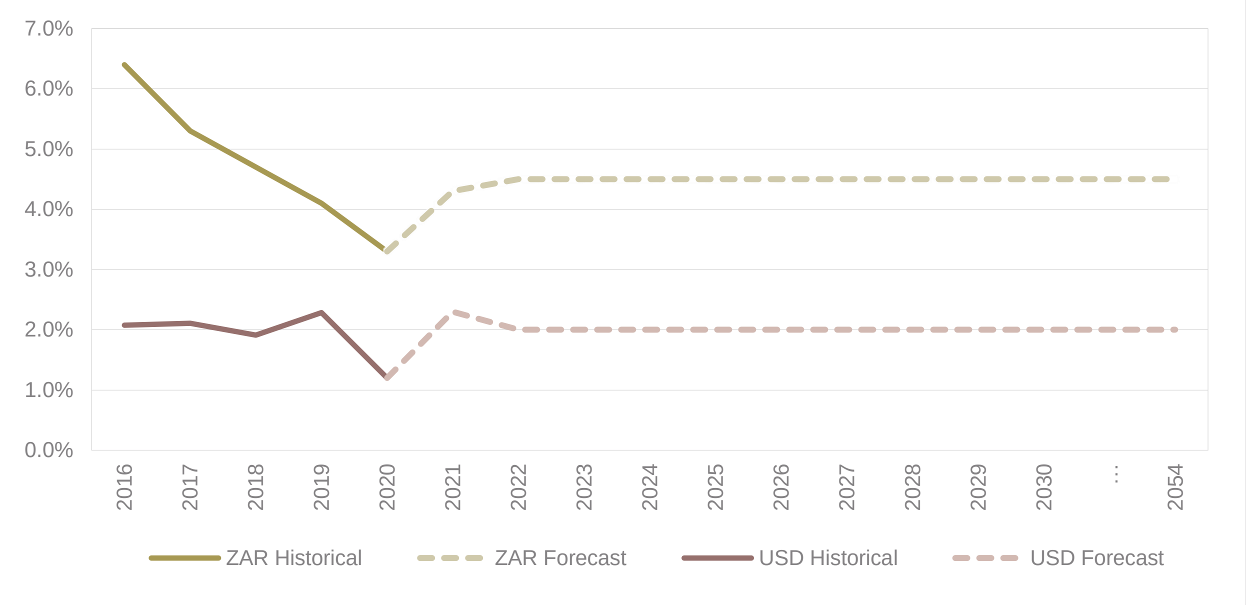

Figure 20-1: Inflation history and forecasts for the LOM (Source: South African Reserve Bank)

In the wake of the COVID-19 pandemic, the ZAR/USD exchange rate has shown high volatility, reaching a high of ZAR19.04/USD on 4 April 2020. By May 2021, this had declined to approximately ZAR14.06/USD with the ZAR weakening again in June 2021. We expect that the ZAR will settle around ZAR14.30/USD for 2021. Further moderate weakening of the ZAR is expected from 2022 to 2024, with a long-term rate of ZAR15.30/USD. Table 20-2 shows the expected ZAR/USD real exchange rate applied in the model. The nominal exchange rate thereafter, was derived from the inflation differential between South Africa and the USA.

Table 20-2: Real ZAR/USD exchange rate forecast

Exchange rate	2021	2022	2023	2024	2025	2026	2027 onwards
ZAR/USD	14.30	14.84	14.83	15.15	15.21	15.21	15.30

The historical and forecast exchange rates are shown in Figure 20-2.

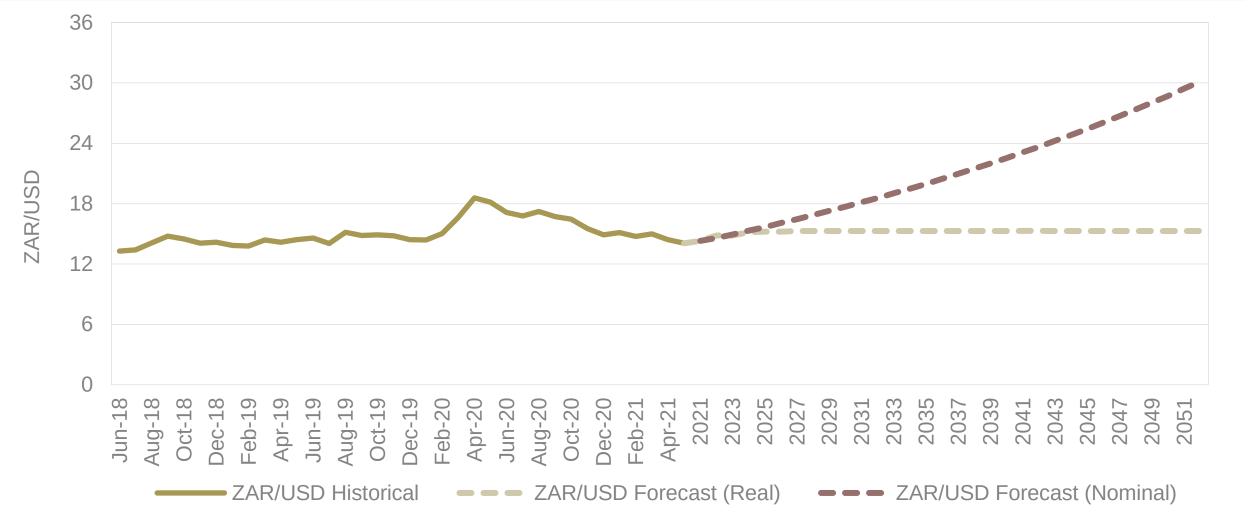

Figure 20-2: ZAR/USD exchange rate historical and forecast (note change of scale on time axis)

Two approaches were used to derive an appropriate project-specific, risk-adjusted discount rate to determine the NPV of the asset. In the first approach, the three key elements, namely, the interest rate (cost of debt), the project risk (based on the stage of development) and the country risk were assessed. In the second approach, on a physical basis, combining a risk-free mining factor (between 1% and 5%), the assessed geological risk (between 1% and 8%), the assessed operating risk (between 1% and 8%), and country risk. The results of the two approaches are subsequently compared.

To apply the first approach, the appropriate interest rate must be derived. The base interest rate is the three-month Johannesburg Interbank Average Rate ("JIBAR"). At the time of writing, this rate was 3.68%. This interest rate is far lower than the pre-COVID-19 crisis rates, which is presented in Figure 20-3. The SARB has so far cut the repo rate by 300 basis points in response to the crisis, causing a commensurate decline in JIBAR.

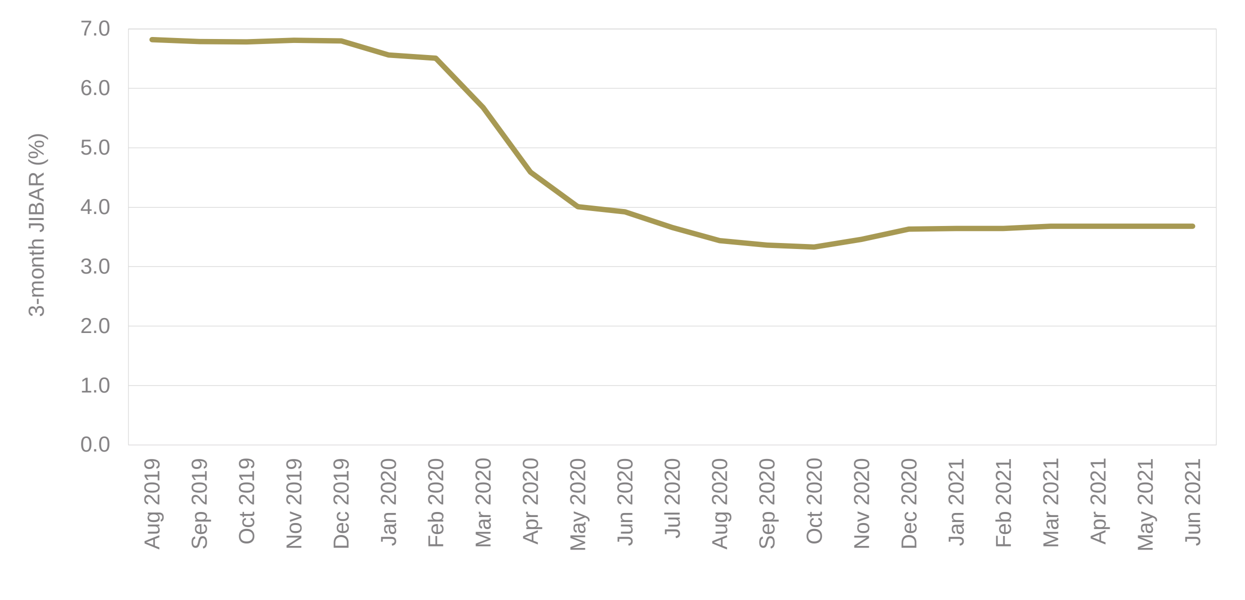

Figure 20-3: JIBAR three-month history (Source: South African Reserve Bank)

Using an indicative margin of 4.5% over JIBAR for resource projects (supplied by Wesizwe corporate finance), the real net after-tax cost of debt is 5.9%. Adding to this the assessed low project risk of 0.6% and country risk of 1.5% result a discount rate of 8%. This rate reflects pre-COVID market expectations and given that there was a substantial decrease in the cost of money globally (2% to 3%) as central banks cut rates in response to the COVID-19 pandemic.

Applying the second approach, assessing the stage of project development indicates a middle range risk free mining factor of 3.5%, added to a low geological risk of 1.5%, low operating risk of 1.5% and the country risk of 1.5%, also result in a discount rate of 8%. The assessment of the CV is that an 8% real base discount rate is reasonable.

20.3.3.Metal prices

The prices for Pt, Pd, Rh, Au, Cu and Ni applied in this CPR were obtained from the June 2021 Energy and Metals Consensus Forecasts, provided by Consensus Economics. The Energy and Metals Consensus Forecasts reflect the results of a monthly survey of over 40 global commodity forecasters.

Rh, Ru and Ir prices are not forecast by Consensus Economics and forecasts are not widely available. Forecasts for these metals were derived by averaging their prices for the last three years. The forecast prices for the precious metals are shown in Table 20-3 and Figure 20-4 and for the base metals in Table 20-4 and Figure 20-5.

Table 20-3: Precious metal price forecasts (USD/t oz) (Source: Consensus Economics, Johnson Matthey)

Metal	2021	2022	2023	2024	2025	2026	2027	2028
Pt	1 193	1 182	1 227	1 176	1 175	1 186	1 186	1 186
Pd	2 693	2 312	1 918	1 620	1 436	1 235	1 235	1 235
Rh	9 834	9 834	9 835	9 836	9 837	9 838	9 838	9 838
Au	1 785	1 694	1 619	1 595	1 593	1 608	1 608	1 608
Ru	305	305	305	305	305	305	305	305
Ir	2 235	2 235	2 235	2 235	2 235	2 235	2 235	2 235
Metal	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036 - 55**
Pt	1 186	1 186	1 186	1 186	1 186	1 186	1 186	1 186
Pd	1 235	1 235	1 235	1 235	1 235	1 235	1 235	1 235
Rh	9 838	9 838	9 838	9 838	9 838	9 838	9 838	9 838
Au	1 608	1 608	1 608	1 608	1 608	1 608	1 608	1 608
Ru	305	305	305	305	305	305	305	305
Ir	2 235	2 235	2 235	2 235	2 235	2 235	2 235	2 235

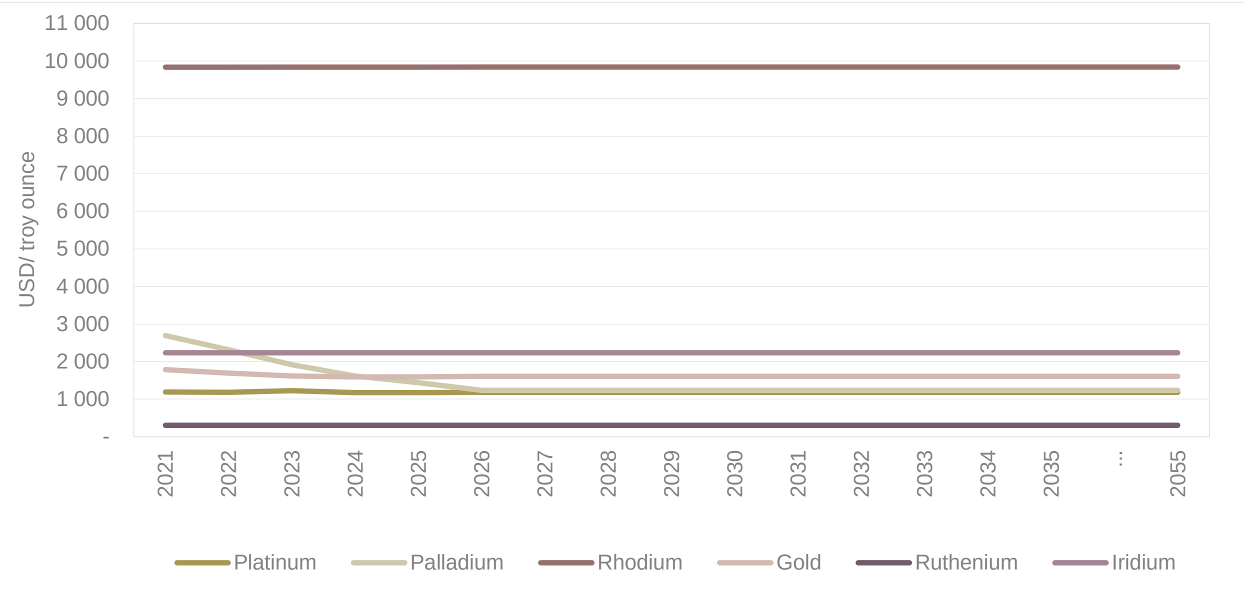

Figure 20-4: Precious metal price forecasts (Source: Consensus Economics, Johnson Matthey)

Table 20-4: Base metal price forecasts (USD/t) (Source: Consensus Economics)

Metal	2021	2021	2022	2023	2024	2025	2026	2027
Ni	16 853	15 966	15 530	15 605	15 937	17 036	17 036	17 036
Cu	9 362	8 297	7 968	7 572	7 639	7 819	7 819	7 819
Metal	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036 - 55**
Ni	17 036	17 036	17 036	17 036	17 036	17 036	17 036	17 036
Cu	7 819	7 819	7 819	7 819	7 819	7 819	7 819	7 819

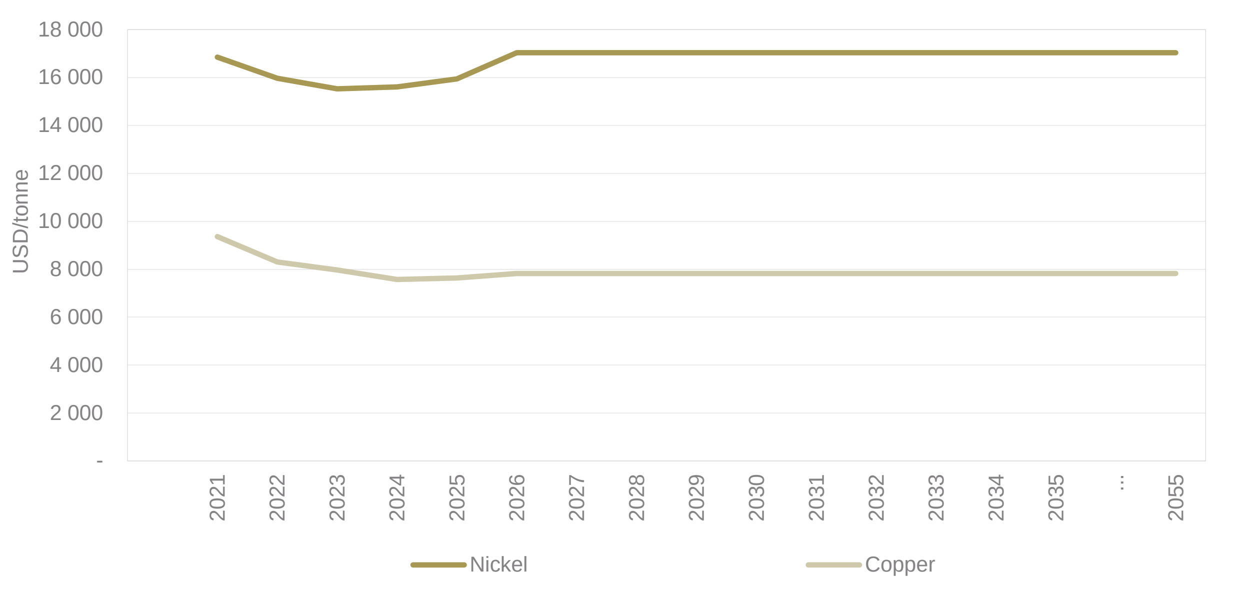

Figure 20-5: Base metal price forecasts (Source: Consensus Economics)

20.3.4.Production

Waste and ore mining tonnages, grades and metal content profiles, as discussed in Section 11, were used as basis for the financial model to drive Opex, replacement Capex, Capex and revenue. Two LOM production profiles are presented here. The first is the 'Mineral Reserve plus mineralised material from Inferred Mineral Resource' case, which is the mining schedule that considers all mineralised material, including Proved Mineral Reserve, Probable Mineral Reserve and mineralised material from Inferred Mineral Resources for inclusion as part of the LOM plan. The second is the 'Mineral Reserve only' case, representing the Proved Mineral Reserve and Probable Mineral Reserve and specifically excluding mineralised material from the Inferred Mineral Resource category as part of the LOM plan. The Mineral Reserve only case is not presented as a realistic LOM operational scenario but is used to demonstrate the value contributed by mineralised material from Inferred Mineral Resources. In compliance with Section 4.1 of the 2016 edition of the SAMVAL Code, it is the opinion of the CV that valuation of the Inferred Mineral Resources is reasonable and required to give a fair valuation of the mining asset.

20.3.5.Mining – Mineral Reserve plus mineralised material from Inferred Mineral Resource

This LOM profile was based on a production profile of 3Mtpa ROM during steady-state operations. In this schedule, mining initially ramps up to 1Mtpa ROM, followed by a steep ramp-up to 3Mtpa ROM by 2027. This rate is maintained until 2053 from where production ramps down in the final year, 2054. The total ore tonnes mined is shown by the cumulative area graph of the Merensky reef and the UG2 Chromitite layer in Figure 20-6.

The bulk of the production is generated from the Merensky reef initially, at approximately 2.7Mtpa ROM from 2027 until 2036. From this point, it declines to approximately 300kt ROM by 2045 before petering out by 2050. The LOM ore production for Merensky is 43.8Mt with an average 3PGE+Au grade (brown dashed line in Figure 20-6) of 3.76g/t.

During the initial and steady-state mining of the Merensky reef, the UG2 Chromitite layer is mined at an initial rate of approximately 150ktpa ROM, gradually increasing to 350kt ROM by 2036. As Merensky production output reduces from 2037, UG2 mining increases to maintain overall ore production at approximately 3Mtpa. The UG2 production reaches steady-state of 2.6Mtpa to 3Mtpa ROM by 2044, maintaining this level until 2053.

The LOM ore production for UG2 is 43.4Mt with an average grade (black dashed line in Figure 20-6) of 3.37g/t (3PGE+Au).

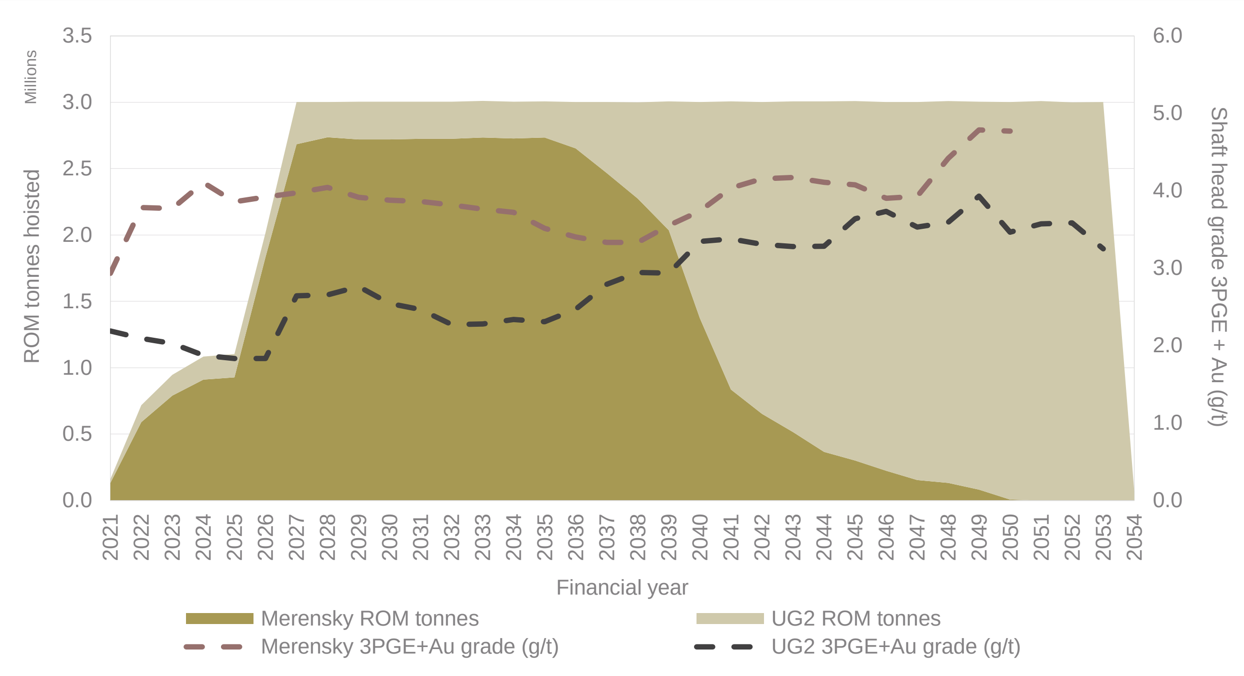

Figure 20-6: LOM schedule based on Mineral Reserve plus mineralised material from Inferred Mineral Resource

20.3.6.Mining – Mineral Reserve only

The Mineral Reserve only schedule is not a formally designed mining plan but was obtained by omitting the Inferred Mineral Resources from the LOM plan. The Inferred Mineral Resources mostly occur towards the latter half of the schedule for each reef type. The Mineral Reserve only case is presented in Figure 20-7. This schedule was not prepared for the purpose of implementation and the details are not discussed here.

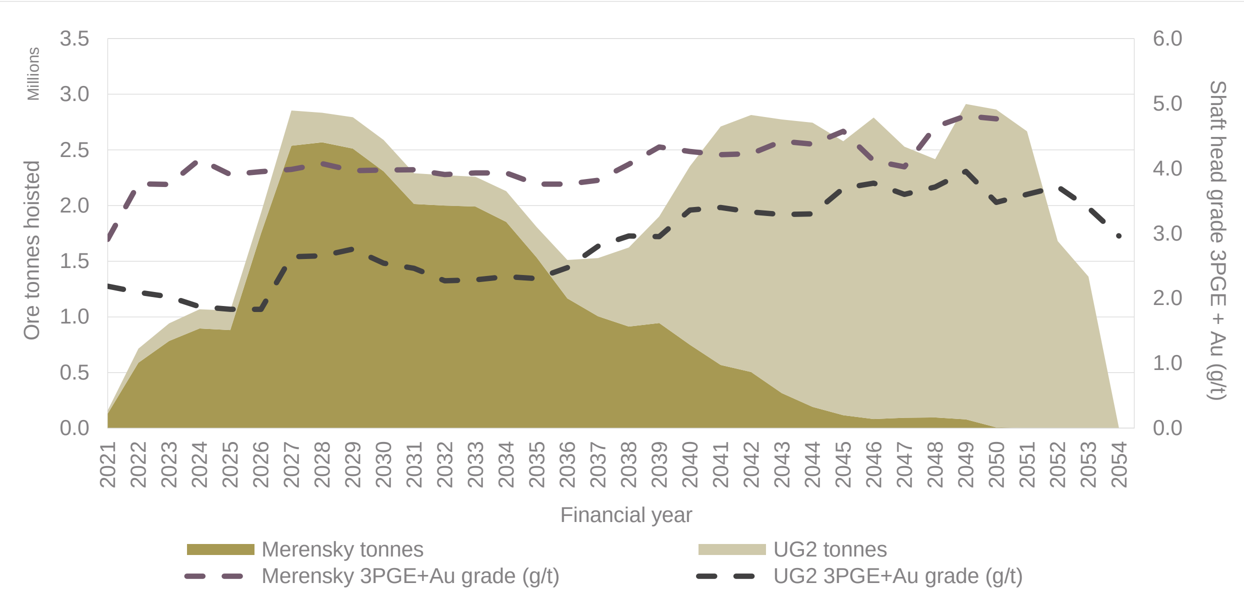

Figure 20-7: LOM ore production tonnages and grades for the Mineral Reserve only case

Table 20-5 presents a comparison of LOM schedules considering the Mineral Reserve portion only vs the Mineral Reserve plus mineralised material from Inferred Mineral Resources. The contribution of mineralised material from Inferred Mineral Resources to the LOM ore tonnages and metal content, is shown separately. The mineralised material from Inferred Mineral Resources contributes 20.2% of the ore tonnes mined and 18.2% of the 3PGE+Au metal content in the LOM plan, considering all available Mineral Resources.

Table 20-5: LOM comparison of Mineral Reserve plus Inferred Mineral Resource vs Mineral Reserve only

Item	Unit	Mineral Reserve plus Inferred mineralised material	Mineral Reserve only	Inferred mineralised material contribution	Inferred mineralised material contribution [%]
Ore tonnes					
Merensky	Mt	43.8	31.2	12.5	28.5
UG2	Mt	43.4	38.3	5.2	11.9
Total ore	**Mt**	**87.2**	**69.5**	**17.6**	**20.2**
Metal content					
Pt	kg	193 625	157 999	35 626	18.4
Pd	kg	87 083	71 466	15 618	17.9
Rh	kg	22 856	19 321	3 535	15.5
Au	kg	7 708	5 928	1 779	23.1
Total 3PGE+Au	**kg**	**311 272**	**254 713**	**56 558**	**18.2**
Ni	kt	91	73	18	19.8
Cu	kt	23	18	5	22.8

20.3.7.Metal production

The recovery of metal contained in the ROM to concentrate, is shown in Table 20-6. This is discussed in more detail in Chapters 12 and 13.

Table 20-6: Metal recovered to concentrate

Metal	Merensky reef metal recovery [%]	UG2 Chromitite Layer metal recovery[%]
Pt	92.5	82.0
Pd	93.0	80.0
Rh	91.0	81.0
Au	68.5	80.0
Ru	81.0	79.0
Ir	78.0	67.0
Ni	55.0	50.0
Cu	86.0	80.0

Over the LOM, a total of 9.3 million troy oz of precious metals is recovered. The steady-state average is 332 thousand troy oz (5PGE+Au), with a peak of 374 thousand troy oz in 2028 and a minimum of 294 thousand troy oz in 2053. Metal production is at its highest initially, gradually declining as the lower-grade UG2 Chromitite layer starts coming on stream. The precious metal recovery to concentrate, is shown in Figure 20-8.

