Competent Person's Report on Moab Khotsong Mine and selected assets of AngloGold Ashanti Vaal River Operations

Report Prepared for

Harmony Gold Mining Company Ltd

Report Prepared by

SRK Consulting (South Africa) (Pty) Ltd

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Report Date: 27 November 2017

Effective Date: 1 January 2018

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Executive Summary

ES1: Purpose

[SR1.1 (i)] [SV1.2, SV1.3]

SRK Consulting (South Africa) (Pty) Ltd. (SRK) was requested by Harmony Gold Mining Company Ltd. (Harmony), to compile a Competent Person's Report (CPR) on selected assets of AngloGold Ashanti (AGA) at the Vaal River Operations (VROs) for the purpose of a potential transaction.

SRK has conducted a Due Diligence (DD) review of the assets in question in the first half of 2017.

Description of Assets

[SR1.1 (i)]

The assets and interests valued in this report are as follows:

- Moab Khotsong (MK) Mine which incorporates the Great Noligwa (GN) Mine and all of the associated fixed plant, equipment and infrastructure. The MK Mine also includes the Zaaiplaats Project which is a down dip extension below the current infrastructure;
- The GN plant complex which includes - GN Gold and Uranium Processing Plant, GN Backfill Plant, Mispah Gold Plant, Mispah 1 and 2. (Referred to individually as Mispah 1 or Mispah 2 or collectively as Mispah Tailings Storage Facilities (Mispah TSFs)), the South Return Water Dam (RWD), the Kopanang Pay Dam (KPD), and Vaal River smelt-house;
- The Marginal Ore Dumps (MODs) situated at GN and MK;
- AGA's entire interests in Margaret Water Company (MWC) and all associated pumping and water infrastructure;
- AGA's entire interest in Nufcor (Pty) Limited (NUFCOR);
- MK and GN Mine Primary Healthcare Centre;
- Vaal River Village, uMuziMuhle Village as well as the properties located in the towns of Orkney and Klerksdorp housing people working at MK and GN Mines;
- Vaal River Region Compulsory Training Centre including the Gateway Training Centre and the Trackless Mining Training Centre; and
- The entire South African Metallurgical Technical Services (SAMTS) office.

ES2: Effective Date and Valuation Date

[SV1.13]

The effective date (Effective Date) and Valuation Date of this CPR is deemed to be 1 January 2018.

ES3: Compliance

[SV1.4]

This CPR has been prepared in accordance with the 2016 South African Code for the Reporting of Exploration Results, Mineral Resources and Mineral Reserves (the SAMREC Code) and the 2016 South African Code for the Reporting of Mineral Asset Valuation (the SAMVAL Code) as well as per the Johannesburg Stock Exchange (JSE) Listing Requirements.

A shorthand notation has been used to denote compliance of a given section, so for example, SR1.1 refers to Section 1.1 Synopsis of Table 1 of the SAMREC Code and SV1.2 refers to T1.2 Synopsis of Table 1 of the SAMVAL Code.

ES4: Forward Looking Statements

[SV1.15]

This report contains statements of a forward looking nature which are subject to a number of known and unknown risks, uncertainties and other factors that may cause the results to differ materially from those anticipated in this report. The achievability of these projections is neither assured nor guaranteed by SRK. The projections cannot be assured as they are based on economic assumptions, many of which are beyond the control of AGA and SRK. Future cash flows and profits derived from such projections are inherently uncertain and actual results may be significantly more or less favourable.

ES5: Mineral Tenure

[SR1.5 (i)] [SV1.5]

Legal Opinion on Title

The mining rights granted to AGA were administered in terms of section 23 (1) of the Mineral and Petroleum Resources Development Act, 28 of 2002.

This report relies on information disclosed by AGA and uploaded to the Data Room. The legality of the underlying agreements was not verified. The report provided to SRK by Fasken Martineau (legal advisors) on 13 October 2017, which is attached and marked Appendix B, addresses the security of tenure of the properties, mining rights and surface rights with reference to Table 1.5 (included in the main body of the report, section 1.5.2, VROs Mineral Rights held by AGA) and the information made available as at 13 October 2017.

ES6: Geology

[SR2.1 (i)] [SV1.6]

The Witwatersrand Supergroup occupies a central position of the Archaean Kaapvaal Craton. It covers an area of 350 x 200 km with an average thickness of 5 to 8 km, underlain by the Dominion Group, Archaean Granitoids and Greenstone basement, and is overlain by the Ventersdorp Supergroup (Frimmel, 2005; Smieja-Krol *et al*., 2009).

The Witwatersrand was separated into a Lower Witwatersrand System, which contained the basal Hospital Hill Series overlain by the Government Reef Series and finally the Jeppestown Series, and an Upper Witwatersrand System containing the Main-Bird (MB) Series and the Kimberley-Elsburg Series by Mellor in 1911, and although numerous revisions and adaptations have been done, including SACS (1980) the basic subdivisions have been retained. The Lower Witwatersrand System is now known as the West Rand Group and the Upper Witwatersrand System is known as the Central Rand Group. The West Rand Group contains numerous well-developed argillaceous units, whereas the Central Rand Group is more arenaceous. The most important gold (Au) bearing horizons are mostly restricted to the Central Rand Group.

Deposit Type

[SR2.1 (v)]

The Vaal Reef (V Reef) is the primary economic horizon at MK Mine and the Crystalkop Reef (C Reef) is the secondary economic horizon, which contributes less than 2% of the total mining volume. Both reefs are narrow tabular deposits forming part of the Witwatersrand Supergroup and are stratigraphically located near the middle of the Central Rand Group. The V Reef lies approximately 255 m below the C Reef.

The geology at MK Mine is structurally complex with large fault-loss areas between the three mining areas. The geological setting is one of crustal extension, dominated by major south-dipping fault systems with north-dipping Zuiping faults wedged between the south-dipping faults. The De Hoek and Buffels East faults structurally bound the reef blocks of the Middle Mine to the north-west and southeast respectively. The northern boundary of MK Middle Mine is a north-dipping Zuiping fault. Extensive drilling is currently underway on the extremities of Middle Mine, targeting potential preserved blocks. MK (particularly Middle Mine) requires a reduced drill spacing pattern on the order of 50 x 50 m which allows for accurate delineation of the structurally bound mineable blocks, whereby accurate and efficient mine designs can be implemented ensuring optimal extraction and maximum orebody utilisation.

Mineralisation

[SR2.1 (vi) (vii)]

The mineralisation model adopted by AGA for Witwatersrand deposits is that of gold precipitation in the Witwatersrand conglomerates from hydrothermal fluids. Reactions that took place at elevated temperatures ranging between (300 – 350°C) caused the fluids to precipitate Au and other elements. Migrating liquid and gaseous hydrocarbons precipitated as a solid hydrocarbon (carbon), which was then mesophased through metamorphism and structural deformation. Carbon was preferentially precipitated in bedding–parallel fractures that most commonly followed the base of the V Reef package (A-bottom sub-facies). Gold and uranium mineralisation is also commonly observed within the A-middle and A-top sub-facies of the V Reef. Au was precipitated very soon after the carbon, giving the critical gold-carbon association that characterises the high-grade V Reef.

A geological model is employed to delineate variations (either lateral or vertical) in characteristics of the V Reef and C Reef. The current geological model thus subdivides the V Reef and C Reef into homogeneous zones based on geological and grade characteristics.

SRK have a different interpretation of the source of the gold within the Witwatersrand Reefs. SRK subscribe to the ‘modified placer’ interpretation, where the gold and uranium is syn-sedimentary alluvial metal, deposited along with the conglomerates, and concentrated in the conglomerates through repeated deposition and erosional cycles. Small scale (cm) hydrothermal re-mobilisation of the gold after deposition has occurred. Regardless of which of the two interpretations are considered however, the controls on the mineralisation are very similar, as the sedimentological characteristics which control the gold and uranium distribution in the modified placer interpretation are also interpreted as controls on the fluid flow and gold deposition in the AGA interpretation. The primary characteristics which inform the definition of estimation domains, using either interpretation, are the sedimentological and mineralogical characteristics of the conglomerates.

ES7: Mineral Resources

[SR4.5 (ii), (iv) (v) (vii)] [SV1.9]

Underground Mineral Resources

AGA report the underground Mineral Resources above a mining width (175 cm at GN Mine, 172 cm at MK Mine and 136 cm at Zaaiplaats Project).

The Mineral Resources are reported after the application of geological loss factors detailed in Table ES.1.

Table ES.1: Geological discounts applied to the Mineral Resources for reporting

Classification	MK Mine [2]	GN Mine V Reef [3]	GN Mine C Reef
Measured	2 %	0 %	6 %
Indicated [1]	3 % - 18 %	6.3 % - 21.3 %	13.7 % - 28.7 %
Inferred	30 %	33.7 %	33.7 %

Notes:
[1] AGA subdivide their Indicated Mineral Resources into three sub-classes for their internal reporting. Each of these sub classed is assigned a different geological loss, hence the ranges listed;
[2] The same losses are applied to the V Reef, C Reef and Zaaiplaats Project; and
[3] GN is predominantly mining pillars, where the geological losses are assumed to be adequately defined in the Measured Mineral Resource blocks.

The Mineral Resource tabulations are based on the 31 December 2016 declaration by AGA, but have been depleted to the effective date. The depletion is based on the actual production results up till 30 September 2017, and planned production from October 2017 to December 2017. The Mineral Resources have been depleted for planned and actual production from stopes and reef development. The Mineral Resources are reported in Table ES.2 and Table ES.3 for gold (Au) and urainium (U_3O_8) respectively.

Table ES.2: MK, GN Mines and Zaaiplaats Project Mineral Resource Statement for Au effective as at 1 January 2018

Operation	Reef type and area	Category	Quantity (Mt)	Au Grade (g/t)	Contained Au (Moz)
Zaaiplaats	V Reef	Measured	-	-	-
		Indicated	8.96	24.83	7.15
		Inferred	3.32	34.47	3.68
MK	V Reef	Measured	2.16	20.06	1.39
		Indicated	4.68	19.46	2.93
		Inferred	0.79	16.83	0.43
GN	V Reef	Measured	0.86	16.42	0.45
		Indicated	1.39	15.35	0.69
		Inferred	0.24	14.31	0.11
GN	C Reef	Measured	0.01	7.50	0.00
		Indicated	0.29	16.51	0.15
		Inferred	0.16	17.49	0.09
Total Underground		**Measured**	**3.03**	**18.97**	**1.85**
		Indicated	**15.33**	**22.17**	**10.93**
		Inferred	**4.51**	**29.71**	**4.31**

Notes:
[1] Mineral Resources are reported inclusive of any Mineral Reserves derived from them;
[2] A Mineral Resource is not a Mineral Reserve, and there is no guarantee that all or part of it will be converted to a Mineral Reserve;
[3] All figures are rounded to reflect the relative accuracy of the estimate;
[4] Mineral Resources are reported above a Au cut-off grade of 700 cm.g/t, which is derived using a Au price of USD1 447 per oz of Au, and exchange rate of USD/ZAR14.75, and Au recoveries of 96 percent;
[5] The Mineral Resources at Zaaiplaats Project are currently below infrastructure; and
[6] 1 troy oz = 31.103486g.

Table ES.3: MK, GN Mines and Zaaiplaats Project Mineral Resource Statement for U_3O_8 effective as at 1 January 2018

Operation	Category	Quantity (Mt)	U_3O_8 Grade (kg/t)	Contained U_3O_8 (M Lb)
		Underground Operations		
Zaaiplaats V Reef	Measured	-	-	-
	Indicated	15.08	0.85	28.28
	Inferred	8.16	0.81	14.58
MK Mine V Reef	Measured	-	-	-
	Indicated	6.84	0.81	12.25
	Inferred	0.79	0.89	1.56
GN Mine V Reef	Measured	-	-	-
	Indicated	2.25	0.54	2.67
	Inferred	0.24	0.51	0.27
GN Mine C Reef	Measured	-	-	-
	Indicated	0.31	0.61	0.41
	Inferred	0.16	0.68	0.23
Total Underground	**Measured**	**-**	**-**	**-**
	Indicated	**24.48**	**0.81**	**43.61**
	Inferred	**9.35**	**0.81**	**16.61**

Notes:
[1] Mineral Resources are reported inclusive of any Mineral Reserves derived from them. A Mineral Resource is not a Mineral Reserve, and there is no guarantee that all or part of it will be converted to a Mineral Reserve;
[2] All figures are rounded to reflect the relative accuracy of the estimate;
[3] The Mineral Resources are reported above the Au cut-off regardless of the U_3O_8 grade as U_3O_8 is reported as a by-product; and
[4] The Mineral Resources at Zaaiplaats are currently below infrastructure.

Surface Sources Mineral Resources Statement

The GN MOD, RWD and Mispah 2 have no declared Mineral Resources stated during the period which is currently under review.

The Mineral Resources for Surface Operations for Au and U_3O_8 as at 1 January 2018 is shown in Table ES.4 below.

Table ES.4: Mineral Resources for Surface Operations for Au and U_3O_8 as at 1 January 2018

Operation	Category	Quantity (Mt)	Au Grade (g/t)	U_3O_8 Grade (kg/t)	Contained Au (Moz)	Contained U_3O_8 (M Lb)
Mispah 1 TSF	Indicated	73.15	0.30	0.12	0.71	19.35
Kopanang Pay Dam	Indicated	10.98	0.20	0.13	0.07	3.15
Moab MOD	Inferred	7.35	0.37	-	0.09	-
Total Surface Operations		**91.49**	**0.29**	**0.13**	**0.87**	**22.50**

ES8: Mining and Mineral Reserves

[SR5.1 (i) (ii)]

The mining method applied at the MK Mine is scattered conventional utilizing backfill support. The declared Mineral Reserves for MK Mine are based on a comprehensive Life of Mine (LoM) plan which is presented in Figure ES.1. Au is the main mineral while U_3O_8 is produced as a by-product. The development waste is currently hoisted with reef at the MK Mine operation.

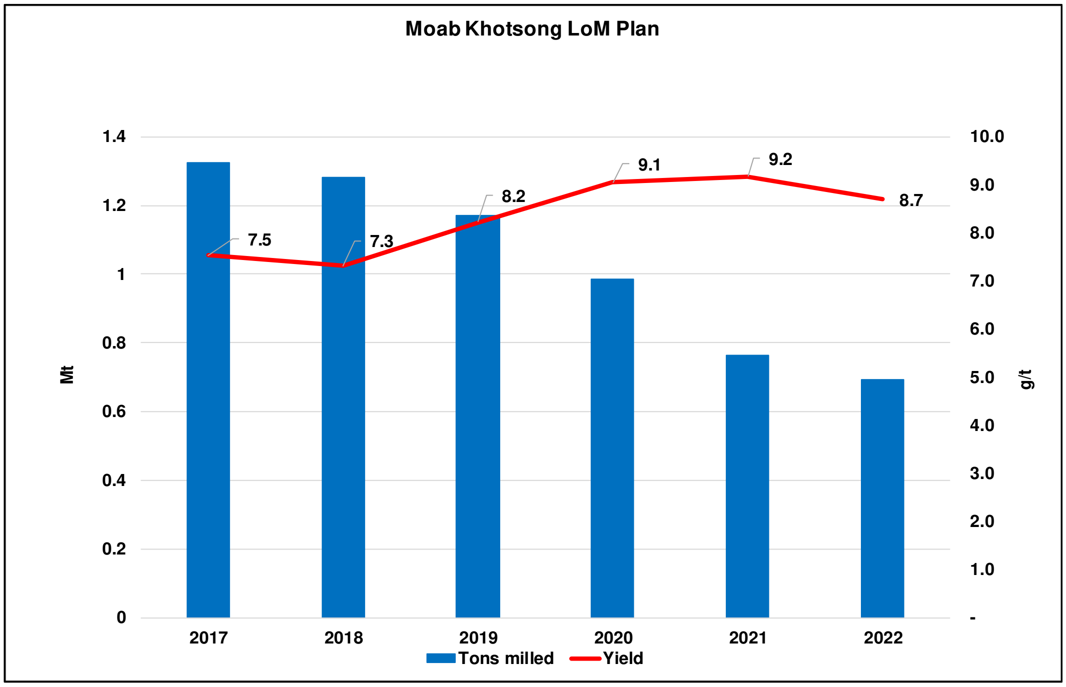


Figure ES.1: MK Mine LoM plan

The production and team efficiencies applied in the LoM plan correlate with those realised in the past. The efficiencies applied in the LoM plan are based on the historical performance statistics including the Section 54 stoppages. The cut-off parameters are outlined in Table ES.5 and the declared Mineral Reserve estimates for Au and U_3O_8 are provided in Table ES.6 and Table ES.7.

Table ES.5: MK Mine Mineral Reserve modifying factors applied in the LoM plan

MK	Au price	Au Cut-off grade	Au Cut-off value	Stoping width	Dilution	MCF	Metallurgical Recovery Factor
	ZAR/kg	(g/t)	(cm.g/t)	(cm)	(%)	(%)	(%)
V Reef – Middle Mine	530 000	4.07	700	172.0	62.7	77.9	96.1
V Reef – Top Mine	530 000	4.09	700	171.0	54.3	77.8	96.4
V Reef – GN	530 000	4.55	700	154.0	38.2	61.4	96.2
C Reef – GN	530 000	5.83	700	120.0	53.9	61.9	95.6

No material changes were observed in the modifying factors from 2016 to the Effective Date of 1 January 2018.

Mineral Reserve for Moab Khotsong

[SR5.2 (ii) (iv)]

The Mineral Reserves are included within the Measured and Indicated Mineral Resources, and are not in addition to them. The Mineral Reserve statement for the MK Mine operation is based on the SAMREC Code. The Mineral Reserves as at 1 January 2018 for Au and U_3O_8 are provided in Table ES.6 and Table ES.7. The U_3O_8 Mineral Reserves have been declared under the probable category to align with the Mineral Resource categories.

The Mineral Reserves are based on the 31 December 2016 declaration by AGA. They have been depleted up until 30 September 2017 and forecasted to December 2017.

Table ES.6: MK Mine Mineral Reserves statement for Au as at 1 January 2018

Operation	Reef type and area	Category	Quantity (Mt)	Au Grade (g/t)	Contained Au (Moz)
MK Mine	V Reef - Middle Mine	Proved	1.10	9.92	0.35
		Probable	2.10	9.87	0.67
		Total	**3.21**	**9.88**	**1.02**
	V Reef - Top Mine	Proved	0.14	7.09	0.03
		Probable	0.20	6.12	0.04
		Total	**0.35**	**6.35**	**0.07**
GN Mine	V Reef	Proved	0.77	6.69	0.17
		Probable	0.23	6.02	0.04
		Total	**1.01**	**6.47**	**0.21**
	C Reef	Proved			
		Probable	0.31	6.01	0.07
		Total	**0.31**	**6.33**	**0.07**
Total MK and GN Mines		**Proved**	**2.02**	**8.47**	**0.55**
		Probable	**2.84**	**8.87**	**0.82**
		Total	**4.86**	**8.71**	**1.37**

Notes:
The modifying factors applied in the LoM plan are as follows:
[1] The average stoping width applied over the LoM is 183 cm and the channel width 93 cm;
[2] The applied MCF is 73.95% and the overall dilution 54%;
[3] Exchange rate is ZAR14.99/USD; and
[4] The pay limit at level 4 costing on a real basis is 14.4 g/t.

Table ES.7: MK Mine Mineral Reserves estimate for U_3O_8 as at 1 January 2018

Category	Quantity (Mt)	Au Grade (kg/t)	Contained U_3O_8 (M Lb)
Probable	4.48	0.31	0.63

Notes:
[1] The following parameters have been applied for the U_3O_8 estimates;
[2] The recovery is 70%; and
[3] MCF of 100%.

Pre-Feasibility Studies (PFS) have been completed for the Zaaiplaats Project, the latest of which was 2017.

The Zaaiplaats Project is not included in the Mineral Reserve in this CPR as the project was not NPV positive at the applied real discount rate of 7.5%.

The GN Shaft pillar is excluded from the Mineral Reserves as it is at a concept level of study and has not been studied to the level of a PFS. The estimated Au content included in the Mineral Resources of the GN Shaft pillar is approximately 0.39 Moz. The shaft barrel at MK Mine has to be available for pumping until the end of the LoM.

SRK Comments

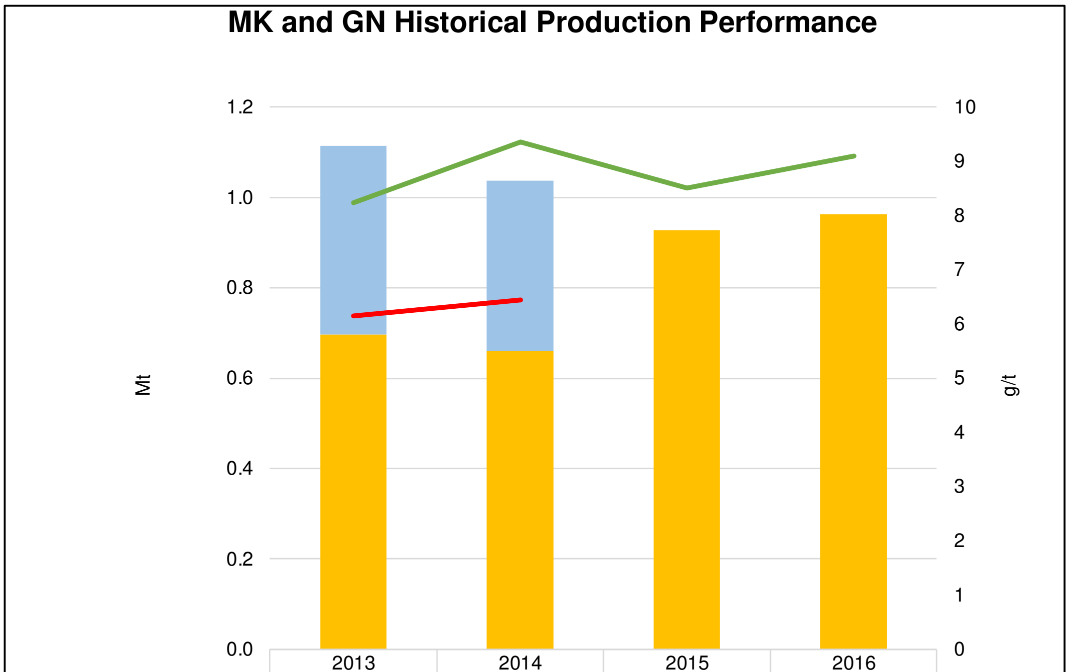
- The scattered conventional mining with backfill support is proven and SRK believe it is suitable for the characteristics of the orebodies at the MK Mine. The operational crews are experienced in the method;

- The mine planning process at MK Mine is conducted with diligence and reasonable modifying factors are applied to convert the Mineral Resources to Mineral Reserves. The modifying factors are reasonable and take cognisance of past performance. SRK is of the view that the LoM plan is realistic and achievable. No significant risk factors were identified; and
- SRK believes the methodology applied to convert the Mineral Resources to Mineral Reserves meets the requirements of the SAMREC Code.

ES9: Historical Production History

[SR1.4 (iii)] [SV1.2, SV1.17]

Brief historical operating statistics for MK Mine are summarised in the graph ES.2 below.



	2013	2014	2015	2016
Tonnes milled GN (Mt)	0.42	0.38		
Tonnes milled MK (Mt)	0.70	0.66	0.93	0.96
Recovered grade MK	8.23	9.36	8.5	9.1
Recovered Grade GNM	6.15	6.44		

Figure ES.2: MK Mine Historical Production History

It can be seen in ES.2 that there has been a gradual improvement in production from 2013 to 2016 at MK Mine operation. Although the average gold grade is volatile, there is an upward trend.

ES10: Operating Cost

The production tonnage planned for MK Mine reduces over the duration of the LoM. The unit operating costs incurred at MK Mine increase as the production reduces. The costs are escalated by inflation over the LoM.

SRK believes the costs applied in the LoM plan are reasonable.

ES11: Geotechnical Engineering

[SR5.2 (vii) (viii)] [SV1.10]

The practical approach implemented by the mine to cater for the provisions of the Code of Practice (CoP) to combat rockfall and rockburst accidents as well as the sufficiency of the seismic monitoring were considered. Both aspects are suitably managed.

The area-specific strategies are suitable.

A geotechnical design at a PFS level has been completed for the Zaaiplaats Project.

ES12: Ventilation and cooling

[SR5.2 (vii) (viii)]

MK Mine is mining at an average depth of 2 800 m below surface with rock temperatures exceeding 53.0°C and therefore is classified as an ultra-deep level mine. The ventilation and cooling infrastructure was originally designed for a production rate of 160 ktpm. Current production is 81 ktpm on average.

The current ventilation quantity (800 kg/s) and reduced cooling (75 MW to 42 MW) has sufficient cooling power for the provision of acceptable environmental conditions throughout the mine.

Average wet bulb temperatures in the Middle Mine do not exceed 28.5°C (Mine standard: 27.5°C). This is in line with industry norms for mines at similar depths.

Production at GN Mine was stopped in 2015. The total ventilation and cooling capacity (1000 kg/s and 50 MW respectively) can be made available if required.

The ventilation and cooling capacities are sufficient for the LoM production.

Occupational health

[SR5.2 (vii) (viii)] [SV1.10]

Silica dust with a crystalline silica content of 18 to 70% is one of the main occupational health risks in the Vaal Reefs area. The AGA mines have an industry leading silica dust suppression and enhanced medical surveillance programme in place in their quest towards zero harm.

Health surveillance records indicate that early diagnosed cases have been on the decline since 2006.

There are short term fluctuations in the number of employees previously exposed being diagnosed with Silicosis. The lag period from exposure to diagnosis is 10 to 20 years.

The mitigating action to reduce the Silicosis risk is the continuation of dust suppression programme.

Safety

There has been a significant reduction in injuries and fatal accidents from 2002 to 2016 across all the AGA VROs, and this is a commendable achievement.

In spite of the improvement, the number of Section 54 safety stoppages were at an all-time high in 2015 at MK. Lost shifts totalled 48 days and the production loss was 1 047 kg Au.

The Labour Court of South Africa, Johannesburg handed down an important decision in November 2016, when it granted AGA an interdict of a Section 54 work stoppage that had been issued by the Department of Mineral Resources (DMR). The judge found that the Section 54 applied at Kopanang Mine lacked “proportionality”; in other words it was unfair to close the entire mine when the safety incidents had occurred at only one level (44 level). This should result in a reduction in the number of lost shifts as a result of Section 54 stoppages in the Vaal Reefs area.

ES13: Hydrogeology and Surface Water

[SR5.2 (II) (vii) (viii)]

External water supply to VROs is provided from the following sources:

Potable water is supplied by Midvaal Water Company. Water supplied by the Midvaal Water Company is utilised by the VROs for domestic purposes as well as for mining and metallurgical processing.

Process water for the GN plant is provided from the Eye Dam, sewage treatment water, and boreholes as well as return water from the Mispah TSFs. The Kopanang Shaft, supplies the GN plant with process water as well as potable water. Water is also returned to the Kopanang complex. Currently more water is transferred to the Kopanang complex than is received.

The villages and the outside sections are supplied water from the Midvaal Water Company.

The Mispah TSFs, MK and GN assets are south of the river and villages and training centre to the north of the Vaal River. The Vaal River will be the main receptor of any pollution from the TSF and Plant/Shaft complexes. The potential issues associated with hydrogeology and surface water are:

- Pollution of the water resources from the tailings dam, MODs and metallurgical plants. The cost to implement seepage collection facilities will be in the order of ZAR15 million and will be funded through working capital;
- Operational compliance with Water Use Licence (WUL) conditions is not possible without treating the decant prior to storage in the RWD. While not practical and unlikely to be implemented, there is a large capital amount required to meet the WUL requirements (ZAR100 – 200 million) and will be funded through working capital if needed; and
- Upgrading of the Pollution Control Dam (PCD) to limit discharge at approximately ZAR50 million and will be funded through working capital.

Table ES.8 and Table ES.9 show a summary of the operating costs for WUL compliance and additional aspects that may be required as post closure costs/liabilities respectively.

Table ES.8: Summary of the Costs for Water

Cost of Compliance OPEX in Near Term Requirements	High Risk[1]	Low Risk[2]
	Cost (ZAR million)	
Separation of reticulation from the AGA assets	75	
Separation of clean and dirty water at TSF to be reprocessed	15	
Water treatment of TSF decant prior to storage in RWD to comply to WUL		150
10 years of OPEX to treat TSF prior to storage in RWD		200
Construction of interception measures at Mispah TSFs	50	
Upgrading of PCD to limit discharge	50	
Total	**190**	**350**

Notes:
[1] These items will be required during separation to comply with current legislation; and
[2] These items are required to comply with the WUL. These requirements are impractical and unlikely to be enforced.

Table ES.9: Additional Requirements

CAPEX Requirements	Cost (ZAR million)
In situ clean-up of water courses	50
Sinkhole formation management	10 - 50
Total	**100**

There may be additional water risks for contingent liability from:

- In situ clean-up of water courses at ZAR50 million;

- Potential for sinkhole formation management of ZAR10 million to ZAR50 million; and
- As the mine is located on dolomitic geology, there is a risk that sink holes may form related to mining activities particularly watering and dewatering of the dolomitic aquifers.

The impact of these risks materializing is not included in the valuation but is shown for informative purposes. Cognisance of the risks has been taken in the Financial Valuation (FV).

The closure costs including the costs associated with water are discussed in the closure section

ES14: Tailings Disposal

[SR5.4 (ii)] [SV1.10]

The Mispah TSFs consist of three compartments with the first compartment commissioned in the early 1990s. There was concern over the geotechnical founding conditions of the Mispah 1 site and this was mitigated by extensive geotechnical investigations and a design that resulted in an active sinkhole on the site being backfilled with waste rock and a plug of concrete cast against the layer of diamictite. As part of the long-term requirements water control measures needed to be maintained on an on-going basis throughout the life of the TSF. A stability analysis undertaken in concluded that is only one mention of a sinkhole or doline in the reviewed data, and concluded that "*This tends to confirm that the general area is not prone to sinkholes or dolines*".

The existing TSF can accommodate LoM tailings tonnage and it can be concluded that the Mispah TSFs are being operated by a competent team and in a professional manner. It is, however, noted that the way dolomite risks are assessed has changed over the years. If the dolomite investigations and risks have not been revisited since the 1990s then they may no longer be in line with current best practice.

The capital expenditure identified is minimal, however it is subject to there being no latent risks associated with the foundation dolomites.

The capital expenditure identified excludes the processing and disposal of the MOD.

ES15: Mineral Processing Facilities

[SR5.3 (i) (ii) (iii)] [SV1.2, SV1.10]

In terms of the transaction, Harmony are acquiring the following AGA mineral processing facilities:

- GN Gold Plant;
- GN Uranium Plant (also known as South Uranium Plant);
- GN Backfill Plant;
- Mispah Gold Plant;
- GN Central Smelt-house; and
- NUFCOR.

Underground ore is processed through the GN Gold Plant and the GN Uranium Plant in a Reverse Leach arrangement. Ore is milled in the Gold Plant then forwarded to the Uranium Plant for U_3O_8 extraction and returned to the Gold Plant for Au extraction.

The GN Gold Plant features conventional Carbon in Pulp (CIP) processing, with electrowinning cathode slimes being further processed to Doré bullion in the GN Central Smelt-house.

Backfill is produced from the Gold Plant tailings for underground mine support.

Historically MOD material has been processed through three plants including the Mispah Gold Plant.

U_3O_8 processing incorporates hot sulphuric acid leaching ahead of Counter Current Decantation, Counter Current Ion Exchange, Solvent Extraction and Ammonium Diuranate (ADU) precipitation. ADU, also known as yellowcake is despatched to NUFCOR for further processing.

NUFCOR produces U_3O_8 which is packaged and exported.

The mineral processing assets included in this transaction are generally in fair condition, with capacity that generally exceeds the planned throughput requirements.

Surplus capacity is likely however, to impact negatively on operating costs. This has been acknowledged in projected operating costs but there is also a risk that process operating costs may increase at reduced throughput. It will accordingly be important to minimise overheads. There may however, be an opportunity to manage operating costs as throughput reduces by shutting down surplus capacity.

Au extraction efficiency has been good but there is a risk that this could be lower than planned in periods of lower Au grade. Au recovery could also drop if ore with inferior metallurgical characteristics is treated.

U_3O_8 processing is currently not profitable. Ongoing operation has been motivated by a historically observed improvement in Au recovery after U_3O_8 leaching with sulphuric acid. There is thus, a risk that Au recovery would drop should U_3O_8 processing be discontinued for any reason.

ES16: Infrastructure and Capital Expenditure

[SR5.4 (i) (ii)]

The infrastructure is mature, well maintained and adequate to support the LoM. The capacity of the MK Mine hoisting and rock handling system is more than adequate to support the LoM.

The planned capital expenditure is Sustaining Capital, Ore Reserve Development (ORD) and some exploration capital.