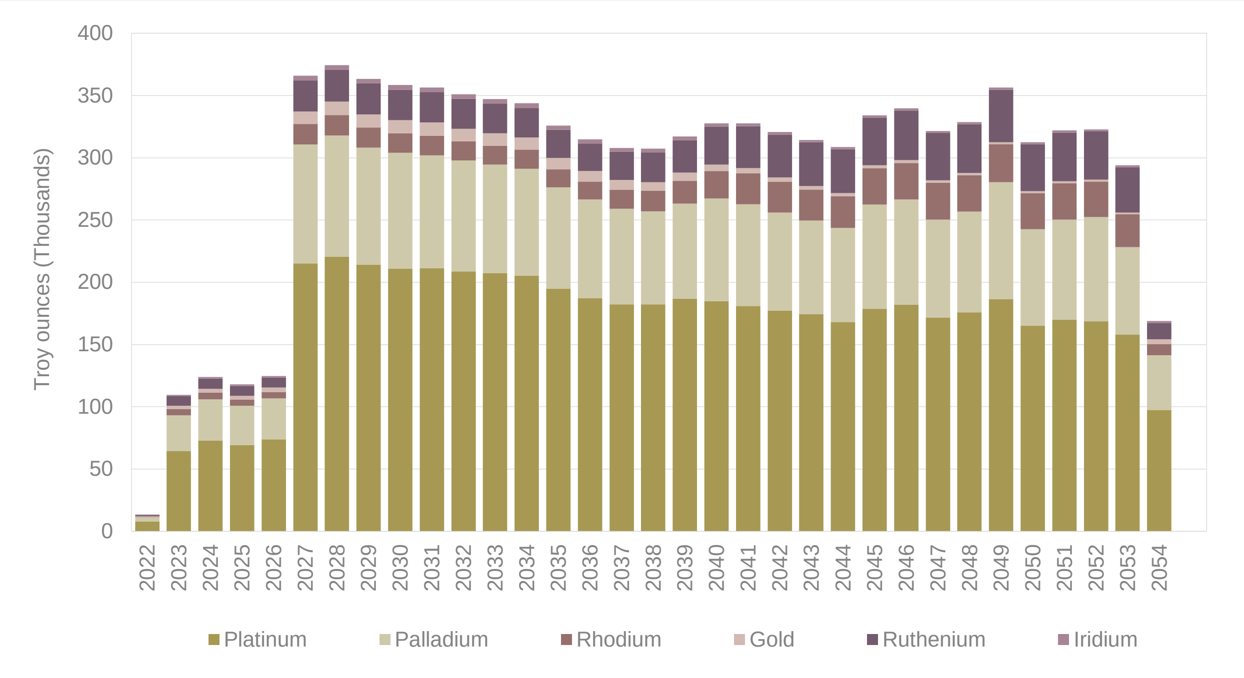

Figure 20-8: Precious metal recovery to concentrate - Mineral Reserve plus Inferred mineralised material

Production of Ni ranges between 1.2kt and 2.2kt per year with a total of 48.5kt over the LOM. During Merensky steady-state production, Cu production averages 812tpa, tapering off as Merensky reef production declines. Little Cu is recovered from the UG2 Chromitite layer. A total of 19.6kt of Cu is produced over the LOM. Figure 20-9 shows the base metal recovery to concentrate, based on the Mineral Reserve plus mineralised material from Inferred Mineral Resource case.

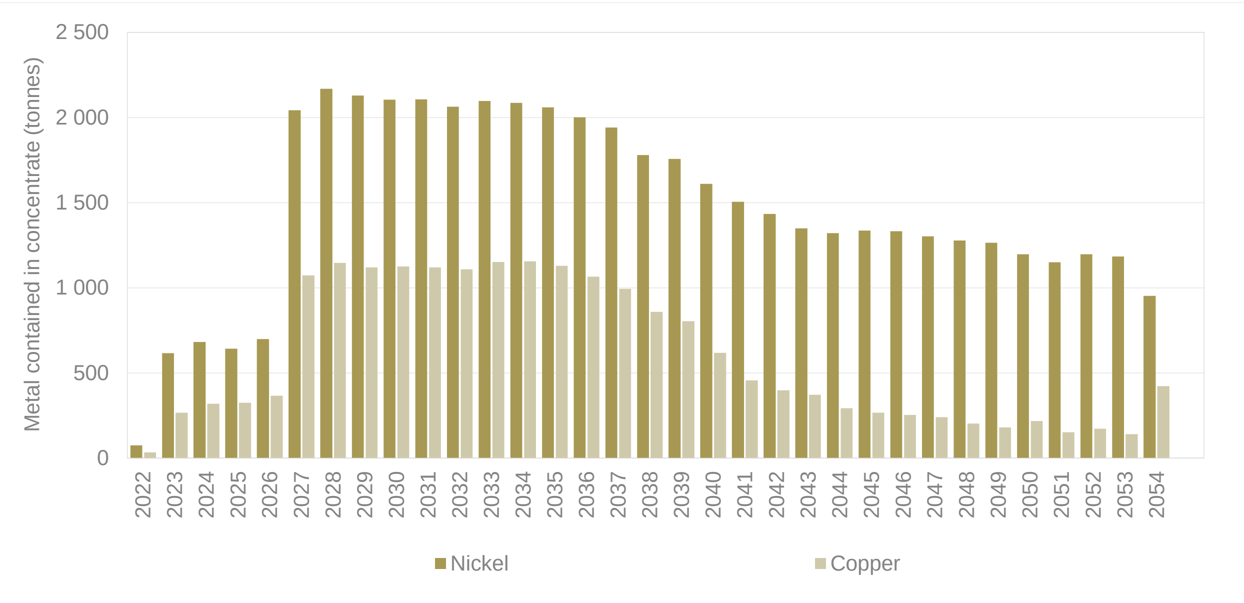

Figure 20-9: Base metal recovery to concentrate - Mineral Reserve plus Inferred mineralised material

Table 20-7 shows the total metal volumes recovered to concentrate for the Mineral Reserve case vs the case that includes Mineral Reserve plus mineralised material from Inferred Mineral Resource. Mineralised material from Inferred Mineral Resources contributes 18.5% of the precious metals recovered, 20.1% of the Cu and 22.9% of the Ni.

Table 20-7: LOM metal recovery for Mineral Reserve only vs Mineral Reserve plus Inferred mineralised material

Item	Unit	Mineral Reserve plus Inferred Mineral Resource	Mineral Reserve only	Inferred mineralised material contribution	Inferred mineralised material contribution [%]
Pt	koz	5 454	4 430	1 024	18.8
Pd	koz	2 422	1 977	446	18.4
Rh	koz	619	521	98	15.8
Au	koz	172	133	39	22.9
Total 3PGE+Au	**koz**	**8 667**	**7 061**	**1 607**	**18.5**
Ru	koz	879	733	143	16.3
Ir	koz	79	62	16	20.8
Total 5PGE+Au	**koz**	**9 622**	**7 856**	**1 766**	**18.4**
Ni	kt	48.5	38.7	9.7	20.1
Cu	kt	19.6	15.1	4.5	22.9

The mass pull of the concentrator plant was estimated at 3.5% for Merensky and 1.2% for UG2. The moisture content of the concentrate is 15.0%. For the Mineral Reserve plus mineralised material from Inferred Mineral Resources case, the LOM concentrate production is 2.06Mt (1.54Mt from Merensky and 0.52Mt from UG2). The annual concentrate production is shown in Figure 20-10. Note, that the concentrate production is higher in the initial steady-state due to the higher mass pull from Merensky. Concentrate grade is approximately 86g/t (3PGE+Au) during Merensky steady-state, increasing to the 150g/t to 200g/t (3PGE+Au) range for UG2. For the Mineral Reserve only case, the LOM concentrate production is 1.56Mt: 1.10Mt from Merensky and 0.46Mt from UG2.

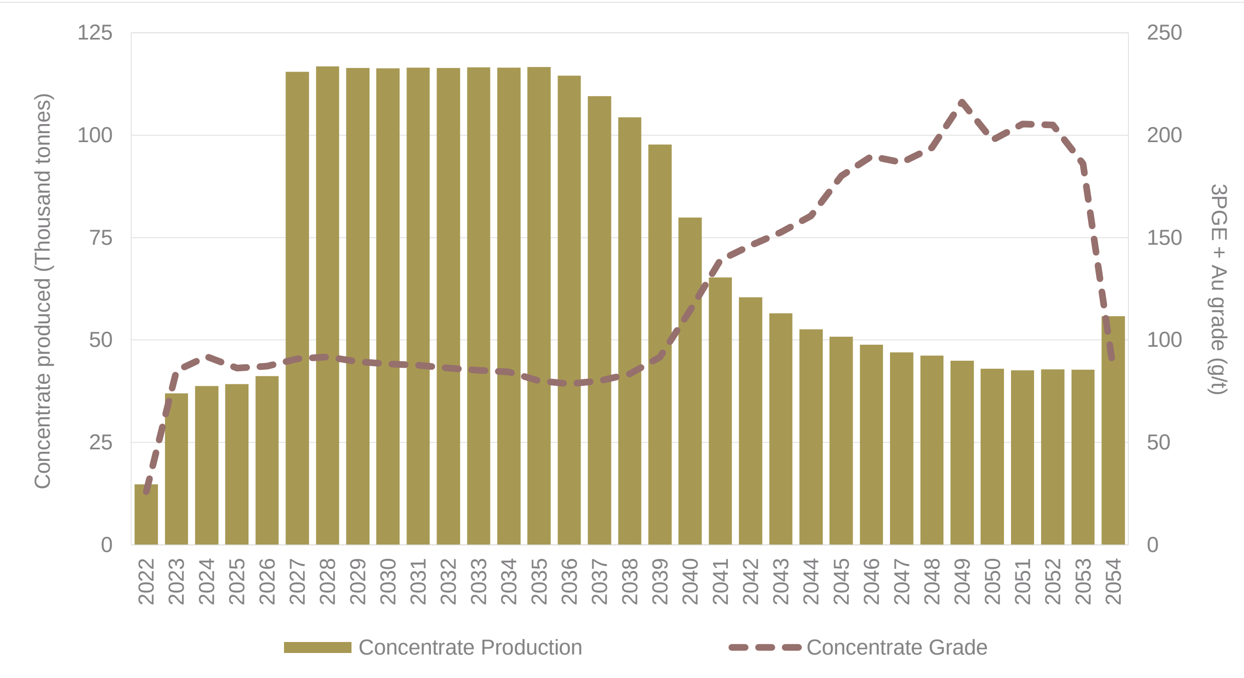

Figure 20-10: Concentrate production - Mineral Reserve vs Mineral Reserve plus Inferred mineralised material

20.3.8. Revenue

Table 20-8 shows the estimated smelter payability for the metals produced by the BPM. The payability is defined as the amount of the contained metal in the concentrate that is payable by the smelter to the BPM. The balance is retained by the smelter.

Table 20-8: Smelter payability

Smelter payability	% of Metal value
Pt	84
Pd	84
Rh	84
Au	84
Ru	50
Ir	55
Ni	75
Cu	70

Applying the payability to the metal content and the pricing assumptions in Section 20.3.3, provides the projected revenue, shown for the LOM in Table 20-9. For All Mineral Resources, total LOM revenue was ZAR218 billion (real 2021 ZAR). Pt is the greatest contributor at 38.0% of revenue, followed by Rh at 35.8% and Pd at 17.8%. Ni contributes 4.3%, with the remaining metals contributing 4.1%. Mineralised material from Inferred Mineral Resources contributes 17.8% of total revenue.

Table 20-9: Revenue (2021 ZAR) for Mineral Reserve vs Mineral Reserve plus Inferred mineralised material

Revenue [ZAR m]	Mineral Reserve plus Inferred mineralised material	Contribution [%]	Mineral Reserve only	Inferred mineralised material contribution	Inferred mineralised material contribution [%]
Pt	83 045	38.0	67 449	15 597	18.8
Pd	38 953	17.8	31 846	7 107	18.2
Rh	78 156	35.8	65 805	12 351	15.8
Au	3 558	1.6	2 742	815	22.9
Ru	2 045	0.9	1 711	334	16.3
Ir	1 479	0.7	1 172	307	20.8
Ni	9 433	4.3	7 530	1 903	20.2
Cu	1 634	0.7	1 253	376	23.0
Total	**218 303**	**100.0**	**179 513**	**38 791**	**17.8**

The revenue for each year is shown in Figure 20-11. Average steady-state revenue was estimated at ZAR7.6 billion, with a maximum of ZAR8.6 billion in 2049 and a minimum of ZAR6.7 billion in 2037.

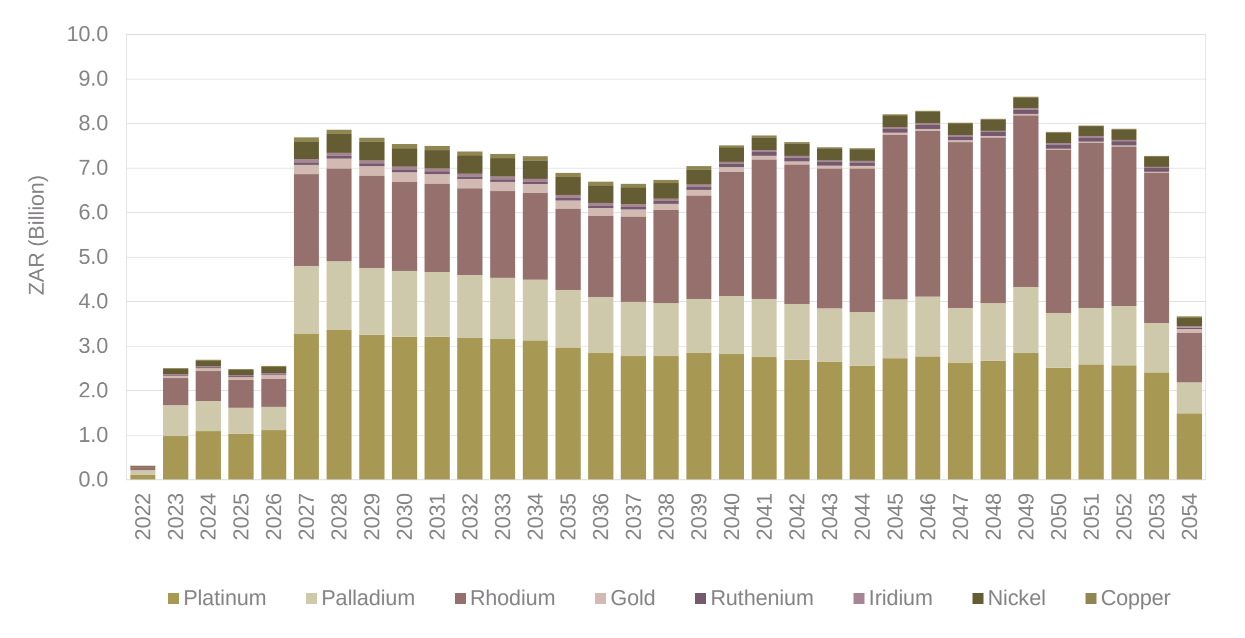

Figure 20-11: LOM revenue for Mineral Reserve plus Inferred mineralised material (Real: 2021 ZAR)

20.3.9.Operating costs

The Opex estimate and the basis of estimate thereof are discussed in detail in Chapter 19. Table 20-10 presents the LOM, percentage contribution of each activity to total Opex, steady-state average and total unit costs per ROM unit.

Table 20-10: Opex summary

Description	Total LOM [ZAR million]	Contribution [%]	LOM average unit cost [ZAR/ROMt]	Steady-state average unit cost [ZAR/ROMt]
Mining	61 751	66.5	708.05	675.04
Processing	15 002	16.2	172.02	165.60
Logistics	265	0.3	3.04	2.90
Rehabilitation fund	271	0.3	3.11	2.66
Overheads	15 550	16.7	178.30	158.96
Total	**92 839**	**100.0**	**1 064.51**	**1 005.15**

Opex costs for each year are shown in Figure 20-12.

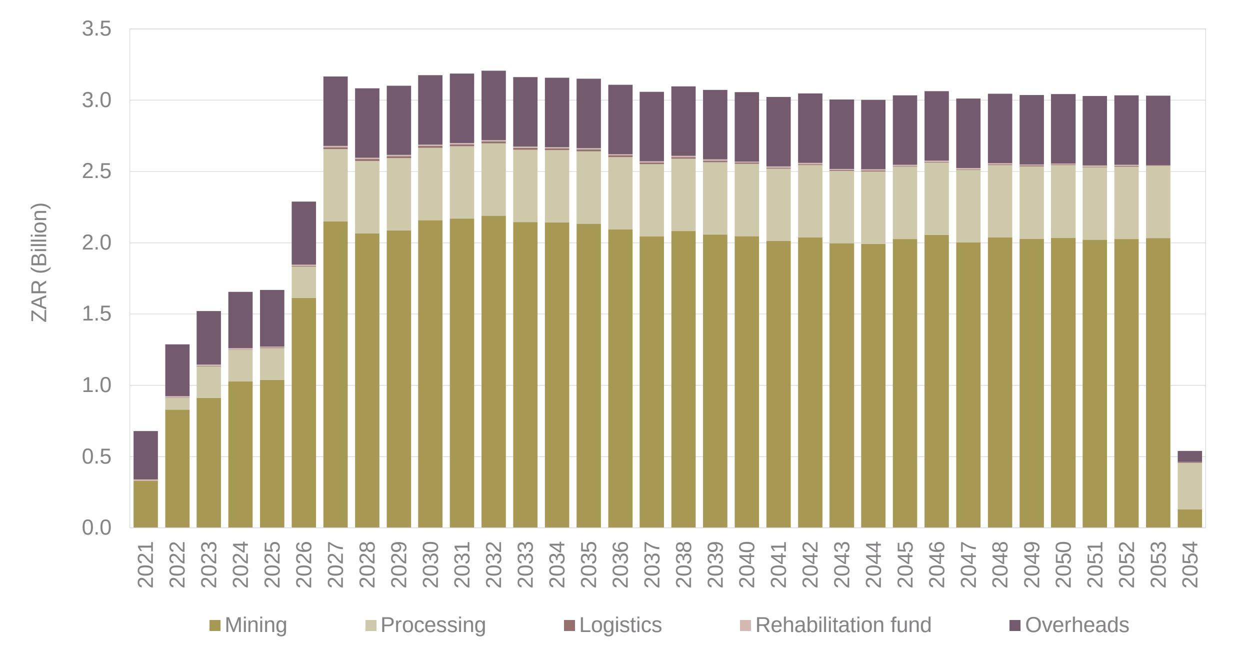

Figure 20-12: LOM Opex for Mineral Reserve plus Inferred mineralised material (Real, 2021 ZAR)

20.3.10. Capital expenditure

Capex is discussed in detail in Chapter 18. Capex up to 31 May 2021 was ZAR13.2 billion, with a further ZAR5.4 billion remaining in the Capex budget estimate. The SIB Capex over the LOM is ZAR5.9 billion, with an average of ZAR180 million in each year of operation. The SIB estimate varies significantly from ZAR10.9 million to ZAR352.0 million per year. The LOM Capex is shown in Figure 20-13 below.

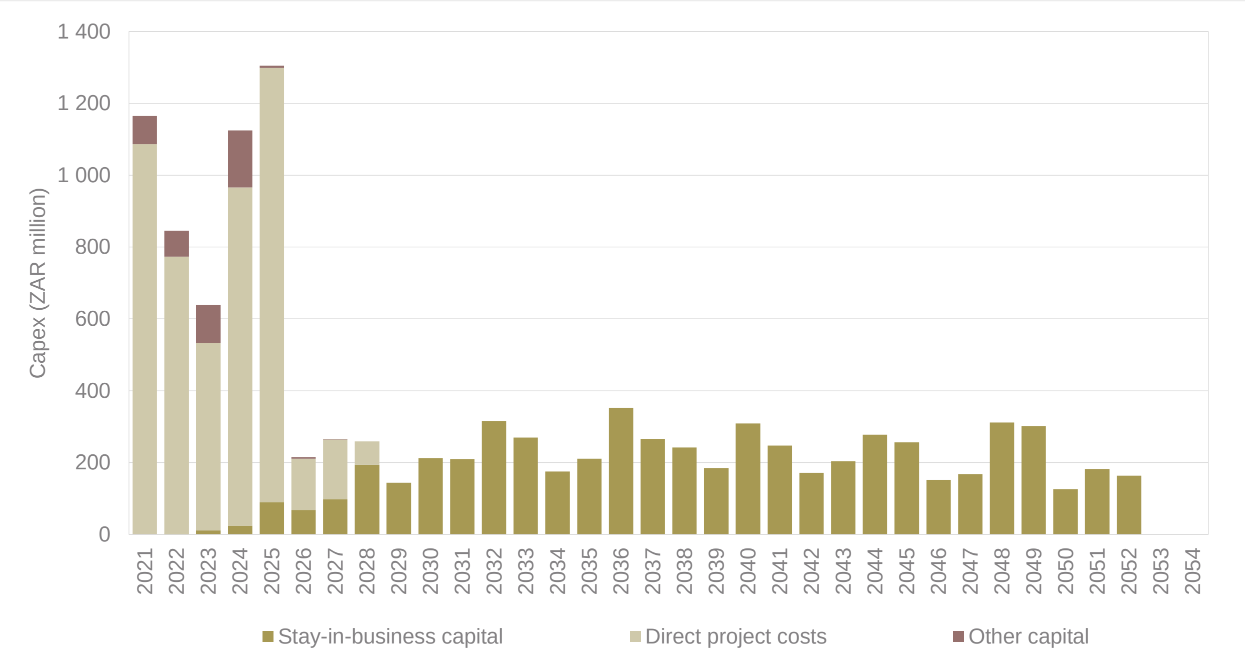

Figure 20-13: LOM Capex (Real, 2021 ZAR)

20.3.11. Rehabilitation and mine closure costs

Rehabilitation and closure costs are based on a closure estimate of ZAR271 million at the end of the LOM. Contributions to the fund begin in 2021 and continue until two years before the end of operations so that the provision is fully funded when rehabilitation operations start. This requires an annual contribution of ZAR8.5 million in 2021 terms.

20.3.12. Working capital

The cash flow effects of working capital are calculated as the net difference between forecast opening and closing balances of accounts receivable (debtors) and accounts payable (creditors). The working capital assumptions applied in the DCF are shown in Table 20-11.

Table 20-11: Working capital assumptions

Description	Unit	Value
Accounts receivable (days turnover)	days	30
Accounts payable (days production cost)	days	30

20.3.13. Taxation and royalties

The standard rate for corporate income tax in South Africa of 28% was applied. Allowable expenses and Capex are deducted from revenue to obtain taxable income. Unutilised expenses may be carried forward to the following period. Under South African tax law, mining companies may deduct mining-related Capex from taxable income in the year in which it is incurred and unredeemed Capex may be carried forward.

Due to the substantial Capex to date, future Capex and Opex cost incurred before production, the BPM is only expected to start paying tax in 2031. The average annual tax payable is ZAR1.04 billion from that point. Over the LOM, ZAR24.80 billion is paid in tax.

Mineral royalties are calculated based on the formula for unrefined mineral resources, given in Equation 20-2. The resulting percentage is applied to gross sales, which is defined as sales less free on board ("FOB") cost and cost, insurance and freight ("CIF") transportation costs. Allowable expenses and Capex are deducted from the gross sales to give the royalty EBIT. Over the LOM, ZAR12.3 billion is paid in royalties, an average royalty rate of 5.6% of revenue.

Equation 20-1: Unrefined mineral resources

Royalty percentage = 0.5% + [EBIT/ (gross sales in respect of unrefined mineral resources x 9)] x 100
(with a minimum of 0.5% and maximum of 7%)

20.3.14. Cash flow

The projected real cash flow is shown in Table 20-12 overleaf and graphically in Figure 20-14.

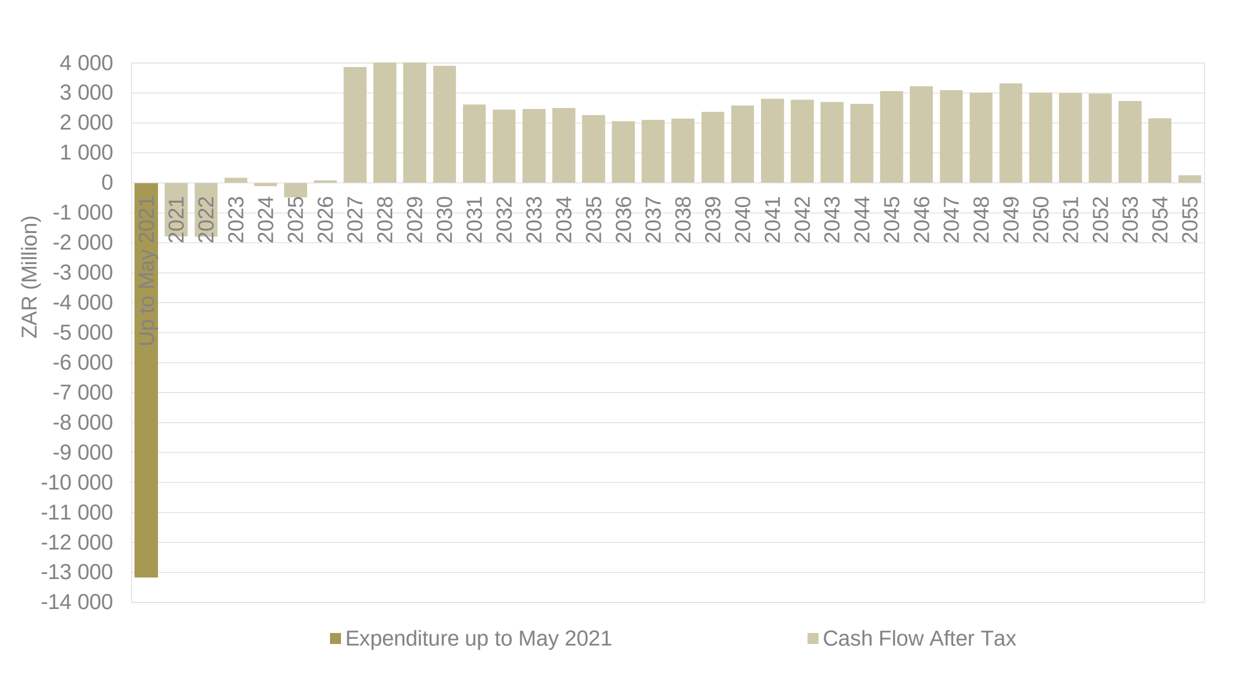

Figure 20-14: Cash flow - Mineral Reserve plus Inferred mineralised material

Table 20-12: Cash flow – Mineral Reserve plus Inferred mineralised material

Cash flow													
Year Revenue	**Unit**	**LOM**	***Up to May 2021***	**Jun – Dec 2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Pt	ZAR m	**83 045**	***0***	0	116	983	1 090	1 039	1 118	3 276	3 360	3 262	3 215
Pd	ZAR m	**38 953**	***0***	0	101	691	682	580	520	1 518	1 545	1 491	1 474
Rh	ZAR m	**78 156**	***0***	0	68	608	667	623	637	2 068	2 088	2 073	1 999
Au	ZAR m	**3 558**	***0***	0	7	56	65	63	73	206	218	215	217
Ru	ZAR m	**2 045**	***0***	0	2	17	19	18	19	58	59	58	57
Ir	ZAR m	**1 479**	***0***	0	3	21	24	23	25	71	74	71	70
Ni	ZAR m	**9 433**	***0***	0	13	106	121	117	136	399	424	416	411
Cu	ZAR m	**1 634**	***0***	0	3	22	26	26	31	90	96	94	94
Total revenue	ZAR m	**218 303**	***0***	**0**	**313**	**2 504**	**2 694**	**2 490**	**2 559**	**7 686**	**7 864**	**7 679**	**7 538**
Opex													
Mining	ZAR m	**61 751**	***0***	331	829	912	1 027	1 038	1 612	2 150	2 067	2 087	2 159
Processing	ZAR m	**15 002**	***0***	0	84	221	221	221	221	508	508	508	508
Logistics costs	ZAR m	**265**	***0***	0	2	4	4	4	5	13	13	13	13
Overheads	ZAR m	**15 821**	***0***	349	373	383	404	406	451	496	496	496	496
Total Opex costs	ZAR m	**92 839**	**0**	**680**	**1 288**	**1 521**	**1 656**	**1 670**	**2 288**	**3 166**	**3 083**	**3 103**	**3 176**
EBITDA	ZAR m	**125 465**	***0***	**-680**	**-974**	**984**	**1 038**	**820**	**271**	**4 520**	**4 781**	**4 576**	**4 362**
Depreciation	ZAR m	**-18 494**	***0***	-404	-435	-458	-486	-524	-548	-553	-558	-559	-559
Opex profit/ (loss)	ZAR m	**106 971**	**0**	**-1 084**	**-1 409**	**526**	**553**	**296**	**-277**	**3 967**	**4 223**	**4 017**	**3 803**
Capex													
Direct project costs	ZAR m	**10 486**	***5 583***	1 086	771	521	942	1 208	142	167	65	0	0
Other Capex	ZAR m	**8 008**	***7 579***	79	72	107	159	6	4	1	0	0	0
SIB capital	ZAR m	**5 938**	***0***	0	2	11	24	90	68	98	194	144	213
Total Capex	ZAR m	**24 432**	***13 162***	**1 165**	**846**	**639**	**1 125**	**1 304**	**215**	**266**	**259**	**144**	**213**
Tax and royalties													
Income tax	ZAR m	**-24 849**	***0***	0	0	0	0	0	0	0	0	0	0
Royalties	ZAR m	**-12 286**	***0***	0	-2	-13	-13	-12	-13	-38	-39	-38	-262
Total taxes and royalties	ZAR m	**-37 135**	***0***	**0**	**-2**	**-13**	**-13**	**-12**	**-13**	**-38**	**-39**	**-38**	**-262**
Cash flow													
EBITDA	ZAR m	**125 465**	**0**	**-680**	**-974**	**984**	**1 038**	**820**	**271**	**4 520**	**4 781**	**4 576**	**4 362**
Taxes and royalties	ZAR m	**-37 135**	**0**	**0**	**-2**	**-13**	**-13**	**-12**	**-13**	**-38**	**-39**	**-38**	**-262**
Capex	ZAR m	**-24 432**	***-13 162***	-1 165	-846	-639	-1 125	-1 304	-215	-266	-259	-144	-213
Net change in working capital	ZAR m	**0**	***0***	56	24	-161	-4	18	45	-349	-21	17	18
Project cash flow	ZAR m	**63 898**	***-13 162***	**-1 789**	**-1 797**	**171**	**-105**	**-479**	**88**	**3 867**	**4 461**	**4 411**	**3 906**

Cash flow													
Year	**Unit**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**
Revenue													
Pt	ZAR m	3 218	3 178	3 159	3 129	2 968	2 849	2 776	2 776	2 845	2 818	2 756	2 699
Pd	ZAR m	1 440	1 414	1 381	1 362	1 294	1 260	1 221	1 186	1 213	1 305	1 298	1 249
Rh	ZAR m	1 986	1 949	1 943	1 943	1 822	1 811	1 915	2 096	2 318	2 788	3 137	3 127
Au	ZAR m	219	211	203	202	190	178	160	142	136	110	85	74
Ru	ZAR m	57	56	56	55	53	52	53	56	61	71	79	80
Ir	ZAR m	70	70	69	69	65	62	58	57	56	49	43	40
Ni	ZAR m	412	403	410	408	403	391	379	348	343	315	294	280
Cu	ZAR m	94	93	96	97	95	89	83	72	67	52	38	33
Total revenue	ZAR m	**7 496**	**7 374**	**7 317**	**7 264**	**6 888**	**6 692**	**6 646**	**6 732**	**7 040**	**7 507**	**7 729**	**7 583**
Opex													
Mining	ZAR m	2 170	2 191	2 145	2 142	2 135	2 093	2 043	2 082	2 057	2 046	2 012	2 038
Processing	ZAR m	508	508	508	508	508	508	508	508	508	508	508	508
Logistics costs	ZAR m	13	13	13	13	13	13	12	11	11	9	7	7
Overheads	ZAR m	496	496	496	496	496	496	496	496	496	496	496	496
Total Opex costs	ZAR m	**3 187**	**3 207**	**3 162**	**3 158**	**3 151**	**3 109**	**3 059**	**3 097**	**3 072**	**3 058**	**3 023**	**3 048**
EBITDA	ZAR m	**4 309**	**4 167**	**4 155**	**4 106**	**3 737**	**3 583**	**3 587**	**3 635**	**3 968**	**4 449**	**4 706**	**4 535**
Depreciation	ZAR m	-559	-559	-559	-559	-559	-559	-559	-559	-559	-559	-559	-559
Opex profit/ (loss)	ZAR m	**3 750**	**3 608**	**3 597**	**3 547**	**3 178**	**3 024**	**3 028**	**3 076**	**3 409**	**3 890**	**4 148**	**3 976**
Capex													
Direct project costs	ZAR m	0	0	0	0	0	0	0	0	0	0	0	0
Other Capex	ZAR m	0	0	0	0	0	0	0	0	0	0	0	0
SIB capital	ZAR m	210	316	270	175	211	352	266	242	185	308	248	171
Total Capex	ZAR m	**210**	**316**	**270**	**175**	**211**	**352**	**266**	**242**	**185**	**308**	**248**	**171**
Tax and royalties													
Income tax	ZAR m	-990	-948	-957	-968	-868	-795	-817	-835	-932	-1 020	-1 099	-1 075
Royalties	ZAR m	-493	-465	-468	-473	-426	-392	-402	-411	-456	-498	-534	-523
Total taxes and royalties	ZAR m	**-1 483**	**-1 413**	**-1 425**	**-1 441**	**-1 294**	**-1 187**	**-1 219**	**-1 246**	**-1 387**	**-1 518**	**-1 633**	**-1 598**
Cash flow													
EBITDA	ZAR m	**4 309**	**4 167**	**4 155**	**4 106**	**3 737**	**3 583**	**3 587**	**3 635**	**3 968**	**4 449**	**4 706**	**4 535**
Taxes and royalties	ZAR m	**-1 483**	**-1 413**	**-1 425**	**-1 441**	**-1 294**	**-1 187**	**-1 219**	**-1 246**	**-1 387**	**-1 518**	**-1 633**	**-1 598**
Capex	ZAR m	-210	-316	-270	-175	-211	-352	-266	-242	-185	-308	-248	-171
Net change in working capital	ZAR m	4	12	1	4	30	13	0	-4	-27	-40	-21	14
Project cash flow	ZAR m	**2 621**	**2 450**	**2 461**	**2 494**	**2 262**	**2 056**	**2 101**	**2 143**	**2 369**	**2 584**	**2 805**	**2 779**

Cash flow													
Year	Unit	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
Revenue													
Pt	ZAR m	2 654	2 562	2 724	2 772	2 616	2 677	2 840	2 515	2 590	2 568	2 410	1 486
Pd	ZAR m	1 195	1 196	1 326	1 341	1 249	1 284	1 493	1 230	1 276	1 332	1 110	697
Rh	ZAR m	3 141	3 235	3 693	3 717	3 714	3 720	3 843	3 660	3 700	3 579	3 369	1 120
Au	ZAR m	62	52	51	45	42	37	35	33	31	33	26	80
Ru	ZAR m	82	82	89	93	89	91	98	88	91	90	85	30
Ir	ZAR m	38	35	36	35	32	33	34	29	30	30	28	30
Ni	ZAR m	264	258	261	260	255	250	247	234	225	234	231	186
Cu	ZAR m	31	25	22	21	20	17	15	18	13	14	12	35
Total revenue	ZAR m	**7 466**	**7 445**	**8 202**	**8 285**	**8 016**	**8 108**	**8 605**	**7 808**	**7 956**	**7 880**	**7 271**	**3 666**
Opex													
Mining	ZAR m	1 996	1 993	2 025	2 054	2 004	2 037	2 029	2 036	2 022	2 027	2 032	129
Processing	ZAR m	508	508	508	508	508	508	508	508	508	508	508	327
Logistics costs	ZAR m	6	6	6	5	5	5	5	5	5	5	5	6
Overheads	ZAR m	496	495	496	496	496	496	495	495	495	495	487	78
Total Opex costs	ZAR m	**3 006**	**3 002**	**3 034**	**3 063**	**3 012**	**3 045**	**3 037**	**3 044**	**3 029**	**3 035**	**3 031**	**540**
EBITDA	ZAR m	**4 460**	**4 442**	**5 168**	**5 221**	**5 004**	**5 063**	**5 568**	**4 764**	**4 926**	**4 845**	**4 240**	**3 125**
Depreciation	ZAR m	-559	-559	-559	-559	-559	-559	-559	-559	-559	-559	-559	-559
Opex profit/ (loss)	ZAR m	**3 902**	**3 884**	**4 609**	**4 663**	**4 445**	**4 504**	**5 009**	**4 205**	**4 368**	**4 287**	**3 682**	**2 567**
Capex													
Direct project costs	ZAR m	0	0	0	0	0	0	0	0	0	0	0	0
Other Capex	ZAR m	0	0	0	0	0	0	0	0	0	0	0	0
SIB capital	ZAR m	203	278	256	152	168	311	302	126	182	163	0	0
Total Capex	ZAR m	**203**	**278**	**256**	**152**	**168**	**311**	**302**	**126**	**182**	**163**	**0**	**0**
Tax and royalties													
Income tax	ZAR m	-1 049	-1 026	-1 215	-1 257	-1 197	-1 172	-1 306	-1 146	-1 173	-1 157	-1 045	-803
Royalties	ZAR m	-510	-500	-574	-580	-561	-568	-602	-547	-557	-552	-508	-257
Total taxes and royalties	ZAR m	**-1 560**	**-1 526**	**-1 789**	**-1 837**	**-1 758**	**-1 739**	**-1 908**	**-1 692**	**-1 729**	**-1 708**	**-1 553**	**-1 060**
Cash flow													
EBITDA	ZAR m	**4 460**	**4 442**	**5 168**	**5 221**	**5 004**	**5 063**	**5 568**	**4 764**	**4 926**	**4 845**	**4 240**	**3 125**
Taxes and royalties	ZAR m	**-1 560**	**-1 526**	**-1 789**	**-1 837**	**-1 758**	**-1 739**	**-1 908**	**-1 692**	**-1 729**	**-1 708**	**-1 553**	**-1 060**
Capex	ZAR m	-203	-278	-256	-152	-168	-311	-302	-126	-182	-163	0	0
Net change in working capital	ZAR m	7	1	-60	-4	18	-5	-41	67	-13	6	50	92
Project cash flow	ZAR m	**2 769**	**2 707**	**3 132**	**3 297**	**3 167**	**3 080**	**3 388**	**3 077**	**3 065**	**3 046**	**2 801**	**2 218**

20.3.15. Discounted cash flow results

The NPV of the projected cash flows for the BPM for the Mineral Reserve, plus Inferred mineralised material case is ZAR19 115 million. This cash flow excludes sunk costs to 31 May 2021. Although sunk costs were not accounted for in this valuation, these costs were funded by equity and debt and the providers of this funding have rights over the assets of the BPM. Note four of the Wesizwe Platinum Annual Financial Statements for 2019 (p26) state that all assets of the BPM are encumbered in favour of a South African Special Purpose Vehicle that holds the security for the benefit of the lender, the China Development Bank. The loan from the China Development Bank had a carrying amount of ZAR9.4 billion at 31 December 2020, while the shareholders of Wesizwe had contributed ZAR3.4 billion by that date. The value of the future cash flows of the BPM must be evaluated against these considerations. Table 20-13 shows the financial performance (NPV and internal rate of return ("IRR")) of the Mineral Reserve plus Inferred mineralised material versus the Mineral Reserve only case.

Table 20-13: Project NPV and IRR

Resource Case	Mineral Reserve plus Inferred mineralised material	Mineral Reserve only
Project NPV (ZAR million)	19 115	15 303
Project IRR (%)	31.0	29.7

The sensitivity of project NPV (excluding sunk Capex) to changes in revenue, Capex and Opex are shown in Table 20-14.

Table 20-14: NPV sensitivity analysis

Sensitivity	Unit	-20%	-10%	0%	10%	20%
Revenue	ZAR million	10 520	14 863	19 115	23 343	27 596
Capex		20 043	19 579	19 115	18 646	18 177
Opex		23 348	21 199	19 115	17 041	14 954

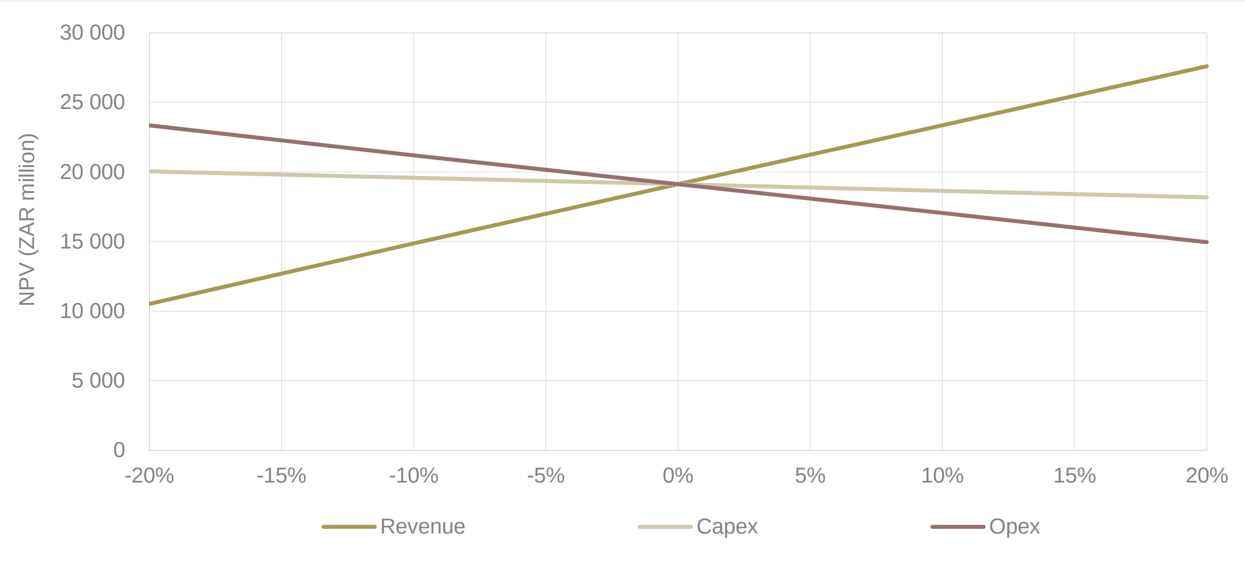

Figure 20-15: NPV sensitivity graph - post tax and royalties

Revenue is dependent upon both the USD price of the basket of metals produced and the ZAR/USD exchange rate. The NPV is equally sensitive to a given change in either the basket price or exchange rate, equivalent to the revenue sensitivity. The Capex and Opex estimated were entirely prepared in ZAR, so the effect of a change in the exchange rate on the cost base is unknown.

Sensitivity of the NPV to the discount rate is shown in Table 20-15. The upper and lower limits of the discount rate range are 20% and -20% relative changes from a discount rate of 10%, with a base rate selected finally of 8% (Real) for valuation purposes.

Table 20-15: NPV sensitivity to change in discount rate

Discount rate [%]	Project NPV [ZAR million]
6	21 633
8	19 115
10	13 193
12	10 606

The value range was derived by considering the average effect of 10% changes in the key value-driver variables as follows:

- 10% Downside: revenue -10%, Capex and Opex +10% and discount rate 8.8% (+80 basis points)
- 10% Upside: revenue +10%, Capex and Opex -10% and discount rate 7.2% (-80 basis points).

The resulting value range, shown in Table 20-16, is from ZAR16 870 million to ZAR21 439 million, with the DCF value for the BPM being ZAR19 115 million.

Table 20-16: Value range

Value range parameter	10% Downside [ZAR million]	Base case [ZAR million]	10% Upside [ZAR million]
Revenue	14 863	19 115	23 343
Opex	17 041	19 115	21 199
Capex	18 646	19 115	19 579
Discount rate	16 930	19 115	21 633
Average	**16 870**	**19 115**	**21 439**

The value range shown in Table 20-16 attributes full value to the Inferred Mineral Resources and must be revised as discussed in the following section.

20.3.16. Contribution of Inferred Mineral Resources

Although the BPM project is premised upon the Mineral Reserve plus Inferred mineralised material case, the SAMVAL Code requires the CV to define the effect that Mineral Resources that have not been converted to Mineral Reserves have on the valuation. Table 20-17 summarises the contribution of Inferred mineralised material to key project outcomes.

Table 20-17: Contribution of Inferred Mineral Resources to project metrics

Resource case	Unit	Mineral Reserve plus Inferred mineralised material	Mineral Reserve only	Inferred mineralised material contribution	Inferred mineralised material contribution [%]
ROM Ore	Mt	87.2	69.5	**17.6**	20.2
5PGE+Au recovered to concentrate	Troy oz [million]	9.6	7.8	**1.7**	18.4
Revenue	ZAR million	218 303	179 513	**38 791**	17.8
Project NPV	ZAR million	19 115	15 303	**3 812**	19.9
Project IRR	%	31.0	29.7	**1.3**	-

BPM intends to mine these Inferred mineralised material as they form an integral part of the mine plan due to the tabular nature of the Merensky and UG2 reefs. This result must be interpreted with some caution.

For Inferred Mineral Resources, the geological evidence is sufficient to imply but not verify geological and grade or quality continuity. An Inferred Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. While it would be reasonable to expect that the majority of Inferred Mineral Resources would upgrade to Indicated Mineral Resources with continued exploration, due to the uncertainty of Inferred Mineral Resources, it should not be assumed that such upgrading will always occur.

Inferred mineralised material contributes ZAR3 812 million to the NPV or 19.9% (17.8% of revenue). This was based on the hypothetical exclusion of Inferred mineralised material from the targeted 3Mtpa ROM production profile, therefore significantly devaluing the Mineral Reserve only case and overvaluing the contribution from Inferred mineralised material. The alternative approach of excluding the Inferred mineralised material and to reschedule the ROM production profile (and ramp up the UG2 Chromitite layer earlier) to maintain the 3Mtpa production profile, is equally hypothetical and practically flawed.

Most of the Capex and a large proportion of the Opex are fixed and would not reduce if the Inferred mineralised material were (hypothetically) not mined, while these costs are fully incurred in the Mineral Reserve only case.

Given that there would be no significant variance in the cost of mining a tonne of Inferred or Measured/ Indicated Mineral Resources, the "real" contribution of Inferred Mineral Resources to NPV is more accurately captured by the revenue contribution, suggesting that the contribution of Inferred Mineral Resources to NPV is 17.8%, or ZAR3 397 million and that of Proved and Probable Mineral Reserve ZAR15 718 million.

Due to the uncertainty associated with Inferred Mineral Resources, it is prudent to apply a discount to their contribution to the valuation. In the opinion of the CV, a discount of 25% is reasonable in this case. This reduces their value by ZAR849 million to ZAR2 547 million. Retaining the value of Proved and Probable Mineral Reserve of ZAR15 718 million gives a revised valuation of ZAR18 266 million with an IRR of 30.7%. The value range from Table 20-16 is revised accordingly in Table 20-18. The range is from ZAR16 121 million to ZAR20 486 million, with a preferred DCF value for the BPM of ZAR18 266 million.

Table 20-18: Value range after discounting contribution from Inferred Mineral Resources

Value range parameter	10% Downside [ZAR million]	Base case [ZAR million]	10% Upside [ZAR million]
Revenue	14 203	18 266	22 306
Opex	16 284	18 266	20 257
Capex	17 817	18 266	18 709
Discount rate	16 178	18 266	20 672
Average	**16 121**	**18 266**	**20 486**

20.4. Market approach

SV T1.10; T1.12; T1.14; T1.15

The market approach seeks to place a value on a Mineral Resource by comparing it with similar resources that were the subject of transactions in the market. Although there will be differences between the assets, a comparison can be made through deriving a value per unit of Mineral Resource/ Mineral Reserve by dividing the total project value by the total Mineral Resources/ Mineral Reserve of a resource project that was sold. This unit value can be applied to the Mineral Resources/ Mineral Reserve of the Mineral Asset under consideration to provide an estimate of its value. The comparison is improved by selecting projects of a similar nature and stage of development and by using several comparative transactions where possible.

20.4.1. Comparable transactions

It is problematic to find information on transactions in the public domain involving Western Limb PGM projects that are at the same development/ pre-production stage as the BPM. Appropriate information was obtained for Western Limb operating companies that were the subject of transactions. The transactions are listed in Table 20-19.

Table 20-19: Comparable transactions

Transaction	Date	Description
1	April 2019	Acquisition of Lonmin by Sibanye-Stillwater
2	September 2015	Acquisition of Amplats Rustenburg mines by Sibanye Gold

For the sake of comparison, Table 20-20 to Table 20-22 show the summarised Mineral Resource and Mineral Reserve statements for the BPM, Lonmin and Rustenburg. The latter two were obtained from the published Mineral Resource and Mineral Reserve statements for those companies at the date closest to the transaction.

Table 20-20: Summarised Mineral Resources and Mineral Reserves for the BPM as at 1 June 2021

BPM 2021	Tonnage [Mt]	3E+Au [g/t]	3E+Au [koz]	Tonnage [Mt]	3E+Au [g/t]	3E+Au [koz]	Tonnage [Mt]	3E+Au [g/t]	3E+Au [koz]
Mineral Resources	**Merensky**			**UG2**			**Total**		
Measured	6.5	6.52	1 369	0.0	0	0	6.5	6.52	1 369
Indicated	21.9	5.28	3 722	34.8	4.66	5 213	56.8	4.90	8 935
Sub total	**28.5**	**5.56**	**5 091**	**34.8**	**4.66**	**5 213**	**63.3**	**5.07**	**10 304**
Inferred	14.1	4.36	1 975	10.1	4.63	1 509	24.2	4.47	3 484
Total	**42.6**	**5.17**	**7 066**	**45.0**	**4.65**	**6 722**	**87.5**	**4.90**	**13 788**
Mineral Reserve	**Merensky**			**UG2**			**Total**		
Proved	7.7	4.51	1 110	0	0	0	7.7	4.51	1 110
Probable	23.5	3.81	2 880	38.3	3.40	4 189	61.8	3.56	7 069
Total	**31.2**	**3.98**	**3 990**	**38.3**	**3.40**	**4 189**	**69.5**	**3.66**	**8 179**

Table 20-21: Summarised Mineral Resources and Mineral Reserves for Lonmin as at 31 December 2018

Lonmin 2018	Tonnage [Mt]	3E+Au grade [g/t]	3E+Au [koz]	Pt [koz]
Mineral Resources				
Marikana	700.6	4.75	106 900	64 500
Limpopo	128.8	4.07	16 800	8 400
Limpopo Baobab shaft	46.1	3.91	5 800	3 000
Akanani	233.1	3.9	29 200	12 000
Loskop JV	9.7	4.05	1 300	800
Sudbury PGM JV	0.4	5.86	70	40
Tailings Dams	20.9	1.1	700	400
Total Mineral Resource	**1139.5**	**4.39**	**160 800**	**89 200**
Mineral Reserve				
Marikana	232.5	4.08	30 500	18 500
Tailings Dams	19.5	1.1	700	400
Total Mineral Reserve	**252**	**3.85**	**31 200**	**18 900**

Table 20-22: Summarised Mineral Resources and Mineral Reserve for Rustenburg Mines as at 31 Dec 2014

Rustenburg Mines 2014	Tonnage [Mt]	3E+Au [g/t]	3E+Au [koz]	Tonnage [Mt]	3E+Au [g/t]	3E+Au [koz]	Tonnage [Mt]	3E+Au [g/t]	3E+Au [koz]
Resources	**Merensky**			**UG2**			**Total**		
Measured	52.9	5.98	10 200	262.4	4.79	40 400	315.3	4.99	50 600
Indicated	44.3	5.94	8 400	78.9	4.90	12 400	123.2	5.27	20 800
Total	**97.2**	**5.96**	**18 600**	**341.3**	**4.82**	**52 900**	**438.5**	**5.07**	**71 500**
Inferred	11.1	5.82	2 100	4.3	5.26	700	15.4	5.66	2 800
Total	**108.3**	**5.95**	**20 700**	**345.6**	**4.82**	**53 600**	**453.9**	**5.09**	**74 300**
Reserves	**Merensky**			**UG2**			**Total**		
Proved	13.3	5.58	2 400	80.8	3.07	8 000	94.1	3.42	10 400
Probable	0.6	5.56	100	7.2	3.29	800	7.8	3.46	900
Total	**13.9**	**5.57**	**2 500**	**88**	**3.09**	**8 700**	**101.9**	**3.43**	**11 200**

Table 20-23 shows the derivation of the implied value per contained 3PGE+Au troy ounce for both Mineral Resources and Mineral Reserves. For Transaction 1, the acquisition of 100% of Lonmin by Sibanye Stillwater in 2019, the value for 3PGE+Au contained in the Mineral Resource was ZAR26.44/oz and ZAR136.25/oz for the Mineral Reserve. For Transaction 2, the acquisition of 100% of Amplats Rustenburg Mines group by Sibanye Gold in 2015, the value for 3PGE+Au contained in the Mineral Resource was ZAR74.03/oz and ZAR491.12/oz for the Mineral Reserve.