The LoM capital is shown in the Table ES.10.

Table ES.10: The LoM capital

Capital	Units	Total
Stay-in-business Capital MK Mine (SIBC)	(ZAR million)	234
Items of a Capital Nature (ICN)	(ZAR million)	50
ORD Capital	(ZAR million)	956
Exploration Capital	(ZAR million)	12
Total Project Capital	**(ZAR million)**	
Total Sustaining Capital (SIBC+ICN)	**(ZAR million)**	**284**
Total Other Capital	**(ZAR million)**	**968**
Total Capital	**(ZAR million)**	**1 252**

Notes:
[1] The figures above are in real terms;
[2] The environmental and closure capital includes some funds already provided for in the rehabilitation and closure fund; and
[3] Sustaining capital for MK Mine varies from ±4% of C1 operating costs in 2018, dropping in the last years of the LoM for the MK mining areas. This is considered to be adequate.

The PFS for the Zaaiplaats Project indicates a capital requirement of ZAR11.63 billion from 2018 to 2030, Mineral Reserve Development of ZAR16.14 billion from 2022 to 2040, and sustaining capital varying from 1.3% to 5.5% of operating costs.

ES17: Power Supply

[SR5.4 (ii)]

Power supply agreements for those assets forming part of this transaction will have to be re-negotiated and transferred to Harmony. Generally the electrical infrastructure has been designed for the rated throughput of the plants and mining during full production, hence it is considered more than adequate for the mining and processing going into the future, due to reduction in mining rates and plant throughput.

Emergency power requirements have been allowed for in the existing electrical network, to provide ventilation, pumping at MK Mine and hoist personnel out from underground during Eskom power outages. The emergency generators should form part of the transaction as they are critical to maintaining hoisting, ventilation and pumping at MK.

It can be concluded from the above that the installed main electrical infrastructure (8 x 132/6.6 kV 20 MVA) at the main consumer substation is sufficient for the requirements of the LoM.

Redistribution of operating and maintenance costs for the electrical infrastructure supplying the accommodation units (which include the houses in the Vaal River Village, uMuziMuhle Village and properties located in the towns of Orkney and Klerksdorp will be part of the transaction.

ES18: Environmental, Social Impact and Mine Closure

[SR5.4 (i) (ii) (iii) (iv)]

AGA has addressed the South African environmental legal compliance requirements, notably with respect to mandatory authorisations and licences. VROs is in possession of the necessary Mining Rights and has an approved Environmental Management Programme (EMP), Social Labour Plan (SLP), Water Use Licence (WUL) and Air Emission Licence (AEL). Following change of ownership, it will be necessary to update the legal register and make application to the relevant authorities for the transfer and/or amendment of environmental authorisations, licences, certificates and permits.

The VROs have developed an Environmental Management System (EMS) for which they have received ISO 14001 certification. In compliance with applicable laws, regulation and requirements, the EMS commits VROs management to continual improvement of environmental management and performance. The EMS and EMP requirements are implemented by dedicated environmental and social staff. Although it is evident that compliance audits are being conducted for VROs, it is necessary that these are undertaken in fulfilment with permit requirements to monitor environmental performance at VROs and avoid potential directives by authorities.

VROs has formalized and structured engagement with local authorities. There is evidence that it also proactively engages with external stakeholders to manage issues and build community relations. Given the extensive property portfolio that VROs service and maintain, it will be necessary to support initiatives to transfer ownership of land and properties thereby reducing social dependencies and financial liability at closure.

VROs undertakes an annual assessment of the premature and planned closure liability, for the biophysical closure of the operations. This assessment does not include internal or external social closure requirements, as these are considered under the SLP, nor does it include post closure water management. The process that VROs follows complies with legal requirements as contained in the MPRDA. The premature closure liability, as calculated at the end of 2016, for the assets under consideration is ZAR639 million for biophysical closure. As required by legislation, AGA have made provisions to fund the liability using a combination of funds contributed to a Trust Fund and Bank Guarantees.

ES19: Mine Closure and Liabilities

The VROs undertakes an annual assessment of the premature and planned closure liability, for the biophysical closure of the operations. Annually, each aspect of the operation is considered to understand what changes have occurred since the last review, focussing on infrastructure constructed or demolished as well as understanding additional disturbance created or rehabilitation undertaken. This review is used to update the closure quantities for each of the operational areas. Rates are then applied to the quantities to determine the resultant liability. SRK understands that a full review of rates is only undertaken every third year, with the rates adjusted between full review by the prevailing inflation rate. The last rate update was undertaken in 2014 and is due again in 2017.

Using the information available, the premature closure liability, as calculated at the end of 2016, for the assets under consideration is ZAR639 million, with the apportionment of the liability presented in Table ES.11.

Table ES.11: Estimate of premature liability for assets included in transaction

Aspect	AGA 2016 Premature Liability Estimate (ZAR million)
Shafts	104.9
Metallurgical Plant	124.8
Water Dams	30.2
SAMTS Offices	2.6
TSF	137.3
Waste Rock dump	39.3
Sustainable Development	27.8
Engineering Services	11.1
Properties	45.8
Land Management	0.5
Incorporated	27.6
Residences	7.7
Business Services	79.6
TOTAL	**639.2**

As required by legislation, AGA has made provisions to fund the liability using a combination of funds contributed to a Trust Fund and Bank Guarantees. Currently, AGA has ZAR835 million in Trust and ZAR943 million in Bank Guarantees for the liability of the entire VROs, which includes assets not part of this transaction. Approval is awaited from the South African Revenue Service for the transfer of ZAR 340 million to the Harmony rehabilitation fund.

In addition to the liability for the VROs, SRK understands from AGA, that the liability for NUFCOR is ZAR13 million as calculated at the end of 2015. However, there is currently no legal requirement under the Nuclear Energy Act to provide for closure liability.

The liability associated with internal and external social closure and post closure water management are not included in the liability estimate of ZAR639 million. AGA recognises that there is a contingent liability for post closure water management, but has not yet quantified this contingent liability.

The contingent liability for water treatment at closure (based on work undertaken by other Consultants in 2015) could be as much as ZAR1.5 billion for the capital costs and ZAR2 billion for the operating costs and that these could be incurred approximately 10 years after the conclusion of underground mining. Whilst it appears likely that some of these costs will be mitigated through water sales, customers (external and internal) may exist for the pumped water prior to the commencement of treatment. These plans are conceptual and the final impact cannot be readily quantified.

ES20: Valuation

[SR5.8 (i) (ii) (iii) (iv)] [SV1.11, SV1.12, SV1.14]

Techno-Economic Model Parameters

SRK makes use of Consensus Economics Inc., a global macroeconomic survey firm, to inform their views on Au and U_3O_8 prices. The seven analysts consulted by Consensus Economics gave a range of long-term price forecasts of USD845 to USD1 419/oz. An exchange rate forecast has been provided by UBS, a global firm providing financial services to private, corporate and institutional clients, and the spot rate has also been considered. The Techno-Economic Model (TEM) developed for the valuation is in real-terms but some real-terms inflation (in excess of Consumer Price Index (CPI)) has been allowed for power and labour, which have historically increased at higher than CPI.

The parameters used in the analysis are shown in Table ES.11. The forecasts from Consensus Economics for the Au and U_3O_8 prices from Quarter 3, 2017 are shown in Table ES.12.

Table ES.12: Au and U_3O_8 Consensus Economics price forecasts and the UBS ZAR:USD

Commodity	Units	SPOT 18 September 2017	2017	2018	2019	2020	2021	LTP
Au	(USD/oz)	1 307	1 250	1 250	1 220	1 220	1 200	1 180
U_3O_8	(USD/lb)	21	22	24	29	34	34	29
ZAR:USD			14.23	13.73	13.42	13.11	13.89	13.89

SRK has made use of the Consensus Economics forecast in conjunction with the above exchange rates from UBS as a base case. The spot rates prevailing on 18 September for the Au price and 20 September 2017 for the exchange rate, USD1 307/oz and 13.30 ZAR:USD respectively, were also evaluated using the TEM. The NPV obtained, USD309 million, with the spot rate and price and was confirmed as positive and still within the selected valuation range.

The U_3O_8 price forecast shows a long-term price of USD29/lb. The forecast is quite volatile currently with several market commentators predicting large gains and a price of USD40-60/lb in the long term. U_3O_8 is produced at MK Mine primarily to improve the Au yield. An improvement in the U_3O_8 price would improve returns.

The Income Approach and Market Approach have been selected for the valuation of MK Mine, a producing property. The valuation is presented in USD, which is the currency of the transaction. The MK Mine is valued as a single operating entity and includes all the assets listed in the Description of Assets.

Income Approach

A detailed TEM was constructed to determine the NPV of the MK Mine. The TEM facilitated the testing of a range of price and cost scenarios and to assess the impact of various risks materialising.

Figure ES.3 shows the MK Mine is cash positive from 2018 until the final year where there is a slight negative cash flow, which is included in the TEM.

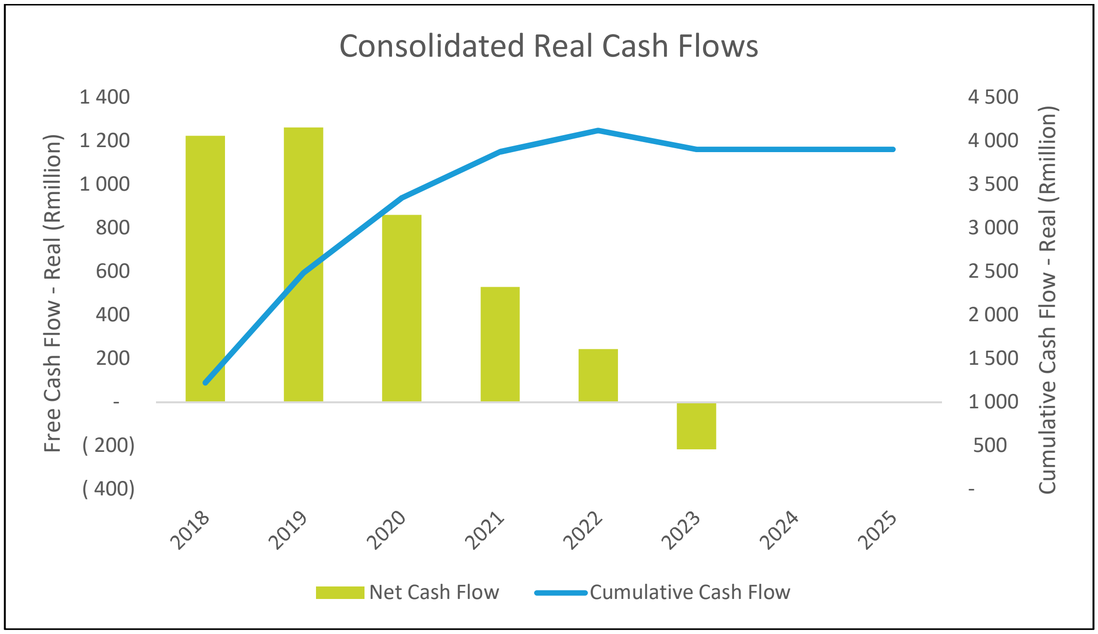


Figure ES.3: Consolidated Real Cash Flows for MK Mine

The sensitivity of the post-tax, pre-finance, NPV in USD million at the selected base case real discount rate of 7.5%, which is considered reasonable for a Au asset in South Africa, to three key variables is shown in Table ES.13 and Table ES.14.

Table ES.13: Two-factor sensitivity to Au Price and Exchange Rate

	USD/oz	974	1 096	1 218	1 340	1 461
ZAR:USD		**-20%**	**-10%**	**0%**	**10%**	**20%**
10.86	-20%	(175)	(66)	36	137	218
12.22	-10%	(66)	49	160	246	326
13.58	0%	36	160	257	343	429
14.94	10%	137	246	343	438	539
16.30	20%	218	326	429	539	641

The base case cost and economic assumptions applied to the Mineral Reserves in the TEM produce an NPV of USD257 million.

The NPV is sensitive to changes in grade, recovery, price and exchange rate. The effects of changes in any of these is similar. A 10% reduction in revenue reduces NPV to USD160 million and a 10% increase in price improves NPV to USD343 million.

There is no significant capital programme in the absence of the Zaaiplaats Project or the GN Shaft pillar. No sensitivity on capital is included but a sensitivity on OPEX was incorporated from the TEM.

Table ES.14: NPV Sensitivity to OPEX

OPEX adjustment	-10%	-5%	0%	5%
NPV (USD million)	322	289	257	225

Table ES.13 shows the impact of reducing the OPEX. The allocated costs detailed in the TEM, including various regional services, represent an opportunity to reduce costs, particularly in the event that various synergies are possible for the new owner. Various procurement initiatives were also underway at AGA to reduce costs but these have not been included as it is not clear that a new owner would use the same suppliers or have the same buying power. A 5% saving in OPEX (equivalent to reducing the allocated costs excluding metallurgical costs by 20%) would see NPV increase to USD289 million.

There are a number of potential opportunities, including the mining of the GN pillar, the development of the Zaaiplaats Project and the treatment of the surface Mineral Resource. SRK consider these opportunities to offset the potential risks of additional closure or environmental costs. Any extension of the LoM would reduce the NPV impact of these risks and allow additional time to fund. The potential opportunities have not been studied to the required level and have therefore not been detailed in the CPR and also not included in the base case valuation.

There are no significant capital programmes and the mine is predicted to operate with a positive cash flow under all reasonable scenarios for the remaining LoM. The risks discussed in the main body of the report are covered by the sensitivities presented.

Significant risks to the NPV include the contingent liability for the pumping and treatment of water from the Vaal Reefs area via the MWC (approximately 50Ml/day). Mitigation opportunities exist, through commercialisation of the water and extension of the LoM. The TEM assumes that the treated water will be sold on a commercial basis. Construction of the water treatment plant is assumed to commence in 2029, with commissioning in 2032. Water sales are assumed to offset OPEX from 2042. This is based on a high level study commissioned by AGA. CAPEX and the first 10 years of OPEX amounts to USD45 million. Failure to commercialise the water by 2042 would reduce the base NPV in this TEM by a further USD5 million.

Harmony have indicated that they have received guidance that 70% of the purchase price will be tax deductible. The value of this deduction is USD46 million and is included in the base case as it would apply to any third party purchasing the assets.

The Income Approach range is driven by the uncertainty around the price. Whilst there are several other sources of uncertainty around cost the price uncertainty dominates. The weighted average price is USD1 218 per ounce with a long-term price of USD1 180. The weighted average exchange rate is ZAR13.58:USD and, combined with the USD price is equivalent to a Au price of ZAR531 311 per kg. The spot price of USD1 307 per ounce and the spot exchange rate of 13.30 ZAR:USD applied throughout the LoM would increase the NPV by approximately USD50 million to USD306 million.

Market Approach

The Market Approach values the ounces in Mineral Reserves and Mineral Resources as in Tables ES2, ES3, ES4, ES6 and ES7 based on transactions recorded in the South African market. Additionally, the Enterprise Value per Mineral Resource and Mineral Reserve ounce was also calculated based on South African gold producers. The ounces of the Zaaiplaats Project have been included in the Mineral Resource. These ounces comprise approximately 63% of the total Mineral Resources ounces and, whilst meeting the criteria for eventual economic extraction, there is no certainty that these Mineral Resources will be converted to Mineral Reserves.

South African Au deposits are unusual in their depth, extent and maturity. Transactions were thus filtered to limit the review to South African assets and companies excluding the sale of 50% of South Deep to Gold Fields in 2006 because of the magnitude of the transaction. South African assets with no Mineral Resources or Mineral Reserves were also excluded.

In the transactions reviewed, the median price paid per Mineral Resource ounce (inclusive) was USD27 (USD15 for Au equivalent) and the price paid per Mineral Reserve ounce was USD135 (USD104 per Au equivalent). The review of EV per ounce for Sibanye, AGA and Harmony showed a price range of USD16 – 29 per Mineral Resource ounce and USD93 – 155 per Mineral Reserve ounce. The metal equivalent Mineral Resource/Reserve is determined by dividing total revenue from all minerals by the Au price.

Valuation Conclusions

Table ES.15 shows the final selected valuation ranges.

Table ES.15: Final selected valuation ranges

Summary	Income Approach (USD million)	Market Approach (USD million)	Final (USD million)
Low	160	127	150
Preferred	257	273	260
High	343	465	350

The implied values from the EV/oz for Harmony are selected as the low and preferred value, USD127 and USD273 million respectively, for the Market Approach. The high value, USD465 million for the Market Approach is selected from the median price paid for Au exclusive Mineral Resources.

The Income Approach range is driven by the uncertainty around the price. Whilst there are several other sources of uncertainty around cost the price uncertainty dominates. The weighted average price is USD1 218 per ounce with a long-term price of USD1 180. The weighted average exchange rate is ZAR 13.58:USD, equivalent to a price of ZAR 531 311 per kg. The spot price of USD1 307 per ounce and the spot exchange rate of 13.30 ZAR:USD applied throughout would increase the NPV by approximately USD50 million to USD306 million.

The Market Approach implies a slightly higher valuation than the Income Approach. Preference has been given to the Income Approach as this is a producing mine and given the uncertainties inherent in the Market Approach.

The recommended value placed on the entity as described is USD260 million.

ES21: Risks and Opportunities

[SR5.7 (i)] [SV1.15]

SRK has not explicitly included conceptual risks or opportunities in the TEM as the magnitude or timing cannot be accurately determined. These risks and opportunities have been described for the information of the reader along with the indicative NPV impacts.

Glossary of Terms, Abbreviations and Units

GLOSSARY

Alaskite	a leucocratic granite of medium or fine grain composed chiefly of quartz and alkali feldspars.
Carnotite	uranium bearing mineral with the formula $K_2(UO_2)2V_2O_8.3(H_2O)$.
Conglomerate	a coarse-grained sedimentary rock composed of rounded fragments (> 2 mm) within a matrix of finer grained material
Calcrete	also called Hardpan, calcium-rich duricrust, a hardened layer in or on a soil. It is formed on calcareous materials as a result of climatic fluctuations in arid and semiarid regions. Calcite is dissolved in groundwater and, under drying conditions, is precipitated as the water evaporates at the surface
Calcretised	cemented by calcrete.
Calc-silicate	A calc–silicate rock is a rock produced by metasomatic alteration of existing rocks in which calcium silicate minerals such as diopside and wollastonite are produced.
Datamine:	Generalized mining software used for the derivation of Mineral Resources and Mineral Reserves.
Diamond drilling:	The act or process of drilling boreholes using bits inset with diamonds as the rock-cutting tool.
Ephemeral	lasting a very short time; short-lived; transitory.
Indicated Mineral Resource:	Is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit. Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing and is sufficient to assume geological and grade or quality continuity between points of observation.
Inferred Mineral Resource:	that part of a Mineral Resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. 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. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.
Lenticular	describing a formation with a lens-shaped cross-section.
Metapelite	Metapelites, are metamorphic rocks, which derived from contact or regional metamorphism of shale or mudstones (clay rich sediments).
Metagreywacke	Metagraywackes are quartzose chlorite or biotite schists containing very fine to coarse granules of blue quartz; primary graded laminations

	have been transposed by shearing into elongate lozenges that give the rock a distinctive pin-striped appearance in weathered surfaces perpendicular to schistosity.
Measured Mineral Resource	Is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit. Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to confirm geological and grade or quality continuity between points of observation. A Measured Mineral Resource has a higher level of confidence than that applying to either an Indicated Mineral Resource or an Inferred Mineral Resource.
Metamorphism	The process of changing the mineral composition and texture of rocks by heat and pressure.
Mineral Reserve	the economically mineable part of a Measured and/or Indicated Mineral Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined or extracted and is defined by studies at Pre-Feasibility or Feasibility level as appropriate that include application of Modifying Factors. Such studies demonstrate that, at the time of reporting, extraction could reasonably be justified.
Mineral Resource	a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling.
Probable Mineral Reserve	Is the economically mineable part of an Indicated, and in some circumstances, a Measured Mineral Resource. The confidence in the Modifying Factors applying to a Probable Mineral Reserve is lower than that applying to a Proved Mineral Reserve.
Proved Mineral Reserve	Is the economically mineable part of a Measured Mineral Resource. A Proved Mineral Reserve implies a high degree of confidence in the Modifying Factors.
Percussion Drilling:	The process of boring into rock by means of an air- or hydraulic-powered drill bit.
SAMREC Code 2016:	South African Code for Reporting of Exploration Results, Mineral Resources and Mineral Reserves released in 2016.
SAMVAL Code 2016:	South African Code for the Reporting of Mineral Asset Valuation 2016 Edition.

ABBREVIATIONS

Acronym	Definition
2-D	2-Dimensional
3-D	3-Dimensional
AEL	Air Emission Licence
AiSC	All in Sustaining Cost
AGA	AngloGold Ashanti
AAS	Atomic Absorption Spectrometry
Aids	Acquired Immune Deficiency Syndrome
AIM	Alternative Investment Market, the London Stock Exchange's international market for smaller growing companies
amsl	above mean sea level
AMIS	African Mineral Standards
BW or SW	Stope Width
BP	Business Plan
CCD	Counter-current-decantation
CRMs	Certified Reference Materials
C Reef	Crystalkop Reef
COAD	Chronic obstructive airway disease diagnosed
CoP	Codes of Practice
CP	Competent Person
CPI	Consumer Price Index
CPR	Competent Person's Report
CSI	Corporate social investment
CN	Cyanide
CDP	Cyanide Destruction Plant
Conc	Concentrates
°C	Degree Celsius
CSW	Chilled service water
the current year	The year ended 31 December 2017
CV	Competent Evaluator
dB	Decibel
DB	Dry Bulb
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
DWS	Department of Water and Sanitation
DFS	Definitive Feasibility Study
DPM	Diesel Plant Matter
DTMs	Digital Terrain Models
EC	Electric Conductivity
ECSA	Engineering Council of South Africa
EMP	Environmental Management Programme
EMS	Environmental Management System
Eskom	Electricity Supply Commission, South African electricity supplier

Acronym	Definition
F2017	Financial year ended 30 June 2017
FM	Financial Model
g/t	Grams/tonne
GN	Great Noligwa
GSSA	Geological Society of South Africa
GTO	Geoscience Technical Office Exploration Section
Harmony	Harmony Gold Mining Company Limited
HDSA	Historically disadvantaged South African
HIV	Human Immunodeficiency Virus
HR	Human Resources
HRD	Human Resource Development
HSM	Heat Stress Management
IBGs	Isolated Blocks of Ground
ICMI	International Cyanide Management Code
ISO	International Standards Organisation
km	Kilometres
kg/s	Kilograms per second
KOSH	Klerksdorp, Orkney, Stilfontein and Hartebeesfontein
koz	Thousand ounces
kt	Thousand tonnes
ktpa	kilotonnes per annum
ktpm	kilotonnes per month
KPD	Kopanag Pay Dam
koz	Thousand ounces
kPa	Kilopascal
KR	Kimberly Reef
kW	Kilowatt
LHD	Load, Haul, Dump machine
LIMS	Laboratory Information Management System
LoM	Life of Mine
LSE	London Stock Exchange
LTIFR	Lost time injury frequency rate
LTIP	Long-Term Incentive Plan
Ma	Million years before present
mamsl	Metres above mean sea level
mbgl	Metres below ground level
MK	Moab Khotsong
MCF	Mine call factor
MHSA	Mine Health and Safety Act 29 of 1996
Mining Charter	Charter to facilitate the sustainable transformation and development of the South African mining industry
MOD	Marginal Ore Dump
Moz	Million ounces
MPa	Megapascal

Acronym	Definition
MPRDA	Mineral and Petroleum Resources Development Act
MPRRRA)	The Mineral and Petroleum Resources Royalty Act, Act No. 28 of 2008, (MPRRA)
MPTRO	Mining Rights of the Mineral and Petroleum Titles Registration Office
MRE	Mineral Resource Estimate
MSDS	Material Safety Data Sheets
Mt	Million tonnes
Mtpa	Million tonnes per annum
Mtpm	Million tonnes per month
MVA	Mega Volt Amperes
MW	Megawatt
MWC	Margaret Water Company
MWS	Mine Waste Solutions Tailings Retreatment Complex
n.d	Not defined
NIHL	Noise-induced hearing loss
NUFCOR	Nufcor (Pty) Limited
NUM	National Union of Mineworkers
No.	Number
NOSA	National Occupational Safety Association
OCB	Oil circuit breaker
OEL	Occupational Exposure Limits
ORD	Ore Reserve Development
Pa	Pascal
PCD	Pollution Control Dam
PFS	Pre-feasibility study
PoD	Point of Delivery
PSD	Particle size distribution
ppm	Parts per million
PbO	Litharge
PRV	Pressure reducing valve
QAQC	Quality Assurance and Quality Control
QC	Quality Control
RCF	Revolving credit facility
RD	Relative Density
RoM	Run-of-mine
RV	Rock and ventilation shaft
RWD	Return Water Dam
SA	South Africa
SAMREC Code	The South African Code for the Reporting of Exploration Results, Mineral Resources and Mineral Reserves, 2016 Edition
SAMVAL Code	The South African Code for the Reporting of Mineral Asset Valuation, 2016 Edition
SANAS	South African Accreditation System
SCADA	Supervisory Control And Data Acquisition
Section 54 safety stoppages	In terms of section 54 of the Mine Health and Safety Act 29 of 1996, if an inspector of mines believes that an occurrence, practice or condition at a mine endangers or may endanger the health or safety of people at the mine, the inspector may give any instruction necessary to protect the health or safety of people at the mine, including instructing that operations at the mine or a part of the mine be halted

Acronym	Definition
Set Point	Set Point Laboratories
SRD	Saline Rock Drainage
SHEQC	Safety, health, environment, quality and community
SIB	Stay in Business
SLP	Social and labour plan
SMU	Small mining unit
SoP	Standard Operating Procedure
SRK	SRK Consulting (South Africa) Pty Ltd
SVOL1	First-search ellipsoids
SVOL2	Second-search ellipsoids
SW	Stope width
TEP	Techno-Economic Parameter
tonne	thousand kilograms
TSF	Tailings Storage Facility
TSFs	Tailings Storage Facilities
TB	Tuberculosis
the previous year	The year ended 31 December 2016
the year or the year under review	The year ended 31 December 2017
TDS	Total Dissolved Solids
tpd	Tonnes per day
tpm	Tonnes per month
U_3O_8	chemical symbol for Uranium Oxide
VCB	Vacuum circuit breaker
WACC	Weighted Average Cost of Capital
WB	Wet Bulb
WHO	World Health Organization
WML	Waste Management Licence
WUL	Water Use Licence
V Reef	Vaal Reef
VROs	Vaal River Operations
Financial terms	
IRR	Internal rate of return
JIBAR	Johannesburg Inter-Bank Acceptance Rate
NPV	Net present value
USD	US Dollar
YTD	Year to date
ZAR	South African rand
ZAR million	Million SA Rands

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1 Introduction

1.1 Property Description

1.1.1 Background

[SR1.1 (i)] [SV1.3]

SRK Consulting (South Africa) (Pty) Ltd. (SRK) was requested by Harmony Gold Mining Company Ltd. (Harmony), to prepare a Competent Persons' Report (CPR) on selected assets of AngloGold Ashanti (AGA) at the Vaal River Operations (VROs) for the purpose of a potential transaction.

1.1.2 AGA Corporate structure

The corporate structure of AGA is shown in Figure 1.1.

1.1.3 Description of Assets

[SR1.1 (i)] [SV1.2, SV1.5]

The assets and interests valued in this report are as follows:

- Moab Khotsong (MK) Mine which incorporates the Great Noligwa (GN) Mine, and all of the associated fixed plant, equipment and infrastructure. The MK Mine also includes the Zaaiplaats Project which is a down dip extension below the current infrastructure;
- The GN plant complex which includes - GN Gold and Uranium Processing Plant, GN Backfill Plant, Mispah Gold Plant, Mispah 1 and 2. (Referred to individually as Mispah 1 or Mispah 2 or collectively as Mispah Tailings Storage Facilities (Mispah TSFs)), the South Return Water Dam (RWD), the Kopanang Pay Dam (KPD), and Vaal River smelt-house;
- The Marginal Ore Dumps (MODs) situated at GN and MK;
- AGA's entire interests in Margaret Water Company (MWC) and all associated pumping and water infrastructure;
- AGA's entire interest in Nufcor (Pty) Limited (NUFCOR);
- MK and GN Mine Primary Healthcare Centre;
- Vaal River Village, uMuziMuhle Village as well as the properties located in the towns of Orkney and Klerksdorp housing people working at MK and GN Mines;
- Vaal River Region Compulsory Training Centre including the Gateway Training Centre and the Trackless Mining Training Centre; and
- The entire South African Metallurgical Technical Services (SAMTS) office.

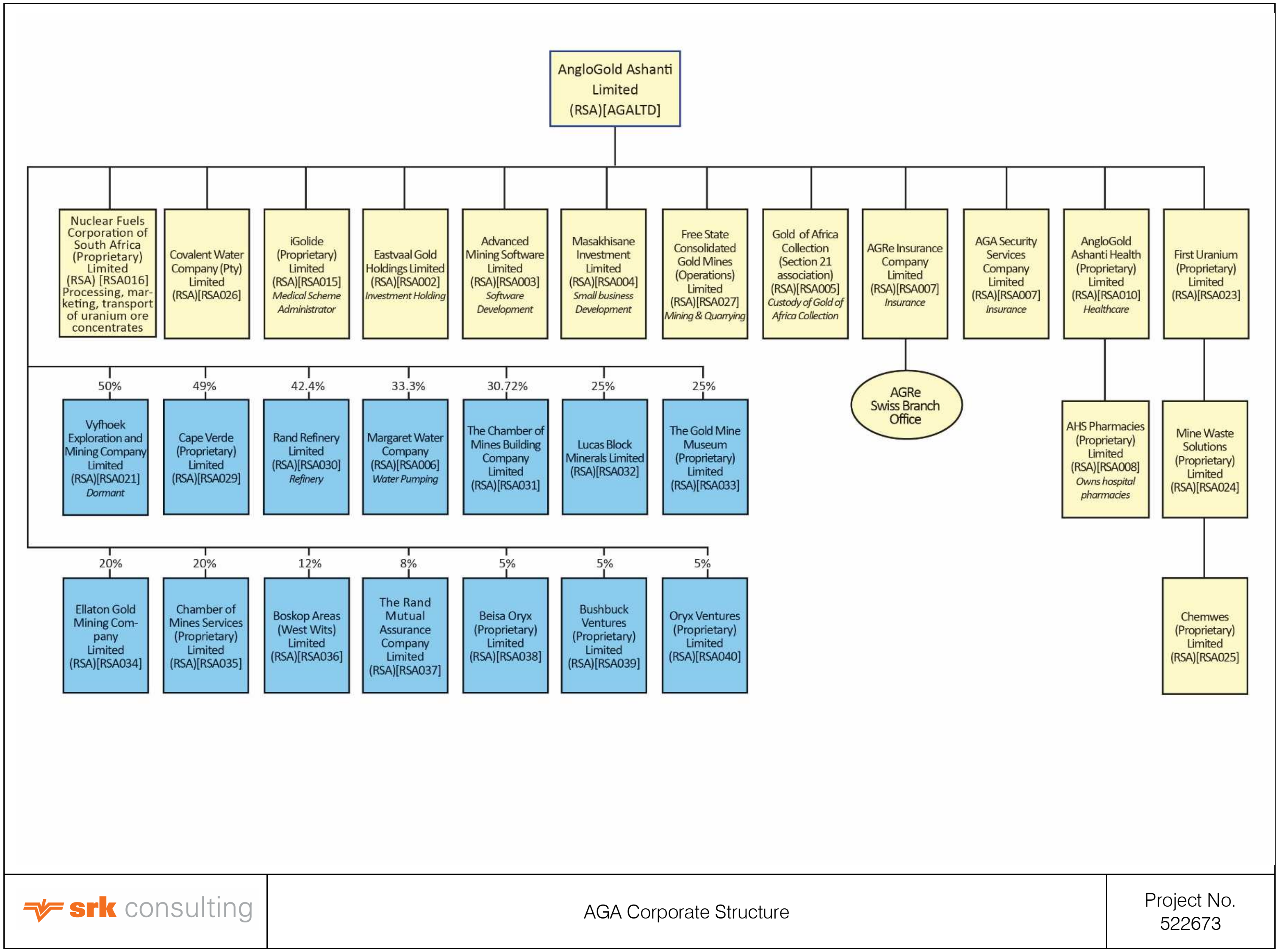


Figure 1.1: AGA Corporate Structure

1.1.4 Accessibility, Climate, Local Resources, Infrastructure and Physiography

[SR1.1 (ii)]

Accessibility

At the existing mining operations, access to the operating sites is well established via a network of national highways and local tarred roads. The site is approximately 15 km south of Klerksdorp in the North West Province. Other neighbouring towns include Orkney and Stilfontein, which are situated 10 km and 10 km respectively to the west and east of VROs. The land occupied by VROs straddles the boundary between the Free State and North West Provinces.

Climate

Table 1.1 summarises the climate experienced around the VROs neighbouring towns of Stilfontein, Orkney and Klerksdorp. Therefore, this information given is rough but provides a close enough indication of the type of climate to expect at VROs.

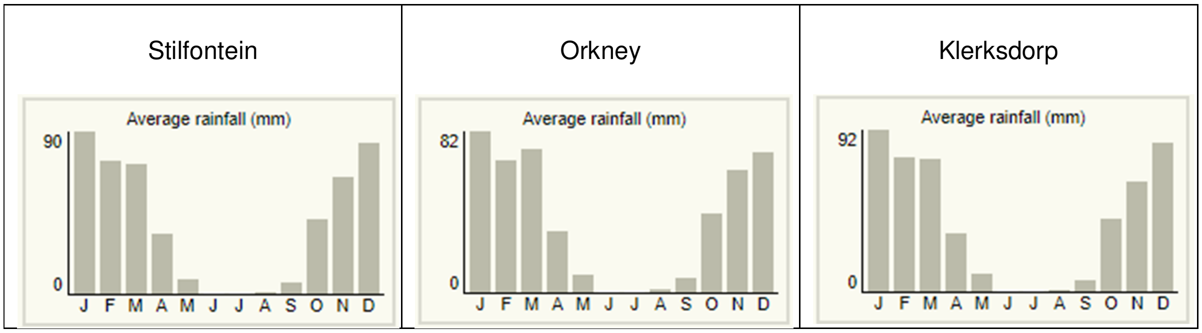
Table 1.1: Summary of Annual Climates experienced around VROs neighbouring towns

Nearest Town	Climate	Average Temperature (°C)	Precipitation (mm)
Stilfontein	Cold semi-arid	16.8	474
Orkney	Cold semi-arid	16.9	444
Klerksdorp	Cold semi-arid	17.0	482

Stilfontein normally receives about 474 mm of rain per year, with most rainfall occurring mainly during mid-summer. The chart below (Figure 1.2) shows the average rainfall values for Stilfontein per month. It receives the lowest rainfall (0 mm) in June and the highest (90 mm) in January. The monthly distribution of average daily maximum temperatures for Stilfontein range from 18°C in June to 29.1°C in January. The region is the coldest during June when the mercury drops to 0°C on average during the night.

Orkney normally receives about 444 mm of rain per year, with most rainfall occurring mainly during mid-summer. The chart below (Figure 1.2) shows the average rainfall values for Orkney per month. It receives the lowest rainfall (0 mm) in June and the highest (82 mm) in January. The monthly distribution of average daily maximum temperatures for Orkney range from 18°C in June to 29.9°C in January. The region is the coldest during July when the mercury drops to 0°C on average during the night.

Klerksdorp normally receives about 482 mm of rain per year, with most rainfall occurring mainly during mid-summer. The chart below (Figure 1.2) shows the average rainfall values for Klerksdorp per month. It receives the lowest rainfall (0 mm) in June and the highest (92 mm) in January. The monthly distribution of average daily maximum temperatures for Klerksdorp range from 18°C in June to 29.5°C in January. The region is the coldest during July when the mercury drops to 0°C on average during the night.



srk consulting	Average rainfall in towns near VROs	Project No. 522673

Figure 1.2: Average rainfall in towns near VROs Source: SA Explorer

Physiography

The Vaal area forms part of the Highveld, this name referring to the high interior plateau of South Africa which is fairly flat with elevations varying from 1 500 m to 1 800 m above sea level. The area is situated south of the sub-continental divide known as the Witwatersrand Ridge which stretches east to west across Johannesburg. The rain falling south of this ridge flows via the Vaal River into the Atlantic Ocean.

The Vaal River Basin is the main hydrological system in the area whose tributaries are non-perennial due to the dry weather. The Vaal Dam is an important source of water for the area, supplying a continuous flow of good quality water into the Vaal River. The two main tributaries of the Vaal River are the Klip River and the Suikerbosch River.

The Vaal area covers falls within the Grassland Biome, which covers the high central plateau of South Africa. About one third of the mammal species of South Africa occur in this biome. Highveld vegetation consists of a combination of grassland types with moist types present towards the east and drier types towards the west and south. Much of the area is covered by Cymbopogon Themeda Veld type. Trees and shrubs such as Protea Caffra are common along rocky hills and ridges. Much of the original habitat has been greatly reduced due to farming and modern developments.

Rock types include sandstone, quartzite, mudstone, basalt and biotite granite. Soil texture types include sand-clay-loam, clay, sand-clay, sand-loam and loam-sand.

The illustration below, Figure 1.3 shows the typical physiography at VROs. Figure 1.3 shows MK Mine (top illustration) and Kopanang Mine (bottom illustration).

srk consulting	Typical landscape in VROs	Project No. 522673

Figure 1.3: Typical landscape in VROs showing MK Mine (above) and Kopanang Mine (below) Source: goldindo.wordpress.com

1.1.5 Site Visits

[SR1.1 (iii)] [SV1.0]

SRK personnel visited selected AGA operations as part of the inspection of surface and underground facilities, metallurgical processing facilities, geotechnical conditions underground and Tailings Storage Facilities (TSFs), and met with personnel representing relevant disciplines of AGA as indicated in Table 1.2. The purpose and overview of the site visits is summarised in Figure 1.4 and includes the following:

- Discuss and review the database;
- Review geological and grade model generation procedures;
- Review resource validation procedures;
- Define geological modelling procedures;
- Review the operational performance and statistics;
- Review the Life of Mine (LoM) planning process and the conversion of Mineral Resources to Mineral Reserves;
- Review the operation’s engineering infrastructure;
- Review the processing plants; and
- Interview project personnel.

Andrew van Zyl (CP with responsibility for the valuation of the assets under review) did not attend the site visit. He met with a range of senior officials from AGA in meetings held in Sandton during 2017 to discuss the assets. In addition, he held meetings with the SRK personnel who attended the site visits and gave input into the operating and capital costs and other technical inputs into the Techno-Economic Model.

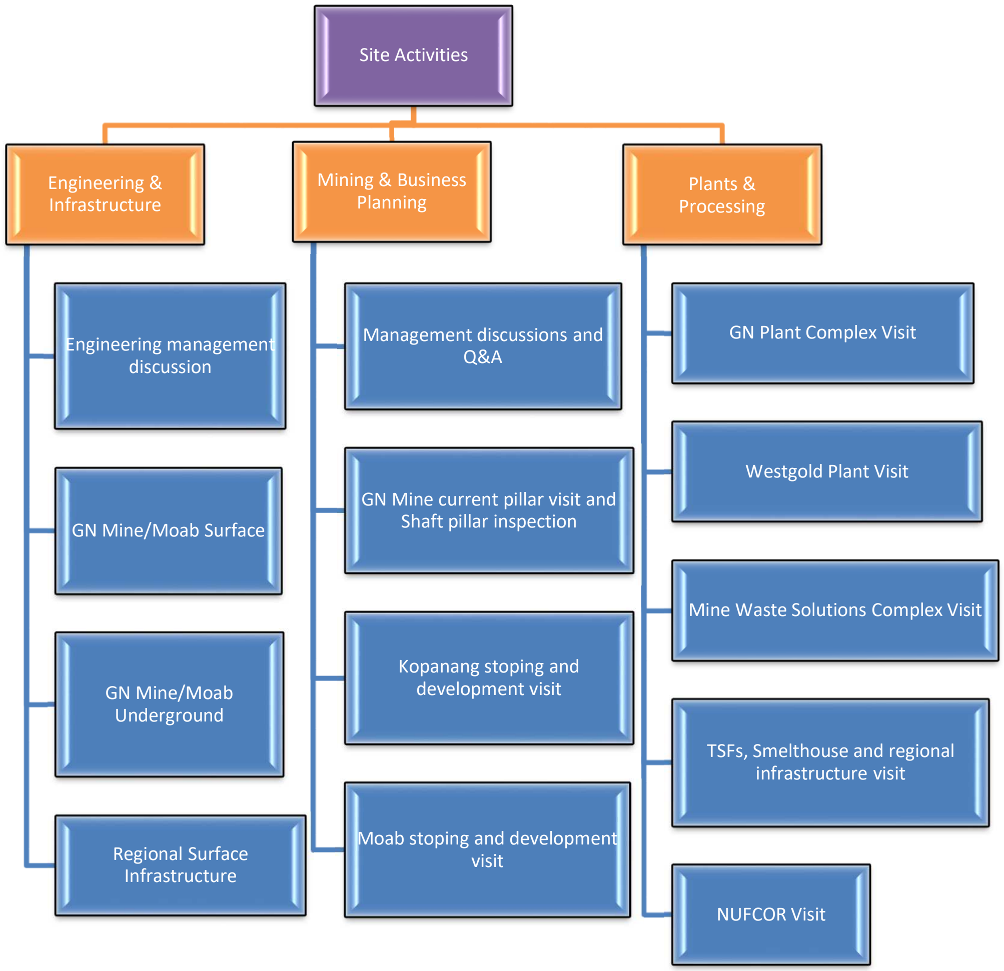
Table 1.2: Summary of Site Visit

Purpose	Operation	Consultant			AGA		Date of Visit	Work place visited and remarks
		Name	Company	Designation/Role	Name	Designation/Role		
Business planning and performance review presentation	West Wits Carletonville Regional office	Joseph Mainama and Roger Dixon	SRK	Mining consultants	Moses Madondo and Shaun Newberry	General management	09-Jun-17	Business plan and performance presentation
Geology and Mineral Resources		Mark Wanless		Principal Geologist	Tim Hewitt	Regional Manager - Geology		Discussed MK Mine geology, resource domaining, structural geology and additional potential
		Senzeni Mandava		Senior Resource Geologist	Tim Hewitt	Regional Manager - Geology	26-Sep-17	Discussed data needed to validate Mineral Resource estimates for both underground (MK and GN Mine) and surface sources (Mispah 1, 2, Moab MOD, Kopanang Pay dam etc.)
Mining and Mineral Reserves	MK Mine	Joseph Mainama, Roger Dixon and Rob McGill	SRK and Fraser McGill	Mining consultants	Corne Van der Merwe	Mine Manager	12-Jun-17	Visited the 70EW raiseline. The 49A pillar was being mined. The team informed us that seismicity was a problem. The manager appeared to have a good relationship with the people but the team was battling to achieve call. The effective shift time is about 4 hours as the workplace is at the extreme ends of the mine.
Engineering Infrastructure and CAPEX/OPEX	Surface Infrastructure, Metallurgical plants at NUFCOR, VROs and TSFs	Willie Schoeman	SRK/Bara Consulting	Infrastructure/ Mechanical Engineer	Clive van der Westhuizen	Engineering Manager	08/06/2017 to 13/06/2017	Surface Infrastructure and Metallurgical plants at NUFCOR and VROs and TSFs. Generally all in good condition.
	Technical Discipline sessions and production presentation at West Wits Offices	Kenny Mahuma	SRK Consulting	Principal Electrical Design Engineer	Richard Mack, Shaun Newberry	Engineering Manager, Regional General Manager	09-Jun-17	General discussions on engineering aspects across all Vaal Reefs Operations. Discussions included compressed air monitoring, pumping control, central generators base load, power supply and reliability, energy efficiency, obsolete equipment such as oil circuit breakers replacement. Discussions were well informing and well presented.
	MK Mine	Robert Holmwood	Private	Engineering Consultant	R Giesenberg	Engineering Manager	11-Jun-17	• Main pump stations 1 200 level, 77 level and 102 level; • Water settlers, 3 pipe chamber system;
					Frans Greyling	Shaft Engineer		

Purpose	Operation	Consultant			AGA		Date of Visit	Work place visited and remarks
		Name	Company	Designation/Role	Name	Designation/Role		
								• Pump station substations; • Shaft Bottom RV and Main shafts; • Conveyor belts 77 level; • Surface infrastructure, compressors, refrigeration, fans; and • Full shaft examination. Infrastructure is well maintained and in good operational order.
		S J Van der Wath	Fraser McGill	Consulting Engineer				MK Mine surface and underground engineering infrastructure, including a shaft examination
Engineering Infrastructure and CAPEX/OPEX	Margaret Water Shaft, Vaal River surface infrastructure		Private	Engineering Consultant	R Mack, T Else	Director Eng. SA, Shaft Engineer	12-Jun-17	Margaret Water Shaft • 16 level pump; station; • Winders; and • Surface pumps and pipelines. VR Surface infrastructure • Surface workshop complex; • Sewerage plant; • No.1 Shaft fan; • Main Electrical Emergency generators; • Mine Hospital; and • Assay offices.Infrastructure is well maintained and in good operational order.
	Margaret Water Shaft	S J Van der Wath	Fraser McGill	Consulting Engineer	At Greyling	Electrical Engineer		Margaret Water Shaft, surface and underground infrastructure and pump stations
	Margaret Shaft and Off Mine Infrastructure	Kenny Mahuma	SRK Consulting	Principal Electrical Design Engineer	Richard Mack, At Greyling, Linelle Lawrence, Shaun Newberry	Engineering Managers, Section Engineer and Off Mine Asset Manager, Regional General Manager		Margaret Shaft 16½ level pump station, Margaret Shaft Winder House, Margaret Shaft Control Room, Central General Substation, No.1 Shaft Main Fan, No.3 Shaft Waste Treatment Plant, Central Control Room, Drive around surface off mine infrastructure such as villages, hospital and core yard. Generally infrastructure in good condition.
	GN Mine		Private	Engineering Consultant	M van Heerden R Giesenberg	Project Engineer Engineering Manager	14-Jun-17	• Fissure water pumping and handling; • Underground pumps; • Underground refrigeration; • Surface infrastructure: winders, compressors, fans, refrigeration; and

Purpose	Operation	Consultant			AGA		Date of Visit	Work place visited and remarks
		Name	Company	Designation/Role	Name	Designation/Role		
Engineering Infrastructure and CAPEX/OPEX								• Discussion on proposed Shaft pillar extraction. Infrastructure is well maintained and in good operational order.
	GN Mine	S J van der Wath	Fraser McGill	Consulting Engineer	Ian Buchanan	Project manager		GN Mine surface and underground engineering infrastructure.
	GN Mine	Kenny Mahuma	SRK Consulting	Principal Electrical Design Engineer	Ian Buchanan	Engineering Manager		78 level pump station substation, 61 level pump station substation, 61 level fridge plant, main incoming substation, surface fridge plant substation. Generally infrastructure in good condition, however automatic fire suppression and remote switching need to be considered at 78 level pump station substation, and second escape door at 61 level pump station substation as per legislation.
Metallurgy	NUFCOR	V W Hills/C Roode	SRK/Metenco	Principal Mineral Processing Consultant/	T Qabaka/	SVP Surface Operations SA Region/ Process Manager: Savuka GP and NUFCOR/ Mineral Resources Manager Surface Operations	08-Jun-17	NUFCOR Plant
	VROs				S Selamolela/ M Gagiano	Process Manager: Savuka GP and NUFCOR/ Mineral Resources Manager Surface Operations		West Gold Plant West Extension TSF Mispah TSFs
					E Pobe/ S Selamolela/ M Gagiano	Manager Metallurgy Vaal River Mines/ Process Manager: Savuka GP and Nufcor/ Mineral Resources Manager Surface Operations	12-Jun-17	South Uranium Plant Noligwa Gold Plant and Smelt house Mispah Gold Plant East Pump Station South Pay Dam Pump Station
	Mine Waste Solutions				B Penny/ S Selamolela/ M Gagiano	GM VR Surface Sources and MWS/ Process Manager: Savuka GP and Nufcor/ Mineral Resources	13-Jun-17	Kareerand TSF Midway Dam Harties Reclamation Harties Pump Station MWS Gold and Uranium Plant

Purpose	Operation	Consultant			AGA		Date of Visit	Work place visited and remarks
		Name	Company	Designation/Role	Name	Designation/Role		
						Manager Surface Operations		
Ventilation, safety, health and occ hygiene	West Wits Carletonville Regional office	J van Eyssen	SRK	Ventilation/Occupational Hygiene	M Beukes	Manager Ventilation AGA South Africa	09-Jun-17	Obtained additional ventilation and occupational hygiene information on all VROs
	MK Mine				Danny Davis	Mine Manager	12-Jun-17	Underground visit to the Middle Mine. Visited ledging stope 92 H 113 and 114 cross cut development end. As a result of limited airway capacity, production cannot be increased at the Middle Mine. The average WB temperatures of 28.5˚C were acceptable. Production at the Top Mine can be increased by 50% by increasing the ventilation supply by 50%.
					Stephen Allen	Section Manager		
					Jaenetta Reynecke	Section Ventilation/Occupational Hygienist		
	GN Mine				Ian Buchanan	Mine Manager	14-Jun-17	Underground visit to 61 level refrigeration plants and surface main fans. The refrigeration plants and fans are well maintained and in good condition. There is sufficient cooling and main fan capacity to increase production at the Top Mine Isolated Blocks of Ground (IBGs) if required.



srk consulting	Site visit overview	Project No. 522673

Figure 1.4: Site visit overview

1.1.6 Sources of Data

[SV1.19]

Details of the information used to prepare this report are listed below;

- Electronic information received from AGA data room; and
- Discussion with the relevant Project team members at AGA and Harmony.

1.1.7 Reporting Compliance, Reporting Standard and Reliance

Reporting Compliance

[SV1.4]

Reporting Standard

This CPR has been prepared in accordance with the following:

- The 2016 South African Code for Reporting of Exploration Results, Mineral Resources and Mineral Reserves (SAMREC) Code and the 2016 South African Code for the Reporting of Mineral Asset Valuation (SAMVAL) Code; and
- In accordance with the SAMREC and SAMVAL Codes, this CPR has been prepared under the direction of the Competent Person (CP) John Roger Dixon and the Competent Valuator (CV) Andrew Van Zyl who assume overall responsibility for this report.

Technical Reliance

The CP is satisfied, that as far as reasonably practical sufficient checks have been conducted to demonstrate that all technical information provided to SRK as at 31 October 2017, is both valid and accurate for the purpose of compiling this CPR.

Legal Reliance

The mining rights granted to AGA were administered in terms of section 23 (1) of the Mineral and Petroleum Resources Development Act, 28 of 2002.

This report relies on information disclosed by AGA and uploaded to the Data Room. The legality of the underlying agreements was not verified. The report provided to SRK by Fasken Martineau (legal advisors) on 13 October 2017, which is attached and marked Appendix B, addresses the security of tenure of the properties, mining rights and surface rights with reference to Table 1.5 and the information made available as at 13 October 2017.

1.1.8 Effective Date and Valuation Date

[SV1.13]

The effective date (Effective Date) and Valuation Date of this CPR is deemed to be 1 January 2018.

1.1.9 Verification and Validation

[SV1.9]

This report is dependent upon technical, financial and legal input. The technical information as provided to and taken in good faith by SRK has not been independently verified by means of re calculation. SRK has, however, conducted a detailed review and assessment of all material technical issues likely to influence the future performance of MK, which included the following:

- Inspection visits to the operations, processing facilities, surface structures and associated infrastructure at MK Mine undertaken in June 2017;

- Discussion and enquiry to key on-mine personnel during the site visit;
- A review of MKs estimates and classification of Mineral Resources and Mineral Reserves, including the methodologies applied in determining such estimates and classifications;
- A review of historical operating records and management accounting statements from MK;
- A review and where considered appropriate by SRK, modification of the production forecasts contained in the LoM mine plans;
- A review and where considered appropriate by SRK, modification of the projected future operating costs and capital expenditure schedules for the LoM; and
- Review of the financial model (FM) for MK Mine provided by AGA, including the forecast macro-economic parameters and consensus price forecasts, and verified by SRK for consistency with historical performance, and adjusted where deemed appropriate by SRK.

SRK has satisfied itself that such information is both appropriate and valid for evaluation as reported herein.

SRK considers that, with respect to all material technical-economic matters, it has undertaken sufficient investigation, both in terms of level of investigation and level of disclosure, to satisfy the reporting requirements of the SAMREC and SAMVAL Codes and to place an appropriate level of reliance on the information provided by AGA.

1.1.10 Valuation Basis

[SV1.2, SV1.12]

The following methods are recommended in the SAMVAL code for the valuation of mineral assets:

Table 1.3: Valuation Approaches

Valuation Approach	Exploration properties	Development properties	Production properties	Dormant properties		Defunct properties
				Economically viable	Not viable	
Cash Flow	Not generally used	Widely used	Widely used	Widely used	Not generally used	Not generally used
Market	Widely used	Less widely used	Quite widely used	Quite widely used	Widely used	Widely used
Cost	Quite widely used	Not generally used	Not generally used		Less widely used	`Quite widely used

Source: The SAMVAL Code

The Income Approach and Market Approach have been selected for the valuation of MK, a producing property.

1.1.11 Previous Valuations

[SV1.11]

SRK are not aware of any previous valuations conducted on these assets.

1.1.12 Reliance on Information

[SV1.15]

SRK has relied upon the accuracy and completeness of technical, financial and legal information and data:

- Furnished by or through AGA, including information and data originating with the Company's Advisors; and
- In respect of, publicly available information published by AGA from time to time, including but not limited to any Mineral Resources and Mineral Reserve statements and technical studies contained in such information or data.

AGA has confirmed to SRK that, to its knowledge, the information provided by it to SRK was complete and not incorrect or misleading in any material aspect. SRK has no reason to believe that any material facts have been withheld.

Whilst SRK has exercised all due care in reviewing the supplied information, SRK does not accept responsibility for finding any errors or omissions contained therein and disclaims liability for any consequences of such errors or omissions.

The technical views in this report are based on information provided by AGA and its advisors throughout the course of SRK's investigations, which in turn reflect various technical-economic conditions prevailing at the date of this report. In particular, the Mineral Reserves, TEPs and values of the Mineral Assets are based on expectations regarding commodity prices and exchange rates prevailing at the Effective Date of this CPR. These can change significantly over relatively short periods of time. Should these change materially, the TEPs could be materially different in these changed circumstances.

SRK has reviewed the information provided by AGA and is satisfied that the extents of the properties described in the various rights are consistent with the maps and diagrams received from AGA.

1.1.13 Limitations, Declarations and Consent

[SV1.0, SV1.15]

This report includes technical information, which requires subsequent calculations to derive subtotals, totals and weighted averages. Such calculations may involve a degree of rounding and consequently introduce an error. Where such errors occur, SRK does not consider them to be material.

1.1.14 Identifiable Component Asset (ICA) Values

[SV1.16]

The MK Mine is valued as an entity and includes all the assets listed in the description of assets.

1.1.15 Consent

[SV1.0]

SRK consents to the issuing of this report in the form and content in which it is to be included in documentation distributed to shareholders of Harmony.

Neither the whole nor any part of this report nor any reference thereto may be included in any other document without the prior written consent of the CP as to the form and context in which it appears.

1.1.16 Disclaimers and Cautionary Statements

This CPR uses the terms "Mineral Resource", "Measured Mineral Resource", "Indicated Mineral Resource" and "Inferred Mineral Resource". US shareholders and investors in Harmony are advised that while such terms are recognised and permitted under the 2016 South African Code for Reporting of Exploration Results, Mineral Resources and Mineral Reserves (the SAMREC Code) and the Listing

Rules, the US Securities and Exchange Commission (SEC) does not recognise them and strictly prohibits companies from including such terms in SEC filings.

Accordingly, US investors and shareholders in the Company are cautioned not to assume that any unmodified part of the Mineral Resources in these categories will ever be converted into Mineral Reserves.

1.1.17 Copyright

1.1.18 Qualifications of Consultants

[SV1.0]

The CP with overall responsibility for the CPR is Mr. John Roger Dixon Pr.Eng, Honorary Life Fellow of the Southern African Institute of Mining and Metallurgy, who is a Corporate Consultant with SRK. Mr Dixon is a mining engineer with 45 years' experience in the mining industry.

The CP with responsibility for the reporting of Mineral Resources is Mr. Mark Wanless Pr.Sci.Nat (South African Council of Natural and Scientific Professionals, Reg. No. 400178/05).

The CP with responsibility for the valuation of the assets under review is Mr. Andrew van Zyl. Mr. Van Zyl is specialized in mine and project valuation, mining conventions, economics.

Table 1.4: Consultant Contributors

Name	Contribution
Roger Dixon Pr.Eng, BSc(Hon), FSAIMM, CRIRSCO	CP with overall responsibility for the CPR
Joseph Mainama Pr.Eng, BSc Eng (Min), MBL, MSAIMM	Mining, Mine Design, Mineral Reserves, Project Manager
Andrew van Zyl BEng, MCom, MSAIMM	Mineral Economics, Market Valuation
Mark Wanless Pr.Sci.Nat BSc(Hons), MGSSA	Geology, Mineral Resources, Grade Control
Victor Hills Pr.Eng BEng MSAIMM	Metallurgy, Mineral Processing
Angus Bracken CGeol Pr.Sci.Nat, MSc, FGSL, MSAIEEG	Tailings Disposal, Logistics
Chris Smythe CertEng HND, MSAIMM	Infrastructure, Engineering, Maintenance, Capital
Kenneth Mahuma, Pr.TechEng, ECSA, N6 (Elect Eng), MSAIMM	Elelectrical Infrustructure
Shaun Murphy CertEng, C.O.M, GDE, MSANIRE	Mining Geotechnics
Darryll Killian CEAPSA MA HDE MSAIE&ES	Environmental permitting, Compliance, Rehabilitation Requirements
Vassie Maharaj BSc MIAIASA MIAPP	Social permitting, Compliance
Senzeni Mandava Pr.Sci.Nat MSc, GDE, MGSSA	Geology, Mineral Resources, Report Compilation
Benedict Mabenge Pr.Sci.Nat, MSc, MGSSA	Hydrogeology, Ground Water
Marcin Wertz Pr.Eng, BSc(Eng), FSAIMM, MMCC	Partner and Final Review
Megan Wentzel Cert of Competence, LLB	Mineral Tenure (Mining Rights), Legal

All of SRK House, 265 Oxford Road, Illovo, 2196, Johannesburg.

1.2 Location

[SR1.2 (i)] [SV1.2, SV1.5]

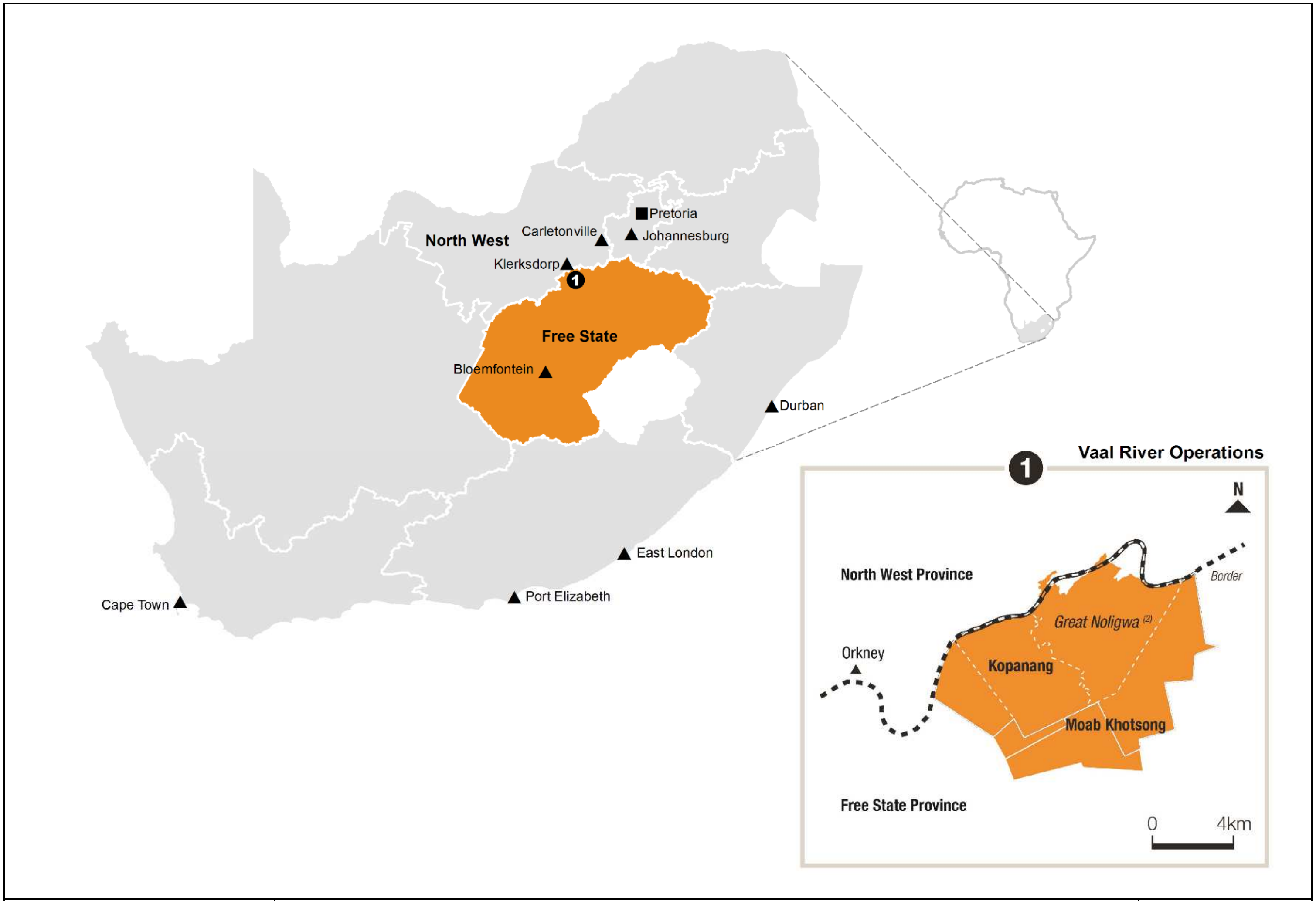
MK Mine, is located approximately 170 km to 180 km from Johannesburg, near the Vaal River within the North West and Free State Provinces of South Africa. The location map is shown in Figure 1.5.

1.2.1 General Mine Overview

MK Mine is the newest of the South African deep-level mines. Three vertical shaft systems are maintained to service the mine. The orebody is divided through major faulting into three distinguishable blocks referred to as Top Mine (GN), Middle Mine and Zaaiplaats. The GN Mine was merged with MK in 2015 and operations are now collectively referred to as MK Mine. GN started production in 1968 and MK started producing in 2003. GN Mine was put under care and maintenance in 2015.

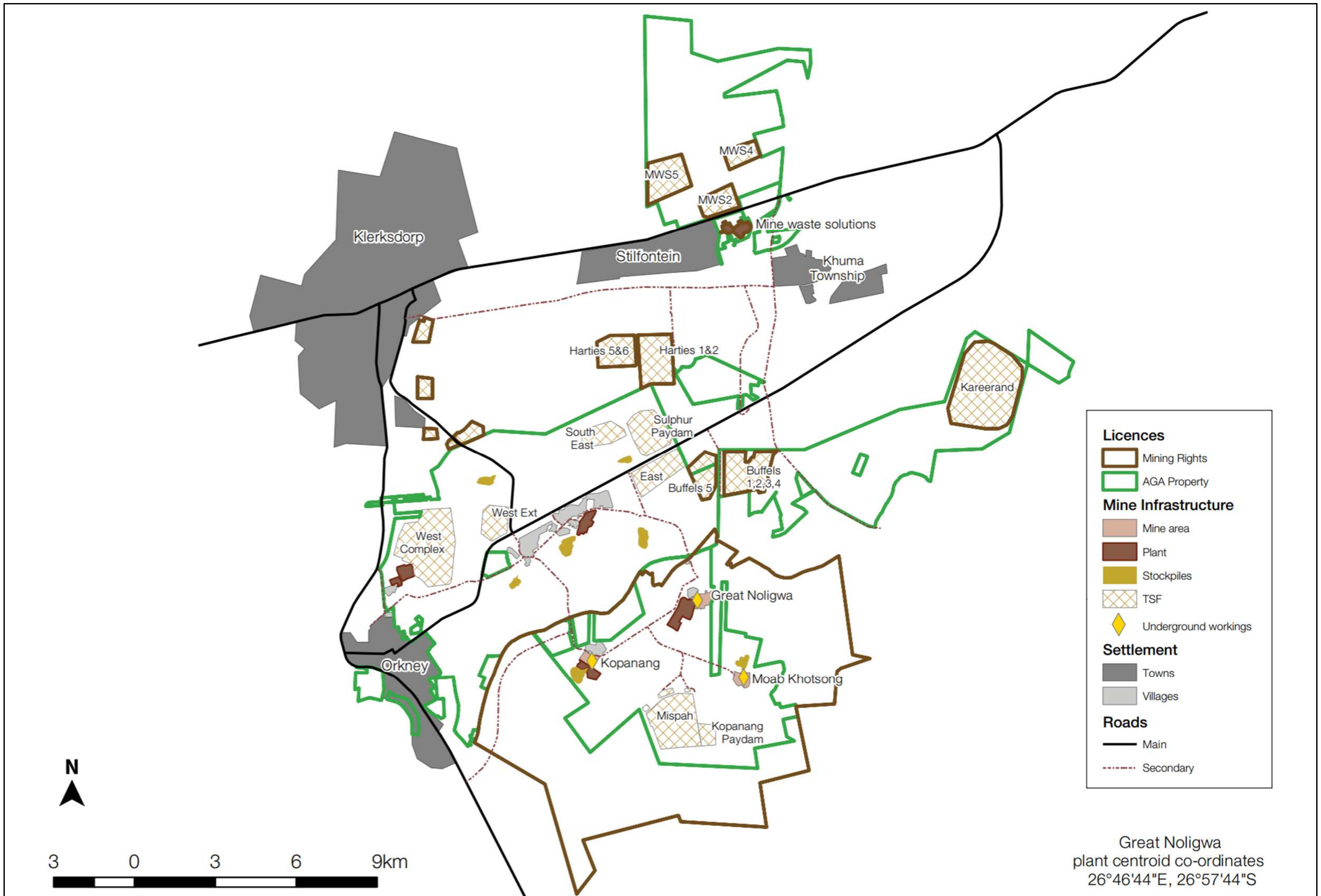
MK, the Top and Middle Mines are currently in production. AngloGold Ashanti (AGA) considers the Lower Mine, which is referred to as Zaaiplaats Project, as an opportunity for future growth.