Table 20-23: Transaction information and unit value of 4E contained in Mineral Resource/ Mineral Reserve

Number	Stake [%]	Price	Exchange Rate at date [ZAR:GBP]	Asset value at date [ZAR m]	Asset value [2021 ZAR m]	Resource [Mt]	3E+Au contained in Resource [Mt oz]	Unit value of 3E+Au contained in Resource [ZAR/ oz]	Mineral Reserve [Mt]	3E+Au contained in Reserve [M oz]	Unit value of 3E+Au contained in Mineral Reserve [ZAR/ oz]
1	100	GBP226 million	18.46	4 173	4 491	1 140	160.8	**27.93**	252.0	31.2	**143.94**
2	100	ZAR4.5 billion	N/A	4 500	5 814	454	74.3	**78.25**	101.9	11.2	**519.12**

Applying these unit values to the Mineral Resources and Mineral Reserve of the BPM provides a range of values shown in Table 20-24.

Table 20-24: Range of values for the BPM by the comparable transaction method

Valuation basis	Units	Transaction 1 values	Transaction 2 values
BPM Mineral Resource value	ZAR million	385	1 079
BPM Mineral Reserve value		1 177	4 246
Average		**781**	**2 662**

Lonmin did not perform well relative to its PGM peer group and it is the opinion of the CV that this is reflected in the lower 3PGE+Au unit valuation of the company, when compared to the Rustenburg Mines. The Rustenburg Mines are a better representation of the PGM peer group. BPM has converted 59% (3PGM + Au content basis) of its Mineral Resources to Mineral Reserves, compared to 15% for Rustenburg. There is a greater confidence in the economic value of the Mineral Resources of the BPM and the value should be higher than that suggested by the Mineral Resource multiplier. In the opinion of the CV, the average of the Mineral Resource and Mineral Reserve valuations for transaction 2 would fairly represent BPM by this method, and a base value of ZAR2 662 million was selected. A variation of 20%, either way, provides the low to high-value range of ZAR2 130 million to ZAR3 195 million.

The valuation by the market approach of the BPM is compared to the market capitalisation of Wesizwe. At the close of trading on 22 July 2021, the share price was ZAR0.47 per share and with 1 627 827 058 shares in issue, the market capitalisation was ZAR765 million (Source: Sharenet).

20.5. Comparison to previous valuation

SV T1.11

WorleyParsons completed a Mining Optimisation Study in February 2014. This study included a financial valuation with a base case value for the BPM of ZAR7.86 billion (Jan 2014 ZAR), with a real IRR of 16.7%. Table 20-25 provides a comparison of the two valuations. It was not stated if the valuation completed by WorleyParsons in 2014 was SAMVAL compliant. The mining schedule and other assumptions in the 2014 Optimisation Study were materially different and a direct comparison of the two valuations is of limited utility.

Table 20-25: Comparison of 2014 Optimisation study and CPR valuations

Item	Unit	2014 Optimisation study valuation	CPR valuation
Project NPV	ZAR billion	7.86 (January 2014 ZAR)	18.27 (June 2021 ZAR)
Project IRR (Real)	%	16.7	30.7
Platinum price	USD/troy oz	1 495	1 186 (long-term)
ZAR/USD exchange rate	ZAR/USD	10.08	15.30
Discount rate (Real)	%	9.77	8.00
Direct Capex	ZAR billion	10.7	11.4
Opex	ZAR/t hoisted	640	1 064
LOM ore tonnes	Mt	79.0	87.2
Grade (3PGE+Au)	g/t	4.24	3.57
Annual production	Mtpa	3.06	3.00 (steady state)

21. Mineral Reserve estimate

SV T1.10 / JSE 12.10(h)(ix)

21.1. Basis of estimate

SR 5.1(i); 5.2(iii); 6.1(i)

A detailed LOM plan was completed to declare the Mineral Reserve estimate for the underground operations, based on the geological model used as basis of the Mineral Resource estimate. Various technical aspects were considered in the mine design and schedule, including the geotechnical parameters, mining methodology, mining sequence, production rates, practical mining considerations and other techno-economic factors. The mining-related modifying factors applied included various factors that are considered appropriate and the level of detail of the technical work conducted was appropriate to declare a Mineral Reserve that is compliant with the SAMREC Code (2016).

The basis of estimate for the Mineral Reserve, including key assumptions, modifying factors, parameters and methods used are described in detail under Chapter 11 – Mining engineering of this CPR. The Mineral Resource estimate on which the Mineral Reserve estimate was based, is shown in Table 8-8 and Table 8-9 of this CPR.

21.2. Mineral Reserve estimate

SR 5.6(v); 6.1(ii); 6.2(i); 6.3(i); 6.3(ii); 6.3(iii); 6.3(v); 6.3(vi) / SV T1.9

The Mineral Resources reported are inclusive of the Mineral Reserve. The Mineral Reserve estimate was derived from the Measured and Indicated Mineral Resources contained within the LOM plan. No Inferred Mineral Resources were included. Proved Mineral Reserves were derived from Measured Mineral Resources and Probable Mineral Reserves from Indicated Mineral Resources. No Probable Mineral Reserves were derived from Measured Mineral Resources.

The Mineral Reserve estimate was based on the underground operations. No Mineral Reserves were estimated for surface stockpiles or tailings. The basis of the Mineral Reserve estimate was the delivery of ROM material to the shaft head bin, processing plant, or related ROM stockpile.

The consolidated Mineral Reserve as at 1 June 2021 for the underground operations of the BPM was estimated at 69.5Mt at 3.66g/t (3PGE+Au). The Proved Mineral Reserve was estimated at 7.7Mt at 4.51g/t (3PGE+Au) and the Probable Mineral Reserve was estimated at 61.8Mt at 3.56g/t (3PGE+Au). The consolidated Mineral Reserve estimate is shown in Table 21-1.

Table 21-1: Mineral Reserve estimate as at 1 June 2021

Reef type	Mineral Reserve classification	Tonnage [Mt]	3PGE+Au [g/t]	Pt [g/t]	Pd [g/t]	Rh [g/t]	Au [g/t]	Cu [%]	Ni [%]	3PGE+Au (Contained) [koz]	Pt (Contained) [koz]	Pd (Contained) [koz]	Rh (Contained) [koz]	Au (Contained) [koz]	Cu (Contained) [t]	Ni (Contained) [t]
Merensky	Proved	7.7	4.51	2.90	1.22	0.20	0.19	0.06	0.16	1 110	713	300	50	47	4 216	12 087
	Probable	23.5	3.81	2.45	1.03	0.17	0.16	0.05	0.13	2 880	1 851	779	130	121	10 938	31 361
	Total	**31.2**	**3.98**	**2.56**	**1.08**	**0.18**	**0.17**	**0.05**	**0.14**	**3 991**	**2 564**	**1 079**	**181**	**168**	**15 154**	**43 448**
UG2	Proved	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0
	Probable	38.3	3.40	2.04	0.99	0.36	0.02	0.01	0.08	4 189	2 510	1 217	440	23	2 496	29 800
	Total	**38.3**	**3.40**	**2.04**	**0.99**	**0.36**	**0.02**	**0.01**	**0.08**	**4 189**	**2 510**	**1 217**	**440**	**23**	**2 496**	**29 800**
Total	**Proved**	**7.7**	**4.51**	**2.90**	**1.22**	**0.20**	**0.19**	**0.06**	**0.16**	**1 110**	**713**	**300**	**50**	**47**	**4 216**	**12 087**
	Probable	**61.8**	**3.56**	**2.19**	**1.00**	**0.29**	**0.07**	**0.02**	**0.10**	**7 070**	**4 361**	**1 995**	**571**	**144**	**13 433**	**61 161**
	Total	**69.5**	**3.66**	**2.27**	**1.03**	**0.28**	**0.09**	**0.03**	**0.11**	**8 180**	**5 074**	**2 295**	**621**	**190**	**17 649**	**73 248**

Notes:
1) The Mineral Reserve estimate was reported in accordance with the guidelines of The SAMREC Code 2016
2) Mineral Resources were reported inclusive of Mineral Reserve
3) The basis of the Mineral Reserve estimate was the delivery of ROM material to the shaft head bin, respective processing plant or related ROM stockpile
4) No cut-off grades were applied in the Mineral Reserve estimate
5) Tonnage estimates are in metric units and reported as Mt
6) 3PGE/ 4E (g/t) = Pt grade (g/t) + Pd grade (g/t) + Rh grade (g/t) + Au grade (g/t)
7) Numbers may not add up due to rounding.

21.3. Mineral Reserve reconciliation

SR 6.1(iii); 6.3(iv)

No previous code-compliant Mineral Reserve estimate was publicly reported.

21.4. Mineral Reserve related risks

SR 5.7(i)

The major risks associated with the estimated Mineral Reserve are:

- **Product revenue parameters:** A decrease in the 3PGE+Au basket price and associated base metals prices has the potential to impact the economical extraction of the Mineral Reserve
- **Operating expenditure:** Variations in Opex within the -20% to +20% range are significant to a change in the overall NPV. A sustained increase in Opex has the potential to materially impact the estimated Mineral Reserve
- **Increase in mining dilution:** If mining dilution is not appropriately controlled, it may impact on the ROM grade, mining related cost and revenue. The impact on ROM grade, cost and revenue parameters could impact the Mineral Reserve
- **Geologically complexed ore body:** Faults with an apparent vertical displacement of less than 8m were not identified by the seismic survey. A high-frequency of intersection with unknown geological features with reef displacement, has the potential to increase the geology and associated mining related losses and impact on the estimate Mineral Reserve.

22. Risks

SR 4.3(viii); 5.7(i) / JSE 12.10(h)(iv); (h)(x)

22.1. Introduction

The risks presented in this section are based on risks identified by the respective CPs/ CV and technical experts during the completion of this CPR. The risk analysis determined the level of risk, classified from minor to major, as indicated below:

- **Minor risk:** This level of risk, if uncorrected, has little effect on projected cash flow
- **Moderate risk:** This level of risk has a significant effect on the projected cash flow unless mitigated by some corrective action
- **Major risk:** This level of risk signifies a material effect on the projected cash flow and performance.

The likelihood of a risk was considered as the likelihood that the event may occur and is classified as:

- Likely (will probably occur) or
- Possible (may occur) or
- Unlikely (improbable to occur).

The impact of a risk and its likelihood is combined into an overall risk rating matrix as indicated in Table 22-1 below.

Table 22-1: Overall risk rating matrix

Likelihood	Level of risk		
	Minor	Moderate	Major
Likely	Medium	High	High
Possible	Low	Medium	High
Unlikely	Low	Low	Medium

22.2. Summary of risks

SV T1.15

A summary of the perceived risks is indicated in Table 22-2.

Table 22-2: Risk summary

Risk description	Likelihood	Level	Overall risk
Geology and Mineral Resources			
Significant variance in Mineral Resource tonnage estimate	Unlikely	Minor	Low
Mineral Resource grade variation	Unlikely	Minor	Low
Significant variance in geological losses	Unlikely	Minor	Low
Significant change in the geological model/ structure on mining	Unlikely	Minor	Low
Geotechnical engineering			
Inadequate multi reef stoping strategy for narrow middlings	Likely	Moderate	High
Inappropriate use of UCS and absence of elastic rock mass properties	Possible	Minor	Low
Ineffective delineation of ground control districts	Likely	Moderate	High
Mining engineering and Mineral Reserve			
Inability to achieve planned production build-up	Possible	Moderate	Medium
Variation in Mineral Reserve tonnage estimate	Possible	Minor	Low
Mineral Reserve grade variation	Possible	Minor	Low
Additional losses due to the intersection of geological features	Possible	Moderate	Medium
Metallurgy and processing			
Poor understanding of degree of alteration in ore body resulting in poor recovery	Likely	Moderate	Medium
Excessive dilution resulting in reduced PGE + Au production	Likely	Moderate	Medium
Inadequate water storage capacity on plant in event of TSF disruption	Likely	Minor	Low

Risk description	Likelihood	Level	Overall risk
Future concentrate grade restrictions resulting in recovery losses	Possible	Moderate	Medium
Infrastructural			
Emergency pack-up electrical supply	Possible	Moderate	Medium
Winder earthing standard	Possible	Moderate	Medium
Substation fire detection system	Possible	Moderate	Medium
Environmental			
Scheduling delays due to TSF licensing and authorisation processes	Likely	Moderate	High
Social/ community unrest	Likely	Minor	Medium
Increase in closure liability	Possible	Moderate	Medium
Marketing and logistics			
Lack of an offtake agreement might affect product sales	Unlikely	Moderate	Low
COVID-19 impact	Possible	Major	High
Disruptions or shortfalls in primary PGM supply	Possible	Minor	Low
Domestic concentrate oversupply	Possible	Moderate	Medium
Substitute products to PGM	Likely	Major	High
Market penetration of electric vehicles and hydrogen fuel cells	Possible	Major	High
Costs and financial valuation			
Change in Opex	Likely	Moderate	Medium
Process recovery and payability	Likely	Moderate	Medium
Change in Capex	Possible	Minor	Low
ZAR/USD exchange rate	Likely	Major	High
Market and price considerations	Likely	Major	High
Changes in fiscal regime	Unlikely	Major	Medium
Contingency allowances	Likely	Moderate	Medium

22.3. Discussion of risks

22.3.1. Geology and Mineral Resources

22.3.1.1. Significant variance in Mineral Resource tonnage estimate

The approach to the Mineral Resource estimate was to define the resource cut for each reef and facies type, prior to the estimation. The variables that could affect the tonnage estimate are the facies definition, the resource cut (both position relative to the identified marker and planned height) and bulk density.

Based on the current expectation of the resource cut and the recorded bulk densities in the geological model, the risk of a significant change in the tonnage estimate is considered unlikely and so the risk was rated as low. Should the required mining cut change, the tonnage will be significantly different.

22.3.1.2. Mineral Resource grade variation

The variation of the grade on a local scale is anticipated. As the estimation is reliant on data points that are at a spacing of approximately 250m x 250m apart, some local variation is expected. The global grade estimation is not likely to change significantly unless a change in the mining cut is made. Changes in the global grade are possible as a result of a change of mining approach, change of mining cut or redefinition of the facies.

22.3.1.3. Significant variance in geological losses

The geological model presents a tabular deposit with some dykes and faults crossing the property. The major dykes and faults were delineated and some smaller scale faulting (<8m displacement). No potholes or mafic intrusions/ IRUPs were delineated although it is considered likely that some potholing has occurred and mafic intrusions/ IRUPs are likely to affect the FW of the UG2 Chromitite layer in particular. It is difficult to assess the degree of potholing or the presence of mafic intrusions/ IRUPs. The application of the geological loss as determined from the drill hole intersections is in line with the knowledge of the BC and is intended to represent those areas where the Merensky reef and UG2 Chromitite layer are replaced by mafic intrusions/ IRUPs, intersected by faults or dykes, or disrupted by potholes.

22.3.1.4. Significant change in the geological model/ structure on mining

As indicated an appropriate understanding exists in terms of the attitude of the Merensky reef and UG2 Chromitite layer. These units are relatively flat-lying with dips of <5°. Where the dip steepens, the work completed provides the necessary detail.

22.3.2. Geotechnical

22.3.2.1. Inadequate multi reef stoping strategy for narrow middlings

The Merensky to UG2 interburden distances range between 20m to 50m with an average of 38m. The multi reef layout comprises the same panel layouts, pillar dimensions and support strategy across both reefs. No analysis was performed to ascertain the spatial distribution of changes in interburden. These changes are critical for stope span and support design. Extensive elastic modelling was completed and the stress profile is well understood. Inelastic modelling and/ or further modelling and a middling analysis are suggested.

22.3.2.2. Inappropriate use of rock strength properties

The confidence in the laboratory UCS test results is low as there is no understanding of rock strength spatial variability or whether the samples tested were representative of the mining area. Verify or validate the UCS results conducted on the in-situ rock samples by augmenting the database with additional tests that are representative of the entire mining area. Additional properties such as density, elastic modulus and Poisson's ratio must be tested or measured.

22.3.2.3. Ineffective delineation of ground control districts

The BFS optimisation geotechnical study based the delineation of ground control districts on the depth of potential planes in the HW. Redefine geotechnical ground control districts by taking cognisance of spatial variation in rock strength, critical middling distances and potential planes of weakness.

22.3.3. Mining engineering and Mineral Reserve

22.3.3.1. Inability to achieve planned production build-up

The planned development production schedule, as contained in this CPR, was aligned to the BPM business plan for the remainder of 2021 (June 2021 to December 2021). The approved business plan for 2021 contains a total development target for the period of 8 620m. For 2022, a material increase in development was planned (15 168m) to ensure appropriate access and reef development to support subsequent stoping operations and meet the defined production schedule drivers.

To date, the mine has not demonstrated consistent achievement of planned development targets. Non-achievement of the planned development targets has the potential to materially impact the planned production build-up.

22.3.3.2. Significant variance in the Mineral Reserve tonnage estimate

The approach to the planned mining cut was based on the defined resource cut contained in the geological model, with the addition of allowable overbreak dilution. Any variation to the defined resource cut (of which the variables include the facies definition, both positions of the resource cut relative to the identified marker, planned height and bulk density) has the potential to impact on the estimate Mineral Reserve tonnage.

22.3.3.3. Mineral Reserve grade variation

The variation of the Mineral Reserve grade is anticipated on a local scale, aligned to the expected variation of the Mineral Resource grade. The Mineral Resource estimation was reliant on data points that are at a spacing of approximately 250m x 250m, thus some variation is expected. The global grade estimation is not likely to change significantly unless a change in the redefinition of the facies or the resource cut is made.

An additional impact on the Mineral Reserve grade estimate may result, should the stope dilution not be appropriately controlled. The stope overbreak allowance is considered appropriate, based on similar operations but may be exceeded in areas where excessive rolling reef and geological features occur. Appropriate grade control practices must be implemented during stoping activities to ensure stope dilution is monitored and controlled within acceptable levels.

22.3.3.4. Additional losses due to the intersection of unknown geological features

The application of the geological loss as determined from the drill hole intersections is in line with the knowledge of the BC and is intended to represent those areas where the Merensky reef and UG2 Chromitite layer are replaced by mafic intrusions/ IRUPs, intersected by faults or dykes, or disrupted by potholes. The seismic survey completed in 2008 had the following resolution characteristics:

- In the area of good seismic data (BPM core area), it was estimated that faults with an apparent vertical displacement down to 8m were identified
- In the area of poor data (west of the Koedoesfontein Fault) only faults with an apparent vertical displacement of more than 20m could be reliably identified
- The lateral position of faults is generally thought to be within 50m of the interpreted position. The position of the Caldera Fault is probably only accurate to within 80m, due to its position on the margin of the survey area
- The elevation of the reefs within the BPM core area is generally better than 10m. In the Mimosa area and distant from drill hole control, errors in elevation of approximately 45m can be anticipated.

As indicated faults with an apparent vertical displacement of less than 8m were not identified by the seismic survey. This represents a risk as mining operations may intersect numerous faults of low vertical displacement not yet identified. The perceived risk is increased with the potential mining related losses due to the nature of the employed mechanised mining method.

Mechanised mining equipment is limited at the operational inclination at which the machines can effectively operate as compared to conventional mining methods. When faults or other geological features causing reef displacement are intersected, the planned inclination of the development end is altered by the mine geology or survey department to re-intersect the estimated reef elevation as soon as possible to limit mining related losses and re-development requirements.

Mechanised mining equipment is limited to an effective operating inclination of approximately 10°. This means that when a geological feature that caused reef displacement is intersected, a longer distance of development is required to re-intersect the reef horizon due to the restricted operating inclination of the mining equipment. This results in a higher percentage of mining related losses. A high frequency of intersections, with unknown geological features with reef displacement, has the potential to increase the geology and associated mining related losses and impact on the estimate Mineral Reserve.

22.3.4. Metallurgy and processing

22.3.4.1. Poor understanding of alteration in ore body resulting in poor recovery

The metallurgical test work indicated that there was a significant impact on the PGE + Au recovery in the altered zones, particularly in the vicinity of the Caldera fault (WorleyParsons 2014a). The risk exists that other altered areas may be present that were not included in the recovery forecast. Reference to the metallurgical test work and integration with the mining plan will assist to alleviate the impact.

22.3.4.2. Excessive dilution resulting in reduced PGM production

Although HW and FW materials were included in the bulk samples processed at the Mintek pilot plant, excessive dilution may be generated from mining activities. Test work was conducted on the waste rock and found that it was significantly harder than the ore. Excessive dilution will result in either a reduced mill throughput or a coarser grind in the mills, both resulting in reduced PGE + Au production. Strict grade control protocols must be established to ensure that the design capacity of the plant is not exceeded.

22.3.4.3. Inadequate water storage capacity for tailings storage facility disruption

The water storage capacity was specified as sufficient to sustain operations for a period of 24 hours in the event of a prolonged water supply interruption. A disruption in the return water from the TSF, will result in a plant stoppage and will cause a loss in metal throughput. This may become evident in the summer months when the evaporative losses on the TSF may be as high as 70%. Additional water storage capacity is recommended.

22.3.4.4. Future concentrate grade restrictions resulting in recovery losses

The lack of a formal concentrate off-take agreement has resulted in an assumed target concentrate grade to be produced. The test work indicated that an increase in the target concentrate grade from 100g/t (3PGE+Au) to 120g/t will result in a potential loss of 5% in PGE + Au recovery rates.

It is recommended that potential toll smelters/ refiners are approached to secure processing slots and acceptable concentrate grade specifications. The simultaneous processing of the two ore bodies will result in a decrease in the Cu and Ni content in the concentrate, that may affect the negotiations as the base metal content is an important consideration for the toll smelters.

22.3.5.Infrastructural

22.3.5.1. Emergency backup electrical supply

All the required generators for emergency backup electrical supply are not currently available and are still in the procurement phase. The current generation arrangement will allow for only the service winder to operate, which will take considerately longer to evacuate persons from underground workings in the event of a major power failure.

22.3.5.2. Winder earthing standard

No resistivity testing could be presented to explain the earthing standard used for the winder generator back to the high-tension switchgear substation. It is recommended to have this completed as a precaution for downstream failures/ damage.

22.3.5.3. Substation fire detection system

An inappropriate CO_2 fire suppression system is currently installed in the electrical substations. The current system will not be adequate in the unfortunate event of a fire. An appropriate CO_2 system must be installed.

22.3.6.Environmental

22.3.6.1. Scheduling delays and authorisations

An interim TSF is planned adjacent to the concentrator that requires an IEA (EA and WML) and IWUL. The final EMPR amendment was submitted by Knight Piésold to the DMRE on 19 May 2021. All the necessary documents were submitted to the DMRE and the IEA is currently under review and pending approval. The WUL application forms for the TSF were submitted on 31 May 2021. The process will now progress to the next phase, where the DHSWS will determine whether a site visit is required and will confirm the technical documents that must be submitted as part of the application.

The expected time frame to obtain the necessary approvals range from a minimum of between six and nine months after submission of the WUL application forms. The IEA is expected to be awarded sooner, however, these timeframes are subject to the authorities reviewing the submitted documentation timeously and also whether the authorities are satisfied that the engineering designs submitted are appropriate. A number of interested and affected parties has objected to the development during the public participation process. Appeals against the IEA and WUL have also not been taken into consideration in the stated timeframes. All of the above aspects have the potential to impact the planned production schedule.

22.3.6.2. Social and community unrest

There is high level of unemployment in the nearby communities. Impact on the SLO due to expectations from the community, with reference to job opportunities and allocation of funding for social spend can present a risk to the operations.

22.3.6.3. Closure liability

The transition from the old regulations to the new regulations that are scheduled for implementation in June 2022 may increase the quantum provision. According to the new regulations, the remaining LOM must determine the accuracy and level of detail. Mines will require significantly more accurate financial closure liability calculations that use site-specific rates and consider the remediation and management of latent and residual environmental impacts.

22.3.7.Marketing and logistics

22.3.7.1. Offtake agreements

At present, the BPM has not concluded any offtake agreements for their PGM concentrates with any of the primary or secondary smelter operators in South Africa, despite plans to commence production ramp-up through their beneficiation plant. The risks associated with a lack of an offtake agreement are considered a low risk of not being able to place their concentrates into the market. The geographical location of the BPM within the Western Limb and the niche quality of the Merensky: UG2 concentrates is likely to make this a sought-after blending product for primary PGM producers in the Rustenburg and Northam areas.

As the UG2 production increases and the Merensky reef production decreases, market placement might prove more problematic as this concentrate will be on par with the remaining Western Limb and Eastern Limb concentrate. The imminent expansion of low-chromite Northern Limb Platreef concentrate for matte smelter blending is likely to alleviate this risk, potentially augmented by the implementation of alloy smelting and hydrometallurgical processing technologies tailored specifically for UG2-rich feeds.

More concerning is the price uncertainties for the PGM concentrates brought about by the lack of a smelter offtake agreement. The anticipated smelter payable for the primary 3PGE+Au (Pt, Pd, Rh and Au) is 84% of the metal's market price, with minor PGEs (Ir and Ru) expecting to fetch a 50% to 55% payable and base metals (Ni and Cu) around 70% to 75%. These smelter payables are not only determined by the metal commodity prices but are impacted by factors like concentrate volumes processed, contract durations, smelting costs (in particular energy and environmental costs), payment terms and penalties – all aspects which are negotiated on an individual contractual basis with stand-alone suppliers of merchant PGM concentrates.

Implats expressed interest in the BPM concentrate product in the past, whilst Amplats is a 13% minority shareholder in the BPM project. It is unlikely that the BPM will have substantial difficulties in placing their product into the market as operations ramp up. It is critical to secure any offtake agreements to firm up the expected revenue that will be attained for their PGM concentrate.

22.3.7.2. COVID-19

The COVID-19 global pandemic had a substantial impact on the global PGM market in late 2019 and 2020, resulting in a net 3PGE supply decrease of 12.4% and demand reduction of 10.9% during 2020.

In jurisdictions like China, Europe and North America, the impact of the COVID-19-pandemic is adequately mitigated through large-scale vaccination programmes. However, countries like South Africa, Zimbabwe and Japan lag in vaccination rollouts, while variant virus strains have the potential to reduce the efficiency of existing vaccines.

The combination of these factors in conjunction with a resurgence in COVID-19 outbreaks in many countries increase uncertainties in both the supply and demand forecasts for 2021.

22.3.7.3. Primary platinum group metal supply disruptions

The BPM is a stand-alone supplier of merchant PGM concentrates to third-party smelting and refining operators – either primary or secondary producers. As such, they are directly impacted by downstream PGM market volatility, yet have little to no influence in mitigating these risks.

The world's primary PGM supply output remained fairly constant at around 14Moz over the past 15 years, with the market demand balance supplied from secondary recycled PGMs. Sustained primary supply shortfalls, high metal prices and primary supply volatility are likely to result in an acceleration of secondary refining capacities across the globe, thereby negatively impacting the demand for primary PGMs.

In a constraint demand cycle, any market share lost by primary PGM suppliers to secondary recycling operations will be difficult, if not impossible, to recover, given the capital the secondary refiners will have to incur. The same goes for sustained periods of primary supply shortfalls attributable to factors such as production stoppages, major breakdowns at any of the limited number of primary smelters and/or refineries, electricity supply interruptions and labour disputes which result in production decreases.

The potential impact on the mine is that any supply issues that reduce the market share of the primary PGM producers, are likely to result in PGMs from secondary suppliers displacing a portion, if not all, of the mine's PGM contribution in the global market – especially as primary producers will give preference to their internally-mined products in a constrained market. In the long-term, the mine might have to evaluate either the development of their own smelting/ refining operations, perhaps more suited to UG2-chromite concentrates, or strategically aligning with secondary producers of PGMs.