The geographic location of MK Mine in relation to VROs assets is set out in the map (Figure 1.6). The map also shows the outlines of the mining lease boundary, metallurgical plants and TSFs.



srk consulting	Vaal River Operations Locality Plan	Project No. 522673

Figure 1.5: Vaal River Operations Locality Plan



srk consulting	Geographic location of MK, GN and Adjacent properties showing mining lease boundary, metallurgical plants and TSFs	Project No. 522673

Figure 1.6: Geographic location of MK, GN and Adjacent properties showing mining lease boundary, metallurgical plants and TSFs

1.3 Adjacent Properties

[SR1.3 (i)]

Figure 1.6 shows some of the mining properties that are adjacent to MK Mine. These are described in the following section.

1.3.1 Buffelsfontein 9 and 12 Shafts

Buffelsfontein's (Buffels) large resource base featuring Measured and Indicated Mineral Resources of 11.12 million ounces coupled with excellent conversion potential makes Buffels the golden heart of the then Simmer and Jack Mines, provided the company with a cash-generating, LoM produced 318 000 oz per annum 2014.

1.3.2 Buffelsfontein South

The bulk of the plant's production comes from the two underground sources (Tau Lekoa and Buffels), with low grade waste rock material being used as grinding medium which has resulted in significant costs savings compared to the previous usage of steel balls. Uranium occurs in conjunction with the gold in the conglomerate reef, but is not currently being extracted. The plant is a Carbon-in-Pulp (CIP) plant with plant capacity of around 180 ktpm of ore. The operation's two Uranium Plants have long since been decommissioned and demolished.

1.3.3 Kopanang

The major reef mined at Kopanang is the Vaal Reef (V Reef), while a secondary reef, the Crystalkop Reef (C Reef), is mined on a smaller scale. Mining operations are conducted at depths ranging from 1 350 m to 2 240 metres. The Kopanang operation comprises a single shaft system. Given the geologically complex orebody occurring at Kopanang, a scattered mining method is used with the orebody being accessed mainly via footwall tunnelling, raised on the dip of the reef and stoped on strike. Kopanang has a gold processing plant that uses both conventional semi-autogenous grinding and Carbon in Pulp (CIP) technology.

1.4 History

[SR1.4 (i) (ii) (iii)]

1.4.1 Historical Development

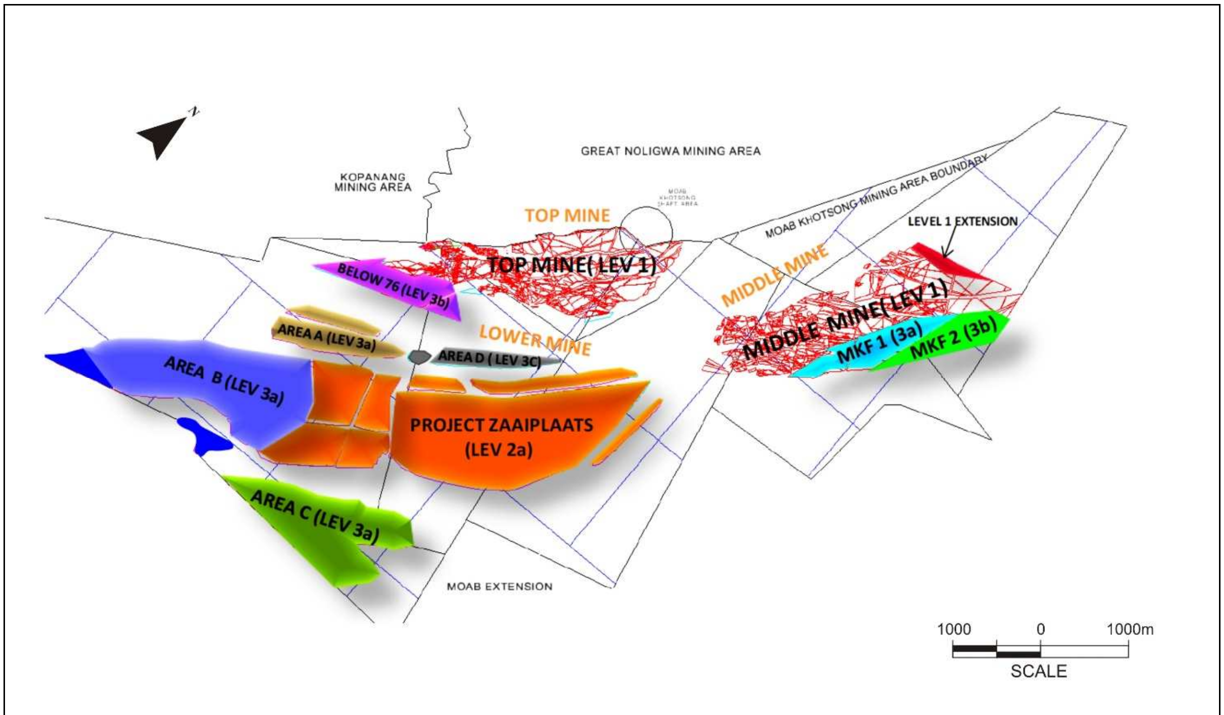
The discovery of gold deposits in the Witwatersrand was in 1886, hosted in quartz-pebble conglomerate known as “reefs” (Mellor, 1916; McCarthy, 2006). These gold-bearing reefs were also discovered in the Klerksdorp area (V Reef), as late as the 1940s (Chapman et al., 1986).

GN Mine commenced production in 1968. Following the successful exploration of the V Reef in the Moab lease area, which lies to the south and is contiguous with GN lease area, a decision was taken in late 1989 to exploit the Moab Mineral Resource and shaft sinking started in 1991.

MK Mine started producing in 2003. The original plan was to exploit two distinct portions of the MK Mine lease area, namely the Middle Mine (85 to 101 Level) and the Lower Mine (101 to 118 Level), Figure 1.7. The Middle Mine exploits the V Reef to depths between 2 600 m and 3 054 m below surface on the down-thrown side of the Die Hoek and Jersey fault complex (all these are discussed in Section 2.1.2. In 2008 the SV4 section of GN was incorporated into MK Mine and this section is now termed the Top Mine (56, 59, 61, 64, 68, 70, 73 and 76 Level).

The initial development of MK Mine was taken with a view that the new mine would be well positioned to exploit additional surrounding ore blocks. The most important of these blocks will be the Zaaiplaats

Project block, positioned to the southwest of the current MK Mine infrastructure and extending some 400 m deeper than the existing mine. Mining is based on a scattered mining method with an integrated backfill support system combined with bracket pillars.



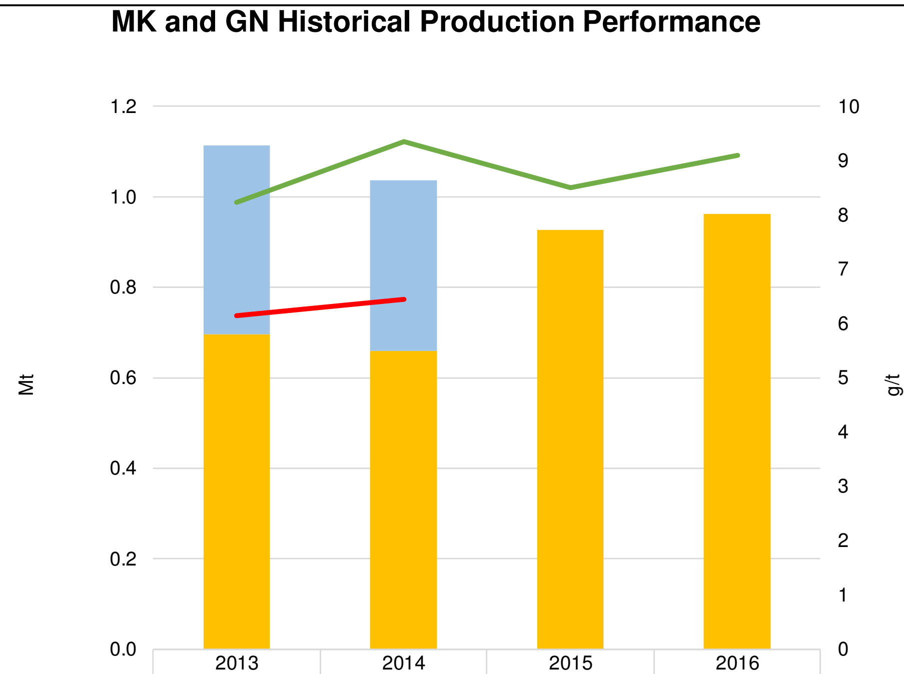
srk consulting	GN and MK Mines and Zaaiplaats Project locality	Project No. 522673

Figure 1.7: GN and MK Mines and Zaaiplaats Project locality

1.4.2 Moab Khotsong Operational Performance

The production is sourced from two main sources. The operations are MK Mine and some of the levels of the mothballed GN Mine. As from 2015 the GN production plan was integrated in to the MK Mine plan and then was put under care and maintenance. GN Mine's operating infrastructure and employees have been incorporated into MK Mine since 2015.

The brief historical operating statistics for MK Mine are summarised in Figure 1.8.



	2013	2014	2015	2016
Tonnes milled GN (Mt)	0.42	0.38		
Tonnes milled MK (Mt)	0.70	0.66	0.93	0.96
Recovered grade MK	8.23	9.36	8.5	9.1
Recovered Grade GNM	6.15	6.44		

srk consulting	MK Mine Historical Production History	Project No. 522673

Figure 1.8: MK Mine Historical Production History

It can be seen in Figure 1.8 that there has been a gradual improvement in production from 2013 to 2016 at MK Mine operation. Although the average gold grade is volatile, there is an upward trend.

1.5 Legal Aspects and Permitting

[SR1.5 (i) (ii) (iii) (iv) (v)] [SV1.5]

1.5.1 South African Regulatory Environment

The relevant South African regulatory framework is summarised below.

Constitution of the Republic of South Africa Act (Act No. 108 of 1996)

Section 24 of The Bill of Rights in the Constitution of the Republic of South Africa affords every citizen the right:

- To an environment that is not harmful to their health or well-being;
- To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:
  - Prevent pollution and ecological degradation;
  - Promote conservation; and
  - Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

The Constitution is the supreme law of the Land, all conduct and legislation inconsistent with its contents is unlawful and will be set aside.

Mineral Framework: The Minerals and Petroleum Resources Development Act

The Minerals and Petroleum Resources Development Act (MPRDA), promulgated by the South African Parliament in July 2002, came into effect on 1 May 2004. Prior to 1 May 2004, mineral rights were held in private tenure or in some instances by the State. The MPRDA repealed the status quo and transferred all mineral tenure to the State as the 'custodian of all Mineral Resources'. Transitional Provisions in the MPRDA allow mining right holders to convert their existing 'old order' rights to 'new order' rights. The provisions contemplate three categories of 'old order' rights:

- Unused 'old order' rights: mineral rights in respect of which no prospecting or mining authorisation had been granted under the Minerals Act No 50 of 1991 ("the Minerals Act") or, where such an authorisation was granted, no prospecting or mining activities had taken place on or before 1 May 2004;
- 'Old order' prospecting rights: category of rights issued under the Minerals Act, with prospecting initiated on or before 1 May 2004; and
- 'Old order' mining rights: category of rights issued under the Minerals Act. Holders were required to apply for conversion of leases to mining rights and/or prospecting rights under the MPRDA within one year of 1 May 2004, i.e. on or before 30 April 2005.

'Old order' rights granted under the Minerals Act would remain valid (Schedule 2, section 6 and 7) until they expired by their term, two years for a prospecting right and five years for a mining right, or by default on 30 June 2007. To secure perpetuity, conversion applications were required on or before 30 April 2005. Under the MPRDA, prospecting rights would be granted for five years, eligible for renewal for a maximum period of three years thereafter. Mining rights would be granted for thirty years, eligible for renewal in periods of thirty years thereafter. A retention permit will be granted in circumstances where prospecting is complete, but mining is commercially unviable. Such a permit will be granted for the duration specified on the permit and/or a period not exceeding three years.

Mineral Framework: The Mining Charter

The Broad-Based Black Socio-Economic Empowerment Charter for the South African Mining and Minerals Industry (The Mining Charter) embraces a range of criteria against which prospecting and mining right applications and/or conversion applications are measured. The criteria includes, amongst other things: ownership, human resources development, sustainable development of the industry, employment equity, housing and living conditions and procurement procedures – all of which are critically premised on the need to redress historical and socio-economic inequalities and to streamline the industry with other legislative instruments (Broad-Base Black Economic Empowerment Act, Employment Equity Act). The Mining Charter has been amended twice, with the status quo maintained at 26% HDSA ownership of mining assets by 1 May 2014.

In June 2017, the Minister of Mineral Resources Gazetted a revised 'Charter III', a decision that was immediately taken on review and will be adjudicated in November 2017. The contention is primarily hinged on the Minister's failure to encourage robust stakeholder engagement *prior* to a decision and, in the absence thereof, failed to take into account relevant considerations pertaining to labour and ownership etc. The complementary litigation is on the issue of the increased HDSA ownership requirement and the 'once empowered, always empowered' principle – ring-fencing share transfers from one Black Person to another Black Person or category of Black Person, *only*.

1.5.2 Mineral Tenure

[SV1.1, SV1.5]

Table 1.5 presents a summary of AGA's permits and current legal tenure and Figure 1.9 and Figure 1.10 shows the plans of the land and mining area for MK.

1.5.3 Surface Rights

Insofar as mining activities will disturb the right to use private land, all interested and affected persons must be consulted. This requirement is protected in statute (section 5 (4) (c), 10 (2), 16 (4) (b), 22 (4) (b), 27 (5) (b) and Regulation 3 of the MPRDA) and in South African constitutional jurisprudence (*Bengwanyama Minerals*). As it stands, the Surface Use Permits were confirmed as valid and enforceable with reference to the available information as it was uploaded to the Data Room on 13 October 2017. In general, section 5 (3) of the MPRDA assigns the holder of a mining right substantive rights to use the land to which it relates for the purpose it was intended. This may include *inter alia*: to enter the land with any employees; to mine and/or explore; to construct surface and sub-surface infrastructure; to remove and dispose of any mineral subject to the conditions imposed by any subsidiary environmental authorisation.

1.6 Royalties

[SR1.6 (i)]

The Mineral and Petroleum Resources Royalty Act No 28 of 2008 (Royalty Act) was enacted on 1 May 2009. The Royalty Act embodies a formula-derived royalty rate regime, since it provides necessary relief for mines during times of difficulties (low commodity prices or marginal mines) and allows the fiscus to share in the benefits during time of higher commodity prices. As the final product can be either refined or unrefined, two separate formulae are given. Both formulae calculate the royalty rate based on a company's earnings before interest and taxes (referred to as EBIT) and its aggregate gross sales for the assessment period. While the gross sales figure used in the formulae excludes transportation and handling costs, these are taken into account in the determination of the EBIT figure.

The mineral royalty percentage rate (Y%) is calculated using the following formulae:

- Refined Minerals:

$$Y(\%) = 0.5 + \frac{EBIT}{Gross\ Sales \times 12.5} \times \frac{100\%}{1}$$

- Unrefined Minerals:

$$Y(\%) = 0.5 + \frac{EBIT}{Gross\ Sales \times 9.0} \times \frac{100\%}{1}$$

Gold refined to a 99.5% purity is treated as a refined mineral (Schedule 1 of the Royalty Act). The maximum percentage rates for refined and unrefined minerals are 5.0% and 7.0% respectively.

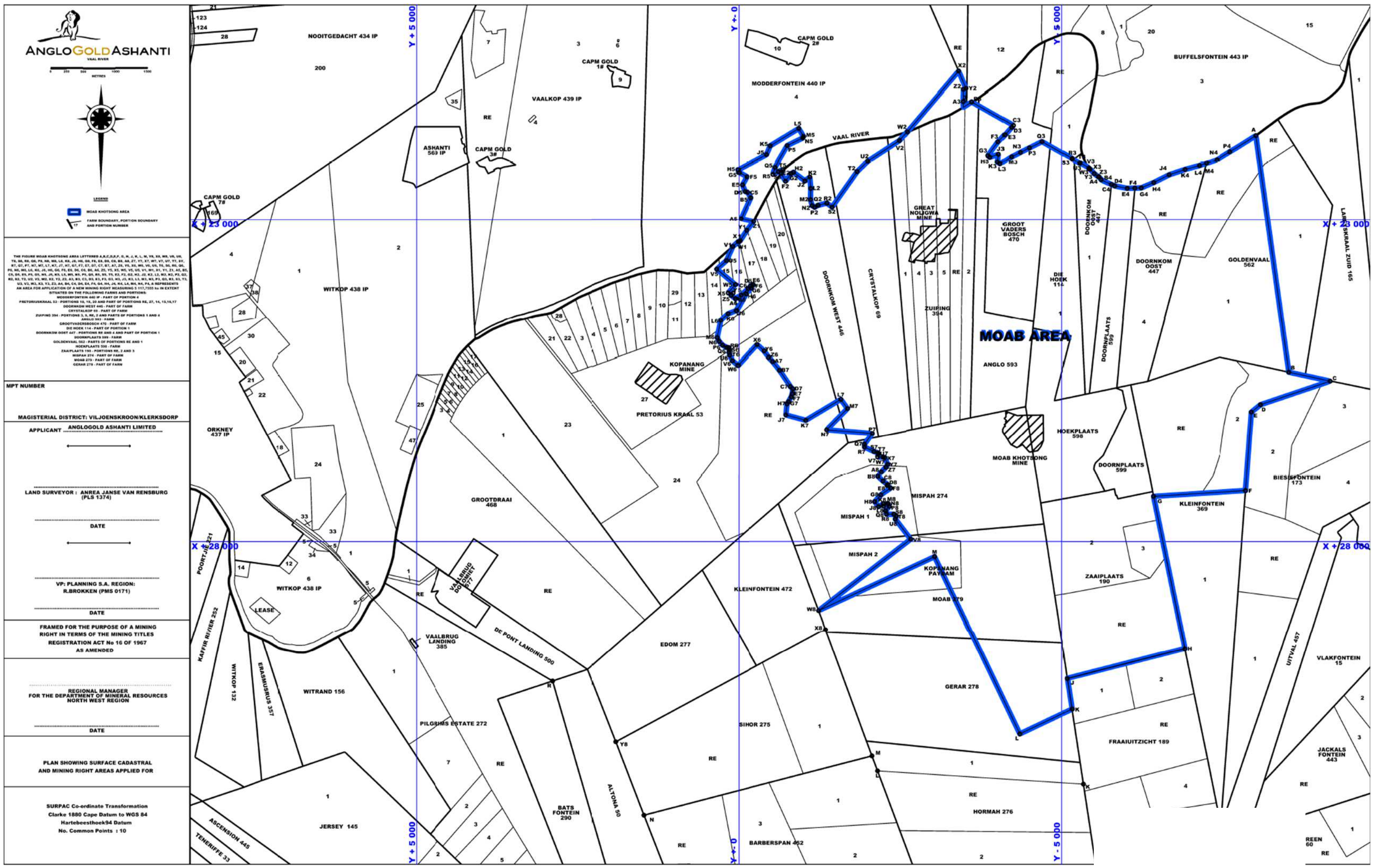
1.7 Liabilities

[SR1.7 (i)]

These are addressed and discussed in Section 5.5.

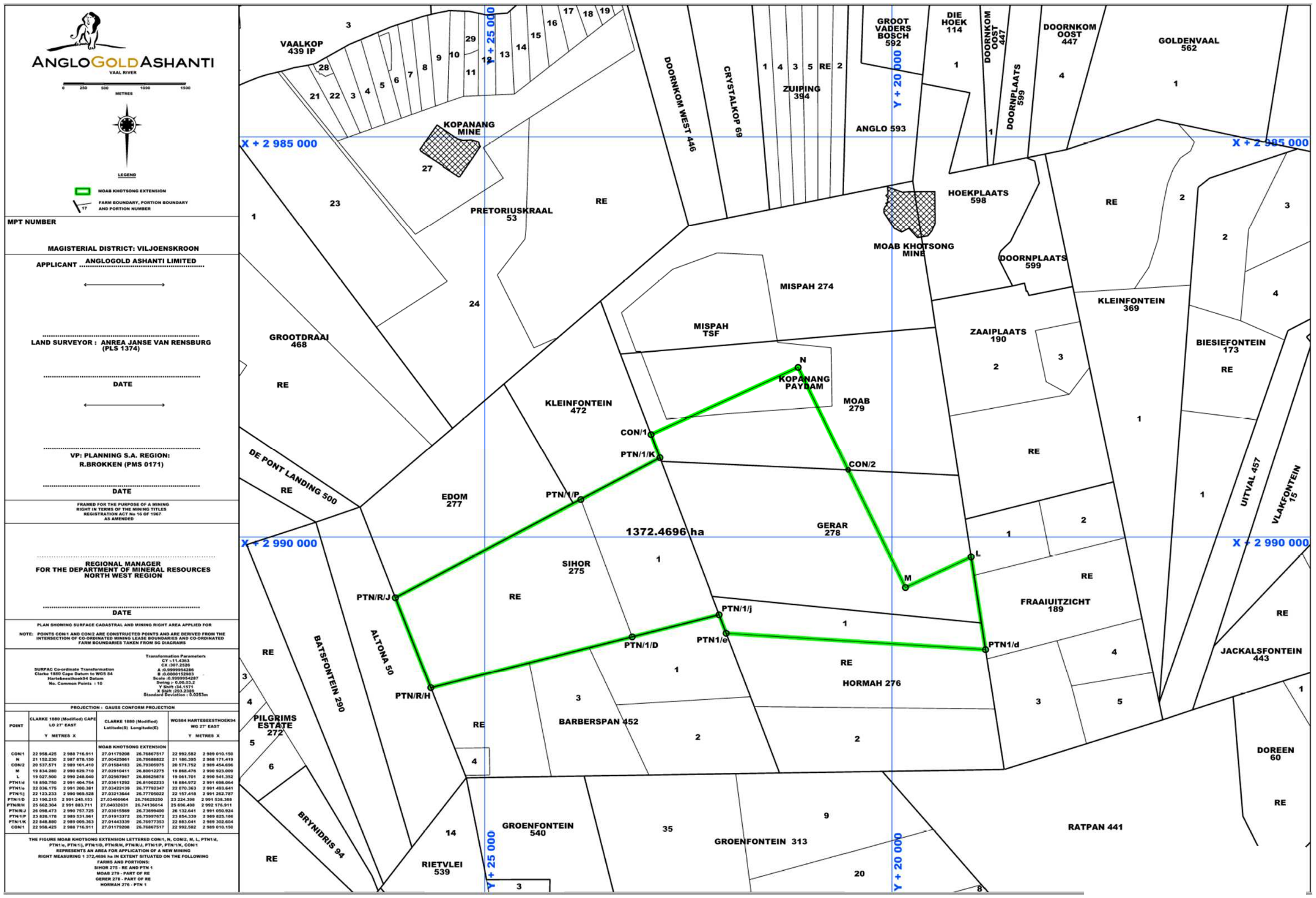
Table 1.5: VROs Mineral Rights held by AGA

Department of Mineral Resources (DMR) REF	OPERATION	PROPERTY DESCRIPTIONS	EXPIRY DATE
NW30/5/1/2/2/15MR	MK Please note that the MK Shaft falls within the 16MR mining right boundary. AGA refers to 15MR is the Moab Extension mining right.	A portion of the Farm Moab No. 279 Administrative Division Viljoenskroon Free State Province. Note: Ownership of the whole farm (i.e. the farm Moab 279) is to be transferred as part of the transaction. A portion of the Farm Gerar No. 278 Administrative Division Viljoenskroon Free State Province. Portion 1 of the Farm Hormah No.276 Administrative Division Viljoenskroon Free State Province. The Remaining Extent and Portion 1 of the Farm Sihor No. 275 Administrative Division Viljoenskroon Free State Province.	11 September 2022
NW30/5/1/2/2/16MR	GN and MK Mines	The Remaining Extent Portion 2 Portion 3 Portion 5 and portions of Portion 1 and 4 of the Farm Zuiping No.394 Administrative Division Viljoenskroon Free State Province. Note: Ownership of the whole farm (i.e. all the above farm portions of Zuiping 394) are to be transferred as part of the transaction. The Remaining Extent Portion 2 and Portion 3 of the Farm Zaaiplaats No.1 Administrative Division Viljoenskroon Free State Province. Note: Ownership of the whole farm (i.e. all the above farm portions of Zaaiplaats 190) are to be transferred as part of the transaction. A portion of the Farm Mispah No.274 Administrative Division Viljoenskroon Free State Province. Note: Ownership of the whole farm (i.e. the farm Mispah 274) is to be transferred as part of the transaction. A portion of the Farm Moab No. 279 Administrative Division Viljoenskroon Free State Province. Note: Ownership of the whole farm (i.e. the farm Moab 279) is to be transferred as part of the transaction. A portion of the Farm Doornkom West No. 446 Administrative Division Viljoenskroon Free State Province. Note: Ownership of the whole farm (i.e. the farm Doornkom West 446) is to be transferred as part of the transaction. A portion of the Farm Crystalkop No. 69 Administrative Division Viljoenskroon Free State Province. Note: Ownership of the whole farm (i.e. the farm Crystalkop 69) is to be transferred as part of the transaction. Portion 18 Portion 19 and 20 and portions of the Remining Extent Portion 27 Portion 14 Portion 15 Portion 16 and Portion 17 of the Farm Pretorius Kraal No. 53 Administrative Division Viljoenskroon Free State Province. Note: Ownership of Portion 20 of the Farm Pretorius Kraal 53 is to be transferred as part of the transaction. The boundary line between the portion remaining with AGA and the portion to be transferred to Harmony must still be determined. Portions of Portion 4 of the Farm Modderfontein No. 440 Registration Division IP North-West Province. The Farm Hoekplaats No. 598 Administrative Division Viljoenskroon Free State Province. Note: Ownership of the whole farm (i.e. the farm Hoekplaats 598) is to be transferred as part of the transaction. The Farm Anglo No. 593 Administrative Division Viljoenskroon Free State Province. Note: Ownership of the whole farm (i.e. the farm Hoekplaats 598) is to be transferred as part of the transaction. A portion of the Farm Grootvadersbosch No. 470 Administrative Division Viljoenskroon Free State Province. A portion of Portion 1 of the Farm De Hoek No. 114 Administrative Division Viljoenskroon Free State Province. The Remaining Extent Portion 4 and a portion of Portion 1 of the Farm Doornkom Oost 447 Administrative Division Viljoenskroon Free State Province. The Farm Doornplaats No. 599 Administrative Division Viljoenskroon Free State Province. Portions of the Remaining Extent and Portion 1 of the Farm Goldenvaal No. 562 Administrative Division Viljoenskroon Free State Province. The Remaining Extent and Portion 2 of the Farm Kleinfontein No. 369 Administrative Division Viljoenskroon Free State Province. A portion of the Farm Gerar No. 278 Administrative Division Viljoenskroon Free State Province.	19 August 2038



srk consulting	Plan Showing the Land and Mining Area for MK	Project No. 522673

Figure 1.9: Plan Showing the Land and Mining Area for MK



srk consulting	Plan Showing the Land and Mining Area (Moab Extension mining right)	Project No. 522673

Figure 1.10: Plan Showing the Land and Mining Area (Moab Extension mining right)

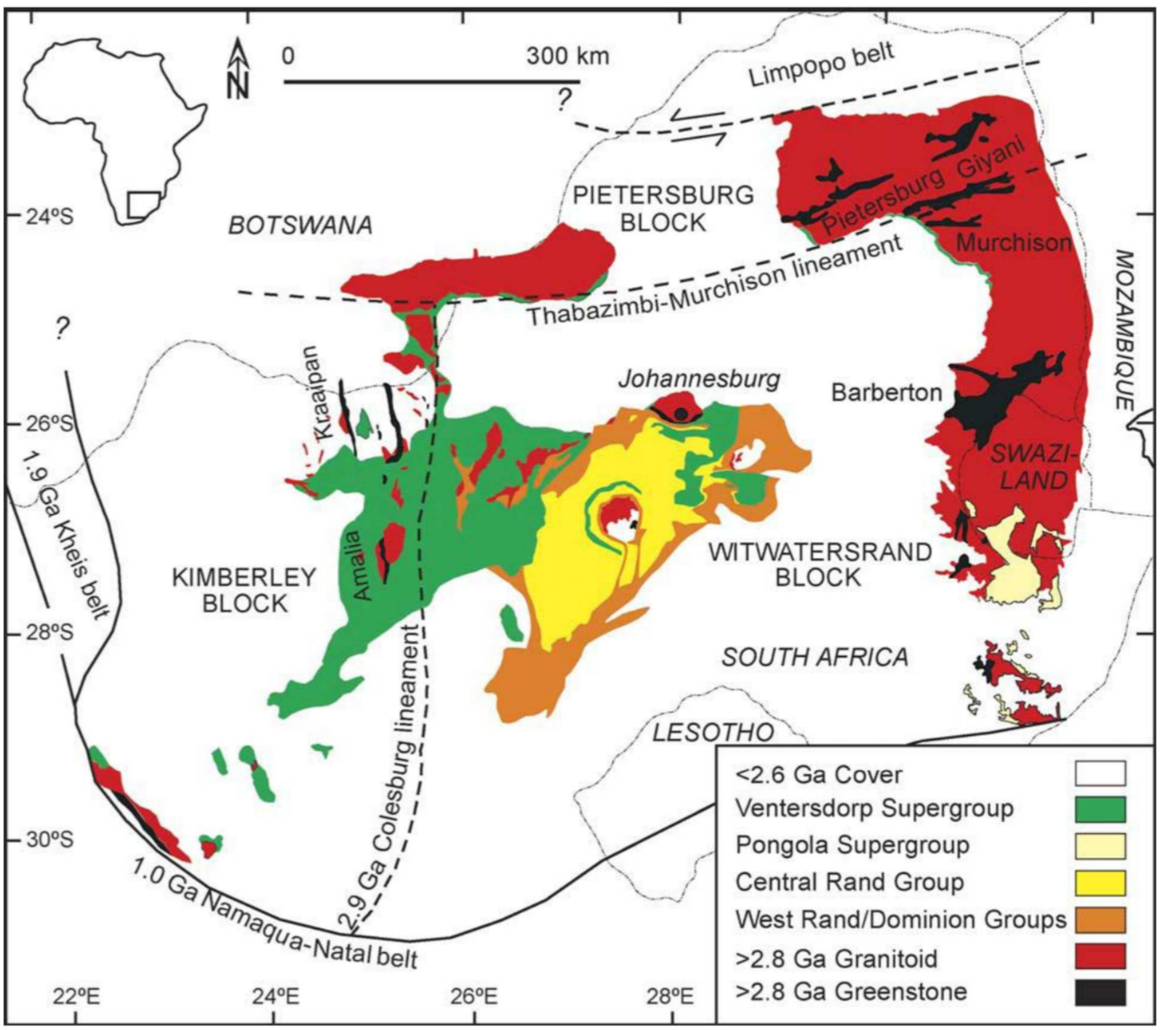
2 Geological Setting, Deposit and Mineralisation

2.1 Regional Geology

[SR2.1 (i)] [SV1.7]

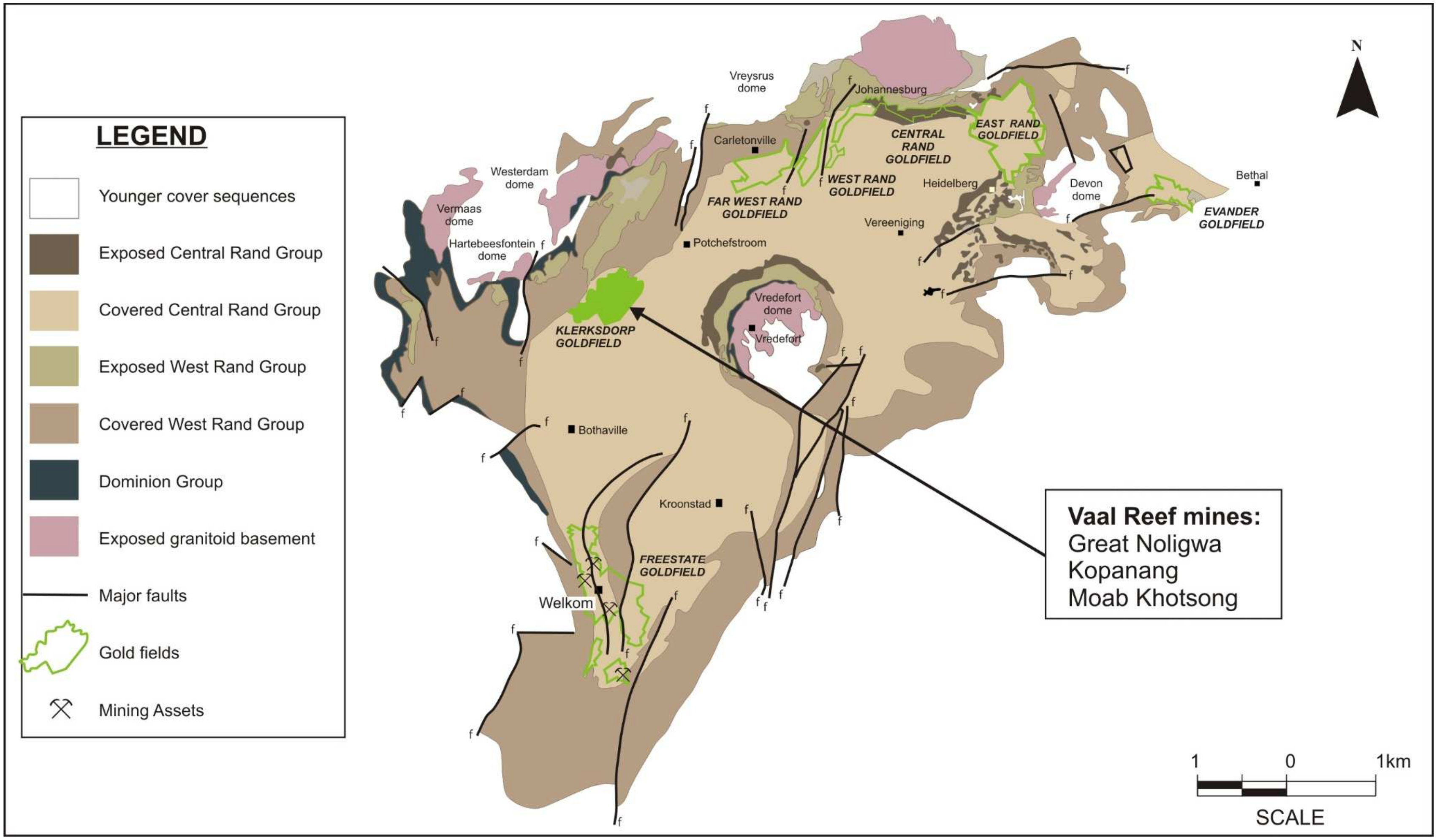
2.1.1 Witwatersrand Basin Geology

The Witwatersrand Supergroup occupies a central position of the Archaean Kaapvaal Craton. It covers an area of 350 x 200 km with an average thickness of 5 to 8 km, underlain by the Dominion Group, Archaean Granitoids and Greenstone basement, and is overlain by the Ventersdorp Supergroup (Frimmel, 2005; Smieja-Krol *et al.*, 2009). (Figure 2.1). The simplified geological map of the Witwatersrand Basin showing the Archaean granitoid domes, the nine major Goldfields, major faults and palaeocurrent directions of reefs in the Central Rand and the VROs is shown in Figure 2.2.



srk consulting | The Witwatersrand Supergroup with the West Rand and Central Rand Groups | Project No. 522673

Figure 2.1: The Witwatersrand Supergroup with the West Rand and Central Rand Groups occupying the centre of the three crustal blocks of the Kaapvaal Craton constituted by older granitoids and greenstone formations (after Frimmel, 2005)



srk consulting	The Witwatersrand Basin and the outline of major goldfields and VROs	Project No. 522673

Figure 2.2: The Witwatersrand Basin and the outline of major goldfields and the VROs

Stratigraphy of the Witwatersrand Supergroup

The Witwatersrand was separated into a Lower Witwatersrand System, which contained the basal Hospital Hill Series overlain by the Government Reef Series and finally the Jeppestown Series, and an Upper Witwatersrand System containing the Main-Bird (MB) Series and the Kimberley-Elsburg Series, discovered by Mellor in 1911, and although numerous revisions and adaptations have been done, including SACS (1980) the basic subdivisions have been retained. The Lower Witwatersrand System is now known as the West Rand Group and the Upper Witwatersrand System is known as the Central Rand Group. The West Rand Group contains numerous well-developed argillaceous units, whereas the Central Rand Group is more arenaceous. The most important gold bearing horizons are mostly restricted to the Central Rand Group, shown in the stratigraphic column for the VROs (Figure 2.3).

2.1.2 Local Geology

[SR2.1 (ii) (iii) (iv)] [SV1.7]

The Klerksdorp Goldfield which hosts the VROs is located 160 km southwest of Johannesburg, and lies on the western rim of the Witwatersrand Basin (Antrobus, 1986). The Klerksdorp Goldfield has been an area of active mining since the discovery of gold and uranium on the Western Reefs Mine and the V Reef in the 1940s and 1950s.

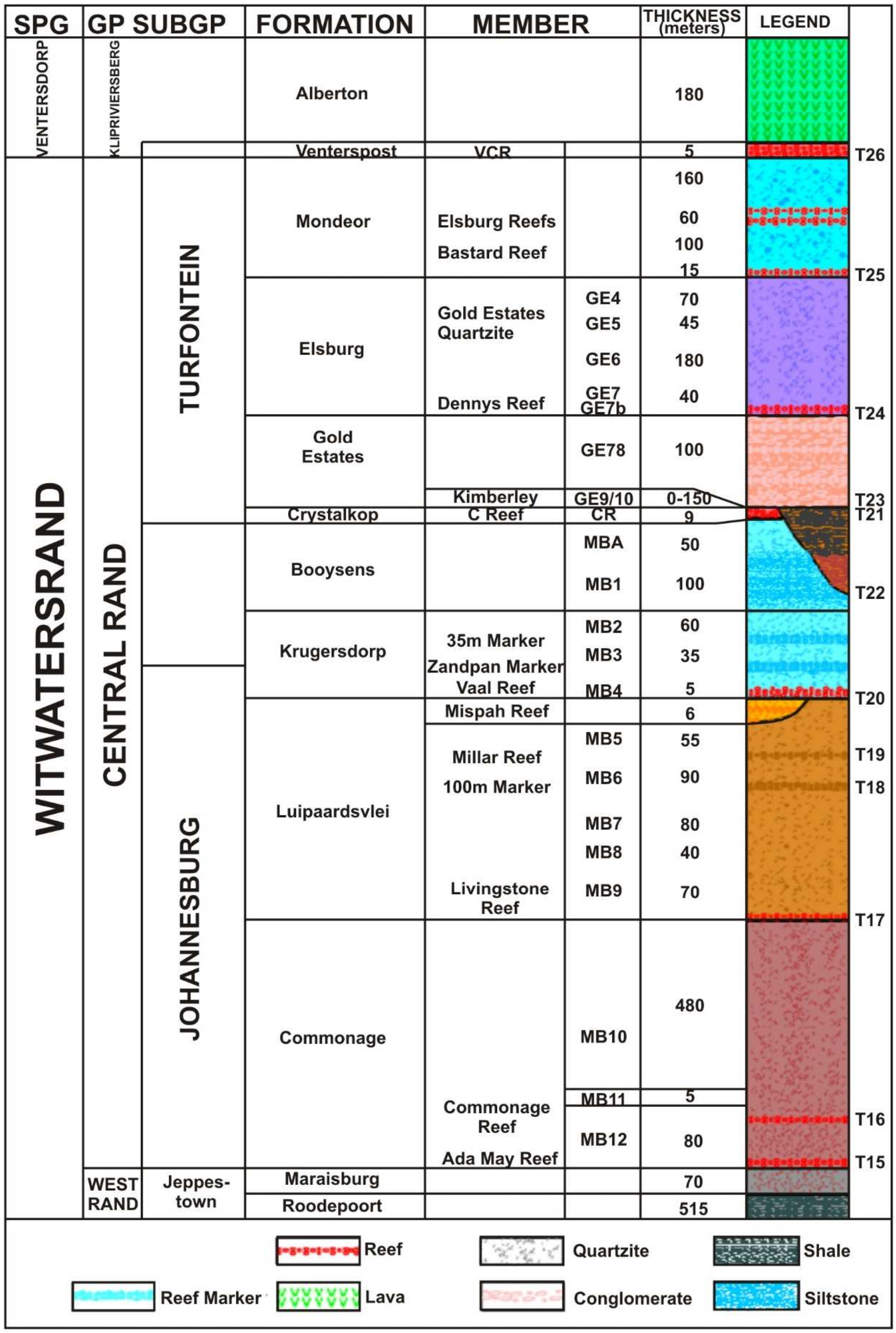
On MK Mine, the Archean Witwatersrand Supergroup is unconformably overlain by the Archean Ventersdorp and Proterozoic Transvaal Supergroups, as well as the Phanerozoic Karoo Supergroup to the south of the lease area (Figure 2.3). The former can be split into a lower West Rand Group and an upper Central Rand Group. The Ventersdorp Supergroup consists of a lower Klipriviersberg lava which is overlain by sediments belonging to the Platberg Group and finally by sediments and lavas of the Pniel Sequence. The Black Reef is sporadically developed on an unconformity that marks the base of the Transvaal Supergroup. The Black Reef is conformably overlain by a thick succession of dolomites belonging to the Malmani Subgroup, which outcrop across most of the mine. Sediments belonging to the Permo-Triassic Ecca Formation of the Karoo Supergroup outcrop near the southern portion of the mine.

West Rand Group

In the Klerksdorp area, the West Rand Group attains a thickness of 4 500 metres and consists of interlayered shales and quartzites, together with a minor volcanic unit, the Crown Lava. Numerous conglomeratic units in the West Rand Group have been mined where they outcrop on surface and will not be discussed further in this report. Armstrong *et al*. (1991), using U/Pb dating on zircons have determined an age of 2914 +/- 6 Ma for the Crown Lava.

Central Rand Group

The Central Rand Group reaches a thickness of 2 100 metres in the study area, and contains mostly quartzites, with lesser amounts of shale and conglomerates. The Central Rand Group is distinctly less argillaceous than the underlying West Rand Group and this is a result of tectonic uplift in the hinterlands during Central Rand Times (e.g. Tankard *et al*., 1982). Gold is hosted in the conglomerates of the Central Rand Group, and these conglomerate horizons are known as reefs. The economically important V Reef is located near the middle of this sedimentary sequence. The V Reef is the equivalent of the Basal Reef in the Free State Goldfield and the Bird Reef in the West Rand Goldfield. The Central Rand Group has been divided into two subgroups, the lower Johannesburg and the upper Turfontein subgroup.



srk consulting	Simplified stratigraphic column of the Witwatersrand Central Rand Supergroup, Subgroups, common Formations and lithologies	Project No. 522673

Figure 2.3: Simplified stratigraphic column of the Witwatersrand Central Rand Supergroup, Subgroups, common Formations and lithologies

Tectonic evolution of the V Reef

Following deposition of the V Reef, the Vaal River area underwent extensive structural deformation. Initially, early NNW-dipping Zuiping thrusts and reverse faults were re-activated as normal faults. Continued extension led to the development of the large south-dipping faults, principally the Jersey and Die Hoek Faults. These cut the older Zuiping Faults and displaced the upper portions to the southeast.

After deposition of the Transvaal Supergroup, more normal and reverse faults were formed, probably associated with the development of the Vredefort Dome. The large Buffels East fault appears to have formed at this time.

One key difference between the current model and its predecessors is that movement on the Jersey and Die Hoek Faults has been shown to be west-to-east rather than northwest-to-southeast.

On MK, interest is currently focused on sets of north-west-trending faults along the north eastern boundary of MK Mine. In plan, the north-east trending Zuiping faults are often offset on these type of faults, creating the perception of late strike-slip activity.

2.1.3 Deposit Type

[SR2.1 (v)]

The V Reef is the primary economic horizon at MK Mine and the C Reef is the secondary economic horizon, which contributes less than 2% of the total mining volume. Both reefs are narrow tabular deposits forming part of the Witwatersrand Supergroup and are stratigraphically located near the middle of the Central Rand Group. The V Reef lies approximately 255 m below the C Reef.

The geology at MK Mine is structurally complex with large fault-loss areas between the three mining areas. The geological setting is one of crustal extension, dominated by major south-dipping fault systems with north-dipping Zuiping faults wedged between the south-dipping faults. The De Hoek and Buffels East faults structurally bound the reef blocks of the Middle Mine to the north-west and southeast respectively. The northern boundary of MK Middle Mine is a north-dipping Zuiping fault. Extensive drilling is currently underway on the extremities of Middle Mine, targeting potential preserved blocks. MK (particularly Middle Mine) requires a reduced drill spacing pattern on the order of 50 x 50 m which allows for accurate delineation of the structurally bound mineable blocks, whereby accurate and efficient mine designs can be implemented ensuring optimal extraction and maximum orebody utilisation

2.1.4 Mineralisation

[SR2.1 (vi) (vii)]

The mineralisation model adopted by AGA for Witwatersrand deposits is that of gold precipitation in the Witwatersrand conglomerates from hydrothermal fluids. Reactions that took place at elevated temperatures ranging between (300 – 350°C) caused the fluids to precipitate gold and other elements. Migrating liquid and gaseous hydrocarbons precipitated as a solid hydrocarbon (carbon), which was then mesophased through metamorphism and structural deformation. Carbon was preferentially precipitated in bedding–parallel fractures that most commonly followed the base of the V Reef package (A-bottom sub-facies). Gold and uranium mineralisation is also commonly observed within the A-middle and A-top sub-facies of the V Reef. Gold was precipitated very soon after the carbon, giving the critical gold-carbon association that characterises the high-grade V Reef.

A geological model is employed to delineate variations (either lateral or vertical) in characteristics of the V Reef and C Reef. The current geological model thus subdivides the V Reef and C Reef into homogeneous zones based on geological and grade characteristics.

SRK have a different interpretation of the source of the gold within the Witwatersrand Reefs. SRK subscribe to the ‘modified placer’ interpretation, where the gold and uranium is syn-sedimentary alluvial metal, deposited along with the conglomerates, and concentrated in the conglomerates through repeated deposition and erosional cycles. Small scale (cm) hydrothermal re-mobilisation of the gold after deposition has occurred. Regardless of which of the two interpretations are considered however, the controls on the mineralisation are very similar, as the sedimentological characteristics which control the gold and uranium distribution in the modified placer interpretation are also interpreted as controls on the fluid flow and gold deposition in the AGA interpretation. The primary characteristics which inform the definition of estimation domains, using either interpretation, are the sedimentological and mineralogical characteristics of the conglomerates.

The V Reef consists of a thin basal conglomerate (the C-Facies) and a thicker sequence of upper conglomerates (the A-Facies). These two sedimentary facies are separated by the B-Facies, which is a layer of barren orthoquartzite. The A-Facies is the principal economic horizon at MK, but remnants of the C-Facies are sporadically preserved below the A-Facies (Figure 5.23). High gold values in the V Reef are often located at the base of this unit and are associated with high uranium values and the presence of carbon. Uranium is an important by-product.

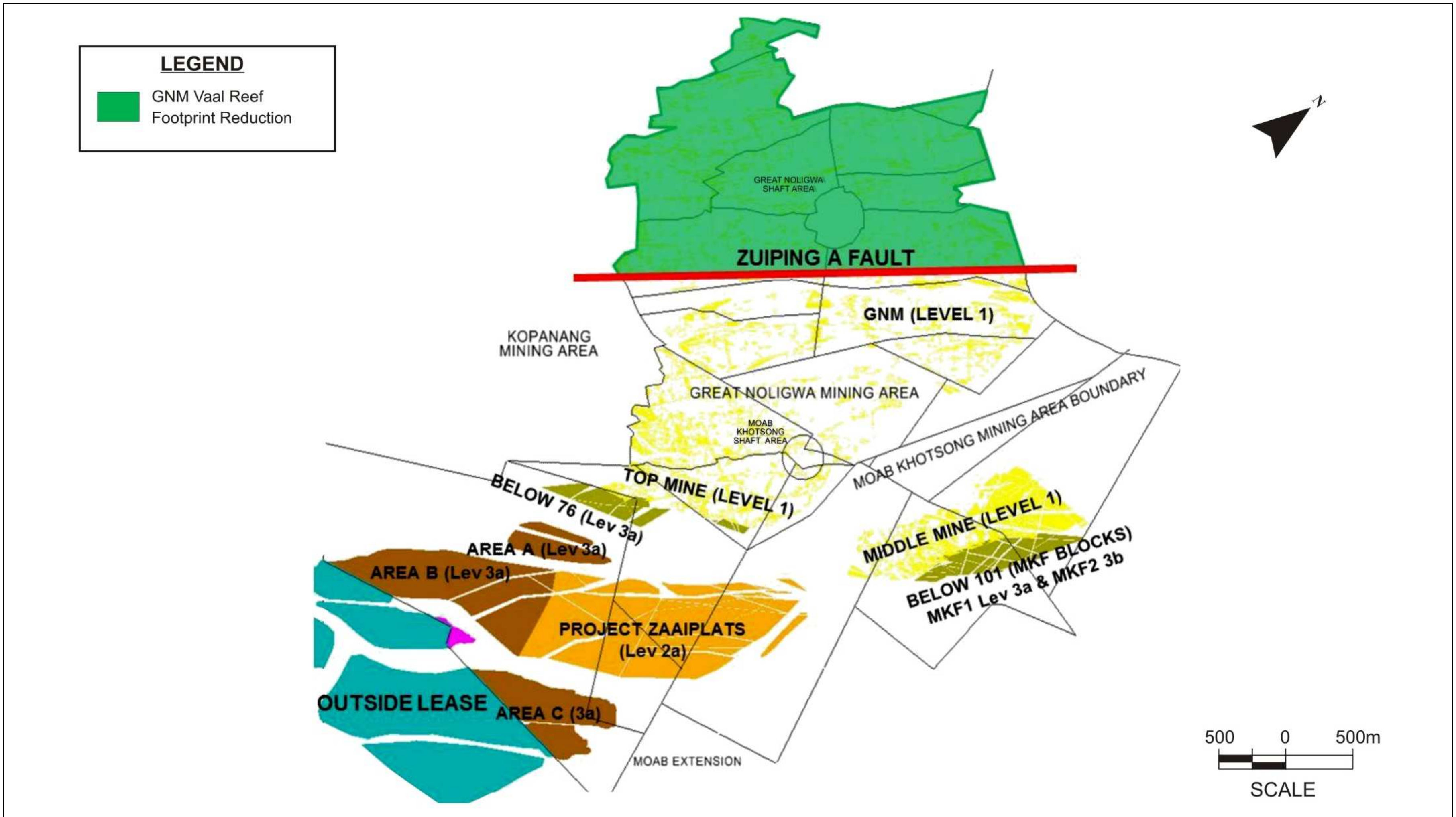
The C Reef is mined on a limited scale, in the central part of Top Mine where a high-grade, north-south orientated sedimentary channel, containing two economic horizons, has been exposed. To the east and the west of this channel, the C reef is poorly developed, with relatively small areas of economic interest. As with the V Reef, high uranium values are also often associated with high gold values and the presence of a 5 mm to 2 cm thick carbon seam at the base of the conglomerate. To the north of the mine, the C reef subcrops against the Gold Estates Conglomerate Formation and, in the extreme south of the mine, the C reef has been eliminated by a deep Kimberley erosion channel and the Jersey fault. The C reef that is preserved in the eastern parts of the Middle Mine has not been proven to be feasible for eventual economic extraction and has, therefore, not been included into the published Mineral Resource. Figure 2.5 shows a geological cross-section through MK Mine and the complexity of the fault networks.

2.1.5 Geology/Mineralisation of Tailing Storage Facilities and Marginal Ore Dumps

[SR2.1 (vi) (vii)]

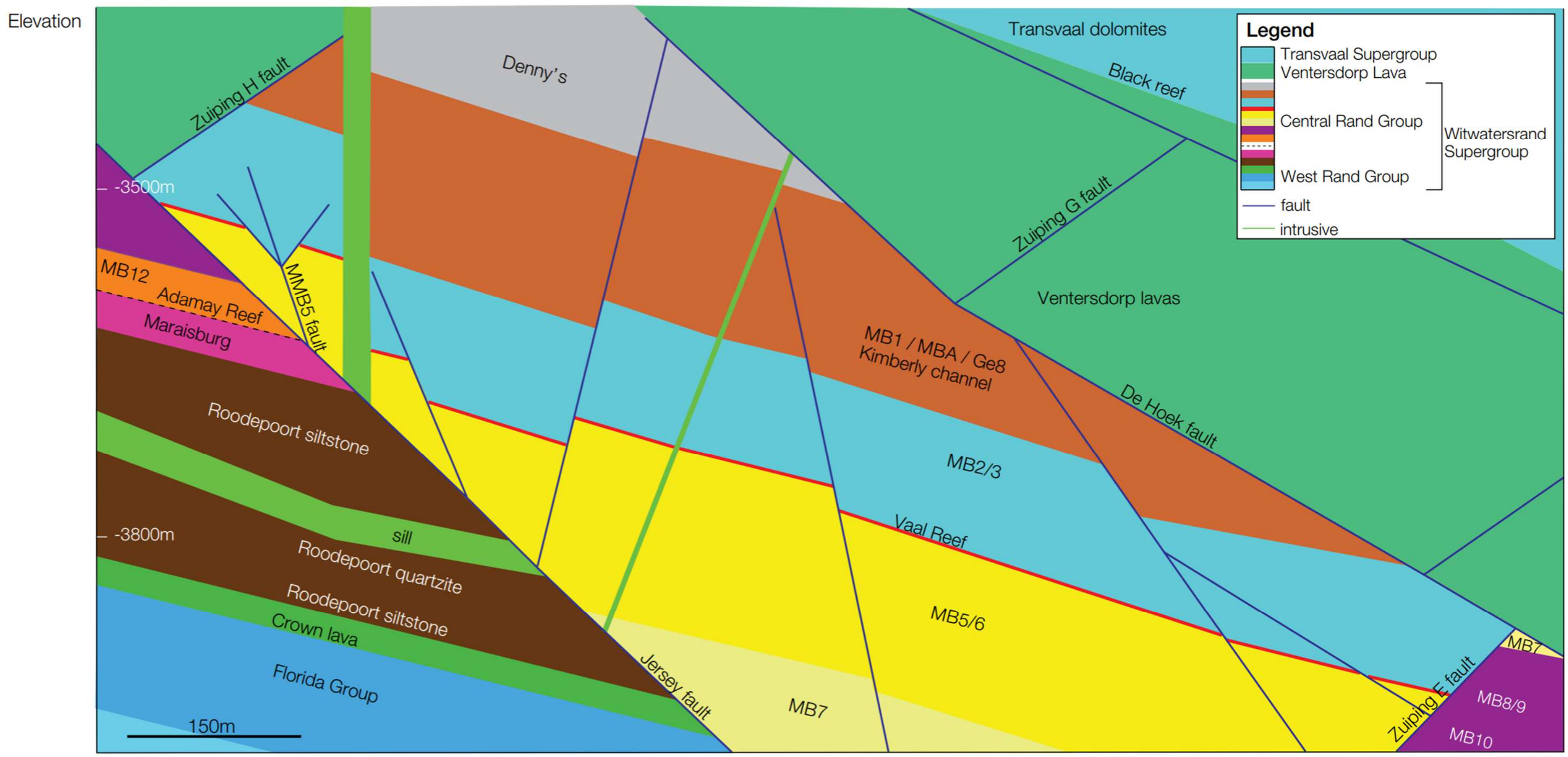
The material contained in the TSFs originates from the ore-bearing reefs historically mined at VROs. The material contained in the TSFs is fine grained.

The gold contained in the MODs is from minor reefs that are intersected during primary development, off – reef development and cross-tramming of reef to waste of the primary reefs.



srk consulting	COMPETENT PERSON'S REPORT V Reef Overview	Project No. 522673

Figure 2.4: V Reef Overview



srk consulting	Geological Cross-Section through Moab Khotsong	Project No. 522673

Figure 2.5: Geological Cross-Section through Moab Khotsong

3 Exploration and Drilling, Sampling Techniques and Data

[SR3.1 (i) (ii) (iii) (iv) (vi) (vii)]

3.1 Exploration

3.1.1 Underground Mapping

All development ends are mapped mainly by Geological Technicians and assisted by the Senior Geologists in more complex structural areas and to confirm rock type. Rock type, strike, dip, faulting and intrusive are incorporated into the structural and facies model and used to dynamically update the geological models. Development mapping reporting is carried out per procedure and the signed mappings are scanned and saved electronically for easy access and reference by production personnel.

Stope panels are mapped by Geological Technicians and also by Mineral Resource Officers during routine sampling. The aim is to map and sample 75% of the panels before 6.5 m panel advance.

3.1.2 Capital/Exploration Drilling

Exploration drilling is carried out by the Geosciences Department to optimize placement of primary development; and to upgrade mineral inventory for inclusion in the Mineral Resource. Surface drilling is managed by the Geoscience Technical Office Exploration Section (GTO) and Underground is managed from the mine. All the drilling budgets fall under brownfields exploration.

Brownfields exploration is focused on improving confidence in the geological model, as well as adding additional Mineral Resource to the mine.

MZA10 surface drill hole commenced drilling in March 2014 and was successfully completed during 2015 along with its additional long deflection in September 2015. All MZA10 structural data and the reef intersection information were incorporated into the structural and estimation model during 2016. The structural and reef intersection value information has now been incorporated into the Zaaiplaats Project geological model. Reef intersection information had minimal impact on the estimates.

Underground exploration is done through diamond drilling (DD) and utilises a combination of hydraulic and pneumatic powered machines. The exploration strategy adopted for MK Mine is to address its structural complexity and involves:

- Definition drilling aiming for a 100 m x 100 m drilling grid for optimal placement of primary haulage and cross-cut development;
- While infill drilling aims for a minimum of 50 m x 50 m drilling spacing for placement of secondary development; and
- The drill spacing is reduced further in structurally complex areas to reduce the risk of stoping operations intersecting unexpected faults greater than 3 m.

Three underground hydraulic powered DD rigs were deployed to carry out drilling on the Top Mine and Middle Mine. This drilling is primarily used to obtain structural and grade information aimed at upgrading the Mineral Resource and improving the structural confidence of MK. Two drill rigs are currently deployed in the Top Mine to obtain structural information in the V Reef blocks below 76 Level. One drill rig is deployed in the Middle Mine to obtain structural information on the 95 and 98 Level V Reef blocks within the Middle Mine infrastructure in the eastern side of the mine. The Middle Mine below 101 Level structural re-interpretation has been completed and the geological model has been updated.

3.1.3 Projects - Zaaiplaats

The initial development of MK Mine was taken with a view that the new mine would be well positioned to facilitate the exploitation of additional ore blocks adjacent and contiguous to current mining areas. The most important of these blocks are the Lower Mine blocks (Zaaiplaats, Area A, B and C), positioned to the south-west of the current MK Mine infrastructure and extending below the existing mine.

3.2 Drilling Techniques

[SV1.6, SV1.8]

Diamond drilling is undertaken using hydraulic and pneumatic drill rigs. The core sizes produced through reef intersections by the different rigs are as follows: pneumatic drilling - AXT, hydraulic drilling- BX or BQ and surface drilling - BX or BQ using a thin-walled core barrel (TNW size core barrel) that delivers NQ core for better sample recovery.

3.2.1 Underground Diamond Drilling

Underground diamond drilling takes place to obtain geological information and to cover development ends advancing into virgin ground. Cover drilling investigates the potential occurrence of methane and/or water ahead of the face. The aims of an exploration drilling programme are to:

- Identify timeously any geological structures that may impact on future development;
- Optimize cross-cut positions relative to geological structures to optimize extraction rates;
- Upgrade the confidence of resource blocks; and
- Upgrade the confidence in the facies/geozones or mineralisation model.
- All drill hole core from the diamond drilling is logged, plotted, entered into AuBIS and interpreted according to the AGA internal company standard. AuBIS is the definitive borehole database. Quarterly exception reports are generated from the AuBIS database to ensure that the all boreholes drilled and surveys carried out are captured, flagged correctly and used in the geological model update. The Geoscience Manager uses this report to follow-up and ensure that all issues and exceptions are rectified.

Underground drilling is audited in conjunction with the underground mapping.

The Field Officer carries out regular AuBIS quality checks.

Ore Reserve Development (ORD) drilling forms part of integrated drilling strategy of increasing geological model confidence to advise the production plan. The focus for MK Mine is to improve structural model confidence, to achieve optimal planning of secondary development, achieve planned reef meters and stoping plan.

ORD drilling is progressing well for MK Mine and the focus has helped to significantly reduce and stabilize the impact of intersecting unanticipated structures over the last few years particularly in Middle Mine. Drilling plans are revised monthly to ensure that the programme is optimal and the costs are contained. The number of machines is gradually reduced with increasing drilling efficiencies, while maintaining the number of machines required to service ORD ends going at any given time. The impact of this drilling is reflected in the structural changes.

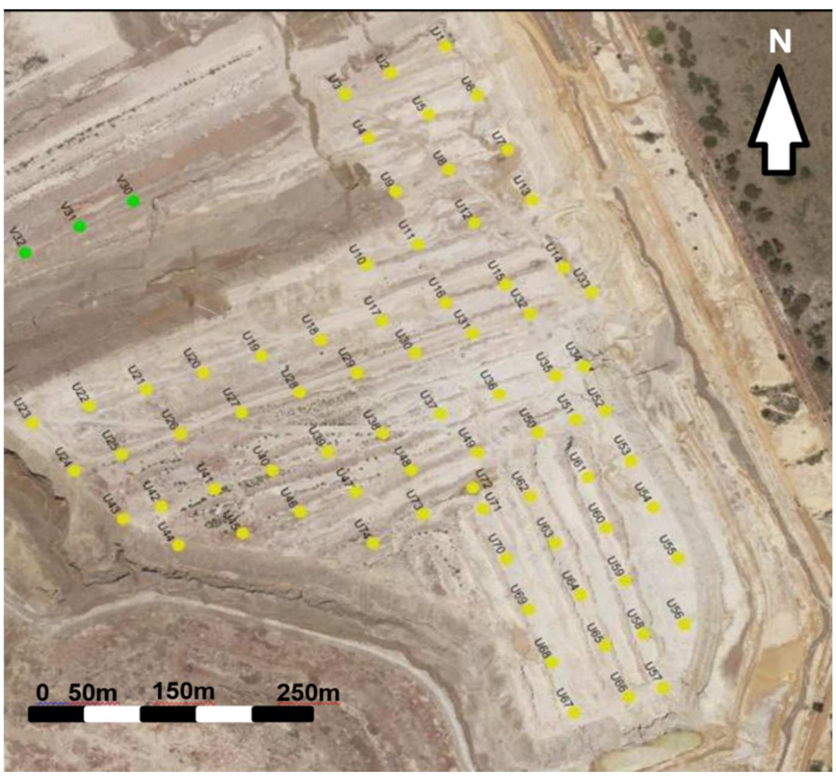
Table 3.1 displays details of drillhole spacing and type in relation to the Mineral Resource Classification.

Table 3.1: Details of Average Drillhole Spacing and Type in Relation to Mineral Resource Classification

MK		Type of drilling					
Category	**Spacing (m)**	**Diamond**	**RC**	**Blasthole**	**Channel**	**Other**	**Comments**
Measured	5 x 5	-	-	-	√	-	Chip sampling
Indicated	100 x 100 800 x 800	√	-	-	-	-	Underground drilling
Inferred	1 000 x 1 000	√	-	-	-	-	Surface drilling
Grade/ore control		-	-	-	√	-	See Measured Category

3.2.2 Tailing Storage Facility Drilling (Auger drilling)

The method of drilling utilised on TSFs is Auger drilling which uses a rotating spiral enclosed in a steel core barrel. The drilling grid is (50 x 50 m for grade control and 150 x 150 m for resources). Example of drilling pattern is shown in Figure 3.1.



srk consulting | TSF Drilling Pattern | Project No. 522673

Figure 3.1: TSF Drilling Pattern

Drilling Methodology

The method of sampling involves vertical drilling of a TSF from the outer surface of the deposit (top of a TSF) to intersect the underlying sub-soil or bedrock. Figure 3.2 summarises the drilling process.