22.3.7.4. Domestic oversupply

South Africa has four primary PGM producers (Amplats, Implats, Sibanye and Northam), with three operating their own PGM and base metals refineries. The fourth, Northam Platinum, operates a PGM smelter and base metals refinery but has outsourced PGM refining to the German company Heraeus. A number of other small-scale precious- and base metals secondary producers exist in South Africa, but they have very limited throughput capacities and are primarily focused on PGM recycling.

The PGM mining landscape in South Africa looks significantly more complex, given the resource size and clustered configuration of the BC. The existence of more than seventeen operating mines, the number of operations presently in care and maintenance and more than 27 resource replacement and expansion projects in various phases of development.

To date, the bulk of South Africa's PGM output was produced from underground mines within the Merensky-rich Western Limb, with the UG2-chromite dominant Eastern Limb playing a supporting role in sustaining primary PGM production levels in South Africa. Only Amplats operated in the Northern Limb from Mogalakwena mine – the richest and largest open-pit PGM mine in the world.

With economically extractable Mineral Resources in the Western Limb rapidly depleting, the development focus seems to have shifted to the Platreef ore in the Northern Limb. This region has the potential to produce massive amounts of Pd- and base metal-rich sulphide ores per annum with negligible chromite content – the ideal feedstock for matte production in existing smelters and refineries, despite the additional processes required to handle its higher sulphur content.

It is highly likely that primary PGM producers will blend Platreefs and UG2 concentrates in the future to optimise their process asset utilisation. The risk is that, by the mid-2030s, the majority of the Eastern and Western Limbs will be producing nearly exclusively UG2 concentrates, with the Northern Limb's Platreefs concentrates arising from a central location between these regions. If domestic PGM smelting and refining capacity remains constant at around 8Moz per annum as per the last 15 years, the BPM might have difficulty placing their concentrates in the market after 2036, once their Merensky reef production starts diminishing.

The current availability of excess capacity for toll smelting and refining gave rise to a number of nascent and emerging concentrates-only operations, including the BPM. If market demand and higher basket prices prevail, there is a high likelihood that more of these operations will emerge. The potential exists that the BPM will have to compete with projects like Ivanhoe's Platreef Mine and Platinum Group Metals' Waterberg project for the limited excess tolling capacity in an over-supplied smelter concentrate feedstock market, as there are no active plans to expand primary PGM smelter and refining capacity in South Africa.

The South African PGM landscape is set to be dominated by the four primary producers for years to come, with mergers and acquisitions, empowerment subsidiary deals and consolidation of exploration rights within existing mining rights the order of the day during this bullish PGM demand cycle. The primary PGM producers will promote the utilisation of feedstocks in which they have direct or indirect economic interest when making excess toll treatment capacity available to stand-alone concentrates producers.

As one of a select few concentrates-only operations where one of the PGM majors holds only a minor equity stake, the BPM might have to conclude long-term offtake agreements to mitigate the risk of future toll smelting and refining allocation security.

22.3.7.5. Substitutions

For many industrial applications, e.g., auto-catalysts, there is no commercial substitute at present for PGMs. Globally PGM consuming industries are actively researching and developing either PGM substitutes or equivalent products that harnesses more recycled PGMs to minimise their exposure to primary PGM supply and price fluctuations. This is an unavoidable, emerging reality that all primary producers of PGMs (and their upstream concentrate suppliers) must face as technology continues to develop. The BPM might not be able to eliminate the long-term risk of PGM substitution, but they can mitigate this risk by:

- Securing long-term offtake agreements at metal prices that promotes the downstream use of primary PGMs over substitutes or recycled materials
- Maximise holistic revenue generation through e.g., the beneficiation of its chromite-rich tailings.

22.3.7.6. Electric vehicle market

The rapid rise of interest in electric vehicles as the environmentally sustainable mode of future transportation holds both risks and opportunities for the long-term PGM market. Auto-catalysts in diesel and petrol vehicles are by far the largest consumers of PGMs at present, supported by chemical catalysts for the refining of petroleum – markets that are set to substantially reduce as the market penetration of electric vehicles increases. To an extent, the decrease in PGM demand associated with internal combustion transportation can be offset by promoting fuel cell electric vehicles ("FCEVs") as:

- Fuel cells use two to three times more PGMs than a typical auto-catalyst, hence an increase in FCEVs will have a positive impact on long-term PGM demand
- PGMs are used in smaller-scale electrolysers to produce hydrogen from water – typical installations supply filling stations with fuel for FCEVs.

Although this emerging technology can be positive for the PGM supply market, the following poses major risks that are likely to impact future supply/ demand:

- An automotive market shift from internal combustion engines to electric vehicles will drastically increase the available recyclable PGMs from discarded auto-catalysts

- For the PGM industry to capitalise on the electric vehicle market, it is of utmost importance that battery electric vehicles ("BEVs") do not attain market dominance over FCEVs
- Whilst both the FCEV and BEV technologies are gaining in maturity, the availability of hydrogen fuel for FCEVs and the cost associated with establishing the necessary filling infrastructure might prove prohibitive.

Although the mine can exert very little influence on this ongoing FCEV vs BEV debate, it can mitigate this potential risk of securing long-term offtake markets by diversifying their product placement strategy to specifically include battery/ energy metals (e.g., Ni, Cr) in their product suite.

22.3.8.Costs and financial valuation

22.3.8.1. Operating expenditure

Opex is driven by myriad factors, including labour, energy, fuel, steel, cement and many other categories of cost. South Africa has a recent average inflation rate of 5% but has shown increases well above inflation in some categories. Electricity costs regularly increase in excess of 9% per year. The probability of cost increases is highly likely.

22.3.8.2. Process recovery and payability

The percentages of recovery to concentrate were not determined to a high degree of certainty. The payability factors were determined by benchmarks in the industry rather than demonstrated contracts with smelters. It is likely that as a result, revenue could be estimated incorrectly. This is tempered by the fact that the factors applied were reasonable and in line with similar operations.

22.3.8.3. Capital expenditure

Approximately half of the budgeted capital for the project was already spent and the future development requirements are well understood. There remains a risk that capital equipment inflation could exceed expectations. The Capex allowance for the concentrator plant may be underestimated due to a change in the planned construction methodology with specific reference to construction labour sourcing. The NPV is least sensitive to Capex.

22.3.8.4. Market dynamics and commodity price

Given that the project NPV is most sensitive to revenue, the impact of this risk can be major. The world is in the midst of economic upheaval due to the COVID-19 pandemic and the magnitude and duration of its ongoing effects on global economic activity and hence, the demand for minerals is impossible to quantify. The use of the Consensus Economics forecasts for product prices should mitigate this somewhat, but the likelihood of metal prices declining remains likely.

22.3.8.5. South African Rand/ United States Dollar exchange rate

A further market dynamic is the ZAR/USD exchange rate. This is both beneficial and detrimental, as a weak ZAR drives revenue up (although in the context of a negative impact on the national economy) but increases some Capex and Opex. The effects of ZAR volatility are often short-lived as the ZAR recovers aftershocks and tends to revert to the long-term mean determined by the inflation rate differential between South Africa and other economies. Volatility in the ZAR is likely and the impact, particularly if the ZAR strengthens beyond the model forecast of ZAR15.30/USD (long-term), could be major.

22.3.8.6. Changes in fiscal regime

With pressure on the South African Government due to the negative effects of the COVID-19 pandemic on the economy and hence the national fiscus, the government may adjust fiscal factors such as the corporate income tax rate or the royalty rate. Although this seems unlikely, the impact could be major, making this a medium rated risk.

22.3.8.7. Contingency allowances

It is entirely likely, almost certain, that Opex costs will change/ increase over the project life. The estimate makes no specific provision, built into the estimations (Capex or Opex), for contingency. A contingency provision will permit greater flexibility and protection from uncertainty, but a contingency amount will remain a liability. The probability of cost increases is likely (note: the project is less sensitive to changes in Capex but more so to Opex).

23. Conclusions and recommendations

This CPR was prepared by a team of experienced professionals. The terms of reference were to prepare the CPR to provide a summary of the material scientific and technical information concerning the mineral exploration, Mineral Resources, Mineral Reserves and associated production activities and mineral asset valuation of the BPM in accordance with the guidelines of The SAMREC Code and The SAMVAL Code.

The purpose of this CPR is to inform investors and interested parties of material changes in regard to the material assets of the BPM and to comply with JSE regulations for listed companies. This CPR was developed based on the guidelines of The SAMREC Code, The SAMVAL Code and Section 12.10 of the JSE listing requirements.

Each CP/ CV was responsible for specific sections of this CPR, which they personally authored supervised or reviewed. These individuals are defined as CPs and CV as set out in The SAMREC Code and The SAMVAL Code and certify that they are mineral industry professionals, members or fellows of recognised professional organisations and have the relevant experience through their education affiliation with a professional association and past relevant work experience.

Ukwazi is an independent advisory group, with no direct or indirect interests in the BPM. Neither Ukwazi nor the key personnel responsible for the technical work, has any material interest in the mine, the companies associated with the BPM, their subsidiaries or their mineral properties. All work completed by Ukwazi for Bakubung is strictly in return for professional fees. Payment for the work is not in any way dependent on the outcome thereof.

This CPR contains the expression of professional opinions of individuals based on the information available at the time of preparation. The quality of information, conclusions and estimates contained within are consistent with the intended level of accuracy.

23.1. Ownership and tenure

BPM is fully owned by Bakubung with company registration number 2002/017306/07, a wholly-owned subsidiary of Wesizwe with company registration number 2003/020161/06. Wesizwe is a public company incorporated in the Republic of SA with its shares listed on the JSE.

In compliance with Section 22(1)(a) to (c) of the MPRDA, a mining right application for the mining of PGMs, Au, Ag, Ni, Cu, Co and Cr was lodged with the DMRE during 2007. A mining right was granted to Bakubung under protocol NW 30/5/1/2/2/339 MR in terms of Section 23(1) of the MPRDA. The mining right was granted on 25 May 2009 and unless cancelled or suspended will be valid for 25 years ending 24 May 2034.

23.2. Geology and Mineral Resources

The BPM is located on the BC and is underlain by the Merensky reef and UG2 Chromitite layer. A significant body of work was completed to provide an appropriate understanding of the structure of the reefs and their attitude. The understanding of the geology and specifically of the Merensky reef and UG2 Chromitite layer, is good and is in line with the knowledge of these units based on the platinum industry knowledge.

The drilling was undertaken in a professional manner enabling the definition of the various facies. The mining cuts selected for the Merensky reef incorporated the current underrating of the facies distribution and grade profile providing a realistic estimate of the grade. The cut selection in respect of the UG2 Chromitite layer included geotechnical considerations and is, therefore, considered to have reasonable prospects of being extracted economically.

The Mineral Resource estimate is thus considered robust.

23.3. Geotechnical

As part of the CPR, the geotechnical aspects of the existing and planned mining and mine design were examined to ensure that correct practice is being followed and to ascertain any risks to the mine's future due to potential failures, poor safety records or negligence causing temporary or permanent mine closures. The geotechnical design employed satisfied the following aspects:

- Geotechnical data collection (core logging, transformation and analysis)
- In-situ rock testing (although verification is required)
- Rock mass classification
- Empirical, analytical and numerical methodologies to validate design
- Benchmarking where appropriate.

A database of geotechnical data and work exists, although not well consolidated and important excavations such as mine accesses and overall mine stability are aligned to sound design principles and industry practices. No critical risks were identified for the current development stages. Detailed technical substantiation and improvements are required. The review of layouts and support design should be ongoing as new information becomes available.

A mandatory code of practice to combat rockfall and rockburst accidents was drafted in accordance with sections 9 (2) and (3) of the MHSA, 1996 (Act 29 of 1996) and are appropriate.

23.4. Hydrogeology and hydrology

The aquifer underlying the area can be classified as a minor aquifer system and is important for the baseflow component of the Elands River. Groundwater is mainly used for domestic purposes, while irrigation from boreholes takes place on farms south of the Elands River. Pre-development groundwater quality in the area is generally good with most of the water samples fit for human consumption. Selected samples have elevated *E. coli* values, indicative of faecal contamination. The zone of influence identified from a hydrogeological perspective was contained within the mining right area and did not affect sensitive receptors. These were modelled results that have a level of uncertainty. The perceived risks from a hydrogeological perspective, which were mostly related to the impact of dewatering and pollution plume migration from the TSF, were regarded as low given the implementation of the mitigation and management measures proposed in the TSF design report and EMPs. A baseline was established against which future impacts can be monitored and efficiency of mitigation measures determined. It is recommended that monitoring results be captured within an electronic database with monthly trend analysis. The groundwater model should be updated and calibrated with monitoring data on an annual basis.

Sensitive receptors from a surface water perspective included the seasonal wetland area that occurs to the south-western area of the Mimosa site, the Elands River, the Sandspruit and the unnamed tributary of the Elands River. It must be noted that the nature of the surface water features is highly modified due to regional anthropogenic impacts. Elevated levels of *E. coli* were also observed during pre-mining conditions. Perceived surface water risks were mainly identified as potential runoff from the proposed TSF, WRD and ROM stockpile areas and were rated low, given the implementation of stormwater measures according to the approved stormwater management plan. Contact water is intercepted through a series of drains and channels and diverted to containment facilities. Clean surface water runoff from the catchments upstream of the mining areas is diverted and returned to the non-perennial drainage lines. The mine has implemented a surface water monitoring programme. A baseline was established against which future mining activities will be monitored and the effectiveness of mitigation measures determined. A water and salt balance were compiled for the mine. It is recommended that a dynamic water and salt balance be developed for the mine to assess on-site water management and associated impacts on an ongoing basis. The dynamic water balance must be calibrated with flow meter data and on-site meteorological data. The objective must be to re-use contact water, minimise evaporation and maintain the stormwater dam capacity to accommodate high rainfall events.

23.5. Mining engineering and Mineral Reserve

The mining engineering related work was done at a LOM level of accuracy to declare a Mineral Reserve estimate. A structured process was followed that considered mining and non-mining related modifying factors. The initial BFS study for the project was completed in 2009 by TWP. Subsequent mine optimisation studies were done by WorleyParsons in 2014. The basis of the current mine design was primarily based on the BFS, subsequent optimisation studies and some local and regional design updates completed by Ukwazi in 2020 and 2021.

The updated mine design was completed in the Datamine™ Studio 5D planner. Production scheduling drivers' constraints and practical mining requirements were identified prior to commencing the scheduling processes. The aim was to ramp-up initial production to 1Mtpa ROM (secondary production ramp-up to 3Mtpa ROM by 2027), considering practical mining aspects, the processing plant construction status and processing strategy. During the initial 15 years of the LOM, the mining strategy targeted the majority (90%) of the production from the Merensky reef.

The Mineral Reserve estimate was based on the application of appropriate modifying factors for the underground operations, no Mineral Reserves were estimated from surface stockpiles or tailings. The basis of the Mineral Reserve estimate was the delivery of ROM material to the shaft head bin, processing plant or related ROM surface stockpile.

The consolidated Mineral Reserve as at 1 June 2021 for the underground operations of the BPM was estimated at 69.5Mt at 3.66g/t (3PGE+Au). The Proved Mineral Reserve was estimated at 7.7Mt at 4.51g/t (3PGE+Au) and the Probable Mineral Reserve was estimated at 61.8Mt at 3.56g/t (3PGE+Au).

23.6. Metallurgy and processing

A vast amount of laboratory and pilot plant work was completed in defining the process design criteria and understanding the variability in the ore body. Cognisance was taken of the geological characteristics of the ore body and the presence of the major Caldera Fault. Flotation tests were conducted to understand the impact of the alteration in the ore on the milling and flotation characteristics.

Mineralogical analysis of the ore samples identified anomalies in both the Merensky and UG2 ores that must be catered for in the plant design. The most significant being that the Merensky ore must be milled finer than industry excepted norms. The major UG2 precious minerals identified are recognised to be slow floating, meaning that the residence time of the flotation stages must be increased to minimise potential losses.

The process design criteria developed in the test work were suitably transferred into the plant design and the anomalies identified were appropriately catered for. Based on a plant feed ratio of 90%:10% Merensky: UG2 blend the plant will be able to produce a concentrate grade exceeding 100g/t (3PGE+Au) at a metal recovery rate of approximately 89% (3PGE+Au).

23.7. Infrastructure

The general infrastructure requirements were assessed, based on information obtained during site visits and from technical studies supplied by the BPM, in accordance with the following structure:

- Surface facilities
- Shaft configuration
- Winding systems
- People transportation
- Rock handling
- Underground services
- Underground facilities.

Bulk electrical supply to the mine was established by Eskom in 2013. Eskom provided equipped bays of 3 x 40MVA transformers to supply the mine, which includes a premium supply of 40MVA at all times. The 33kV, three-phase, 50Hz supply is derived from an Eskom 88/33kV yard adjacent to the mine.

The mine is located in an area where water is generally in short supply. Exacerbating this, is the fact that the main water authority supplying the mine is only able to supply potable water. Storage of make-up water is provided by 2 x 3 megalitre capacity reservoirs. Approximately 6 megalitres/day of municipal makeup water is required. A water agreement with Magalies Water is currently in place for 2 190 megalitres/annum with an estimated maximum seven-day design requirement of 52.5 megalitres. The daily provision from 2017 onwards was 6 megalitres/day.

The current surface and mining related infrastructure are generally in good condition with most of the major infrastructural components already developed, or in the process of being developed to achieve the planned production profile.

23.8. Socio-economic and human resources

The mine has committed to investment projects within the local community, in accordance with the SLP. Benefits will include local employment, training and capacity building.

The social and labour plan approved for the period 2019 to 2023, allowed for a financial provision of ZAR235 million. There is a high level of unemployment and a skills shortage in nearby communities and the expectation for work opportunities can lead to the influx of job seekers to the area. This can then result in added pressure on existing communities and possibly the development of informal settlements.

The loss of grazing for cattle owners on Frischgewaagd was a contentious issue for the cattle owners and the Ipopeng-Hlanganani Farmers Association. These aspects may have a significant impact on the mine's SLO and appropriate forums must be maintained. An appropriate grievance mechanism will ensure that potential issues can be identified and managed timeously, in line with the IFC standards. The social risks were adequately captured during the authorisation processes and appropriate mitigation measures were presented in the EMP, SLP and through governance structures implemented by the mine.

23.9. Environmental

The mine has an adequate understanding of the environmental and social aspects through baseline and specialist studies previously conducted. Risk management and mitigation measures were appropriately addressed in the EMPs and will be effective to mitigate risks and impacts to acceptable levels should the measures be implemented according to the specialists' recommendations. The internal structure of the department responsible for governance issues includes a risk and compliance manager, environmental manager, environmental control officer, stakeholder relations manager and a communication specialist. Indications are that the governance team is efficient in addressing community-related issues pro-actively through the correct structures, projects and programmes.

Most of the EAs are in place for the infrastructure detailed in the optimisation study, with the exception of the interim TSF. An IEA and WUL will be required for the facility and associated infrastructure. Based on current industry norms, the necessary approvals will take at least six to nine months to be finalised after submission of the WUL application. The final EMPR amendment was submitted to the DMRE on 19 May 2021 and approval is currently pending. The IEA is expected to be awarded at an earlier date than the WUL, however, these timeframes are subject to the authorities reviewing the submitted documentation timeously and also whether the authorities are satisfied that the engineering designs are appropriate. A number of interested and affected parties objected against the development during the public participation process.

23.10. Marketing

The competitive quality of the BPM concentrates and the mine's central geographical position within the Western Limb of the BC is likely to make this an attractive feedstock for matte production in the smelters of the surrounding primary PGM producers: Amplats, Implats, Sibanye-Stillwater and Northam Platinum. A formal concentrate offtake agreement must be negotiated.

Strong medium-term industrial demand growth is forecasted for Pt driven by nascent hydrogen and fuel cell technology adoption, whilst tightening in the markets for Pd and Rh is expected to support the higher pricing in the short to medium-term.

Longer-term demand is influenced by factors such as increased PGM recycling, the development of PGM substitutes in mainly industrial and automotive applications and potential concentrates over-supply, hamstrung by limited regional smelting and refining capacities. The BPM can address these risks by ensuring the complete mine-to-market extraction process is optimised for their specific ROM feed grades and by deriving holistic value from the minerals mined.

23.11. Capital and operating expenditure

The Capex estimate was scheduled in detail and captured items for production and development capital, SIB capital and other capital. A summary of the total LOM Capex estimate is shown in Table 23-1 below. ZAR5.6 billion was spent to the valuation date on developing the project, with a further ZAR7.2 billion on capitalised costs. An additional ZAR11.4 billion is expected over the remaining LOM (ZAR5.4 billion on development capital and ZAR5.9 billion on SIB capital).

Table 23-1: Capex summary (2021 real terms)

Description	Capex spend to 31 May 2021 [ZAR million - Real 2021]	Capex estimate after 31 May 2021 [ZAR million - Real 2021]	Total capex estimate [ZAR million - Real 2021]
Total direct project cost	5 583	4 903	10 486
Other Capex	381	514	895
SIB capital	0	5 938	5 938
Capitalised costs	7 199	0	7 199
Total	**13 162**	**11 355**	**24 517**

The various Opex items were developed in sufficient detail and accuracy to be used in the financial valuation. Where applicable, input costs were linked to an appropriate production driver and determined from first principles. All Opex mining activities were assumed to be owner mining operations. Table 23-2 shows the LOM, the percentage contribution of each activity to total Opex, the steady-state average and the total LOM unit costs per ROM unit.

Table 23-2: Opex summary (real terms)

Description	Total LOM [ZAR million]	Contribution [%]	LOM average unit cost [ZAR/ROMt]	Steady-state average unit cost [ZAR/ROMt]
Mining	61 751	66.5	708.05	675.04
Processing	15 002	16.2	172.02	165.60
Logistics	265	0.3	3.04	2.90
Rehabilitation fund	271	0.3	3.11	2.66
Overheads	15 550	16.7	178.30	158.96
Total	**92 839**	**100.0**	**1 064.51**	**1 005.15**

23.12.Financial valuation

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The BPM Mineral Asset was valued using two approaches. The primary approach utilised was the income approach. A DCF financial model was built, based on the revised mining and production schedules produced as part of this CPR, Capex and Opex assumptions from Wesizwe's technical work on the project and the revenue and macroeconomic assumptions applied. The model was base dated 1 June 2021 and only considered cash flows from that date for the valuation shown in Table 23-3. The valuation includes Inferred Mineral Resources, the valuation of which was discounted by 25%. Up to 31 May 2021, sunk costs of ZAR13.2 billion were spent on developing the project.

Table 23-3: Income approach (DCF) valuation

Approach	Valuation [ZAR million]			Basis
	Low	Base	High	
DCF NPV model	16 121	18 266	20 486	69.5Mt Mineral Reserve, 17.6Mt Inferred Mineral Resources, 35-year LOM, discount rate applied 8%

The secondary approach applied was that of comparable transactions, shown in Table 23-4.

Table 23-4: Market approach valuation

Approach	Valuation [ZAR million]			Basis
	Low	Base	High	
Comparable transactions	2 130	2 662	3 195	Mineral Resource and Mineral Reserve valuations per troy ounce of contained metal, 13.8 million troy oz (3E+Au) content in Mineral Resources

By way of statement of comparative observation only, the results of this specific valuation assessment are in stark contrast to the current market capitalisation of Wesizwe Platinum Ltd (the Bakubung project owner) which, at the close of trading on 22 July 2021, had a share price of ZAR0.47 per share, which with 1 627 827 058 shares in issue, was ZAR765 million, a discount of approximately 96% to the project NPV. Currently, all the metal commodity explorers, developers, emerging producers and producers' share prices are still depressed to varying degrees based upon the uncertain future supply/ demand drivers from emerging energy generation and storage technologies. Wesizwe peers in the upper junior and low mid-tier rankings all depict similar deep discounts to both NPV and/or net asset value of their assets.

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25. Signature page

SR 9.1(i)

25.1. Competent Persons/ Competent Valuator responsibilities

This CPR has an effective date of 1 June 2021. No material changes have occurred between the effective date and the date of signature of this report. The details of the CPs and CV and their respective responsibilities for the CPR are indicated in the table below.

Table 25-1: Competent Persons list and CPR responsibilities

Name of person	Role and responsibilities	Qualifications	Affiliations	Company	Responsible chapters
Kenneth Graham Lomberg	CP – Mineral Resources	B. Sc (Geology and Geochemistry), B. Sc (Honours) Geology, BCom (Economics and Statistics), M Eng. (Mining Engineering) Pr. Sci. Nat.	SACNASP – Member (Reg no: 400038/01)	Pivot Mining Consultants (Pty) Ltd – SA	4.1, 4.2, 5, 6, 7, 8, 22, 23, 24, 25.2, 26.1.2, 26.1.3, 26.1.4, 26.1.7, 26.1.9, 26.5.1
Jacobus Johannes Lotheringen	CP – Mineral Reserve and principal author (Lead CP)	Pr. Eng. (Mining Eng.)	SAIMM – Member (Reg no: 701237). ECSA (Reg no: 20030022).	Ukwazi Mining Studies (Pty) Ltd – SA	1, 2, 3, 4.3, 4.4, 9, 10, 11, 12, 13, 14, 15, 16, 17, 21, 22, 23, 24, 25.3, 26.1.1, 26.1.5, 26.1.6, 26.1.7, 26.1.8, 26.1.9, 26.3, 26.4, 26.5.2
Alan Mitchell Clegg	CV	Pr. Eng. (Mining Eng.)	SAIMM – Fellow (Reg no: 701825) ECSA – (Reg no: 20050117)	Ukwazi Mining Studies (Pty) Ltd – SA	18, 19, 20, 22, 23, 24, 25.4, 26.2, 26.5.3

25.2. Competent Person: Mineral Resources

SV T1.9

I, Kenneth Graham Lomberg, a registered geologist with the SACNASP (Registration number: 400038/01), a Director of Pivot Mining Consultants (Pty) Ltd – South Africa, was appointed by Bakubung Minerals (Pty) Ltd to be the Competent Person: Mineral Resources in accordance with The SAMREC Code, 2016 edition and was responsible for preparing or supervising the preparation of this report in respect of the material assets of the Bakubung Platinum Mine, located in the North West Province, in the Republic of South Africa.

I have sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Competent Person for Mineral Resources as defined in the 2016 edition of The SAMREC Code.

____

Mr. K.G. Lomberg
SACNASP
Competent Person
Mineral Resources
Date of signature: 30 July 2021

25.3. Competent Person: Mineral Reserve

SV T1.9

I, Jacobus Johannes Lotheringen, Professional Engineer, registered at the ECSA (Registration number: 20030022), member of the SAIMM (Registration number: 701237) and Director of Ukwazi Mining Studies (Pty) Ltd was appointed by Bakubung Minerals (Pty) Ltd to be the Competent Person: Mineral Reserve in accordance with The SAMREC Code, 2016 edition and was responsible for preparing or supervising the preparation of this report in respect of the material assets of the Bakubung Platinum Mine, located in the North West Province, in the Republic of South Africa.