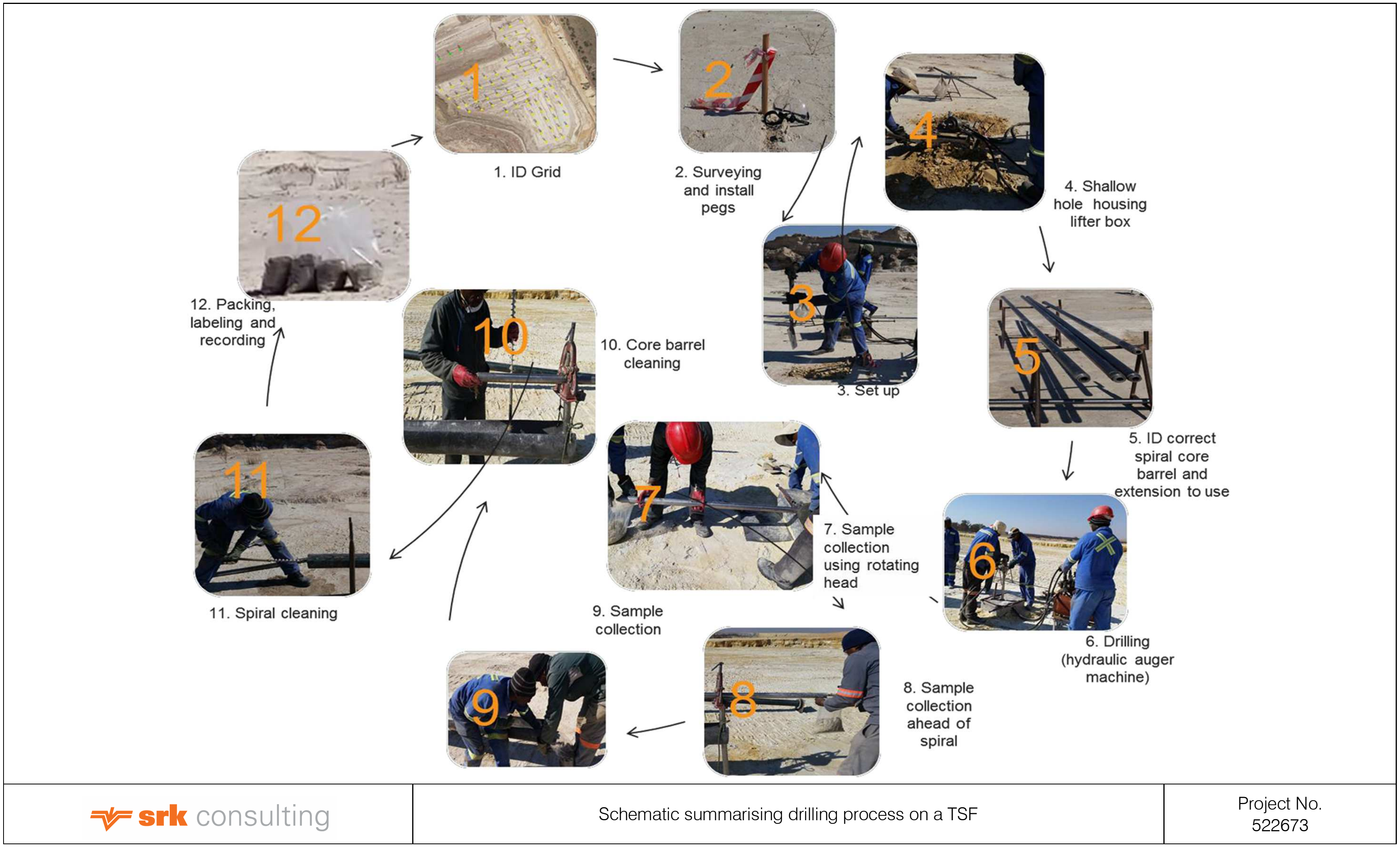


Figure 3.2: Schematic summarising drilling process on a TSF

3.3 Sampling Method, Collection, Capture and Storage

[SR3.3 (i) (ii) (iii) (iv) (v) (vi) (vii)]

3.3.1 Borehole Sampling Procedures

All strategic surface boreholes to be sampled, as well as underground exploration boreholes (LIB, LVB, etc.) and any other underground holes that are considered strategic, in terms of their potential impact on Mineral Resource and Mineral Reserve estimations are brought to the GTO for sampling so that uniformity in the sampling process is maintained. The borehole reef intersections are cut with a diamond saw along the low-point of the apparent bedding dip, as determined on the reef/footwall contacts or on internal bedding planes. The diamond saw facilities at the Regional Exploration Office are used to eliminate possible external contamination from sources such as mine dumps or other contaminated rock dust. Additional lengths of hangingwall and footwall core are also sampled. All other identifiable conglomerate bands are routinely sampled if intersected.

The remaining half of each core sample is marked with its unique sample number in indelible ink, and stored in boxes for future reference, or for sample re-submission if necessary.

The same Project / Mine Geologist supervises the borehole from borehole layout, drilling supervision, core logging, core sampling, AuBIS data entry and value calculations to ensure data integrity.

The minimum core sample size taken is 20 cm small samples being adequate to provide material for multiple fire assays. Samples are crushed and pulverised using dedicated ring mill, located in a separate room in the laboratory.

Samples are submitted to the SGS Lakefield Research laboratories in Johannesburg. This is a dedicated exploration laboratory that conforms to AGA Corporate assaying standards.

Assay results are emailed and hard-copied to the Geoscience Manager who then adds the sampling information to AuBIS to be subsequently used for evaluation.

An example of a Borehole Sample Report is shown in Figure 3.4. It provides a summary of data in AuBIS that are relevant to calculated intersection gold values. The reports are generated automatically in Downhole Explorer, via an ODBC connection to AuBIS, and exactly reflect the data in AuBIS at that time and date. The report is designed to make it easy to view and check the relationships between stratigraphy, lithology, sampling and intersection calculations that are stored in separate tables in AuBIS.

3.3.2 Underground Chip Sampling Procedures

- The area to be sampled is cleared of all loose pieces of rock and then thoroughly washed down with clean water so as to remove completely, any fines or sludge;
- The reef is then closely examined and segregated according to its apparent quality as well observed geological differences, maximum and minimum sample widths should not be less than 5 cm (including HW/FW conditions) and no greater than 20 cm;
- The width of a reef is the shortest distance between the waste rocks on each side and is determined by measuring at right angles to the plane of the reef;
- The sample is chipped (using a sharp chisel) to a uniform depth 2 cm throughout the rectangle contained by its perimeter so that the cutting edge of the moil is sharp and the

sample dish is held immediately below the sample being chipped, to avoid any sample losses;

- Where more than one sample is marked off at a sampling section, the order in which the samples are chipped is from bottom upward in order to avoid contamination;
- Once chipping of the sample is completed, great care must be taken to ensure that no contamination or sample loss occurs during the transfer of the sample to the sample bag. The sample bags must be securely packed for transport from the workplace and care must also be taken in bringing the samples to the surface; and
- During emptying of bags at the crusher house the whole sample must be transferred to the sample pan.

The sampling protocol for development is the same as for stope sampling.

Procedure for the sampling of the ore zone and placing of blanks & standards when sampling reef intersections

The general rules for sampling reef intersections are:

- One Standard per reef intersection irrespective of how many reef samples are taken;
- One Standard per 20 samples that make up an individual reef intersection (laboratory batch);
- Standard grade must be appropriate to the estimate grade of the reef sample;
- A blank must be placed after the standard to ensure that if there is any contamination from the standard, it does not influence the next reef sample in any way;
- If more than one standard is to be placed, a mixture of high and low grade standards must also be used;
- A blank must be placed between the last (bottom contact) reef sample and the first of the two footwall samples. In this way if gold in any concentration is reported in the first footwall sample, the possibility of contamination from the bottom contact reef sample can be ruled out; and
- If the hole is drilled in such a way that it passes from the footwall sequence, through reef into the hanging wall, the sampling procedure is merely reversed e.g. FW, FW, standard, Blank, reef, blank, reef, blank, HW, HW.

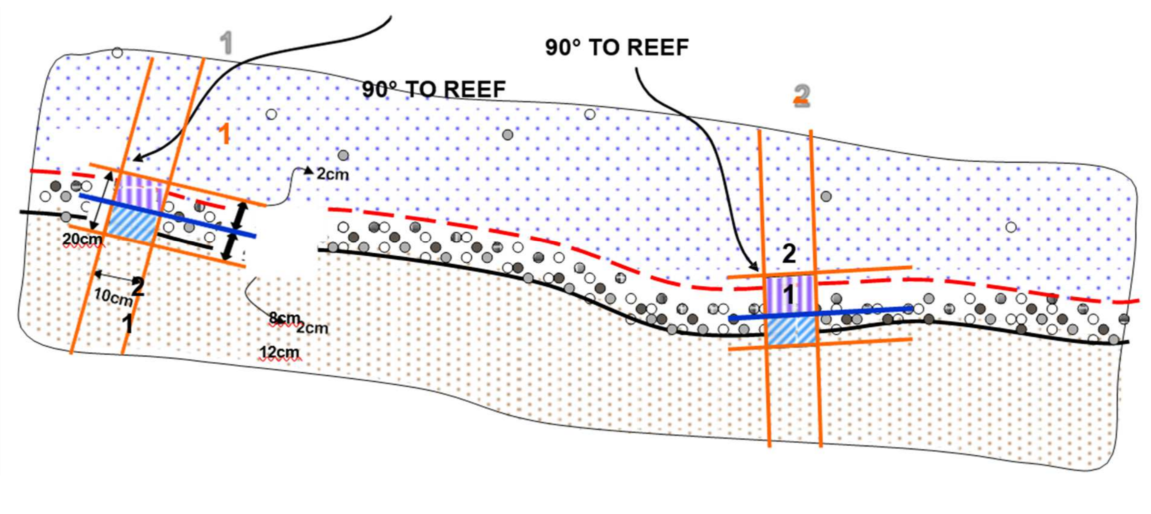
Diagram indicating the underground sampling method is shown in Figure 3.3.

The sample lengths are determined by the rock type (density), core diameter, whether the core is sampled whole, halved or quartered, so as to ensure that after milling, sufficient material (200 g) exists to conduct at least 2 gold fire assays and one uranium XRF analysis per sample. Table 1.5 shows the guidelines for sample lengths versus the size of the core based on split core sampling. Values can be halved for whole-core sampling.

Table 3.2: Guidelines for sample lengths versus the core size based on split core sampling.

Core Size	Core Diameter (mm)	Recommended Sample Length (cm)
AXT	32.51	30-40
BQ	36.4	25-40
BX	42.04	25-40
TBW	45.19	20-40
NQ	47.63	20-40
NX	54.74	20-40
HQ	63.5	15-30

The representativeness of samples within a reef intersection is defined by the completeness of the expected lithology within the samples. This is determined by the amount of core loss due to grinding, and/or any cross-cutting geological structure (veining, intrusive or faulting) that may have resulted in a loss of any of parts of the expected lithology within a particular sample. The facies, or sedimentary characteristics of the samples should not be used to determine their representativeness, as these may change regularly over a small scale. Furthermore, a full reef intersection need only be classified as Non-Representative where non-representative samples form part of the reef intersection calculation, i.e. where footwall samples are classified as non-representative, but do not fall within the mineralised zone (or calculated intersection), the reef intersection as a whole may be classified as Representative.



srk consulting | Diagram indicating the underground sampling method | Project No. 522673

Figure 3.3: Diagram indicating the underground sampling method

All chip samples are assayed using the internationally accepted Fire Assay method with a gravimetric finish using SGS Laboratories (historical data assayed using the in-house AGA Laboratory and a mixture of AZTEC and Fire Assay AA Finish techniques).

Digital photography

Digital photography is used on a site specific basis. The quality requirements of all samples are ensured using digital photography underground. A before photograph and an after photograph is taken for every section that is sampled. Multiple photographs are required for larger channel widths.

3.4 Sampling Preparation and Analysis

3.4.1 Sample Laboratories

[SR3.4 (i)]

A Corporate decision was made during 2005 to use an accredited laboratory, SGS Johannesburg, to conduct fire assay on all the underground samples of the SA Underground Region. MK Mine sent the first samples to SGS in November 2005. Since 2014 the samples have been sent to SGS Randfontein laboratories.

3.4.2 Assay Techniques

[SR3.4 (ii)] [SV1.9]

All underground chip samples are analysed using the Fire Assay method with a Gravimetric finish.

After the preparation stage the samples are packed into trays and transported to the fluxing-room. A catch weight aliquot of ±30 g and a flux aliquot of ±100 g is placed into a fire assay crucible and thoroughly mixed. The purpose of the flux is to separate the precious metals from the gangue. A scoop of Copper Sulphate is placed into the appropriate crucibles to mark them as per the sample-tracking layout for that tray. Samples that are known to be of low gold grade also get a small amount of Silver Nitrate added, in order to produce a larger prill after cupellation. The samples are then transferred to the ovens for the fusion process. The cupellation process is where the precious metals are collected in a lead button and then separated from the lead by means of oxidation fusion. The gold prill is then added to a nitric acid solution to dissolve the silver and thereafter the remaining gold prill is weighed to determine its mass relative to the original sample mass. Extremely low-grade samples are dissolved in an Aqua Regia solution (1:3 Nitric to Hydrochloric Acid) where Atomic Absorption Spectrometry is used to determine the grade of the sample

3.4.3 Sample preparation

[SR3.4 (iii)]

Sample preparation includes the delivery of the TSF samples, manually capturing each sample number into the Laboratory Information Management System (LIMS), mass measuring (wet) each sample, transferring the samples to the drying dishes and oven, mass measuring the dried material and de-agglomerating and splitting the dry material into sub-samples. Steps are followed methodically to prevent sample swops, losses and contamination.

3.5 Sampling Governance

[SR3.5 (i) (ii) (iii) (iv)]

3.5.1 Tailings Storage Facility material

Sample delivery

- The samples collected from the TSF are placed in quality plastic bags and stapled shut prior to submission (collection by SGS);

- The samples are collected at the MWS plant by SGS. Samples (already assayed) are also returned from SGS to MWS during these trips;
- Each sample is mass measured upon receipt (wet). These weights are recorded and reported;
- Samples submitted by MWS are labelled by means of barcoded sample tickets. A ticket is placed on the sample bag and a duplicate ticket placed inside the bag;

Sample transfer and drying

The laboratory uses rectangular pans for drying. This increases the exposed surface area of each sample, ultimately decreasing the drying time. The drying oven can accommodate one trolley with 70 drying pans.

All the sample dishes are washed before use and the spatula that is used to spread the samples in the drying pans are rinsed in water between samples. The oven temperature is set at 105^{o}C and maintained at this setting so that the composition of the ore is not altered.

Each sample is mass measured after drying and the weights are recorded and reported.

Splitting and Storage

- The samples are de-agglomerated on a 1 000 µm sieve;
- Sub-sampling is conducted by means of a 10-way cascade rotary splitter to reduce sample size;
- The cup divider runs at an angular speed of less than 0.6 m/s. The vibration of the feeder is moderate, ensuring an even flow of material with a bed thickness of ±5 mm;
- Each paper bag is torn (post sample transfer) by the operator, ensuring that all the material is transferred into the feed hopper of the rotary splitter;
- The 10 sub-samples (obtained from splitting) are transferred to individual sample bags where one sub-sample is marked for gold assay (at the Allanridge laboratory) and the other sub-sample is submitted to the Vaal River Chemical Laboratory for uranium and sulphur (S) analysis. The remnant eight sub-samples are dispatched to the MWS plant;
- Barcoded tickets are placed on the sample bag and kept by the laboratory for analysis; and
- Samples are then fluxed for Fire Assay.

Digestion of Prills and Evaluation

During the digestion of prills process the gold prill is digested by a nitric acid (HNO_3 70% m/m) and hydrochloric acid (HCL 33% m/m) solution (ratio of 1:3). Aqua regia dissolves the Au, though neither constituent acid will do so alone, as each acid in combination performs a different task. Nitric acid is a powerful oxidizer, which will actually dissolve the gold, forming Au ions (Au^{3+}). The hydrochloric acid provides a ready supply of chloride ions (Cl^{-}), which react with the Au ions to produce tetrachloroaurate (III) anions (in solution). The reaction with hydrochloric acid is an equilibrium reaction which favours formation of chloroaurate anions ($AuCl_4^{-}$). This results in a removal of gold ions from solution and allows further oxidation of gold to take place. The gold dissolves to become chloroauric acid. Steps are followed meticulously to prevent sample swops, losses and contamination.

3.5.2 Diamond Drill Core

Diamond drilled core is recovered for sampling, the samples are re-logged, checked and then split for assay. Acceptability of the samples is discussed and categorised according to strict criteria. Borehole Sampling Procedure (see Section 3.3.1) in place and followed. Underground Chip sampling also goes through a number of quality checks including planned compliance observation reporting, mass measurements versus theoretical mass and photographic process checks. Achieving a well-balanced sample entails chipping the entire marked off area, including the 2 cm hangingwall and footwall widths, as well as chipping at a consistent depth throughout the entire sample.

Samples are kept in secured storage facilities and can only be transported by a permit holder for transporting gold bearing material. Weighbills and registers are checked and signed off by security. The samples are received from the mines in locked containers with seals. The sample labels are scanned and the batches compared to the submitted sample sheets. The scanned bar codes are transferred to C-class and work sheets are automatically created.

Once assay results are returned, the Senior Geologist will do the inputs and calculations. A peer review, including the Vice President Geosciences, will be done on the inputs and calculations and then signed off. Through a process of accepturization, it is determined if the cluster should be used for estimation purposes. Bi-annual audits are done on chip sampling by a Geosciences Manager.

3.6 Quality Control/Quality Assurance

[SR3.5 (i) (iii)] [SR3.6 (i)]

QAQC programmes prescribe the routine insertion of QC materials at several critical stages of sample collection, preparation and assaying. The routine insertion of QC materials involves a number of different types of materials and practices to monitor and measure laboratory performance. These include:

- Standard reference material - Certified Reference Materials (CRMs) are inserted in all assay batches to enable continuous monitoring of accuracy. Analysis of customer sent standards in conjunction with internal standards used by the laboratory are used to pass or fail batches. Standards are inserted in each batch of samples. A minimum of one standard in every 20 samples is used;
- Blank material (coarse, crushed and fine) - Blanks are submitted in all assay batches to check for contamination. Coarse-, crushed- and milled blanks are included in every batch. One coarse- or crushed- and one milled blank is included in every 20 samples. These blanks are positioned randomly in sequence with underground chip samples;
- Duplicate samples (coarse and pulp) - Duplicate submissions are intended to test the assay repeatability of each 30 g-fire assay aliquot selected from a single 200 to 500 g pulp. The two sample sets, taken from the same pulp, allow the precision of the analytical procedure at the laboratory to be assessed without any masking or bias introduced by sample preparation procedures. One percent of pulp packets submitted is collected from the laboratory. These pulps are re-numbered randomly within a pre-determined sequence of underground chip samples. Care is taken in maintaining sample tracking in the database;
- Check assays (to original and referee laboratories) - Check sample submissions are intended to compare the accuracy of a laboratory to another one. The samples are submitted to a second laboratory for analyses by an identical technique. No less than 30 samples should be submitted;

- Particle size analysis (also called sieve analysis) - Results of routine Screen Tests on assay pulps by the assay laboratory are used to check comminution of samples to contract specification, i.e. (90% passing 75 µm). QAQC controls involve regular submission of remaining pulps to an adjudicator laboratory for check screen tests. A minimum of one dry screen test in every 20 samples is done during routine assays;
- Mass measurement (loss in each step);
- Spiked or salted blanks (coarse and fine); and
- Audits.

In practice a QAQC programme is maintained by the routine submission of QC samples that accompany the project samples to the primary laboratory. The QC materials used to assess the laboratory's performance are intercalated but not always indistinguishable from the submitted samples.

As a variant, AGA combines blanks, standards and check assays into sample submission comprising of pre-prepared, carefully labelled and sequenced blanks, standards and previously assayed pulps. Table 3.3 lists the minimum number of QC material to be in consignments of samples submitted for gold assay.

SRK has done detailed QAQC review on the operations under review and it is satisfied that AGA has maintained a systematic independent QAQC programme for the sample batches submitted to the analytical laboratories, including the submission of CRMs, pulp duplicates and blanks. In addition SRK is of the opinion that the action plans necessary for ensuring that the QAQC results meet acceptable standards are being implemented and maintained at the operations.

3.7 Relative Density

[SR3.7 (i)] [SV1.9]

It is common practice within the Witwatersrand deep level gold mines to report the Mineral Resources using a constant Relative Density (RD). Historical practices on the Witwatersrand mines did not include routine RD measurements. AGA have used a RD of 2.78 t/m^3 in the conversion of volumes to tonnes. AGA report that a validation of this value was undertaken in 2014 based on measurements on 653 samples taken from underground workings including hangingwall, reef and footwall samples and sampled using the Archimedes bath technique, where the dry mass and the submerged mass of the samples in water were taken and the density calculated. Samples weighing approximately 200 g were used. AGA did not supply the result of this test work for SRK to review.

3.8 Bulk-Sampling

[SR3.7 (i) (ii) (iii) (iv)]

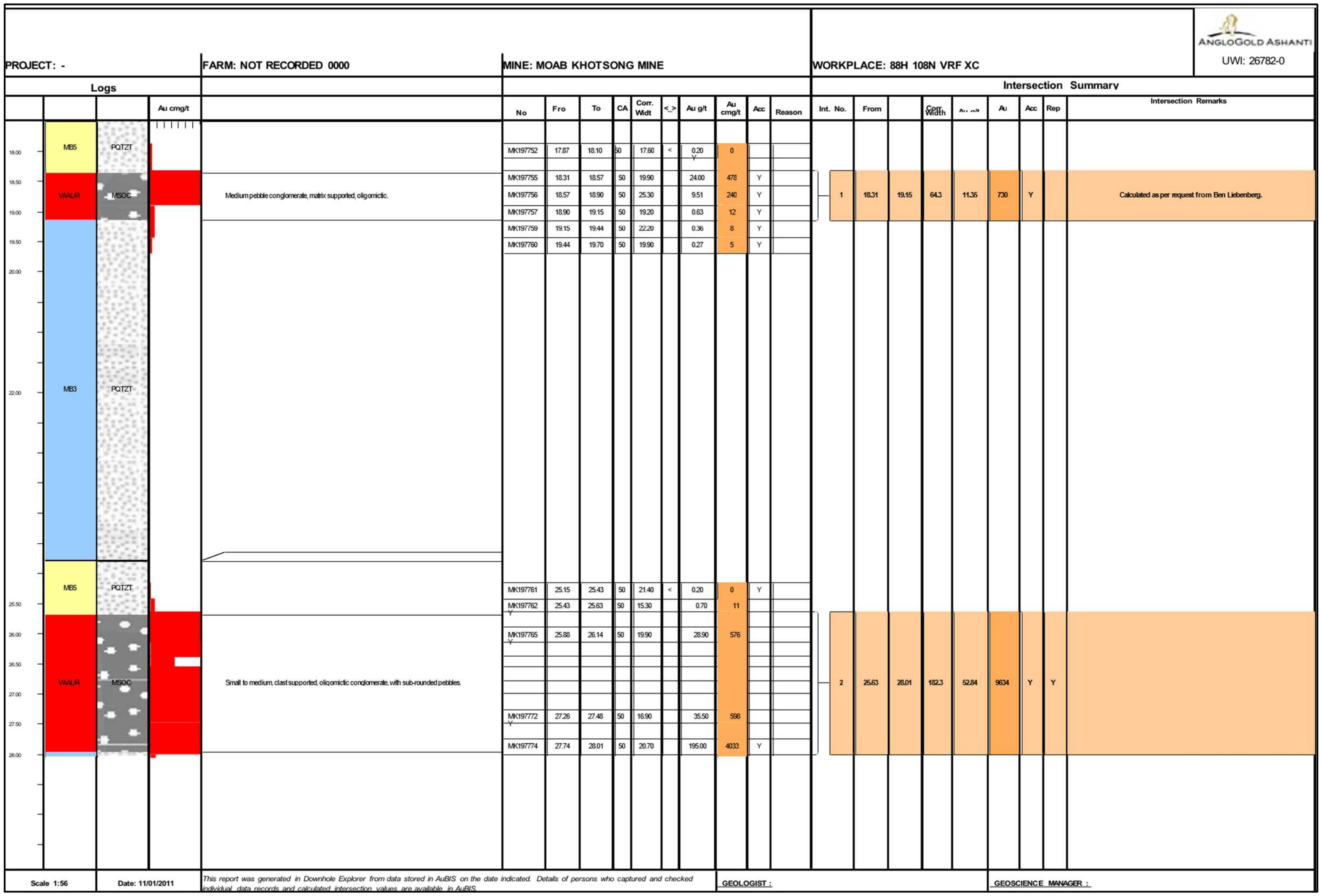
The following is the procedure undertaken when bulk sampling:

- The size and spacing/density of samples recovered is described and confirmed whether the sample sizes and distribution are appropriate to the grain size of the material being sampled;
- The method of mining and treatment is also described; and
- The degree to which the samples are representative of the various types and styles of mineralisation and the mineral deposit as a whole is indicated.

SRK is satisfied with the method adopted by AGA for bulk sampling.

Table 3.3: Minimum Number of QC Material to Be In Consignments of Samples Submitted For Gold Assay.

QAQC material	Type	Amount			
		Grade Control	EX2A	EX2B	EX3
Blanks	Coarse Crushed Fine	1% (consisting of crushed and fine)	5% (consisting of crushed and fine)	4% (consisting of crushed and fine)	4% (consisting of coarse, crushed and fine according to sample particle size)
	Spiked	ad hoc	ad hoc	ad hoc	ad hoc
Standards	CRM SRM	2%. Reduce to 1% if 95% of values <BV±2stdev	5%	4%	4%
Duplicates	Crusher		Ad hoc to test variability of sub-sampling at crushers		
	Rig	Campaign basis	Campaign basis	Campaign basis	Campaign basis
	Pulp	1% (sample values across grade range)	5% (sample values across grade range)	4% (sample values across grade range)	4% mineralised material consisting of coarse and pulp samples
Check assays		Quarterly 100 to 200 random samples from mineralised material 5% CRM (minimum 10) + 5% blank (minimum 10) in batch; include portion of waste margin	10% per project (per ore zone),5% CRM (minimum 10) + 5% blank (minimum 10) in batch; include portion of waste margin	10% per project (per ore zone),5% CRM (minimum 10) + 5% blank (minimum 10) in batch; include portion of waste margin	5% per project (per ore zone),5% CRM (minimum 10) + 5% blank (minimum 10) in batch; include portion of waste margin



srk consulting	Example of Borehole Sample Report	Project No. 522673

Figure 3.4: Example of Borehole Sample Report

4 Mineral Resource and Classification

[SV1.9]

The following sections are primarily concerned with VROs underground operations under review unless stated otherwise. Other sections will include Vaal River surface sources and the non-mentioning of them in other sections purports that it is not applicable/relevant for that particular section.

4.1 Geological Modelling and Geozones Interpretation

4.1.1 Database and Data Validation

[SR4.1 (v)]

The database of exploration information is a combination of data collected over the life of the operations, and during the original exploration phases. As underground development and mining progresses, the original exploration data becomes increasingly less important as it is superseded by high density mapping and sampling information. In the case of the V Reef at GN, the original exploration information has no impact on the Mineral Resource estimate, as the dense underground chip sampling dominates the estimation process. For the Zaaiplaats Project the original exploration (surface drill holes and LIB holes) is the primary data informing the estimate. At MK, the surface drill holes and LIB holes still play a role in the peripheral estimates (primarily Indicated and Inferred Resources).

The chip sampling is captured and managed in a commercial software suite designed for Witwatersrand gold mines. The data is exported from the software database into text files, which are imported into the estimation software (Geoserv). The sample section co-ordinates and values are checked through a set of validation routines, which include detection of duplicate values, removal of zero values, incomplete sample sections (these are not exported from the database), outside of acceptable thresholds (i.e. channel widths smaller than the sampling standard minimum width, and plotting inside fault loss structures.

Note that SRK detected a small number of duplicate values (219 duplicates out of 408 617 composites) in the datasets provided for review. All of the duplicates have identical accumulation values, and co-ordinates 10 cm apart along the X axis. While this indicates a failure of AGA's validation routines, SRK does not believe this will have a material impact on the results of the estimate based on this data.

The surface and long inclined boreholes (LIB holes) which are drilled and sampled (note that the underground drill holes are not routinely sampled due to the risk of loss of carbon during drilling, which is expected to bias the grades) are captured and stored in a proprietary AGA drill hole database (AuBIS).

Each intersection is logged as representative in the database during the geological logging, sampling and capture procedure. AGA classify the intersection as representative if the top and bottom contact are intact and sampled, and if there is no significant fault loss in the reef, or other indication of reef or gold loss. A second flag is also recoded to indicate whether the intersection is suitable for use in the second phase of data filtering applied to the drill holes. The flag indicates whether the observed issues with the intersection (fault loss etc.) are relatively minor, and if the intersections should still be considered for statistical analysis of acceptability.

Each cluster of intersections (i.e. short and long deflections from a parent hole) is assessed using an analysis of variance (Anova) which is a statistical test to determine whether the individual samples theoretically belong to the same population. This result is used to test if the clusters of deflections should be treated as individual samples, or if they can be combined into an average for the cluster.

Following this, the data are assessed through a process that is based on the acceptability or not of the reef intersections (determined in the logging phase) and the relationship to the 95% confidence limits of the ratios of non-acceptable and acceptable pairs within clusters. As a result of the significant faulting which affects the V Reef and C Reef in the Vaal River area, a significant proportion of the intersections are deemed unacceptable, and where these are all to be excluded, the quantity of data available for estimation would be significantly reduced. The acceptability assessment shows that the acceptable intersections have very similar mean gold values to the unacceptable intersections, and through the iterative process above, the most significant grade outliers are removed from the estimation dataset, without biasing the grade of the dataset. SRK consider this to be an appropriate and acceptable approach to dealing with the surface and LIB holes.

4.1.2 Geology Modelling and Domain Interpretation

[SR4.1 (i) (ii) (iii)]

Two reef horizons have been exploited on GN, which are termed by AGA as the V Reef and the C Reef (see section see section 2.1.2 for more detail). Each reef has different criteria for selection and definition of estimation domains, and these are discussed briefly below.

Vaal Reef

The V Reef is composed of three stratigraphic layers (see section 2.1.2) with identifiable sedimentological and mineralogical characteristics. The three layers are a result of two overlying unconformity surfaces on which mineralized conglomerates are developed. The Mineralised sequence is divided into three units termed (from top to bottom) the A Facies, B Facies and C Facies. The A Facies is broken down into a further three distinct layers (Top A, Middle A, and Bottom A).

The B Facies thins from west to east, and is well developed over parts of the adjacent Kopanang Mine, but mostly absent at GN and MK. The B Facies is developed over the western part of the Zaaiplaats Project. The B Facies is described as a clean pale trough cross bedded orthoquartzite, which may contain grit bands in places.

The C Facies is usually characterised by a thin basal pebble layer with an overlying argillaceous quartzite. A carbon seam is commonly present varying in thickness from a millimetre up to 5 centimetres.

The Bottom A sub-facies consists of argillaceous quartzites, pebbly quartzites and conglomerates, with carbon seams present and associated with elevated gold mineralisation. The Middle A sub-facies is usually a cross bedded orthoquartzite. The quartzite contains pyrite in places, as well as matrix supported conglomerates in places. The Top A sub-facies is the most widely present of the three A facies, and is usually a well-developed, moderately to well packed, and often well pyritised conglomerate.

The base of the A Facies has a well-developed unconformity in the east, but appears to become more conformable to the west, where it may be very difficult to identify the base of the A Facies from the top of the B Facies. The bottom A is typically the best mineralized unit in the V Reef.

Over parts of GN, the V Reef is underlain by the Mizpah Quartzite and the Mizpah Reef. The presence and proportion of these components of the V Reef, and the underlying Mispah units broadly define the domains which are used in the Mineral Resource estimation. The distribution of the vertical facies and the lateral domains is illustrated in Figure 4.1. Each domain has a matrix of identification characteristics, including the channel width, clast size, presence of carbon, degree of alteration footwall type, presence of characteristic units, percentage of conglomerate and gold content.

Based on the criteria described above with respect to the vertical facies, and the geological characteristics, the areas with similar characteristics have been outlined and domains created. The distribution of the domains across the Vaal River area is shown in Figure 4.2. These domains are updated and refined as additional mapping and data is collected, and are assessed to determine if the samples within the domain belong to the same population, and satisfy the criteria of second order stationarity.

The majority of the V Reef domain boundaries are hard boundaries, i.e. only data from within the domain is used to estimates blocks within the domain. A small number (mainly in the Kopanang Mine lease area) are soft boundaries.