I have sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Competent Person for Mineral Reserves as defined in the 2016 edition of The SAMREC Code.

Mr. J.J. Lotheringen
Pr. Eng.
SAIMM, ECSA
Competent Person
Mineral Reserve
Date of signature: 30 July 2021

25.4. Competent Valuator

SV T1.0; T1.4; T1.13 / JSE 12.10(f)

The information contained in this report that relates to Mineral Asset Valuations reflects information compiled and conclusions derived by Alan Mitchell Clegg, who is a Professional Engineer, registered at the ECSA (Registration number: 20050117), a fellow of the SAIMM (Registration number: 701825) and an employee of Ukwazi Mining Studies (Pty) Ltd.

I, Alan Mitchell Clegg has sufficient experience relevant to Mineral Asset Valuations of the material assets under consideration and to the activity undertaking to qualify as a Competent Mineral Asset Valuator as defined in the 2016 edition of The SAMVAL Code. The mineral asset valuation was completed based on the guidelines of the SAMVAL code, based on my knowledge all aspects disclosed are factually correct.

Mr. A.M. Clegg
Pr. Eng. Pr. CPM PMP
FSAIMM, FIOQ, ECSA, SACPCMP
Competent Valuator
Date of signature: 30 July 2021

26. Appendices

26.1. Appendix A – The SAMREC Code, 2016 Edition, Table 1

26.1.1. Section 1: Project outline

Table 26-1: Section 1: Project outline

SAMREC Table 1						
			Exploration results	Mineral Resources	Mineral Reserves	Comments/ CPR section
Section 1: Project Outline						
1.1	Property description	(i)	Brief description of the scope of project (i.e. whether in preliminary sampling, advanced exploration, Scoping, Pre-feasibility, or Feasibility phase, Life of Mine for an ongoing mining operation or closure)			Executive summary ("ES") 1.1/ 20.1
		(ii)	Describe (noting any conditions that may affect possible prospecting/ mining activities) the topography, elevation, drainage, fauna and flora, the means and ease of access to the property, the proximity of the property to a population centre, and the transport infrastructure, the climate, known associated climatic risks and the length of the operating season and to the extent these are relevant to the mineral project, the sufficiency of surface rights for mining operations including the availability and sources of power, water mining personnel, potential tailings storage areas, potential waste disposal areas, heap leach pad areas, and potential processing plant sites.			ES/ 2.1/ 2.2/ 3.1/ 3.2/ 3.3/ 3.4/ 10.2/ 16.2/ 16.3
		(iii)	Specify the details of the personal inspection on the property by each CP or, if applicable the reason why a personal inspection has not been completed.			1.3
1.2	Location	(i)	Description of location and map (country, province, and closest town/ city, coordinate systems and ranges, etc)			ES/ 2.1/ 3.5
		(ii)	Country profile: present information pertaining to the project host country that is pertinent to the project, including relevant applicable legislation, environmental and social context etc. Assess, at a high level, relevant technical, environmental, social, economic, political and other key risks.			2.4/ 2.5
		(iii)	Provide a general topocadastral map	Provide a topocadastral map in sufficient detail to support the assessment of eventual economics. State the known associated climate risks	Provide a detailed topocadastral map. Confirm that applicable aerial surveys have been checked with ground controls and survey, particularly in areas of rugged terrain, dense vegetation or high altitude	3.1
1.3	Adjacent properties	(i)	Discuss details of relevant adjacent properties. If adjacent or nearby properties have an important bearing on the report, then their location and common mineralised structures should be included on the maps. Reference all information used from other sources.			2.3
1.4	History	(i)	State historical background to the project and adjacent areas concerned, including known results of previous exploration and mining activities (type, amount, quantity and development work), previous ownership and changes thereto.			ES/ 4/ 4.1/ 4.4
		(ii)	Present details of previous successes or failures with reasons why the project may now be considered potentially economic.			4.4
		(iii)		Discuss known or existing historical Mineral Resource estimates and performance statistics on actual production for past and current operations.		4.2/ 4.3/ 4.4
1.5	Legal aspects and permitting	Confirm the legal tenure to the satisfaction of the CP, including the following information:				-
		(i)	Discuss the nature of the issuer's rights (e.g. prospecting and/or mining) and the right to use the surface of the properties to which these rights relate. Disclose the date of expiry and other relevant details.			ES/ 2.5

SAMREC Table 1				
			Exploration results / Mineral Resources / Mineral Reserves	Comments/ CPR section
Section 1: Project Outline				
		(ii)	Present the principal terms and conditions of all existing agreements, and details of those still to be obtained, (such as but not limited to, concessions, partnerships, joint ventures, access rights, leases, historical and cultural sites, wilderness or national park and environmental settings, royalties, consents, permission, permits or authorisations).	2.5/ 2.7/ 16.2
		(iii)	Present the security of the tenure held at the time of reporting or that is reasonably expected to be granted in the future along with any known impediments to obtaining the right to operate in the area. State details of applications that have been made.	2.5/ 16.2
		(iv)	Provide a statement of any legal proceedings, for example, land claims, that may have an influence on the rights to prospect or mine for minerals or an appropriate negative statement.	ES/ 2.5/ 2.7
		(v)	Provide a statement relating to governmental/ statutory requirements and permits as may be required, have been applied for, approved or can be reasonably be expected to be obtained.	2.5/ 2.6/ 16.2
1.6	Royalties	(i)	Describe the royalties that are payable in respect of each property.	2.6
1.7	Liabilities	(i)	Describe any liabilities, including rehabilitation guarantees, that are pertinent to the project. Provide a description of the rehabilitation liability, including, but not limited to, legislative requirements, assumptions and limitations.	2.6/ 16.2/ 16.5/ 19.6

26.1.2. Section 2: Geological setting, deposit, mineralisation

Table 26-2: Geological setting, deposit, mineralisation

SAMREC Table 1				
			Exploration results / Mineral Resources / Mineral Reserves	Comments/ CPR section
Section 2: Geological setting, Deposit, Mineralisation				
2.1	Geological setting, deposit, mineralisation	(i)	Describe the regional geology	ES/ 5.1
		(ii)	Describe the project geology, including deposit type, geological setting and style of mineralisation.	ES/ 5.2/ 5.3
		(iii)	Discuss the geological model or concepts being applied in the investigation and on the basis of which the exploration programmes are planned. Describe the inferenced made from this model.	7.1/ 7.2
		(iv)	Discuss data density, distribution and reliability and whether the quality and quantity of information are sufficient to support statements, made of inferred, concerning the Exploration Target or Mineralisation.	N/A
		(v)	Discuss the significant minerals present in the deposit, their frequency, size and other characteristics. Include minor and gangue minerals where these will have an effect on the processing steps. Indicate the variability of each important mineral within the deposit.	5.2
		(vi)	Describe the significant mineralised zones encountered on the property, including a summary of the surrounding rock types, relevant geological controls, and the length, width, depth, and continuity of the mineralisation, together with a description of the type, character and distribution of the mineralisation.	5.2/ 5.3
		(vii)	Confirm that reliable geological models and/ or maps and cross-sections that support interpretations exist.	7.1/ 7.2

26.1.3.Section 3: Exploration, drilling, sampling techniques and data

Table 26-3: Section 3: Exploration, drilling, sampling techniques and data

SAMREC Table 1				
			Exploration results / Mineral Resources / Mineral Reserves	Comments/ CPR section
Section 3: Exploration and drilling, sampling techniques and data				
3.1	Exploration	(i)	Describe the data acquisition or exploration techniques and the nature, level of details, and confidence in the geological data used (i.e. geological observations, remote sensing results, stratigraphy, lithology, structure, alteration, mineralisation, hydrology, geophysical, geochemical, petrography, mineralogy, geochronology, bulk density, potential deleterious or contaminating substances, geotechnical and rock characteristics, moisture content, bulk samples etc.). Confirm the data sets include all relevant metadata, such as unique sample number, sample mass, collection date, spatial location etc.	4.1/ 6.1/ 6.2/ 6.3/ 6.4/ 9.2/ 10
		(ii)	Identify and comment on the primary data elements (observation and measurements) used for the project and describe the management and verification of these data or the database. This should describe the following relevant process: acquisition (capture or transfer), validation, integration, control, storage, retrieval and backup processes. It is assumed data are stored digitally, but hand-printed tables with well-organised data and information may also constitute a database.	6.3/ 6.5
		(iii)	Acknowledge and appraise data from other parties and reference all data and information used from other sources.	1.4/ 4.1/ 6
		(iv)	Clearly distinguish between data/ information from the property under discussion and that derived from surrounding properties.	6/ 7
		(v)	Describe the survey methods, techniques and expected accuracies of data. Specify the grid system used.	3.5/ 6.1/ 6.3
		(vi)	Discuss whether the data spacing and distribution are sufficient to establish the degree of geological and grade continuity appropriate for the estimation procedure(s) and classifications applied.	7.1/ 8.2/ 8.7
		(vii)	Present representative models and/ or maps and cross-sections or other two- or three-dimensional illustrations of results, showing location of samples, accurate drill-hole collar positions, downhole surveys, exploration pits, underground workings, relevant geological data, etc.	6/ 7.1/ 7.2
		(viii)	Report the relationships between mineralisation widths and intercept lengths and (particularly important) the geometry of the mineralisation with respect to the drill-hole angle. If it is not known and only the downhole lengths are reported, confirm it with a clear statement to this effect (e.g. 'downhole length, true width not known').	8.1
3.2	Drilling techniques	(i)	Present the type of drilling undertaken (e.g. core, reverse circulation, open-hole hammer, rotary air blast, auger, Banka, sonic, etc) and details (e.g. core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).	4.1/ 6.1
		(ii)	Describe whether core and chip samples have been geologically and geotechnically logged to a level of detail support appropriate Mineral Resource estimation, Technical studies, mining studies and metallurgical studies.	6.1/ 9.2
		(iii)	Describe whether logging is qualitative or quantitative in nature; indicate core photography (or costean, channel, etc) was undertaken.	6.2/ 6.4
		(iv)	Present the total length and percentage of the relevant intersections logged.	4.1/ 6.1
		(v)	Discuss the results of any downhole surveys of the drill-holes.	6.1
3.3	Sampling method, collection, capture and storage	(i)	Describe the nature and quality of sampling (e.g. cut channels, random chips, or specific specialised industry-standard measurement tools appropriate to the minerals under investigation, such as downhole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.	6.2/ 6.4
		(ii)	Describe the sampling processes, including sub-sampling stages to maximise retrospectivity of samples. This should include whether sample sizes are appropriate to the grain size of the material being sampled. Indicate whether sample compositing has been applied.	6.2

SAMREC Table 1				
			Exploration results / Mineral Resources / Mineral Reserves	Comments/ CPR section
Section 3: Exploration and drilling, sampling techniques and data				
		(iii)	Appropriately describe each data set (e.g. geology, grade, density, quality, diamond breakage, geometallurgical characteristics etc.), sample type, sample size selection, and collection methods.	6.2
		(iv)	Report the geometry of the mineralisation with respect to the drill-hole angle. State whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type. State if the intersection angle is not known and only the downhole lengths are reported.	6.1/ 6.2/ 7.1/ 7.2
		(v)	Describe retention policy and storage of physical samples (e.g. core, sample reject, etc)	6.2
		(vi)	Describe the method of recording and assessing core and chip sample recoveries and results assessed, measures taken to maximise sample recovery and ensure representative nature of the samples and whether a relationship exists between sample recovery and grade, and whether sample bias may have occurred due to preferential loss/ gain of fine/ coarse material.	6.2
		(vii)	If a drill-core sample is taken, state whether it was split or sawn and whether quarter, half or full core was submitted for analysis. If a non-core sample, state whether the sample was riffled, tube sampled, rotary split etc. and whether it was sampled wet or dry.	6.2
3.4	Sample preparation and analysis	(i)	Identify the laboratory/ laboratories and state their accreditation status and Registration Number or provide a statement that the laboratories are not accredited.	6.4
		(ii)	Identify the analytical method. Discuss the nature, quality and appropriateness of the assaying and laboratory processes and procedures used and whether the technique is considered partial or total.	6.4
		(iii)	Describe the process and method used for sample preparation, sub-sampling and size reduction, and likelihood of inadequate or non-representative samples (i.e. improper size reduction, contamination, screen sizes, granulometry, mass balance, etc).	6.4
3.5	Sampling governance	(i)	Discuss the governance of the sampling campaign and process, to ensure quality and representativity of samples and data such as sample recovery, high-grading, selective losses or contamination, core/hole diameter, internal and external QA/QC, and any other factors that may have resulted in or identified sample bias.	6.3/ 6.4/ 6.5
		(ii)	Describe the measure taken to ensure sample security and the chain of custody	6.3/ 6.5
		(iii)	Describe the validation procedures used to ensure the integrity of the data, e.g. transcription, input or other errors, between its initial collection and its future use for modelling (e.g. geology, grade, density, etc.).	6.3/ 6.5
		(iv)	Describe the audit process and frequency (including dates of these audits) and disclose any material risks identified.	6.3
3.6	Quality control/ quality assurance	(i)	Demonstrate that adequate field sampling process verification techniques (Q/QC) have been applied, e.g. the level of duplicates, blanks, reference material standards, process audits, analysis, etc. If indirect methods of measurement were used (e.g. geophysical methods), these should be described, with attention given to the confidence of interpretation.	6.5
3.7	Bulk density	(i)	Describe the method of bulk density determination with reference to the frequency of measurements, the size, nature and representativeness of the samples.	6.4
		(ii)	If target tonnage ranges are reported, state the preliminary estimates or basis of assumptions made for bulk density.	N/A
		(iii)	Discuss the retrospectivity of bulk density samples of the material for which a grade range is reported.	N/A
		(iv)	Discuss the adequacy of the methods of bulk density determination for bulk material with special reference to accounting for void spaces (bugs, porosity etc), moisture and differences between rock and alteration zones within the deposit.	6.4
3.8	Bulk sampling and/ trial mining	(i)	Indicate the location of individual samples (including map)	12.2
		(ii)	Describe the size of samples, spacing/ density of samples, recovered and whether sample sizes and distribution are appropriate to the grain size of the material being sampled.	12.2
		(iii)	Describe the method of mining and treatment.	12.2/ 12.3/ 12.4

SAMREC Table 1						
			Exploration results	Mineral Resources	Mineral Reserves	Comments/ CPR section
Section 3: Exploration and drilling, sampling techniques and data						
		(iv)	Indicate the degree to which the samples are representative of the various types and styles of mineralisation and the mineral deposit as a whole.			12.2/ 12.3/ 12.4

26.1.4.Section 4: Estimation and reporting of Exploration results and Mineral Resources

Table 26-4: Section 4: Estimation and reporting of Exploration results and Mineral Resources

SAMREC Table 1						
			Exploration results	Mineral Resources	Mineral Reserves	Comments/ CPR section
Section 4: Estimation and reporting of Exploration Results and Mineral Resources						
4.1	Geological model and interpretation	(i)	Describe the geological model, construction technique and assumptions that form the basis for the Exploration results or Mineral Resource estimate. Discuss the sufficiency of data density to assure continuity of mineralisation and geology and provide an adequate basis for the estimation and classification procedures applied.			7.1/ 7.2
		(ii)	Describe the nature, detail and reliability of geological information with which lithological, structural, mineralogical, alteration or other geological, geotechnical and geo-metallurgical characteristics were recorded.			7.1/ 7.2
		(iii)	Describe any obvious geological, mining, metallurgical, environmental, social, infrastructural, legal and economic factors that could have a significant effect on the prospects of any possible exploration target or deposit			N/A – Mineral Resources and Mineral Reserve reported
		(iv)		Discuss all known geological data that could materially influence the estimated quantity and quality of the Mineral Resource.		6.1/ 6.2/ 6.3/ 6.4/ 6.5/ 6.6/ 7.1/ 7.2
		(v)		Discuss whether consideration was given to alternative interpretations or models and their possible effect (or potential risk), if any, on the Mineral Resource estimate.		7.1/ 7.2
		(vi)		Discuss geological discounts (e.g. magnitude, per reef, domain, etc) applied in the model, whether applied to mineralised and/ or unmineralized material (e.g. potholes, faults, dykes, etc)		8.5
4.2	Estimation and modelling techniques	(i)	Describe in detail the estimation techniques and assumptions used to determine the grade and tonnage ranges			N/A – Mineral Resources and Mineral Reserves reported
		(ii)		Discuss the nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values (cutting or capping), compositing (including by length and/or density), domaining, sample spacing, estimation unit size, (block size), selective mining units, interpolation parameters and maximum distance of extrapolation from data points.		8.1/ 8.2/ 8.3/ 8.4/ 8.6
		(iii)		Describe assumptions and justification of correlations made between variables		8.2
		(iv)		Provide details of any relevant specialised computer program (software) used with the version number, together with the estimation parameters used.		8.4

SAMREC Table 1						
			Exploration results	Mineral Resources	Mineral Reserves	Comments/ CPR section
Section 4: Estimation and reporting of Exploration Results and Mineral Resources						
		(v)		State the processes of checking and validation, the comparison of model information to sample data and use of reconciliation data, and whether the Mineral Resource estimate takes account of such information.		8.6/ 8.10
		(vi)		Describe the assumptions made regarding the estimation of any co-products, by-products or deleterious elements.		8.2/ 8.4
4.3	Reasonable and realistic prospects for eventual economic extraction	(i)		Disclose and discuss geological parameters. These would include (but not limited to) volume/ tonnage, grade and value/ quality estimates, cut-off grades, strip ratios, upper and lower screen sizes.		8.1/ 8.5
		(ii)		Disclose and discuss the engineering parameters. These would include mining method, dilution, processing, geotechnical, geo-hydraulic and metallurgical) parameters		8.8/ 9/ 10/ 11/ 12/ 13
		(iii)		Disclose and discuss the infrastructure, including, but not limited to, power water, site access		8.8/ 13/ 14
		(iv)		Disclose and discuss the legal, governmental, permitting, statutory parameters		2.5/ 8.8/ 16.2
		(v)		Disclose and discuss the environmental and social (or community) parameters		15/ 16
		(vi)		Disclose and discuss the marketing parameters		17
		(vii)		Disclose and discuss the economic assumptions and parameters. These factors will include, but not limited to, commodity prices and potential capital and operating costs.		2.6/ 8.8/ 18/ 19/ 20
		(viii)		Discuss any material risks		22
		(ix)		Discuss the parameters used to support the concept of 'eventual'		8.8
4.4	Classification criteria	(i)		Describe criteria and methods used as the basis for the classification of the Mineral Resources into various confidence categories		8.7
4.5	Reporting	(i)	Discuss the reported low and high grades and widths together with their spatial location to avoid misleading the reporting of Exploration Results, Mineral Resources or Mineral Reserves.			8.1
		(ii)	Discuss whether the reported grades are regional averages or if they are selected individual samples taken from the property under discussion.			8.1/ 8.2/ 8.4
		(iii)	State assumptions regarding mining methods, infrastructure, metallurgy, environmental and social parameters. State and discuss where no mining-related assumptions have been made.			N/A
		(iv)	State the specific quantities and grades/ qualities that are reported in ranges and/or widths and explain the basis of the reporting.			N/A
		(v)		Present the detail, for example, open pit, underground residue stockpile, remnants, tailings, and existing pillars or other sources in the Mineral Resource statement.		ES/ 8.9

SAMREC Table 1						
			Exploration results	Mineral Resources	Mineral Reserves	Comments/ CPR section
Section 4: Estimation and reporting of Exploration Results and Mineral Resources						
		(vi)		Present a reconciliation with any previous Mineral Resource estimates Where appropriate, report and comment on any historical trends (e.g. global bias).		8.10
		(vii)		Present the defined reference point for the tonnages and grades reported as Mineral Resources. State the reference point if the point is where the run-of-mine material is delivered to the processing plant. It is important that, in all situations where the reference point is different, such as for a saleable product, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported.		8.9
		(viii)	If the CP is relying on a report, opinion, or statement of another expert who is not a CP, disclose the date, title, and author of the report, opinion, or statement, the qualifications of the other expert and why it is reasonable for the CP to rely on the other expert, any significant risks, and any steps the CP took to verify the information provided.			1.6
		(ix)	State the basis of equivalent metal formulae, if applied.			N/A – Metal equivalents not reported

26.1.5.Section 5: Technical studies

Table 26-5: Section 5: Technical studies

SAMREC Table 1						
			Exploration results	Mineral Resources	Mineral Reserves	Comments/ CPR section
Section 5: Technical studies						
5.1	Introduction	(i)	Technical studies are not applicable to Exploration results	State the level of study – whether Scoping, Pre-feasibility, Feasibility or ongoing Life of Mine	State the level of study – whether Pre-feasibility, Feasibility or ongoing Life-of-Mine. The Code requires that a study to a least a Pre-Feasibility level has been undertaken to convert Mineral Resources to Mineral Reserve. Such studies will have been carried out and will include a mine plan or production schedule that is technically achievable and economically viable and consider all Modifying factors.	ES/ 11/ 21.1
		(ii)			Provide a summary table of the Modifying factors used to convert the Mineral Resource to Mineral Reserve for Pre-feasibility, Feasibility or ongoing Life-of-Mine studies.	ES/ 11.4

SAMREC Table 1						
			Exploration results	**Mineral Resources**	**Mineral Reserves**	**Comments/ CPR section**
Section 5: Technical studies						
5.2	Mining Design	(i)	Technical studies are not applicable to Exploration results	State assumptions regarding mining methods and parameters when estimating Mineral Resources or explain where no mining assumptions have been made.		8.8
		(ii)			State and justify all Modifying factors and assumptions made regarding mining methods, minimum mining dimensions (or pit shell) and internal and if applicable, external mining dilution and mining losses used for the techno-economic study and signed off, such as mining method, mine design criteria, infrastructure, capacities, production schedule, mining efficiencies, grade control, geotechnical and hydrological considerations, closure plans, and personnel requirements.	9/ 10/ 11/ 13/ 14/ 16.5/ 19.7
		(iii)			State what Mineral Resource models have been used in the study.	21.1
		(iv)			Explain the basis of (the adopted) cut-off grade(s) or quality parameters applied. Include metal equivalents if relevant.	11
		(v)			Describe and justify the mining method(s) to be used.	11
		(vi)			For open pit mines, include a discussion of pit slopes, slope stability, and strip ratio.	N/A
		(vii)			For underground mines, include a discussion of mining method, geotechnical considerations, mine design characteristics, and ventilation/ cooling requirements.	9/ 11.3/ 11.7
		(viii)			Discuss the mining rate, equipment selected, grade control methods, geotechnical and hydrogeological considerations, health and safety of the workforce, staffing requirements, dilution, and recovery.	9/ 10/ 11.3/ 11.4/ 11.5/ 11.6/ 19.7
		(ix)			State the optimisation methods used in planning, list of constraints	11/ 11.5

SAMREC Table 1						
			Exploration results	Mineral Resources	Mineral Reserves	Comments/ CPR section
Section 5: Technical studies						
					(practicality, plant, access, exposed Mineral Reserves, stripped Mineral Reserves, bottlenecks, draw control).	
5.3	Metallurgical and test work	(i)	Technical studies are not applicable to Exploration results		Discuss the source of the sample and the techniques to obtain the sample, laboratory and metallurgical testing techniques.	12
		(ii)			Explain the basis for assumptions or predictions regarding metallurgical amenability and any preliminary mineralogical test work already carried out.	12
		(iii)		Discuss the possible processing methods and any processing factors that could have a material effect on the likelihood of eventual economic extraction. Discuss the appropriateness of the processing methods to the style of mineralisation.	Describe and justify the processing method(s) to be used, equipment, plant capacity, efficiencies, and personnel requirements.	12/ 13/ 19.7
		(iv)			Discuss the nature, amount and representativeness of metallurgical test work undertaken and the recovery factors used. A detailed flow sheet/ diagram and a mass balance should exist, especially for multi-product operations from which the saleable materials are priced for different chemical and physical characteristics.	12/ 13
		(v)			State what assumptions or allowances have been made for deleterious elements and the existence of any bulk-sample or pilot-scale test work and the degree to which such samples are representative of the orebody as a whole.	12
		(vi)			State whether the metallurgical process is well-tested technology or novel in nature.	12
5.4	Infrastructure	(i)	Technical studies are not applicable to Exploration results	Comment regarding the current state of infrastructure or the ease with		3.4/ / 13.2/ 13.3/ 14

SAMREC Table 1						
			Exploration results	Mineral Resources	Mineral Reserves	Comments/ CPR section
Section 5: Technical studies						
				which the infrastructure can be provided or accessed.		
		(ii)			Report in sufficient detail to demonstrate that the necessary facilities have been allowed for (which may include, but not be limited to, processing plant, tailings dam, leaching facilities, waste dumps, road, rail or port facilities, water and power supply, offices, housing, security, resource sterilisation testing etc). Provide detailed maps showing locations of facilities.	13.2/ 13.3/ 14
		(iii)			Provide a statement showing that all necessary logistics have been considered.	14/ 17.3
5.5	Environmental and social	(i)	Technical studies are not applicable to Exploration results.	Confirm that the company holding the tenement has addressed the host country's environmental legal compliance requirements and any mandatory and/or voluntary standards or guideline to which it subscribes.		16.1/ 16.2/ 16.4
		(ii)		Identify the necessary permits that will be required and their status. Where not yet obtained, confirm that there is a reasonable basis to believe that all permits required for the project will be obtained.		ES/ 16.2
		(iii)		Identify and discuss any sensitive areas that may affect the project as well as any other environmental factors, including Interested and Affected Parties (I&AP) and/ or studies that could have a material effect on the likelihood of eventual economic extraction. Discuss possible means of mitigation.		16.2/ 16.3/ 16.4
		(iv)		Identify any legislated social management programmes that may be required and discuss the content and status of these.		15
		(v)		Outline and quantify the material socio-economic and cultural impacts that need to be mitigated, and their mitigation measures and, where appropriate, the associated costs.		15
5.6	Market studies and economic criteria	(i)	Technical studies are not applicable to Exploration results.		Describe the valuable and potentially valuable product(s), including suitability of products, co-products and by-products for marketing.	17
		(ii)			Describe the product(s) to be sold, customer specifications, testing, and acceptance requirements. Discuss whether there exists a ready market for the product(s) and whether contracts for the sale of the product(s) are in place or expected to be readily obtained. Present price	ES/ 17.1/ 17.2

SAMREC Table 1						
			Exploration results	Mineral Resources	Mineral Reserves	Comments/ CPR section
Section 5: Technical studies						
					and volume forecasts and the basis for the forecast.	
		(iii)			State and describe all economic criteria that have been used for the study, such as capital and operating costs, exchange rates, revenue/ price curves, royalties, cut-off grades, reserve pay limits.	1.5/ 2.6/ 18/ 19/ 20
		(iv)			Provide a summary description, source of and confidence in method used to estimate the commodity price/ value profiles used for cut-off grade calculation, economic analysis and project valuation, including applicable taxes, inflation indices, discount rate and exchange rates.	2.6/ 20
		(v)			Present the details of the point of reference for the tonnages and grades reported as Mineral Reserves, e.g. material delivered to the processing facility or saleable product(s). It is important that, in any situation where the reference point is different, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported.	21.2
		(vi)			Justify assumptions made concerning production cost including transportation, treatment, penalties, exchange rates, marketing and other costs. Provide details of allowances that are made for the content of deleterious elements and the cost of penalties.	17/ 19
		(vii)			Provide details of allowances made for royalties payable, both to Government and private concerns.	2.6/ 20.3
		(viii)			State type, extent and condition of plant and equipment that is significant to the existing operation(s).	13
		(ix)			Provide details of all environmental, social and labour costs considered.	15/ 16.5/ 19.6/ 19.7/ 20.3

SAMREC Table 1						
			Exploration results	Mineral Resources	Mineral Reserves	Comments/ CPR section
Section 5: Technical studies						
5.7	Risk analysis	(i)	Technical studies are not applicable to Exploration results	Report an assessment of technical, environmental, social, economic, political and other key risks to the project. Describe actions that will be taken to mitigate and/or manage the identified risks.		21.4/ 22
5.8	Economic analysis	(i) (ii) (iii) (iv)	Technical studies are not applicable to Exploration results	At the relevant level (Scoping study, Pre-feasibility, Feasibility or ongoing Life-of-Mine), provide an economic analysis for the project that includes: ▪ Cash flow forecast on an annual basis using Mineral Reserves or an annual production schedule for the life of the project ▪ A discussion of net present value (NPV), internal rate of return (IRR) and payback period of capital ▪ Sensitivity or other analysis using variants in commodity price, grade, capital and operating costs, or other significant parameters, as appropriate, and discuss the impact of the results.		18/ 19/ 20

26.1.6.Section 6: Estimation and reporting of Mineral Reserves

Table 26-6: Section 6: Estimation and reporting of Mineral Reserves

SAMREC Table 1						
			Exploration results	Mineral Resources	Mineral Reserves	Comments/ CPR section
Section 6: Estimation and Reporting of Mineral Reserves						
6.1	Estimation and modelling techniques	(i)		Describe the Mineral Resource estimate used as a basis for the conversion to a Mineral Reserve.		21.1
		(ii)		Report the Mineral Reserve statement with sufficient detail indicating if the mining is an open pit or underground plus the source and type of mineralisation, domain or orebody, surface dumps, stockpiles and all other sources.		21.2
		(iii)			Provide a reconciliation reporting historical reliability of the performance parameters, assumptions and Modifying factors, including a comparison with the previous Reserve quantity and qualities, if available. Where appropriate, report and comment on any historical trends (e.g. global bias).	21.3
6.2	Classification criteria	(i)			Describe and justify criteria and methods used as the basis for the classification of the Mineral Reserves into various confidence categories, based on the Mineral Resource category, and including consideration	21.2

SAMREC Table 1						
			Exploration results	Mineral Resources	Mineral Reserves	Comments/ CPR section
Section 6: Estimation and Reporting of Mineral Reserves						
					of the confidence in all the Modifying factors.	
6.3	Reporting	(i)			Discuss the proportion of Probable Mineral Reserves that have been derived from Measure Mineral Resources (if any), including the reason(s) therefore.	21.2
		(ii)			Present details of, for example, open pit, underground, residue stockpile, remnants, tailings, and existing pillars or other sources in respect of the Mineral Reserve statement.	21.2
		(iii)			Present the details of the defined reference point for the Mineral Reserves. State where the reference pint is the point where the run-of-mine material is delivered to the processing plant. It is important that in all situations where the reference point is different, such as for a saleable product, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported. State clearly whether the tonnages and grades reported for Mineral Reserves are in respect of material delivered to the plant or after recovery.	21.2
		(iv)			Present a reconciliation with the previous Mineral Reserve estimates. Where appropriate, report and comment on any historic trends (e.g. global bias).	21.3
		(v)			Only Measured and Indicated Mineral Resources can be considered for inclusion in the Mineral Reserve.	21.2
		(vi)			State whether the Mineral Resources are inclusive or exclusive of Mineral Reserves.	8.9/ 21.2

26.1.7.Section 7: Audits and reviews

Table 26-7: Section 7: Audits and reviews

SAMREC Table 1				
			Exploration results / Mineral Resources / Mineral Reserves	Comments/ CPR section
Section 7: Audits and reviews				
7.1	Audits and reviews	(i)	State type of review/ audit (e.g. independent, external), area (e.g. laboratory, drilling, data, environmental compliance etc.), date and name of the reviewer(s) together with their recognised professional qualifications	6.5.3/ 16.7
		(ii)	Disclose the conclusions of relevant audits or reviews. Note where significant deficiencies exist and remedial actions are required.	6.5.3/ 16.7

26.1.8.Section 8: Other relevant information

Table 26-8: Section 8: Other relevant information

SAMREC Table 1				
			Exploration results / Mineral Resources / Mineral Reserves	Comments/ CPR section
Section 8: Other relevant information				
8.1		(i)	Discuss all other relevant and material information not discussed elsewhere.	In the opinion of the CP, all relevant information is contained in the CPR

26.1.9.Section 9: Qualification of Competent Person(s) – date and signature page

Table 26-9: Section 9: Qualification of Competent Person(s) - date and signature page

SAMREC Table 1				
			Exploration results / Mineral Resources / Mineral Reserves	Comments/ CPR section
Section 9: Qualification of Competent Person(s) and other key technical staff – date and signature page				
9.1		(i)	State the full name, registration number and name of the professional body or Recognised Professional Organisation (RPO) for all the CPs. State the relevant experience of the CP(s) and other key technical staff who prepared and are responsible for the Public Report.	1.3/ 1.6/ 25/ 26.5
		(ii)	State the CP's relationship to the issuer of the report.	1.2
		(iii)	Provide the Certificate of the CP (Appendix 2) including the date of sign-off and the effective date, in the Public Report.	26.5

26.1.10. Section 10: Reporting of Coal Resources and Reserves

Table 26-10: Section 10: Reporting of Coal Resources and Reserves

SAMREC Table 1						
			Exploration results	Mineral Resources	Mineral Reserves	Comments/ CPR section
Section 10: Reporting of Coal Resources and Reserves						
10.1	Specific reporting for Coal	(i)	Confirm that the reports on coal deposits take cognisance of Sections 54 – 74 of the Code and Sections 1 – 9 of Table 1.			N/A – Coal Resources and Coal Reserve not reported
		(ii)	Confirm that the Coal Exploration results, Coal inventory, Coal Resources and Coal Reserves are reported using South African National Standard 10320 as the guideline.			N/A
10.2	Geological setting, Deposit, Mineralisation	(i)	Describe the project geology, including coal deposit type, geological setting and coal seams/ zones present.			N/A
		(ii)	Identify and discuss the structural complexity, physical continuity, coal rank, qualitative and quantitative properties of the significant coal seams or zones on the property.			N/A
10.3	Drilling techniques	(i)	Report core recoveries and method of calculation. Confirm that core recoveries in cored drill holes are in excess of 95% by length within the coal seam intersection.			N/A
	Relative density to replace Bulk density	(ii)	Describe the apparent relative density or true relative density of the coal seam(s) determined on coal samples from drill hole cores using recognised standard laboratory methods or commonly used procedures. State the moisture basis on which the relative density determination is based and the moisture basis on which the final density value is reported (in-situ or air-dried basis).			N/A
	Bulk sampling and/or Trial mining	(iii)	Describe the purpose or aim of the bulk sampling programme, the size of samples, and spacing/ density of samples recovered. Describe the applicability of bulk sampling or large diameter core samples in providing representative samples for tests. Compare and comment on results obtained from bulk sampling versus exploration sampling.			N/A
10.4	Reasonable and realistic prospects for eventual economic extraction	(i)	Confirm that an appropriate coal quality is reported for all Coal Resource categories. Present and discuss the type of analysis (e.g. raw coal, washed coal at a specific cut-point density) and the basis of reporting of the coal quality parameters (e.g. air-dried basis, dry basis, etc).			N/A
10.5	Coal Resource reporting	(i)		A Coal Resource includes only the coal seam(s) above the minimum thickness cut-off and the coal quality cut-off(s). Present and discuss the MTIS Coal Resource tonnage and quality.		N/A
		(ii)		State the reporting basis for the Coal Resource statement with particular reference to moisture and relative density.		N/A
10.6	Coal Reserve reporting	(i)			Sate the reporting basis for the Coal Reserve statement with particular reference to moisture and relative density.	N/A
		(ii)			Confirm that the Coal Reserves are reported as run-of-mine tonnages and coal quality, and also as saleable product/s tonnages and coal quality. Present and discuss the reporting	N/A

SAMREC Table 1						
			Exploration results	Mineral Resources	Mineral Reserves	Comments/ CPR section
Section 10: Reporting of Coal Resources and Reserves						
					basis for the Coal Reserve statement with particular reference to moisture content and relative density.	

26.1.11. Section 11: Reporting of Diamonds and Gemstones

Table 26-11: Section 11: Reporting of Diamonds and Gemstones

SAMREC Table 1				
			Exploration results / Mineral Resources / Mineral Reserves	Comments/ CPR section
Section 11: Reporting of Diamonds and Gemstones				
This section highlights criteria that are applicable to diamond deposits and other gemstone deposits. Reports of diamond and other gemstone properties must also take cognisance of sections 59-71 of the Code, Sections 1 - 9 of Table 1 and the Guidance notes in the SAMCODE Companion Volume. The information required in this section (Section 11) should be included with the relevant sections and should not comprise a separate chapter.				
11.1	Geological Setting, Deposit, Mineralisation	(i)	For diamond placer occurrences, describe the overburden and gravel thicknesses, as well as bedrock topography	N/A – Diamond Resources and Diamond Reserves not reported
11.2	Sampling of Diamond Projects	(i)	Describe the type of sample (outcrop, boulder, drill-core, RC drill cuttings, gravel, stream sediment or soil) and purpose (for example RC drilling to identify gravel thickness, large diameter drilling to establish stones per unit of volume, bulk-sample etc)	N/A
		(ii)	Discuss sample size, distribution and representivity	N/A
		(iii)	Identify the type of sample facility, treatment rate and accreditation	N/A
		(iv)	Discuss sample size reduction, bottom and top screen sizes and any re-crush	N/A
		(v)	Discuss the sample processes (e.g. DMS, grease, X-Ray, Hand-sorting, etc.)	N/A
		(vi)	Discuss process efficiency, tailings auditing and granulometry	N/A
		(vii)	Identify the laboratory used, type of process for micro diamonds and accreditation. Reports of micro diamond recoveries should describe the extraction process, crushing methodology and the stone counts per unit weight, as a minimum.	N/A
		(viii)	State whether the reports of kimberlitic indicator minerals ("KIM's") or diamond indicator minerals ("DIM's") have been prepared by a suitably qualified laboratory which must be identified.	N/A
		(ix)	Supply details of the sampling parameters for reports dealing with recoveries of diamonds or KIM's, including, but not limited to type of sample (stream sediment, soil, bulk, rock, etc.) as well as sample size, sample frequency, representivity and screen parameters are required.	N/A
		(x)	Discuss the relevant major and trace element chemistry of any kimberlitic indicator minerals recovered. Reference relevant peer-reviewed published research articles when reporting the interpretation of mineral chemistry data for diamond exploration projects.	N/A
		(xi)	Provide details of the form, shape, colour and size of the diamonds recovered and, where relevant, comments regarding the nature of the source of the diamonds.	N/A
11.3	Bulk-sampling and/or trial-mining	(i)	Provide a table of relevant results, including (but not limited to) volume of sample, number of individual diamonds, total number of carats, sample grade, diamond value (it is not possible to evaluate diamond assortment from micro diamonds).	N/A
		(ii)	Discuss micro- and macro- diamond sample results per geological domain.	N/A
		(iii)	Discuss stone-size and -number distribution (Size-frequency distribution). Include the suitability of the sample size to the stage of the project and its relevance for both SFD and valuation (assortment) purposes.	N/A

SAMREC Table 1						
			Exploration results	Mineral Resources	Mineral Reserves	Comments/ CPR section
Section 11: Reporting of Diamonds and Gemstones						
		(iv)	State the top and bottom sieve cut-off sizes.			N/A
		(v)	Discuss diamond breakage, where relevant			N/A
		(vi)	Define the unit of grade measure used in the document (e.g. carat per units of mass, area or volume). Where carats per unit of mass is used, include a discussion of mass to tonnage conversion.			N/A
11.4	Estimation and modelling techniques	(i)	Describe in detail any estimation techniques (including geostatistical estimation, where relevant) used to determine the volume/tonnage, grade and value data, including their applicability to the deposit type.			N/A
		(ii)	Express applicable volumes, grades and values in ranges (with appropriate clarifiers to denote lack of reliability of data). The use of "ranges" in this context has no statistical connotation	State all Diamond Resource estimates so as to convey the order of accuracy by rounding off to appropriately significant figures.	State all Diamond Reserve estimates so as to convey the order of accuracy of the estimates by rounding off to appropriately significant figures.	N/A
		(iii)	Discuss volume/tonnage, grade and value information per identified domain (where possible, even if in a very preliminary form)	Discuss volume/tonnage, grade and value information per identified domain		N/A
		(iv)	If grades are reported then state clearly whether these are regional averages, based on micro diamond assessment, KIM analyses, or if they are selected individual samples taken from the property under discussion. The occurrence of individual diamonds or micro diamonds in surficial deposits or from inadequate samples (too small to be statistically valid) from a primary or secondary rock source would not typically qualify as an exploration target. This may not be true for marine deposits, in which case further explanation and discussion would be necessary.	State that the grades for the Diamond Resources are estimated from sampling data derived from the property itself	State that the grades for Diamond Reserves have been estimated from bulk-sampling and/or trial-mining	N/A
		(v)	Report all diamond values in US$/ct. If reference is made to local currencies, then provide the prevailing exchange rate as well as the effective date of the exchange rate. Also, supply the date of valuation.			N/A
		(vi)	Specify details of the type and size of individual samples (including top and bottom cut-off size, in millimetres, used in the recovery).			N/A
		(vii)	Discuss the representivity of the type, size, number and location of the samples			N/A
		(viii)	Discuss geostatistical estimation (where relevant) and interpolation techniques applied and their applicability to the deposit type			N/A
		(ix)	Specify the number and total weight (in carats) of diamonds recovered. The weight of diamonds recovered may only be omitted from the report when the diamonds are less than 0.5mm in size (i.e. when the diamonds recovered are microdiamonds) or when the diamonds are below a specified commercial cut-off value, which must be specified.			N/A

SAMREC Table 1						
			Exploration results	Mineral Resources	Mineral Reserves	Comments/ CPR section
Section 11: Reporting of Diamonds and Gemstones						
		(x)		Disclose the number of stones and the total number of carats used in the SFD, grade and value estimation and discuss the validity of this data.		N/A
		(xi)		Note whether a strict lower cut-off has been applied or if the modelled results include incidental diamonds below the lower cut-off? Discuss the implications.		N/A
		(xii)		Present aspects of spatial structure analysis and grade and value distribution		N/A
		(xiii)		Present aspects of micro and macro- diamond sample results per domain		N/A
		(xiv)		Present aspects of the effect on sample grade and value with change in bottom cut off screen size.		N/A
		(xv)		Describe any adjustments made to size distribution for sample plant performance and performance on a commercial scale, where applicable.		N/A
		(xvi)		Confirm that valuations have not been reported for samples of diamonds processed using total liberation methods (which are commonly used for processing kimberlite exploration samples and which are based on micro diamonds).		N/A
		(xvii)		Justify the use of micro diamonds to extrapolate diamond value at depth through the presentation of geological and size-frequency distribution models		N/A
		(xviii)		State the name, qualifications, experience and independence of the recognised expert responsible for the classification and valuation of the diamond parcel(s).		N/A
		(xix)		For each diamond parcel valued, supply information relating to the number of stones and the carats and size distribution using a standard progression of sieve sizes or diamond mass ranges for each identified geological domain. For marine or alluvial placers, the average price per average stone size may be used instead of a size distribution		N/A
		(xx)		State that the valuation is on the run-of-mine diamond parcel (i.e. not partial parcel)		N/A
		(xxi)		Define the unit of grade measure used in the resource/reserve estimation (e.g. carat per units of mass, area or volume). Where carats per unit of volume is used, include a discussion of mass to tonnage conversion.		N/A
11.5	Resource/Reserve classification criteria	(i)		A Diamond Resource/Reserve must be described in terms of volume/tonnage, grade and value. A Diamond Resource/Reserve must not be reported in terms of contained diamond content unless corresponding tonnages/volumes, grades and values are also reported. The average diamond grade and value must not be reported without specifying the applicable bottom cut-off screen size.		N/A
		(ii)		Discuss issues surrounding stone frequency (stones per cubic metre, per tonne, or per square metre) and stone size (carats per stone) relating to grade (carats per cubic metre, per tonne or per square metre). Consider the elements of uncertainty in these estimates and develop the Diamond Resource classification accordingly.		N/A

SAMREC Table 1						
			Exploration results	Mineral Resources	Mineral Reserves	Comments/ CPR section
Section 11: Reporting of Diamonds and Gemstones						
		(iii)		Present relevant aspects of stone size and number distribution, including the applicability of the parcel size. Note that a Diamond Resource/Reserve may not be declared without reference to an SFD.		N/A
		(iv)		Present aspects of global sample grade per geological domain and local block estimates in the case of Indicated Resources		N/A
11.6	Audits and reviews	(i)	State that the samples were sealed after excavation and discuss the chain of custody from source to reporting of results			N/A
		(ii)	Discuss security standards in sampling plant and recovery sections of bulk-sampling/trial-mining programmes for macro-diamonds			N/A
		(iii)	Describe the type of facility, treatment rate, and accreditation (if any) of the sample plant. It is especially important to discuss the bottom screen size, top screen size and re-crush parameters, in addition to the concentration methodology (e.g. pan, DMS, Optical, etc.) and the recovery technique (e.g. grease, X-ray, hand-sorting, etc.).			N/A
		(iv)	Discuss valuer location, escort, delivery, cleaning losses, reconciliation with recorded sample carats and number of stones;			N/A
		(v)	State whether core samples were washed prior to treatment for micro diamonds and discuss the use of diamond drill-bits			N/A
		(vi)	State whether any audit samples were treated at alternative facilities			N/A
		(vii)	Discuss QA/QC of sampling results, including the process efficiency, tailings auditing and granulometry			N/A
		(viii)	Discuss the recovery of tracer monitors used in sampling and treatment			N/A
		(ix)	Discuss geophysical (logged) density and particle density, where relevant			N/A
		(x)	Discuss cross-validation of sample weights, wet and dry, with hole volume and density, moisture factor			N/A

26.1.12. Section 12: Reporting of Industrial Minerals

Table 26-12: Section 12: Reporting of Industrial Minerals

SAMREC Table 1						
			Exploration results	Mineral Resources	Mineral Reserves	Comments/ CPR section
Section 12: Reporting of Industrial Minerals						
12.1	Specific for reporting of Industrial Minerals	(i)	Confirm that the reports on Industrial Mineral deposits take cognisance of Sections 80 of the Code and Sections 1 – 9 Table 1			N/A – Industrial Minerals not reported
		(ii)	Describe the exploration or geologically specific specialised industry techniques appropriate to the minerals under investigation.			N/A
		(iii)	Describe the nature and quality of sampling or specific specialised industry standard measurement tools appropriate to the minerals under investigation.			N/A
		(iv)	Describe the appropriate saleable product qualities being reported. Describe the basis for reporting (physical or chemical parameters, air-dried basis, etc). Reporting of deleterious chemical elements or physical parameters is required.			N/A
		(v)	State assumptions regarding in particular mining methods, infrastructure, metallurgy, environmental and social parameters. Explain where no mining related assumptions have been made.			N/A
		(vi)	Disclose and discuss the marketing parameters, customer specifications, testing, and acceptance requirements.			N/A
		(vii)	Discuss the nature, amount and representativeness of metallurgical studies completed which form the basis for the various saleable materials that may be priced for different chemical and physical characteristics.			N/A

SAMREC Table 1						
			Exploration results	Mineral Resources	Mineral Reserves	Comments/ CPR section
Section 12: Reporting of Industrial Minerals						
		(viii)	Present the defined reference point of the reported tonnages and grades/ qualities. Where the reference point is the point for a saleable product, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported. State whether the tonnages and grades/ qualities of the material are as delivered to the plant or after recovery.			N/A

26.1.13. Section 13: Reporting using Metal Equivalents

Table 26-13: Section 13: Reporting using Metal Equivalents

SAMREC Table 1						
			Exploration results	Mineral Resources	Mineral Reserves	Comments/ CPR section
Section 13: Reporting using Metal equivalents						
13.1	Specific for metal equivalents reporting	(i)	Confirm that reports on all deposits take cognisance of Sections 73 of the Code and Section 1 – 9 of Table 1			N/A – Metal equivalents not reported
		(ii)		Discuss and describe the basis for the grade estimation for each metal relating to the metal equivalence		N/A
		(iii)		Disclose all economic criteria that have been used for the calculation, such as exchange rates, revenue/ price curves, royalties, cut-off grades, pay limits.		N/A
		(iv)		Discuss the basis for assumptions or predictions regarding metallurgical factors such as recovery used in the metal equivalents calculation.		N/A
		(v)		Show the calculation formula used.		N/A

26.2. Appendix B – The SAMVAL Code, Table 1

26.2.1. Table 1: Mineral asset valuation: reporting and assessment criteria

Table 26-14: Mineral asset valuation: reporting and assessment criteria

Criteria	Comments	Comments/ CPR section
T1.0 General	The Valuation Report shall contain:	-
	The signature of the CV;	25.4/ 26.5
	The CV's qualifications and experience in valuing mineral properties, or relevant valuation experience;	26.5.3
	A statement that all facts presented in the report are correct to the best of the CV's knowledge;	25.4/ 20.1
	A statement that the analyses and conclusions are limited only by the reported forecasts and conditions;	20.1
	A statement of the CV's present or prospective interest in the subject property or asset;	1.2/ 20.1
	A statement that the CV's compensation, employment, or contractual relationship with the Commissioning Entity is not contingent on any aspect of the Report;	1.2/ 20.1
	A statement that the CV has no bias with respect to the assets that are the subject of the Report, or to the parties involved with the assignment;	1.2
	A statement that the CV has (or has not) made a personal inspection of the property; and A record of the CP's and experts who have contributed to the valuation. Written consent to use and rely on such Reports shall be obtained.	1.3/ 1.6
	Significant contributions made by such experts shall be highlighted individually.	1.6
T1.1 Illustrations	There are numerous instances (especially in the non-listed environment) when a valuation is not accompanied by the CPR on which it is based. In these cases, especially, diagrams/illustrations are required and shall be in the required format.	Valuation part of a comprehensive CPR
	Diagrams, maps, plans, sections, and illustrations shall be legible and prepared at an appropriate scale to distinguish important features. Maps shall be dated and include a legend, author or information source, coordinate system and datum, a scale in bar or grid form, and an arrow indicating north. A location or index map and more detailed maps showing all important features described in the text, including all relevant cadastral and other infrastructure features, shall be included.	Comprehensive CPR completed appropriate maps and diagrams included in the report.
T1.2 Synopsis	Provide the salient features of the report – a brief description of the terms of reference, scope of work, the Valuation Date, the mineral property; its location, ownership, geology, and mineralisation; history of exploration and production, current status, Exploration Targets, mineralisation and/or production forecast, Mineral Resources and Mineral Reserves, production facilities (if any); environmental, social, legal, and permitting considerations; valuation approaches and methods, valuation, and conclusions.	ES/ 20.1
T1.3 Introduction and scope	Introduction and scope, specifying commissioning instructions including reference to the valuation, engagement letter, date, purpose and intended use of the valuation. The CV shall fully disclose any interests in the Mineral Asset or Commissioning Entity.	1.1/ 1.2/ 20.1/ 26.5
	Any restrictions on scope and special instructions followed by the CV, and how these affect the reliability of the valuation, shall be disclosed.	20.1
T1.4 Compliance	A statement that the report complies with SAMVAL shall be included. Any variations shall be described and discussed.	1.1/ 20.1/ 25.4/ 26.5
T1.5	The identity, tenure, associated infrastructure and locations of the property interests, rights or securities to be valued (i.e. the physical, legal, and economic characteristics of the property) shall be disclosed.	2/ 3/ 13/ 14/ 20.1

Criteria	Comments	Comments/ CPR section
Identity, tenure and infrastructure		
T1.6 History	History of activities, results, and operations to date shall be included.	4/ 20.1
T1.7 Geological setting	Geological setting, models, and mineralisation shall be described.	5/ 6/ 7/ 20.1
T1.8 Exploration results and exploration targets	Exploration programmes, their location, results, interpretation, and significance shall be described. Exploration Targets shall be discussed.	4/ 4.1/ 6/ 20.1
T1.9 Mineral Resources and Mineral Reserves	Mineral Resource and Mineral Reserve statements shall be provided. They shall be signed off by a Competent Person in compliance with the SAMREC Code or another CRIRSCO code.	8.9/ 20.1/ 21.2/ 25.2/ 25.3
	The CV shall set out the manner in which he has satisfied himself that he can rely upon the information in the CPR.	20.1
T1.10 Modifying factors and key assumptions	A statement of Modifying Factors shall be included, separately summarizing material issues relating to each applicable Modifying Factor. The CV shall set out the manner in which he has satisfied himself that he can rely upon the technical information provided.	8/ 9/ 10/ 11/ 11.4/ 12/ 13/ 14/ 15/ 16/ 17/ 18/ 19/ 20.1/ 20.3/ 20.4/ 21
	(NOTE: All the Modifying Factors shall be listed, or references provided to relevant definitions). This shall include an explanation of all material assumptions and limiting factors.	
	When reporting on environmental, social and governance modifying factors, reference should be made to the ESG reporting parameters as required by the Southern African Minerals Environmental, Social and Governance Guideline (SAMESG) or other recognised code, e.g. Equator Principles.	1.1/ 26.4
T1.11 Previous valuations	The valuation shall refer to all available and relevant previous valuations of the Mineral Asset that have been performed in at least the previous two years and explain any material differences between these and the present valuation.	20.5
T1.12 Valuation approaches and methods	The valuation approaches and methods used in the valuation shall be described and justified in full.	ES/ 20.2/ 20.3/ 20.4
T1.13 Valuation date	A statement detailing the Report Date and the Valuation Date, as defined in this Code, and whether any material changes have occurred between the Valuation Date and the Report Date.	ES/ 1.1/ 20.1/ 25.4/ 26.5
T1.14 Valuation results	For the Income Approach, the valuation cash flow shall be disclosed.	20.3
	For the Market Approach, the market comparable information shall be disclosed.	20.4
	For the Cost Approach, the relevant and applicable cost shall be disclosed.	N/A – Cost approach not utilised in the valuation
T1.15 Valuation summary and conclusions	A summary of the valuation details, consolidated into single material line items, shall be provided.	20.3/ 20.4
	The Mineral Asset Valuation shall specify the key risks and forecasts used in the valuation.	20.3/ 22.2
	A cautionary statement concerning all forward-looking or forecast statements shall be included.	1.7
	The valuation's conclusions, illustrating a range of values, the best estimate value for each valuation, and whether the conclusions are qualified or subject to any restrictions imposed on the CV, shall be included.	20.3/ 20.4/ 23.12
T1.16 Identifiable component asset (ICA) values	In some valuations, the valuation shall be broken down into Identifiable Component Asset Values (an ICA valuation) equaling the Mineral Asset Value. This could be, for example, due to the requirements of other valuation rules and legislative practices including taxation (i.e. fixed property, plant, and equipment relative to Mineral Asset Value allocations such as in recoupment or capital gains tax calculations or where a commissioned Mineral Asset Valuation specifies a need for a breakdown of the Mineral Asset Valuation).	N/A