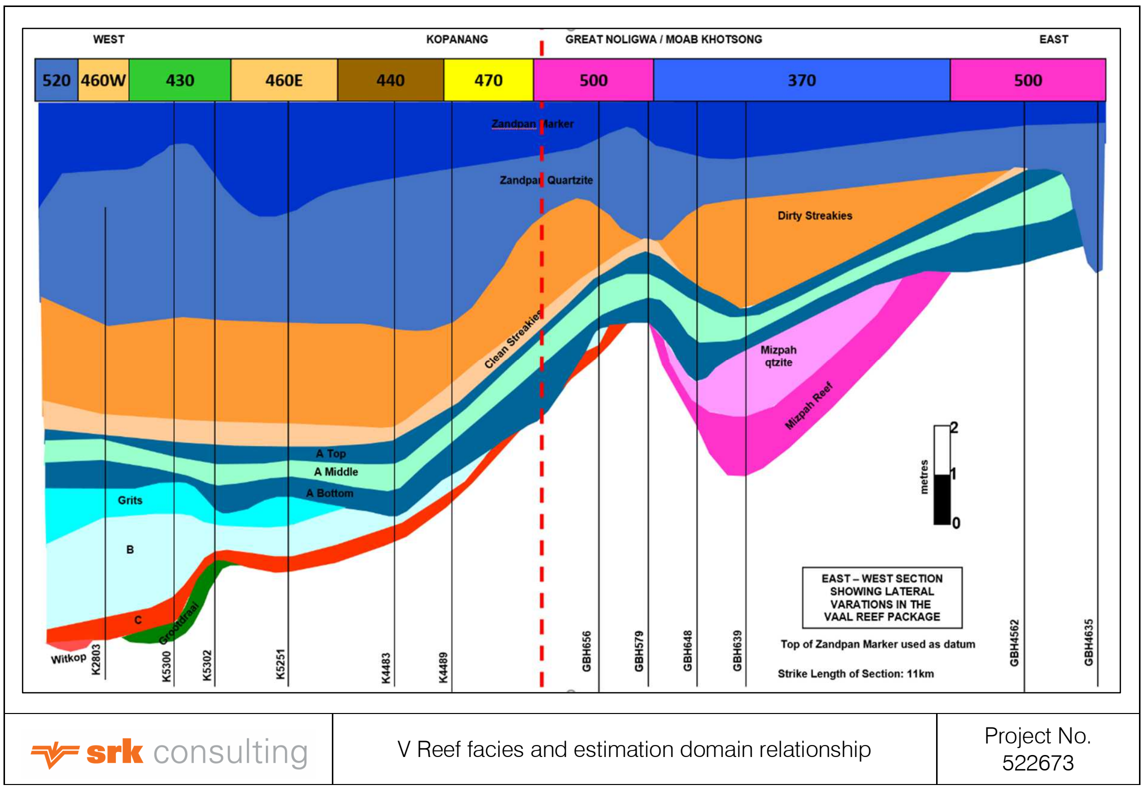
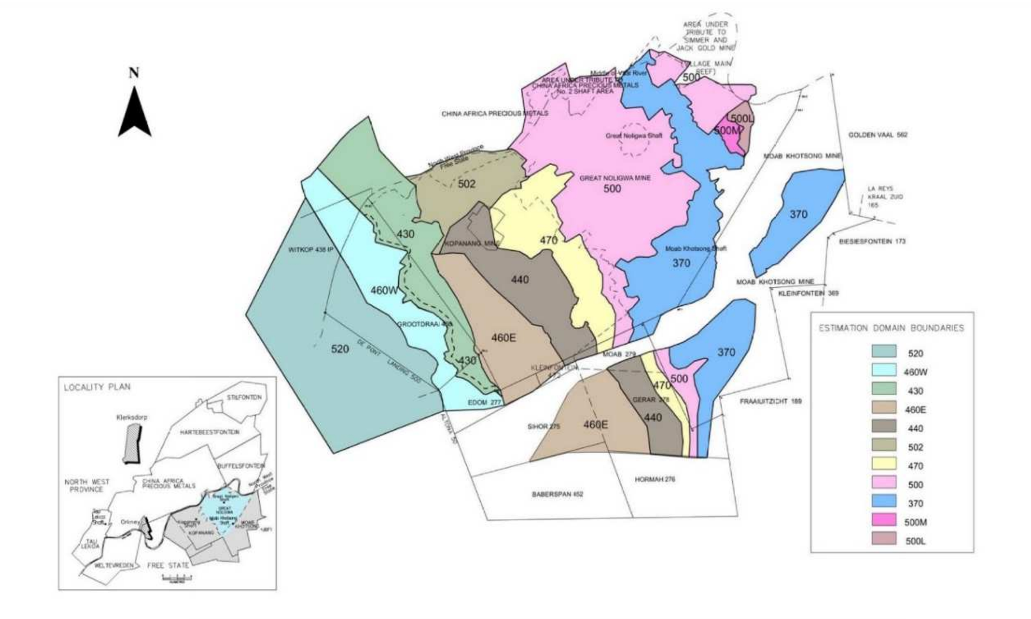


Figure 4.1: V Reef facies and estimation domain relationship



srk consulting	V Reef facies and estimation domain	Project No. 522673

Figure 4.2: V Reef estimation domains

C Reef

The C Reef estimation domains are based on the vertical facies of the reef, in a similar manner to the V Reef. The C Reef is divided into two facies: No.1 Unit and No.2 Unit, with three additional subdivisions of the overlying quartzites defined, but not relevant to the domain definition.

The No.1 Unit is a quartzite, typically less than 20 cm thick, with a carbon seam, pebble lag, or thin conglomerate at the base. The No.2 Unit is an oligomictic conglomerate, where the pebble sizes are generally small, and may grade down to grits in places.

The C Reef is subdivided into 3 domains based on the lateral continuity of both the No.1 and No.2 Units. The C Reef domain model is defined with a CR1 (high grade, high CW) with both the No.1 and No.2 Units well developed. CR2 domain (lower grade, low CW) is defined where Unit No.1 is typically not developed, and Unit No.2 is poorly or not developed. CR3 is defined by a mixture of well-developed and poorly developed No.2 Unit, with the odd No.1 Unit remnant, characterised by very erratic grades and channel variation.

The CR1 and CR2 domain boundaries are hard boundaries (only data from within the domain s used to estimates blocks within the domain, while the CR3 boundary is a soft boundary i.e. data form the low grade CR2 domain can be used to estimate blocks in the CR3 domain, but not vice versa.

Domain validations

AGA standard procedures recommend a robust set of tests that should be applied for assessing of the domain boundaries are appropriate or not. These include:

- Channel Width analyses – break points in scatter plots between channel width and other variables are used to pick intervals which are applied to colour code the estimation data, allowing for visual testing of presence of trends;
- Trend analysis – mean values in bands along X or Y axes are plotted to assess for systematic changes in the mean value of the variable within the domain;
- Cumulative sum – the data are categorised into ranges for a variable, and then from low to high, the cumulative difference from a reference value is calculated from each range, and graphed;
- Boundary analysis – a process that highlights if the selected domain boundary is in the correct spatial position, where there is a sharp break in the parameter value at the boundary position;
- Comparing Frequency distributions;
- Comparing point semi variograms; and
- Scatter plots – Bivariate analysis.

GN and MK Mines are mature operations, with extensive history of estimation, mining and reconciliation. The domain boundaries have been modelled, tested and validated extensively using the above mentioned tools. The AGA report detailing the estimation contains a suite of these tests, mainly where there has been additional data added to the domains, but also contains a record, going back several years for some tests, of the results of statistical analysis of the domain variables. Aside from some minor modifications in places, there are no major changes from the domains used in the previous year's estimates.

From Figure 4.2, it can be seen that the entirety of the original MK Mine is within a single estimation domain, and GN Mine is dominated by only two domains, while Zaaiplaats Project contains the GN Mine domains, as well as the domains which dominate the adjacent Kopanang Mine. The domain boundaries at GN Mine are well constrained by extensive mining and sampling, and there is a single domain at the original MK Mine. The Zaaiplaats Project domains are the least well constrained of the three areas, due to the widely spaced data in the domain, and the lateral displacement of the Zaaiplaats Project reef blocks by the Zuiping C Fault.

Visual validations confirm the grade and channel width thickness that support the definition of the domains. The co-efficient of variation per domain (see Table 4.1) is also relatively low, typically between 1 and 1.3, which supports the definition of single populations within each domain.

Table 4.1: V Reef Gold Domain metal accumulation statistics

Domain	Count	Minimum	Maximum	Mean	Std. Dev.	Variance	Coefficient of Variation
500	114 667	1	74 646	2 105	2 456	6 032 083	1.17
470	35 846	1	51 081	1 011	1 436	2 062 584	1.42
460W	12 931	1	14 079	929	1 093	1 195 436	1.18
460E	61 027	1	57 435	1 575	1 964	3 855 686	1.25
370	108 354	1	123 246	4 022	4 222	17 826 466	1.05
373	23 103	3	95 365	3 289	3 929	15 439 398	1.19
440	56 459	1	98 574	3 017	3 814	14 545 909	1.26

SRK is satisfied that the estimation domains have been adequately defined, based not only on the metal accumulation and reef thickness characteristics, but also on the geological and sedimentological characteristics.

4.2 Mineral Resource Estimation and Modelling Techniques

[SR4.2 (i) (ii)]

The Mineral Resource estimates for the underground assets are compiled by a team of AGA employees, under the supervision of the lead Competent Person, Rebaone Francis Gaelejwe, who is a member of the South African Council for Natural Scientific Professions (SACNASP: 400207/14) and Mr Gaelejwe certifies that he has sufficient experience in the style of mineralisation and type of deposit. SRK has reviewed the data used in the estimate, the geological modelling, domaining, geostatistical parameters and approach, and is satisfied that the approach is consistent with the guidelines of the SAMREC Code. The estimates are generated using 'Geoserv' Software, which is developed specifically for AGA, and is customised for the AGA estimation approach. SRK has not re-estimated the Mineral Resources, but has conducted sufficient checks to be satisfied that the estimates are a reasonable reflection of the deposit and the data informing the estimate. Mr Mark Wanless of SRK who is a member of the South African Council for Natural Scientific Professions (SACNASP: 400178/05) has been responsible for reviewing the underground operations and Ms Senzeni Mandava, also a member of the South African Council for Natural Scientific Professions (SACNASP: 400262/16), has been responsible for reviewing and validating the surface sources.

Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability. There is no certainty that all or any part of the Mineral Resource will be converted into Mineral Reserve. This section describes the Mineral Resource estimation methodology and summarizes the key assumptions considered by AGA. All of the assets under discussion here, are estimates in the same manner in a single final model, which included the adjacent Kopanang Mine, owned at the time of the estimate by AGA. The discussion following therefore covers all three of the assets, unless specified otherwise.

4.2.1 Compositing and Capping of Extreme Values

[SR4.2 (i), (iii)]

It is common practice in the Witwatersrand Basin tabular orebodies to simplify the estimation process into a two dimensional (2D) process. This is possible because of the inability in most instances to mine selectively in the vertical dimension, due to the channel widths typically being close to or lower than the minimum practical mining width.

Because of this, it is required to composite the samples across the full channel width into a single composite value. The Channel Width is generally defined based on the lithological and stratigraphic definitions of the reef. In the case of the C Reef, the base is generally defined as the top of the MBA quartzite, identified by the unconformity surface. The top contact is the interface between either the top of the MBA (if the No.1 and No.2 Units are not developed) or the No.2 Unit and the No.3 Unit quartzite.

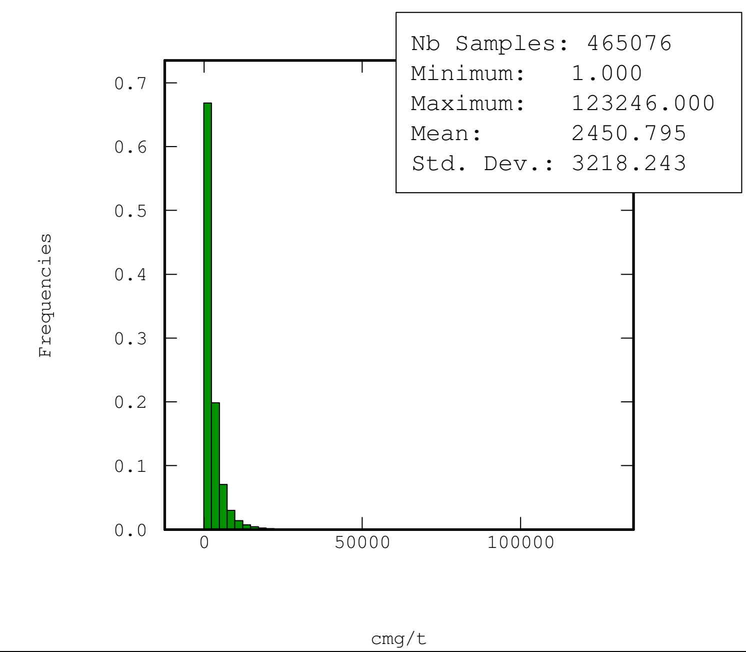
For the V Reef, the top contact is the upper contact of the A Facies with the overlying Streakies or the Zandpan quartzite. The base is the contact between the V Reef C Facies and the Mispah member.

The samples are therefore length weighted and averaged across the full reef width. Where the top contact or bottom contact is not sampled, either through faulting or lack of exposure underground, for example, the composite is discarded as unrepresentative.

Although it would be best practice to use a length and density weighting in the compositing process, it has never been standard practice to measure the density of each chip sample, therefore making it impossible to achieve this.

The result of the full CW compositing is a dataset with mixed support, which is not ideal for geostatistical assessment. Therefore, the standard practice is to calculate the metal accumulation, by weighting the grade by the channel width. This achieves a consistent support, as the accumulation, generally referred to as cm.g/t can be simplified into grams per square meter multiplied by density, which as indicated, is assumed to be a constant.

AGA report that no capping was applied to any of the composites, but have not supplied any justification for this. SRK assessed the histogram of the metal accumulation data used in the estimates. The distribution is highly positively skewed, and includes values which are significant outliers (See Figure 4.2). The quantity of these outliers in the context of the chip sampling dataset is however very small (< 0.001% of the dataset). The outliers are also distributed across the orebody, and not significantly clustered in areas which are poorly informed, and likely to have a material impact on the grade estimates. Further, the estimation in log space, as discussed in the following sections, will also mitigate the impact of high grade outliers. SRK is therefore satisfied that not capping the outliers will not have an important impact on the estimation results.



srk consulting	V Reef gold metal accumulation histogram	Project No. 522673

Figure 4.3: V Reef gold metal accumulation histogram (all domains)

4.2.2 Variograms

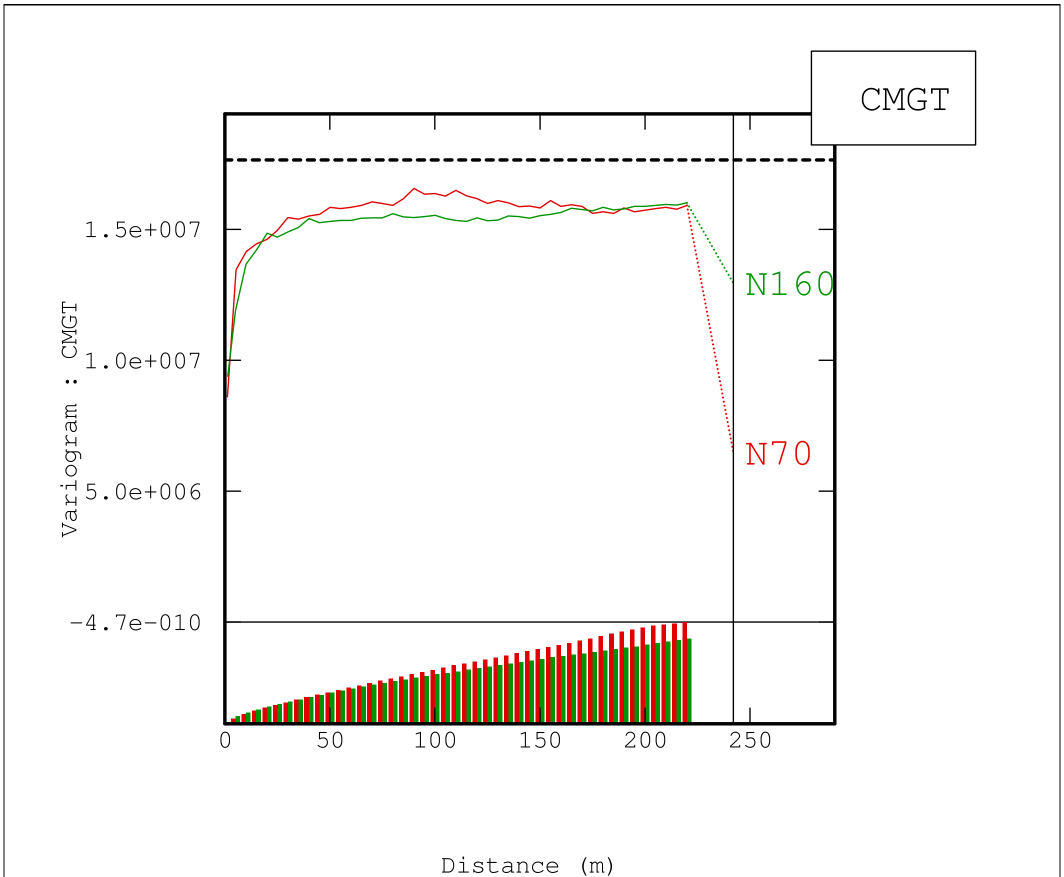
[SR4.2 (ii)]

The AGA estimation process includes kriging on point and block support, and therefore semi-variograms are modelled on both data supports. The point support semi-variogram are generated for the metal accumulation using the chip sample database. Channel width semi-variograms are not calculated, as the block estimates are reported over a mining width which is greater than the channel width, making the channel width estimation redundant. All semi-variogram are omnidirectional (recall that the estimates are 2D, so therefore only calculated in the horizontal plane on full width composites) the nugget effect is derived from experimental semi-variogram which are aligned to the raise line directions, where the highest density of samples are located.

The semi-variograms presented by AGA generally show a robust structure, with long ranges of the order of 90 m to 100 m, nugget effect of 50 % to 70 % of the population variance, and two shorter range structures, which account for 80 % to 90 % of the total variance above the nugget, with ranges of 6 m to 13 m and 15 m to 52 m respectively. AGA present the semi-variograms from previous periods, which illustrate that the semi variogram are relatively consistent from estimate to estimate. Cutting of outlier values is applied for the calculation of the experimental semi-variograms, which allows for more stable structures, and SRK considered to be appropriate.

For estimation domains where the experimental semi-variogram stabilises below the population variance are re-scaled to the population variance. SRK considers it appropriate that the modelled semi-variogram are scaled to the population variance, to allow for the correct Kriging statistics (such as estimation variance, slope of regression etc.).

The block support semi-variograms are calculated and modelled using two datasets. The nugget effect *only* is calculated from a dataset of regularised chip samples. Chip samples are regularised on a 20 m grid, and the support of the regularised points is ignored. The natural logarithm of the regularised metal accumulation is taken and the experimental semi variograms calculated and models fitted. The experimental semi-variograms show relatively robust structures, however the ranges and sill structures are not important since only the nugget value is used from this exercise. The modelled nugget effect values are typically approximately 50 % of the population variance. SRK independently calculated experimental semi-variograms for a set of domains, and found little evidence for anisotropy in the experimental results. Further, the experimental semi-variograms modelled by SRK are similar to those calculated by AGA, supporting the modelled structures and ranges. An example of the experimental semi-variogram calculated by SRK for the 370 domain is shown in Figure 4.4, and confirms the isotropic nature, and the AGA modelled range for this domain of 100 m.

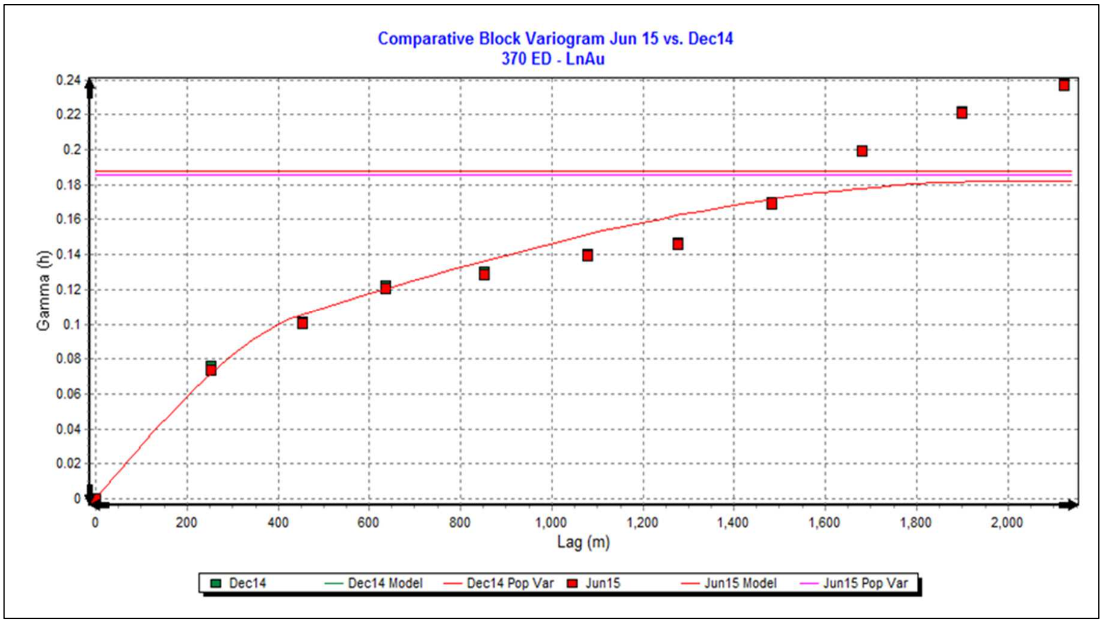


srk consulting	Domain 370 semi-variogram (cm.g/t)	Project No. 522673

Figure 4.4: Domain 370 point support experimental semi-variogram for metal accumulation

Block support semi-variogram are then calculated on a second dataset of regularised data, with a larger support size, consistent with the block size to be used in the mixed support kriged estimates. For this regularised dataset the regularised point support is considered, both in terms of the number of samples in the block (taken as a minimum of half the block size in this instance (201 points based on the 420 by 420 m block size)) and the distribution of points within a block. Each block is visually validated to ensure that there are sufficient samples covering the entire block for it to be accepted for use.

The natural logarithm of each regulated point is calculated for the metal accumulation, as well as the log variance (which is used in the back transformation later). The omnidirectional semi-variogram calculated for each domain is based on the regularised data log values. The experimental semi-variograms are generally relatively poorly structured, due in part to the limited number of points available in each domain, however they still display an interpretable structure, with a typical long range of the order of 1 500 m to 2 000 m. The AGA experimental and modelled semi-variogram for the 370 domain illustrated above (which covers the entire MK Mine resource) is shown in Figure 4.5, including the previous year’s data for comparison.



srk consulting	Domain 370 semi-variogram (Cm.g/t)	Project No. 522673

Figure 4.5: Domain 370 block support experimental and modelled semi-variogram for metal accumulation

4.2.3 Estimation Methodology

[SR4.2 (i), (ii), (iii), (iv) (v)]

Underground Mineral Resources

AGA estimate the metal accumulation with two approaches, one for short scale 'local' estimates, and a second for larger scale 'macro' estimates. Only the metal accumulation is estimated, as the channel widths are generally significantly lower than the mining widths, and the mining widths are used to report the Mineral Resources on a diluted basis.

No information was provided to SRK regarding the uranium (U_3O_8) estimates (U_3O_8 is mined as a by-product of gold (Au) at the operations). As such, SRK has not reviewed the AGA U_3O_8 estimates. AGA report that the U_3O_8 estimates are generated using the same techniques as the Au estimates.

Local estimation

The local estimates are generated in two passes, the first into a 10 m by 10 m grid using Ordinary Kriging and the point support log space semi-variograms discussed in the previous section. Both the lognormal(cm.g/t) (ln(cm.g/t)) and the ln(cm.g/t) variance are estimates (as the variance is required for the back transform of the estimates into normal space). The 10 x 10 Ordinary Kriged estimates are used to define the local mean values within a domain, to be used in the second estimation pass. A 9 x 9 neighbourhood with a 10 x 10 discretization was the best option for all the geozones for this estimation pass.

The second pass estimate is generated using Simple Kriging into 30 x 30 m blocks. The search parameters are selected using a Kriging Optimisation, whereby the effect on a set of ordinary kriging statistics is measured with different neighbourhood parameters, and the optimal neighbourhood is recursively optimised. The objective is to maximise the kriging variance and regression slope and minimise the LaGrange multiplier and count percentage negative weights. The number of discretisation points, search range and minimum and maximum number of composites are selected using this approach. The search is rectangular, and is defined as the number of block model cells (30 m x 30 m grid) around the target block.

The V Reef ln(cm.g/t) estimation parameters are summarised in Table 4.2, and the ln(cm.g/t) variance estimation parameters are summarised in Table 4.3, and the equivalent information for the C Reef in Table 4.4 and Table 4.5 respectively.

Table 4.2: Local estimation search parameters the V Reef for ln(cm.g/t)

Domain	Neighbourhood	Discretisation	Min Comps	Max Comps	% Negative weights
460E	13 x 13	11 x 11	5	60	0 %
440	15 x 15	15 x 15	5	100	0 %
470	13 x 13	10 x 10	5	60	1.7 %
500	5 x 5	10 x 10	5	18	5.6 %
370	9 x 9	8 x 8	5	60	10 %

SRK considers the parameters to be generally appropriate. The large maximum number of samples will result in some smoothing of the estimates, however excluding the 370 domain, the negative weights are not excessive. The 370 domain could reasonably have been estimated with a lower maximum number of composites, which would reduce the smoothing of the local estimates.

Table 4.3: Local estimation search parameters the V Reef for ln(cm.g/t) variance

Domain	Neighbourhood	Discretisation	Min Comps	Max Comps	% Negative weights
460E	17 x 17	15 x 15	3	12	1 %
440	19 x 19	15 x 15	3	20	3 %
470	11 x 11	10 x 10	3	5	1 %
500	5 x 5	10 x 10	5	18	55.6%
370	11 x 11	8 x 8	5	60	0 %

Table 4.4: Local estimation search parameters the C Reef for ln(cm.g/t)

Domain	Neighbourhood	Discretisation	Min Comps	Max Comps	% Negative weights
CR1 & 3	17 x 17	16 x 16	5	42	9.1%
CR2	25 x 25	16 x 16	5	35	2.2%

Table 4.5: Local estimation search parameters the C Reef for ln(cm.g/t) variance

Domain	Neighbourhood	Discretisation	Min Comps	Max Comps	% Negative weights
CR1 & 3	19 x 19	14 x 14	3	7	16.2%
CR2	19 x 19	14 x 14	3	10	7.8%

The shape and ranges of the ln(cm/g.t) variance semi-variograms differ from the ln(cm/g.t) resulting in different optimised parameters. The 500 and 370 domains show the most unusual parameters, with the 500 domain having a small maximum number of composites, short range, and a large number of negative weights, which indicates that the estimate is likely to be relatively poor a short distance from the target block and the close spaced data. The 370 domain shows a relatively large number of composites (and not negative weights) indicating a good quality long range estimate of the parameter.

The C Reef estimates have long search ranges, and relatively high maximum number of composites, indicating good grade continuity, and relatively smoothed estimates.

The estimates are assessed, and the slope of regression derived from an Ordinary Kriging estimate (using the same parameters as the Simple Kriging) is used to constrain the estimates. The variance equivalent to a slope of regression of at least 0.6 is used as the minimum value, below which the estimates are discarded and replaced by the macro estimates.

The parameters selected for the estimation and Simple Kriging approach will, in SRK's view, result in an estimate with significant smoothing. This is in part offset by the estimation in log space, and the subsequent back transform of the estimates into normal space, which will preserve the variance of the samples better than kriging of raw values. The mining at MK and GN Mines are in addition, not highly selective, due to the generally high average grades over the mining areas, and as such, retaining the local variability is less critical than on highly selective operations.

AGA reports that the block factor (estimated Au in a mined area for a month compared to the actual Au produced from the same area (based on the chip sampling data within the mined area)) for the past three years, has averaged at approximately 100 % ± 2 %, indicating reliable estimates.

Macro estimation

The macro estimation is premised on the assumption of second order stationarity within the estimation domains (the mean and variance are constant within the domain). If the domains in fact have second order stationarity, then it is possible to evaluate uninformed areas where limited information exists, based on the detailed information within the domain in other areas. The macro estimates use mixed support ordinary kriging, using a combination of the block support semi-variogram derived from regularised chip sampling data (210 m or 420 m grid), and the nugget effect from point support semi-variograms (in practice these are chip samples regularised on a 20 m grid). The input dataset is a combination of the regularised chip samples, and the drill hole composites (not regularised).

The search neighbourhood is again optimised, dependent on the block size to be estimated (210 m or 420 m), dependent on the domain. The block size is selected based on a, "variance size of area analysis". The variance is related to the size of the block being estimated, the objective is to minimize the influence of the block size on the calculation of variance. This can be achieved through minimizing the between block variance which in turn is achieved by determining the minimum block size for which the log variance of the samples within the block approach the population log-variance. At this point it can be assumed the area over which it is calculated will no longer be influenced by block variance.

The estimation parameters are again derived from a kriging optimisation exercise which tests the impact varying a set of four parameters on the kriging quality statistics. The V Reef metal accumulation search neighbourhood parameters and block sizes are detailed in Table 4.6 and Table 4.8 for ln(cm.g/t) and ln(cm.g/t) variance respectively, and the equivalent parameters for the C Reef in Table 4.7 and Table 4.9 respectively.

Table 4.6: Macro estimation search parameters on the V Reef for ln(cm.g/t)

Domain	Neighbourhood	Discretisation	Min points	Max points	Block size
460E	15 x 15	11 x 11	5	60	420 x 420
440	15 x 15	15 x 15	5	100	420 x 420
470	13 x 13	10 x 10	5	60	420 x 420
500	5 x 5	10 x 10	5	18	420 x 420
370	9 x 9	8 x 8	5	60	210 x 210

Table 4.7: Macro estimation search parameters on the C Reef for ln(cm.g/t)

Domain	Neighbourhood	Discretisation	Min points	Max points	Block size
CR1 & 3	17 x 17	16 x 16	5	42	300 x 300
CR2	25 x 25	16 x 16	5	35	300 x 300

The higher grade V Reef domains (500 and 370) show the lowest search neighbourhood distances, and the 500 domain uses a maximum of 18 points to avoid excessive negative weights. As a result, it is expected that the kriging quality statistics will be the lowest for these domains, due to the higher variance within the domains. As with the local estimation, the C Reef estimates are likely to be significantly smoothed, and also have a smaller quantity of information to inform the estimates.

Table 4.8: Macro estimation search parameters the V Reef for ln(cm.g/t) variance

Domain	Neighbourhood	Discretisation	Min points	Max points	Block size
460E	13 x 13	17 x 17	3	12	420 x 420
440	19 x 19	15 x 15	3	20	420 x 420
470	11 x 11	10 x 10	3	5	420 x 420
500	5 x 5	10 x 10	5	18	420 x 420
370	11 x 11	8 x 8	5	60	210 x 210

Table 4.9: Macro estimation search parameters the C Reef for ln(cm.g/t) variance

Domain	Neighbourhood	Discretisation	Min points	Max points	Block size
CR1 & 3	19 x 19	14 x 14	3	7	300 x 300
CR2	19 x 19	14 x 14	3	10	300 x 300

The remaining blocks at GN are minimally affected by the macro estimation as they are mostly pillars which are informed by the dense chip sampling data and therefore the local estimates. At MK Mine, the most eastern portions of the remaining orebody are estimated by macro kriging, as well as larger remaining blocks, and thus the macro estimates are more critical in this area. At the Zaaiplaats Project, the total Mineral Resource is informed by macro kriging, and there are only relatively widely spaced surface and LIB holes which intersect the reef in this area.

The Zaaiplaats Project estimate is therefore dependent on the assumption that the estimation domains have second order stationarity, and the interpretation that the domains are correctly extrapolated from the well informed blocks in the GN and Kopanang Mine areas. The lateral displacement along the Zuiping C fault is taken into account during the estimation of the Zaaiplaats Project reef blocks. The palinspastic reconstruction done by AGA indicated an approximately 1165 eastwards displacement of the reef. The definition of the domains and the estimates are done after moving the data, and reef blocks to the interpreted pre-faulting position, to allow extrapolation of the accumulation southwards across the fault from Kopanang and GN.

Following estimation of the log accumulation and variance, the estimates are back transformed into normal space.