Criteria	Comments	Comments/ CPR section
	In such cases, the separate allocations of value shall be made by taking account of the value of every separately identifiable component asset. Allocation of value to only some, and not all, identifiable component assets is not allowed. This requires a specialist appraisal of each identifiable component asset of property, plant and equipment, with the 'remaining' value of the Mineral Asset being attributed to the Mineral Resources and Reserves. Such valuations shall be performed by suitably qualified experts, who may include the CV.	N/A
	If the Mineral Asset Valuation includes an ICA Valuation, the CV shall satisfy himself or herself that the ICA Valuation is reasonable before signing off the Mineral Asset Valuation.	N/A
T1.17 Historic verification	A historic verification of the performance parameters on which the Mineral Asset Valuation is based shall be presented.	20
T1.18 Market assessment	A comprehensive market assessment should be presented.	17.1/ 17.2
T1.19 Sources of information	The sources of all material information and data used in the report shall be disclosed, as well as references to any published or unpublished technical papers used in the valuation, subject to confidentiality.	1.4/ 1.6
	A reference shall be made to any other report that has been compiled, for the purpose of providing information for the valuation, including SAMREC-compliant reports and any other contributions or reports from experts.	1.4/ 1.6

26.3. Appendix C – The JSE listing requirements Section 12.10

A Competent Persons' Report must comply with the SAMREC and SAMVAL Codes and must:

Table 26-15: JSE Section 12.10 – Competent Persons' Report

	Criteria		Comments
(a)	have an effective date (being the date at which the contents of the Competent Person's Report are valid) less than six months prior to the date of publication of the pre-listing statement, listing particulars, prospectus or Category 1 circular		Cover page/ ES/ 1.1/ 20.1
(b)	be updated prior to publication of the pre-listing statement, listing particulars, prospectus or Category 1 circular if further material data becomes available after the effective date		-
(c)	if the Competent Person is not independent of the issuer, clearly disclose the nature of the relationship or interest		1.2 / 20.1/ 26.5
(d)	show the particular paragraph of this section, the SAMREC Code (including Table 1) and SAMVAL Code (including Appendices and Tables) complied within the margin of Competent Person's Report		1.1/ 20 -Below all main section headings
(e)	contain a paragraph stating that all requirements of this section, the SAMREC Code (including Table 1) and SAMVAL Code (including Appendices and Tables) have been complied with, or state that certain clauses in the SAMVAL code were not applicable and provide a list of such clauses; and include a statement detailing:		1.1/ 20.1
	(i)	exploration expenditure incurred to date by the applicant issuer and by other parties, where available	4.1
	(ii)	planned exploration expenditure that has been committed, but not yet incurred, by the applicant issuer concerned; and	6.6
	(iii)	planned exploration expenditure that has not been committed to by the applicant issuer, but which is expected to be incurred sometime in the future, in sufficient detail to fairly present future expectations	6.6
(f)	contain a valuation section which must be completed and signed off by a Competent Valuator in terms of and in compliance with the SAMVAL Code (including Appendices and Tables);		20/ 25.4/ 26.5
(g)	be published in full on the applicant issuer's website;		-
(h)	be included in the relevant JSE document either in full (which includes incorporation by reference pursuant to paragraph 11.61) or as an executive summary. The executive summary must be approved by the JSE (after approval by the Readers Panel) at the same time as the Competent Person's Report is approved by the JSE and the Readers Panel. The executive summary should be a concise summary of the Competent Person's Report and must cover, at a minimum, where applicable		
	(i)	purpose	Executive summary/ 1.1
	(ii)	project outline	Executive summary/ 2
	(iii)	location map indicating are of interest	Executive summary/ 2
	(iv)	legal aspects and tenure, including any disputes, risks or impediments	Executive summary/ 2.5/ 22
	(v)	geological setting description	Executive summary/ 5
	(vi)	exploration programme and budget	Executive summary/ 6
	(vii)	brief description of individual key modifying factors	Executive summary/ 8/ 9/ 10/ 11/ 13/ 14/ 15
	(viii)	brief description of key environmental issues	Executive summary/ 16
	(ix)	Mineral Resource and Mineral Reserve Statement	Executive summary/ 8/ 21
	(x)	Reference to risk paragraph in the full Competent Person's Report	Executive summary/ 22
	(xi)	Statement by the Competent Person that the summary is a true reflection of the full Competent Person's Report; and	Executive summary
	(xii)	summary valuation table. Where the cash flow approach has been employed, the valuation summary must include the discount rate(s) applied to calculate the NPV(s) (net present value(s)) per share with reference to the specific paragraph in the Competent Person's Report. If inferred resources are used, show the summary valuation with and without inclusion of such inferred resources.	Executive summary/ 20

26.4. Appendix D – The SAMESG Guideline

SV T1.10

Table 26-16: The SAMESG guideline 2017

1.	**General instructions and requirements**
General instructions	
Item Nr	**Description**
1.	To the extent that any Item or any component of an Item specified in this guideline does not apply to a reporting entity and its activities and operations, or is not material, reference must be made to why that Item or component is not applicable or not material ("If not, why not" Principle).
2.	This guideline sets out proposed minimum reporting standards. A reporting entity may provide additional information not specified, provided that it is not misleading and not inconsistent with the requirements of SAMREC, SAMVAL or SAMOG, and provided that material information required to be disclosed is not omitted.
General reporting requirements	
Item Nr	**Description**
1.	If ESG matters are being reported within the context of a Public Document dealing with Solid Minerals (including, but not limited to, a CPR), then the reporting requirements of SAMREC and SAMVAL have precedence (Ref. SAMREC/SAMVAL Table 1 and/or SAMREC Appendix A).
2.	If ESG matters are being reported within the context of a (SAMOG compliant) Public Report, including but not limited to a CPR, dealing with Oil and Gas projects, then the reporting requirements of SAMOG have preference (Ref. SAMOG Form A).
3.	If ESG matters are reported in any other context, then it is recommended that a separate, stand-alone, ESG-specific document be compiled along the lines described below (or the relevant information should simply be incorporated into a pre-existing format).
4.	A recommended Table of Contents for stand-alone ESG documents is provided (Section 5) for those seeking guidance.
Date of Statement	
Item Nr	**Description**
1.	Disclose the effective date of the information being provided. The same effective date applies to each category reported.
2.	Disclose the preparation date of the information being provided. The preparation date, in respect of written disclosure, means the most recent date to which information relating to the period ending on the effective date was considered in the preparation of the disclosure. The preparation date is a date subsequent to the effective date. This is because it takes time to assemble the report for the reporting period after the finalisation of information required for disclosure as at the effective date.
3.	The frequency of reporting for matters arising in this Guideline should reflect the same dates of appraisal as the applicable Public Report (where relevant), include all new listings, and should consider information that, where relevant, is not older than one year from the time of reporting. For the purposes of understanding significant and existing trends, information older than one year must be included.
4.	If the reporting entity provides information as at a date more recent than the effective date, in addition to the information required as at the effective date, also disclose the date at which that additional information is provided. The provision of such additional information does not relieve the reporting entity of the obligation to provide information as at the effective date.

2.	**Disclosure of ESG parameters when reporting Exploration results**	
Item	**Description**	**Comment/ CPR section**
2.1 - General	Provide a description of organisational structure, systems, policies, procedures and management plans, and governance procedures in place to manage ESG issues.	N/A – Mineral Resources and Mineral Reserve estimates reported for the BPM.
2.2 - Key plans, maps and diagrams	Provide a map which identifies the locality of sensitive receptors within the project area and at least the zone of influence of the site. All surface water features to be included on maps.	N/A
	Describe the location of any sensitive areas within and around the project area including within the prospecting right area and within the zone of influence of the site.	N/A

2.3 - Legal aspects	Outline the applicable ESG legal compliance requirements and any mandatory and/or voluntary standards or guidelines to which the project target subscribes.	N/A
	Identify the ESG permits, authorisations and licenses that have been issued to the project target as well as those permits, authorisations and licenses that have been identified as required but not yet applied for or issued. Motivate whether there is a reasonable basis to believe that all ESG permits, authorisations and licenses can be obtained.	N/A
	Provide a description of any recognised claims received during the reporting period.	N/A
	Provide a description of any penalties, fines and damages, which are due and payable by the target in response to an order of court, decision by a mediator or a decision by an arbitrator whether or not subject to an appeal process.	N/A
	Provide a description of any pending administrative enforcement action such as, but not limited to directives or compliance notices instituted against the project target, including a notice received by the project target of an authority's intention to issue a directive or compliance notice, by any authority concerned with the regulation of ESG issues whether or not such pre-compliance notice or compliance notice has been suspended pending corrective action.	N/A
	Provide a description of any known future financial liabilities that arise by virtue of recognised claims, penalties, fines, damages and administrative enforcement action that will become due and payable in future including the due date for payment.	N/A
2.4 - Environmental parameters	Provide a high-level analysis of the environmental context within which the project is located and give an appropriate analysis of the material aspects and impacts that may need consideration. Include issues that are likely to remain material despite the implementation of proposed mitigation measures.	N/A
	Describe, assess and prioritise the risks associated with any obvious environmental factors that could have a material modification to the planned exploration programme.	N/A
2.5 - External social and political parameters	Provide a high-level analysis of the external social and political context within which the project is located.	N/A
	Describe and prioritise current social and political risks, and potential risks that take into account how exploration activities may exacerbate or mitigate existing risks.	N/A
	Report on any social and political issues that may have a material effect on the planned exploration programme. Include issues that are likely to remain material despite the implementation of proposed mitigation measures.	N/A
2.6 - Internal social parameters	Describe and assess the risks associated with any obvious internal social factors and/or specific contextual details that could have a material effect on the planned exploration programme.	N/A
2.7 - Conformance and compliance audits	Provide a description of legal compliance audits undertaken during the period including a summary of material findings and management plans to address these findings.	N/A
	Provide a description of ESG management system conformance audits undertaken during the reporting period including a summary of material findings and management plans to address these findings.	N/A
2.8 - ESG liability	Describe the project target's current closure, social obligations, rehabilitation activities, material remaining liability and compliance costs.	N/A
	Provide a description of mechanisms in place to address unplanned closure	N/A
2.9 - Risk analysis process	Provide a description of the existence of a risk assessment process which has been undertaken to identify material ESG issues. Describe programmes in place to continuously update and monitor identified material ESG issues.	N/A
	Describe how the risk assessment process is integrated with the overall risk management framework.	N/A
3.	**Disclosure of ESG parameters when reporting Resources**	
Item	**Description**	**Comment/ CPR section**
3.1 - General	Provide a description of organisational structure, systems, policies, procedures and management plans, and governance procedures in place to manage ESG issues.	16.6
3.2 - Key plans, maps and diagrams	Provide a map which identifies the locality of sensitive receptors within the project area and at least the zone of influence of the site. All surface water features to be included on maps.	10.1./ 10.2

	Identify and describe the location of any sensitive areas within and around the project area including within the prospecting right area and within the zone of influence of the site.	10.2/ 15
3.3 - Legal aspects	Outline the applicable ESG legal compliance requirements and any mandatory and/or voluntary standards or guidelines to which the project target subscribes.	2.4/ 2.5/ 2.6/ 16.2
	Identify the ESG permits, authorisations and licenses that have been issued to the project target as well as those permits, authorisations and licenses that have been identified as required but not yet applied for or issued. Motivate whether there is a reasonable basis to believe that all ESG permits, authorisations and licenses can be obtained.	2.5/ 16.2
	Provide a description of any recognised claims in excess of ZAR1 million received during the reporting period.	No known claims based on the information provided.
	Provide a description of any penalties, fines and damages in excess of ZAR1 million, which are due and payable by the target in response to an order of court, decision by a mediator or a decision by an arbitrator whether or not subject to an appeal process.	No known penalties, fines or damages payable based on the information provided.
	Provide a description of any pending administrative enforcement action such as, but not limited to directives or compliance notices instituted against the project target, including a notice received by the target of an authority's intention to issue a directive or compliance notice, by any authority concerned with the regulation of ESG issues whether or not such pre-compliance notice or compliance notice has been suspended pending corrective action.	No known pending administrative enforcement action based on the information provided.
	Provide a description of any known future financial liabilities that arise by virtue of recognised claims, penalties, fines, damages and administrative enforcement action that will become due and payable in future including the due date for payment.	The authors are not aware of any future financial liabilities relating to claims, penalties, fines, damages and administrative enforcement action.
3.4 - Environmental parameters	Provide an appropriate analysis of the environmental context within which the project is located. Give an appropriate analysis of the material aspects and impacts that may need consideration including how existing activities may exacerbate or mitigate existing aspects and impacts.	10/ 15/ 16
	Describe, assess and prioritise the risks associated with any obvious environmental factors that could have a material modification to the planned resources programme. Focus on issues that are likely to remain significant despite the implementation of proven and economically viable mitigation measures.	22.2
3.5 - External social and political parameters	Provide an appropriate analysis of the external social and political context within which the project is located.	2.4/ 15
	Describe and prioritise current social and political risks, and potential risks that take into account how activities may exacerbate or mitigate existing risks.	2.4/ 15
	Report on any social and political issues that may have a material effect on the planned resource programme. Include issues that are likely to remain material despite the implementation of proposed mitigation measures.	2.4/ 15/ 22.2
3.6 - Internal social parameters	Describe, assess and prioritise the risks associated with any obvious internal social factors and/or specific contextual details that could have a material effect on the planned resources programme.	The reviewers are not aware of any internal social factors that could have a material effect on the planned resources programme.
3.7 - Conformance and compliance audits	Provide a description of legal compliance audits undertaken during the period including a summary of material findings and management plans to address these findings.	16.7
	Provide a description of ESG management system conformance audits undertaken during the reporting period including a summary of material findings and management plans to address these findings.	There is currently not a formalised ESG management system in place.
3.8 - ESG liability	Describe the closure, social obligations, rehabilitation plan, activities, remaining liability and compliance costs.	15.2/ 16.5/ 18/ 19/ 20
	Provide a description of mechanisms in place to address unplanned closure.	16.5
3.9 - Risk analysis process	Provide a description of the existence of a risk assessment process which has been undertaken to identify material ESG issues. Describe programmes in place to continuously update and monitor identified material ESG issues.	10/ 16.4/ 22.2
	Describe how the risk assessment process is integrated with the overall risk management framework.	A comprehensive impact assessment process was undertaken during the various EIA

		processes by subject specialists. High significance impacts were identified and mitigation measures documented in the EMP. Audit and compliance reporting is undertaken against the documented plans and submitted to the relevant departments.
4.	**Disclosure of ESG parameters when reporting on Reserves**	
Item	**Description**	**Comment/ CPR section**
4.1 - General	Provide a description of organisational structure, systems, policies, procedures and management plans, and governance procedures in place to manage ESG issues.	16.6
4.2 - Key plans, maps and diagrams	Provide a map which identifies the locality of sensitive receptors to be included on maps within the project area and at least the zone of influence of the site. All surface water features to be included on maps.	10.1./ 10.2
	Identify and describe the location of any sensitive areas within and around the project area within prospecting right and within the zone of influence of the site.	10.2/ 15
4.3 - Legal aspects	Outline the applicable ESG legal compliance requirements and any mandatory and/or voluntary standards or guidelines to which the project target subscribes.	2.4/ 2.5/ 2.6/ 16.2
	Identify the ESG permits, authorisations and licenses that have been issued to the project target as well as those permits, authorisations and licenses that have been identified as required but not yet applied for or issued. Motivate whether there is a reasonable basis to believe that all ESG permits, authorisations and licenses can be obtained.	2.5/ 16.2
	Provide a description of any recognised claims in excess of ZAR1 million received during the reporting period.	No known claims based on the information provided.
	Provide a description of any penalties, fines and damages in excess of ZAR1 million, which are due and payable by the target in response to an order of court, decision by a mediator or a decision by an arbitrator whether or not subject to an appeal process.	No known penalties, fines or damages payable based on the information provided.
	Provide a description of any pending administrative enforcement action such as but not limited to directives or compliance notices instituted against the project target, including a notice received by the target of an authority's intention to issue a directive or compliance notice, by any authority concerned with the regulation of ESG issues whether or not such pre-compliance notice or compliance notice has been suspended pending corrective action.	No known pending administrative enforcement action based on the information provided.
	Provide a description of any known future financial liabilities that arise by virtue of recognised claims, penalties, fines, damages and administrative enforcement action that will become due and payable in future	The authors are not aware of any future financial liabilities relating to claims, penalties, fines, damages and administrative enforcement action.
4.4 - Environmental parameters	Provide an appropriate analysis of the environmental context within which the project is located. Give an appropriate analysis of the material aspects and impacts that may need consideration including how existing activities may exacerbate or mitigate existing aspects and impacts.	10/ 15/ 16
	Describe, assess and prioritise the risks associated with any obvious environmental factors that could have a material modification to the planned resources programme. Focus on issues that are likely to remain significant despite the implementation of proven and economically viable mitigation measures.	22.2
4.5 - External social and political parameters	Provide an appropriate analysis of the external social and political context within which the project is located.	2.4/ 15
	Describe and prioritise current social and political risks, and potential risks that take into account how activities may exacerbate or mitigate existing risks.	2.4/ 15
	Report on any social and political issues that may have a material effect on the planned reserve programme. Include issues that are likely to remain material despite the implementation of proposed mitigation measures.	2.4/ 15/ 22.2

4.6 - Internal social parameters	Describe and assess the risks associated with any obvious internal social factors and/or specific contextual details that could have a material effect on the planned resources programme.	The reviewers are not aware of any internal social factors that could have a material effect on the planned resources programme.
4.7 - Conformance and compliance audits	Provide a description of legal compliance audits undertaken during the period including a summary of material findings and management plans to address these findings.	16.7
	Provide a description of ESG management system conformance audits undertaken during the reporting period including a summary of material findings and management plans to address these findings.	There is currently not a formalised ESG management system in place.
4.8 - ESG liability	Describe the closure, social obligations, rehabilitation plan, activities, remaining liability and compliance costs.	15.2/ 16.5/ 18/ 19/ 20
	Provide a description of mechanisms in place to address unplanned closure.	16.5
	Describe the bonding obligations in place to ensure that these liabilities can be funded on a qualitative and quantitative basis.	16.5
4.9 - Risk analysis process	Provide a description of the existence of a risk assessment process which has been undertaken to identify material ESG issues. Describe programmes in place to monitor identified material ESG issues.	10/ 16.4/ 22.2
	Describe how the risk assessment process is integrated with the overall risk management framework.	A comprehensive impact assessment process was undertaken during the various EIA processes by subject specialists. High significance impacts were identified and mitigation measures documented in the EMP. Audit and compliance reporting is undertaken against the documented plans and submitted to the relevant departments.

26.5. Appendix E – Certificates of Competent Person

SR 9.1(i); 9.1(iii) / SV T1.0; T1.3; T1.4; T1.13 / JSE 12.10(c); 12.10(f)

26.5.1. Competent Persons Certificate – Mineral Resources: K. Lomberg

With reference to the report entitled: **Competent Persons' Report - Bakubung Minerals (Pty) Limited – Bakubung Platinum Mine situated in the North West Province of South Africa**, I hereby state:

1. My name is Kenneth Graham Lomberg and I am a geologist and director of Pivot Mining Consultants (Pty) Ltd. located at Island House, Constantia Office Park, corner of 14th Ave and Hendrik Potgieter Rd, Johannesburg, 1709, South Africa.
2. I am registered with the SACNASP (Registration number: 400038/01).
3. I have a B. Sc (Geology and Geochemistry), B. Sc (Honours) Geology, B. Com (Economics and Statistics) and M. Eng. degree (Mining Eng.)
4. I have 35 years mining industry experience (especially platinum and gold). I have practiced my profession continuously since 1985. I have over five years of relevant experience having completed Mineral Resource estimations on various properties located on the BC hosting Magmatic Layered Intrusive style mineralisation. I have the relevant experience of the type of deposit and of Mineral Resource estimation that is the subject of this report. I have performed consultant work on various projects on the BC including Aurora, Kransplaats, Atok Mine, Mecklenburg, Smokey Hills, Kalplats, Garatau, Kennedy's Vale, Kalkfontein, Blue Ridge Mine, Eland Mine, Western Bushveld Joint Venture ("WBJV"), Palmietfontein, Stellite, Townlands and Tharisa. I have assisted with approximately 15 of the estimated 20 Junior Platinum Exploration and Mining Projects in South Africa. These assignments have ranged from listings documents, CPRs, Independent Technical Reports ("ITRs"), feasibility studies, NI43-101 compliant Mineral Resource estimations and valuations.
5. I am a 'Competent Person' as defined in The SAMREC Code, 2016 edition.
6. As the Competent Person for Mineral Resources, I completed the sections pertaining to geology, exploration, geological modelling and Mineral Resource estimation.
7. I have not conducted a site visit to the Bakubung Platinum Mine as a result of the restrictions due to the COVID-19 pandemic.
8. I have authored the Mineral Resource related sections of this report, including geology, exploration data, geological modelling and the Mineral Resource estimate.
9. I am not aware of any material fact or material change with respect to the subject matter of the CPR that is not reflected in the CPR, the omission of which would make the CPR misleading.
10. I declare that this Report appropriately reflects the Competent Person's view of the Mineral Resources estimated for the Bakubung Platinum Mine.
11. I am independent of Bakubung Minerals (Pty) Ltd.
12. I have read The SAMREC Code (2016 edition) and this CPR has been prepared in accordance with the guidelines of The SAMREC Code.
13. I do not have, nor do I expect to receive, a direct or indirect interest in the Bakubung Platinum Mine.
14. At the effective date of this CPR, to the best of my knowledge, information and belief, this CPR contains all scientific and technical information that is required to be disclosed to make the CPR not misleading.
15. I, Kenneth Lomberg consent to the inclusion in the report of the matters based on my information in the form and context in which it appears.

Signed at Centurion, Gauteng, South Africa on 30 July 2021.

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Kenneth Graham Lomberg

26.5.2. Competent Persons Certificate – Mineral Reserve: J.J. Lotheringen

With reference to the report entitled: **Competent Persons' Report - Bakubung Minerals (Pty) Limited – Bakubung Platinum Mine situated in the North West Province of South Africa**, I hereby state:

1. My name is Jacobus Johannes Lotheringen and I am a professional mining engineer and director of Ukwazi Mining Studies (Pty) Ltd, located at 22 Karee Street, Block D, 2nd Floor, Southdowns Office Park, Southdowns, Centurion, South Africa.
2. I am a member of the SAIMM (Registration number: 401237) and registered as a professional engineer at the ECSA (Registration number: 20030022).
3. I have a B. Eng. degree in mining engineering.
4. I have been actively involved in the mining industry since 1997 with extensive experience based on multiple mining methods and commodities. I have completed numerous Mineral Reserve estimations and related public documentation based on South African, Australian and Canadian reporting requirements.
5. I am a 'Competent Person' as defined in the SAMREC Code, 2016 edition.
6. As a Competent Person and principal author of this report, I supervised the various sections of this report including the Mineral Reserve related sections.
7. I have not conducted a site visit to the Bakubung Platinum Mine as a result of the restrictions due to the COVID-19 pandemic.
8. I was responsible for preparing and supervising the preparation of this CPR in my capacity as the principal author. The details of the sections for which I was responsible is indicated in section 24.1
9. I am not aware of any material fact or material change with respect to the subject matter of the CPR that is not reflected in the CPR, the omission of which would make the CPR misleading.
10. I declare that this CPR appropriately reflects the Competent Person's view of the Mineral Reserve estimated for the Bakubung Platinum Mine.
11. I am independent of Bakubung Minerals (Pty) Ltd.
12. I have read the SAMREC Code (2016 edition) and this CPR has been prepared in accordance with the guidelines of The SAMREC Code
13. I do not have, nor do I expect to receive, a direct or indirect interest in the Bakubung Platinum Mine.
14. At the effective date of this CPR, to the best of my knowledge, information and belief, this CPR contains all scientific and technical information that is required to be disclosed to make the CPR not misleading.
15. I, Jacobus Johannes Lotheringen consent to the inclusion in the report of the matters based on my information in the form and context in which it appears.

Signed at Centurion, Gauteng, South Africa on 30 July 2021.

Jacobus Johannes Lotheringen

26.5.3.Competent Valuators Certificate – A. M. Clegg

With reference to the report entitled: **Competent Persons' Report - Bakubung Minerals (Pty) Limited – Bakubung Platinum Mine situated in the North West Province of South Africa**, I hereby state:

1. My name is Alan Mitchell Clegg and I am a professional mining engineer of Ukwazi Mining Studies (Pty) Ltd, located at 22 Karee Street, Block D, 2nd Floor, Southdowns Office Park, Southdowns, Centurion, South Africa.
2. I am registered with the SAIMM (Registration number: 701825), South African Institute of Quarrying (Registration number: OC35), The ECSA (Registration number: 20050117) and the South African Council of Project and Construction Management Professionals (Registration number: D/999/2006).
3. I have a degree in Mining Engineering.
4. I have worked extensively on PGM deposits and specifically in the BC, with cumulative experience on these deposits of over 30 years. This includes working on the specific deposits and resources of the Bakubung Platinum Mine since exploration discovery and delineation in the early 2000s.
5. I am a 'Competent Valuator' as defined in The SAMVAL Code
6. As a Competent Valuator author for this report, I completed the sections pertaining to the operating expenditure, capital expenditure and financial Valuation.
7. I have not conducted a site visit to the Bakubung Platinum Mine as a result of the restrictions due to the COVID-19 pandemic.
8. I was responsible for preparing or supervising the preparation of this report in respect of the Mineral Asset Valuation in accordance with the SAMVAL Code.
9. I am not aware of any material fact or material change with respect to the subject matter of this CPR that is not reflected in the CPR, the omission of which would make the CPR misleading.
10. I declare that this CPR appropriately reflects the Competent Valuators view of the Bakubung Platinum Mine.
11. I am independent of Bakubung Minerals (Pty) Ltd
12. I have read the SAMREC and SAMVAL Codes (2016 edition) and this CPR has been prepared in accordance with the guidelines of The SAMREC and SAMVAL Codes
13. I do not have, nor do I expect to receive, a direct or indirect interest in the Bakubung Platinum Mine.
14. At the effective date of this CPR, to the best of my knowledge, information and belief, this CPR contains all scientific and technical information that is required to be disclosed to make the CPR not misleading.
15. I consent to the inclusion in the report of the matters based on my information in the form and context in which it appears.

Signed at Centurion, Gauteng, South Africa on 30 July 2021.

Alan Mitchell Clegg