Surface Mineral Resources

Tailings Storage Facilities

TSF Mineral Resources from 2001 to 2008 were computed from weighted averages of available data for each surface resource area. Prior to 2011 for the VROs, the grade estimations for the TSF dams were based on the residue grades obtained from the different process plants, as well as various ad-hoc sampling projects in selected areas. All the TSF dams in VROs have since been re-sampled by means of an extensive drilling exercise which commenced in 2011. A stringent QAQC process was applied to the sampling and assay processes to ensure a high level of confidence in the results. The auger drilling typically took place on a 150 x 150 m grid (Mineral Resource model) as well as a 50 x 50 m grid (Grade control model) as detailed in Section 3.2.2. The vertical sampling interval of 1.5 m was implemented and where possible all holes were drilled into the native underlying strata to allow the estimation of the base of the TSF. The estimation technique being used is 3D ordinary kriging. The variograms used for the grade estimation consisted of both horizontal and downhole variograms. The model used for the construction of the grade model constitutes well defined 3D wireframes which are constructed using the drill holes and the results from monthly surveys on currently reclaimed TSF dams and aerial surveys carried out on an annual basis for TSF dams which are planned to be reclaimed. These models are regularly updated during the grade control process as is documented in the AGA procedure and guidelines to calculate Mineral Resources for surface sources.

SRK has not re-estimated the surface Mineral Resources, but has conducted sufficient checks/validations of the dataset used to generate the block model and is satisfied that the estimates are a reasonable reflection of the TSFs and the data informing the estimates.

Waste Rock Dumps

The Moab (11 Shaft) MOD or Moab MOD is situated at the MK Shaft. The grade estimation of the low grade stockpiles is based on grades obtained from reclaimed tonnages from the different stockpiles, grades obtained from rock deposited on these facilities and grades from various other sampling projects carried out on some of the stockpiles. These sampling exercises involved a pit being dug on a pre-determined grid on the low grade stockpiles from which grab samples were taken. These samples are then split into different size fractions and assayed to determine the Au distribution for the different size fractions. The profiles of the stockpiles are also updated by means of aerial surveys carried out on an annual basis. Sampling is done by means of mechanical stop belt samplers on the feed belts at the Metallurgical plants.

The survey of the MOD was completed by 27 June 2000 and the tonnage of 1 420 940 tonnes was calculated from the volume and RD. An aerial survey of the dump was completed in April/May 2005 and a tonnage of 4 009 732 was computed using a density of 1.67 t/m^3. An aerial survey was carried out again during 2015 and a final tonnage of 8 030 761 tonnes was used for the December 2015 Mineral Resource statement. No new aerial surveys were carried out on the Moab TSF and during 2016 only minor additions and a small reconciliation adjustment was carried resulting in a minor increase in the December 2016 Resource numbers. The Moab MOD footprint is shown in Figure 5.23.

The MOD is sampled with a manually operated go-belt. The following sampling information is available for Moab MOD:

- Daily deposition from 28 August 1998 to 28 March 2001 and July 2004 to July 2005;

- Monthly deposition from September 1998 to March 2001 and January 2003 to October 2008; and
- Annual deposition for 1996 and 1999.

4.2.4 Validation of Estimates

[SR4.2 (v) (vi)]

Underground Mineral Resources

AGA use a suite of software, some of which is not commercially available, for estimating, managing and reporting the Mineral Resources. The block model estimates, generated in Geoserv software are exported as text files per domain, and are imported into a second suite of software named Mineral Resource Inventory System (MRIS), where the block models are constrained (as described in the previous section), combined, and clipped to the interpreted structural blocks. The structural blocks are generated and maintained on an ongoing basis in MRIS for all reef blocks, in the plane of the orebody. While the block models are generated in 2D, the reef blocks and structural interpretation is done in 3D, which allows of the conversion of the 2D estimated into 3D planar estimates in the plane of the orebody. Within MRIS, the reef blocks are ‘depleted’ using the surveyed positions of the underground development and stoping, using a cookie cutting approach, and resulting in a set of polygons which represent the unmined portions of the reef blocks.

Based on the information supplied, SRK is unable to replicate the block model combination and clipping process undertaken in MRIS, and has therefore not been able to independently verify the reported Mineral Resource. SRK has however undertaken a range of checks on the V Reef estimates which are described in this section. While SRK could not independently report the Mineral Resources, SRK has no reason to doubt the reported values due to the following:

- The MRIS system, while not available to SRK to replicate, has been developed over a number of years by AGA and professional software developers contracted to AGA;
- The AGA Mineral Resources have been subject to regular, more detailed audits than SRK was permitted to undertake, where the processes applied in MRIS have been independently verified; and
- AGA reconcile the Mineral Resource depletion and actual mining on an annual basis, which has been independently verified during the independent audits.

SRK has therefore accepted the AGA reported tonnes and grades without independent reporting of the grade and tonnage numbers during the compilation of the CPR. AGA report their own validations in their internal CPR document.

SRK were provided with the Geoserv output blocks from the 30 m x 30 m local, and 201 m x 210 m or 420 m x 420 m macro estimation, in text file format, along with the chip sampling and borehole data, and the outlines of each estimation domain for the V Reef. SRK combined the block models of each block size within each domain, and clipped these to the estimation domains before combining into a single model file. From this block model, SRK undertook a set of validations. Visual validations show that the block model generally honours the grade distribution seen in the chip samples, although with smoothing (discussed in the previous section) due to the estimation approach adopted by AGA.

On a global basis, SRK calculated the average grades of the chip sample and the block models. Acknowledging that the chip samples are not declustered for this comparison, and that the SRK composite block model includes inaccuracies such as areas which are in fact in a fault loss, which should be excluded from the calculation, and possible clipping of the different block sizes incorrectly, the global mean comparison is shown in Table 4.10.

Table 4.10: Global statistical comparison of data versus estimated metal accumulation for the V Reef per domain

Domain	Horizontal area in Domain	% of total area	Data cm.g/t	Block model cm.g/t	% difference
370	15 350 400	25%	3 893	3 711	-4.7%
440	8 150 400	13%	3 023	2 862	-5.3%
470	6 600 600	11%	1 016	1 019	0.3%
500	20 628 000	34%	2 105	2 241	6.5%
460E	9 862 200	16%	1 575	1 575	0.0%

The differences between the data and the estimates are generally low, and considering the clustering of the data which is not accounted for in this comparison, and the inaccuracies in SRK's composite model, SRK considers the comparison to be adequate to good.

SRK also calculated more spatially localised comparisons, using swath plots and grid scatter plots. The swath plots calculate the average grade of the data and estimates in strips 210 m wide along the X and Y axes, per domain. The grid plots show the combination of the X and Y axes swaths, where the data and block model values within 210 m grid cells is compared in an X-Y Scatter plot.

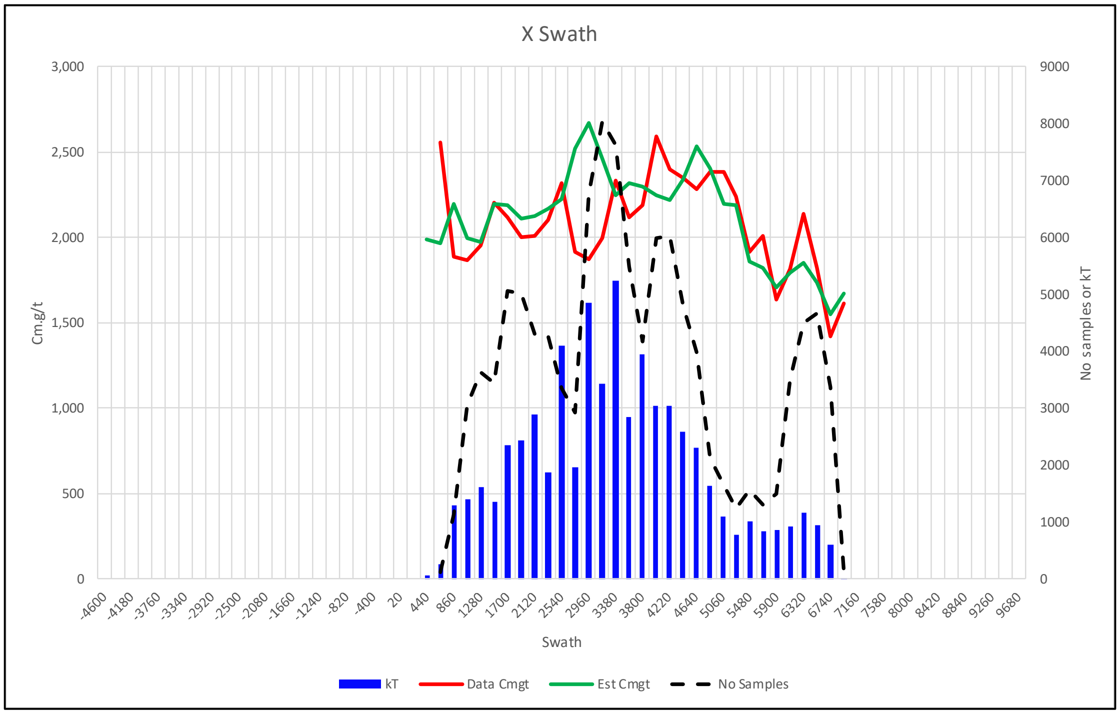
Examples of Swath plots for the 500 and 370 domains are shown in Figure 4.6 and Figure 4.7 respectively. In both figures, and along both axes, it can be observed that the estimates track the trends in the data, although the estimates are naturally less variable than the data. In each plot, the data and approximate tonnage (not resource tonnage due to the inaccuracies described above) are shown to indicate the quantity of data available to inform the estimate locally.

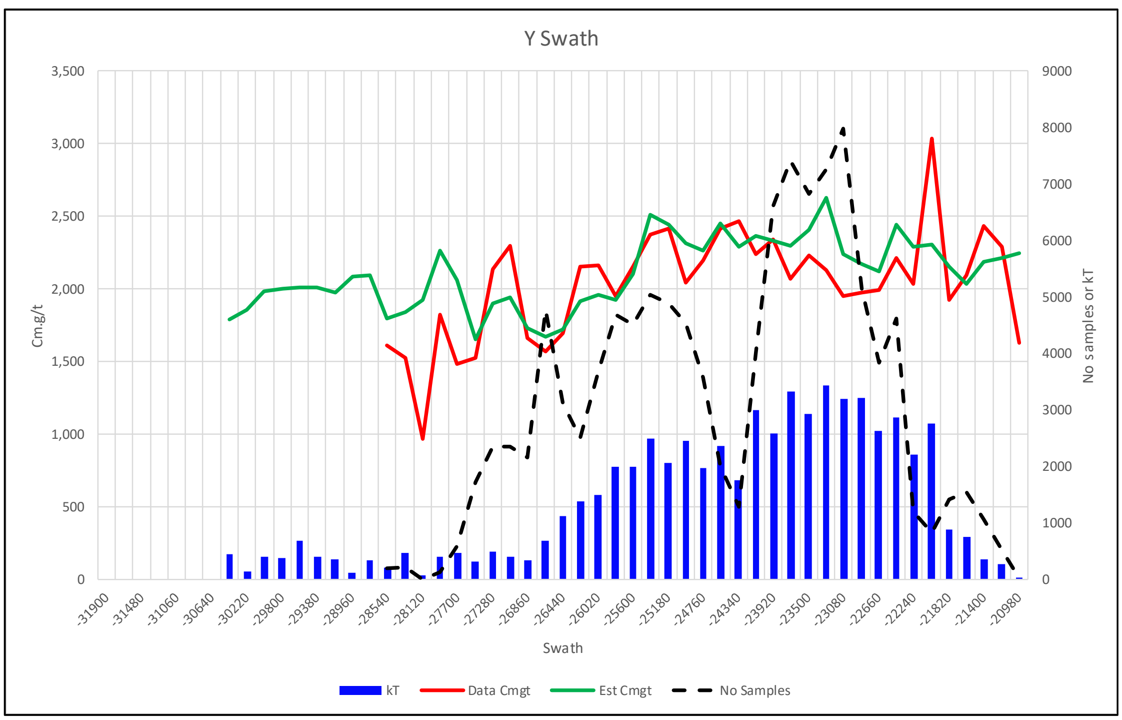
In domain 500, the data indicate a potential decreasing trend towards the south in the Y swath plot, which is not reproduced well by the estimate, although it should be recalled that the quantity of data is decreasing, and the estimation approach relies on the regularised chip sample extrapolation.

In domain 370, the trends within the data are well reproduced in the X swath, as is the decreasing grade trend towards the south in the Y swath plot.

Two X-Y Scatter plots are shown in Figure 4.8, based on all domains. The first (top) includes all 210 m grid cells which contain data and an estimate, while the second (lower plot) excludes any grid cells with less than 50 chip samples inside it. The plots show the mean of the data within the grid location on the X axis against the mean of the block estimate on the Y axis. The ideal correlation is shown in red, while the Reduced Major Axis (RMA) linear trend line is shown as a black dashed line. The equation of the RMA line is shown, along with the correlation co-efficient. The RMA is chosen over a least squares linear trend as it assumes error on both variables.

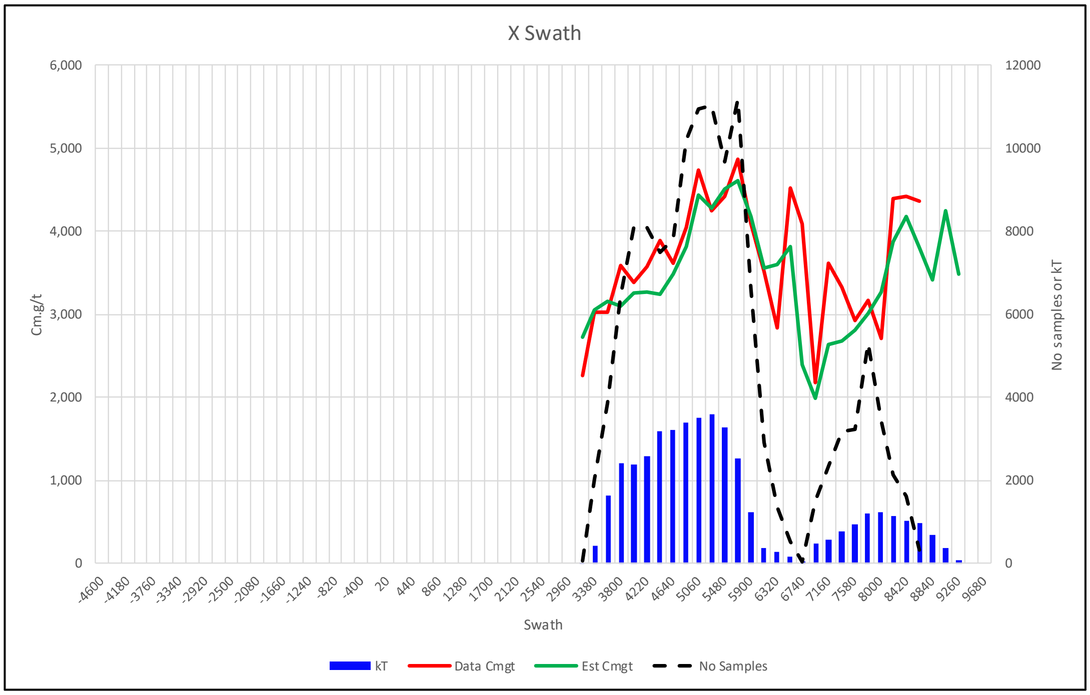
While there is scatter around the ideal correlation line, the correlation co-efficient of 0.88 for the full dataset shows a relatively close correspondence between the data and the local estimates. The slope of the RMA line, which is indicative of the degree of smoothing, is not too flat, at approximately 0.85, indicating that the degree of smoothing in the estimate is not too high. Overall, the validations undertaken by SRK indicate a relatively good agreement between the data and the estimates.

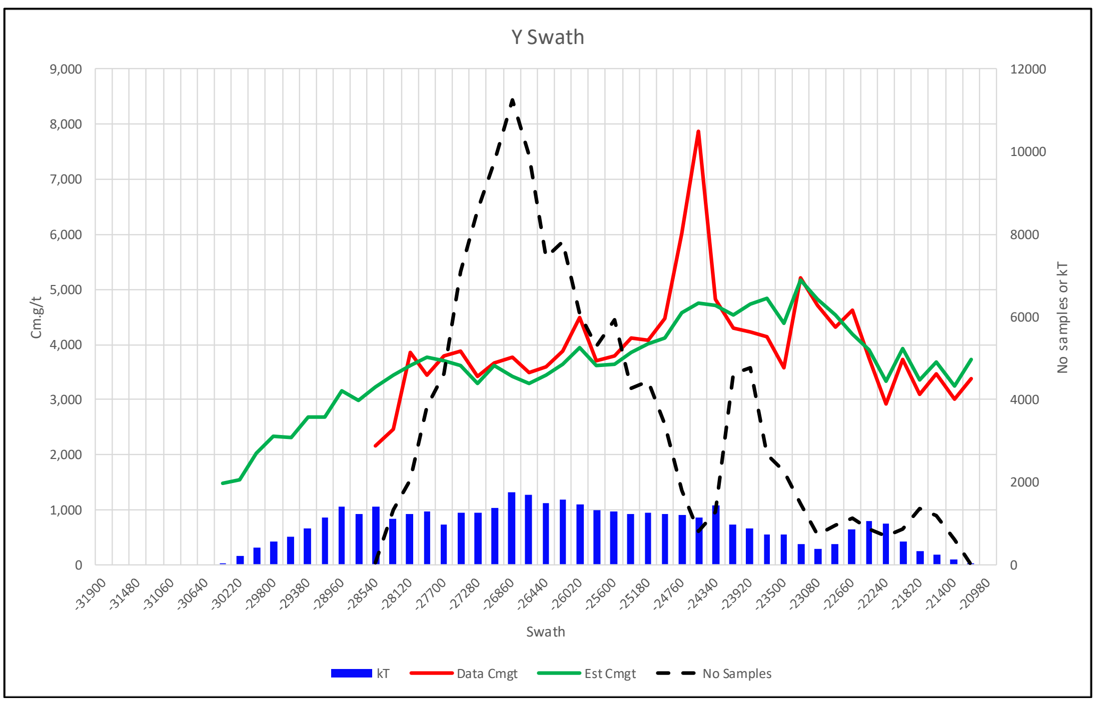




srk consulting	Domain 500 Swath Plots	Project No. 522673

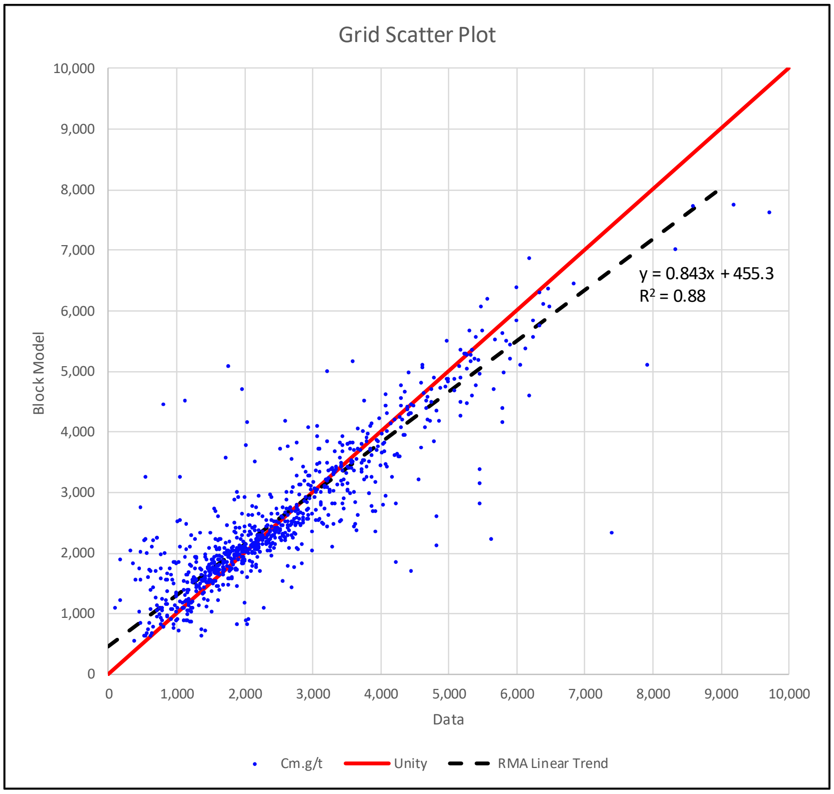
Figure 4.6: Domain 500 X and Y Swath plots for metal accumulation

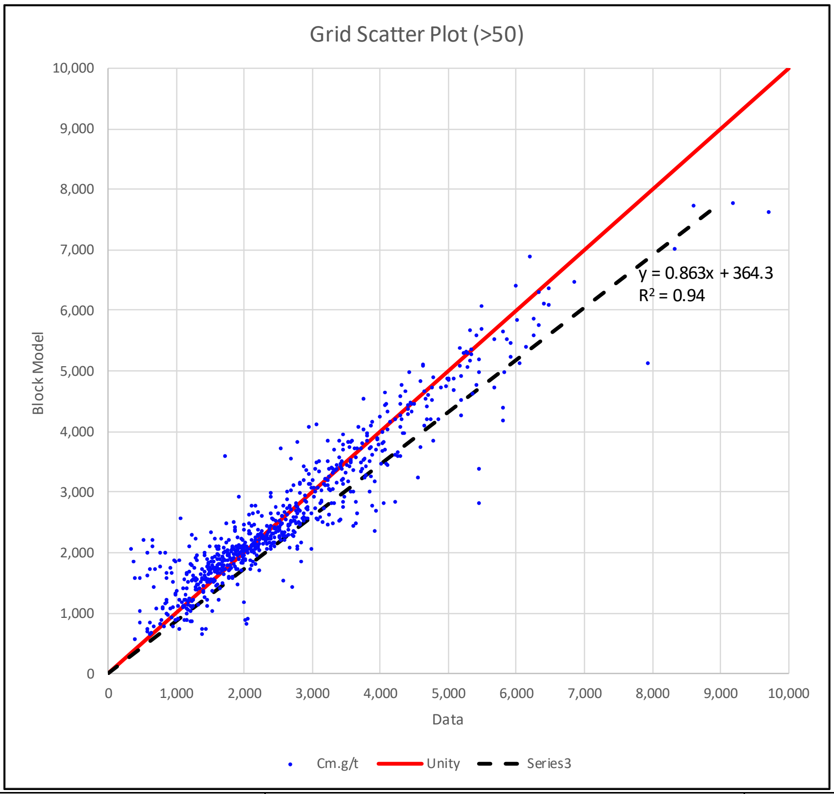




srk consulting	Domain 370 Swath Plots	Project No. 522673

Figure 4.7: Domain 370 X and Y Swath plots for metal accumulation





srk consulting	X-Y Scatter Plots	Project No. 522673

Figure 4.8: X-Y Scatter plots for metal accumulation (All domains)

The variability of the grade between deflections in an individual drill hole or drill hole cluster can be significant. While care is taken to avoid loss of friable carbon (which typically contains a high proportion of the Au) during drilling, it is known that the grade from surface drill holes containing carbon often under report the true values. As a result of this, there is a relatively poor visual comparison between the individual intersections in the Zaaiplaats Project area and the estimates, which are dominated by the regularised chip sampling data, and influenced by high grade intersections amongst the low grade intersections.

The observed continuity of the facies on which the domains are based, including the observations of the geological and sedimetalogical characteristics on which the estimation domains are based and which control the grade distribution supports the AGA approach. There is no reason to believe that the Au distribution would have changed across the Zuiping C fault, which post-dates the Au deposition.

Surface Mineral Resources

Kopanang Pay Dam

AGA supplied a block model and wireframe to enable SRK to validate the Mineral Resources declared in the 31 December 2016 CPR. SRK has validated the block model and wireframe used to create the block model and has been able to reproduce the tonnage and grades reported in the Mineral Resource statement but with a 0.30% difference in tonnage and SRK considers it to be immaterial.

Mispah 1

SRK attempted to replicate the grade and tonnage on the 2011 block model supplied by AGA using a density of 1.45 t/m^3 and obtained 58.09 Mt with an average Au and U_3O_8 grade of 0.31 g/t and 0.13 g/t respectively. The difference in tonnage is also quite small and is considered to be immaterial.

Additions to the Mispah 1 TSF has occurred from year 2011 – 2016 as detailed in Table 4.11.

Table 4.11: Mispah 1 TSF tailings material additions from year 2011 to 2016

Year	Quantity (Mt)	Au Grade (g/t)	Au (kg)	Comments
2011 drilling	58.25	0.306	17 836	Drilling done in 2011 (End April 2011)
2011	1.44	0.308	443	From May till December 2011
2012	2.01	0.314	631	
2013	2.62	0.302	791	
2014	2.85	0.310	884	
2015	2.03	0.270	548	
2016	1.80	0.212	382	
	0.08	0.750	62	3 Month Outlook vs Actual adjustment
Total	**71.08**	**0.304**	**21 579**	

Moab MOD

AGA did not supply any data to support the Moab MOD grades and tonnages stated in the December 2016 CPR and therefore SRK was unable to verify/validate the figures that have been reported. The grades of the waste dumps are assumed from previous production history, and may be materially different from that reported. The classification should remain Inferred until processed and the grades are confirmed.

4.3 Reasonable and Realistic Prospects for Eventual Economic Extraction

[SR4.2 (i) (ii) (iii)]

4.3.1 Mineral Resource Parameters

The SAMREC Code (2016) defines a Mineral Resource as:

"A 'Mineral Resource' is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling."

The "reasonable prospects for eventual economic extraction" requirement generally implies that the quantity and grade estimates meet certain economic thresholds and that the Mineral Resources are reported at an appropriate cut-off grade that takes into account extraction scenarios and processing recoveries. In order to meet this requirement, SRK considers that major portions of the GN Mine, MK Mine and Zaaiplaats Project are amenable for underground extraction. To assess the "reasonable prospects for economic extraction" from an underground mine, an economic cut-off value is applied to the reported Mineral Resources. The primary parameters assumed by AGA for the calculation of the cut-off are summarised in Table 4.12.

Table 4.12: Mineral Resource Calculation Parameters for the Underground Operations

Parameter	Unit	Value
Au price	ZAR/kg Au metal	663 819
U_3O_8 Price	USD/lb	42.0
Exchange rate	USD/ZAR	14.75
Mining costs (Au Only)	ZAR per tonne milled	1 832
Total operating cost (Mining, Processing (Au and U_3O_8))	ZAR per tonne Milled	3 059
Average Channel Width	cm	93
Mining dilution	percent	32 – 63 %
U_3O_8 Mining recoveries	percent	70 %
Au Process recovery	percent	96 %
Cut-off (Au)	cm.g/t	700
Cut-off (Au)	g/t	4.85

4.3.2 Moab Khotsong and Great Noligwa Underground Mineral Resources

AGA reports that the Mineral Resources are classified and reported according to the SAMREC Code guidelines. The classification is initially informed by the geostatistical results, and the modified according to the geological confidence.

The Simple Kriged 30 m x 30 m blocks, which have been constrained using the equivalent Ordinary Kriged slope of regression (block with a Slope of regression above 0.6 are retained) are classified as Measured Mineral Resources. For the definition of Indicated and Inferred categories, the 95 % confidence limits on the log space metal accumulation value is calculated. The ratio of the 95 % lower limit value to the estimated value (in real space) expressed as a percentage is the Lower Limit percentage confidence. Blocks with a Lower Limit percentage confidence of greater than 20 % are classified as Indicated Mineral Resources, and blocks with a Lower Limit percentage confidence between 0 % and 20 % are classified as Inferred.

At GN Mine, and to a lesser degree at MK Mine, blocks which are currently not available to be mined, either due to geotechnical constraints, or if the technical ability to mine the pillars has not been demonstrated through a full investigation, these blocks are excluded from the Mineral Resources, and kept in a mineralised inventory.

For each area, the Competent Person will then asses the confidence in the geological model, structural interpretation, and facies interpretation, and on this basis, then modify the initial classification. AGA indicates that the changes in classification due to geological aspects are typically downgrades in the confidence classification. The AGA Mineral Resource classification for the V Reef is illustrated in Figure 4.9. Note that the interpreted boundaries of the reef blocks in the Zaaiplaats Project are inherently uncertain due to the limited drilling available to pinpoint the boundaries, which ash resulted in downgrades of strips along the boundaries to Inferred Mineral Resources. The classification of the Zaaiplaats Project Mineral Resources in the Indicated category is based on the relative confidence in the facies interpretation, and the grade continuity experiences within the well informed estimation domains to the north of Zaaiplaats. Without the dense chip sampling information to allow confident calculation of the domain mean values, and extrapolation of the grade trends, SRK considers it likely that the blocks would be classified in the Inferred category.

SRK is of the opinion that the AGA classification approach is reasonable, and is compliant with the SAMREC (2016) guidelines, taking sufficient cognisance of both the geological and geostatistical uncertainties. The extensive mining history of the deposit, and the good continuity of the orebody over several kilometres, supports the longer range extrapolation and confidence classification.

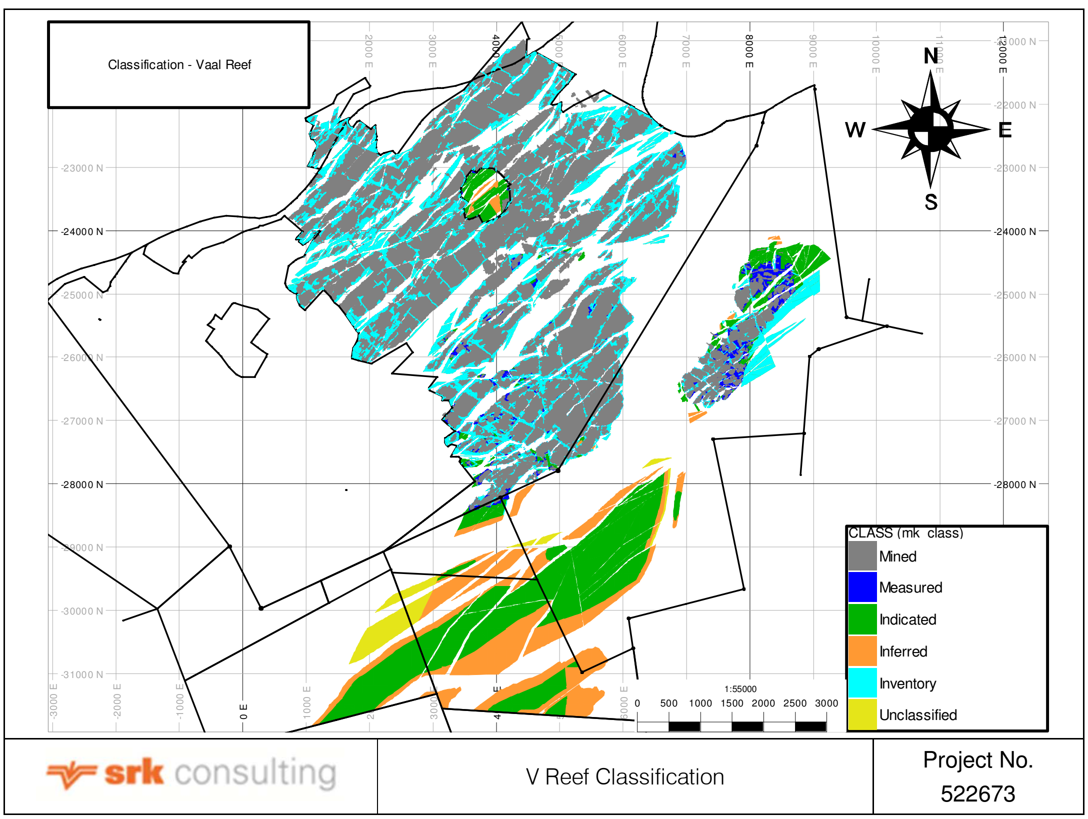


Figure 4.9: AGA Classification of the V Reef

4.4 Classification Criteria

[SR4.4 (i)]

4.5 Reporting

[SR4.5 (ii), (iv) (v) (vii)] [SV1.9]

The Mineral Resources are reported according to the guidelines of the SAMREC Code (2016), inclusive of any Mineral Reserves that are derived from them.

4.5.1 Mineral Resources Statement for Underground Resources

AGA report the underground Mineral Resources above a mining width (175 cm at GN Mine, 172 cm at MK Mine and 136 cm at Zaaiplaats Project).

SRK has not been supplied with the details of the U_3O_8 Mineral Resource estimate, and has not reviewed it. The U_3O_8 Mineral Resources are reported as a by-product, and all blocks above the Au cut-off are reported as Mineral Resources, regardless of their U_3O_8 grade. The classification of the U_3O_8 Mineral Resources is inherited from the Au classification, except that the Measured Mineral Resources for Au are downgrades to Indicated U_3O_8 Mineral Resources.

The Mineral Resources are reported after the application of geological loss factors detailed in Table 4.13.

Table 4.13: Geological discounts applied to the Mineral Resources for reporting

Classification	MK Mine [2]	GN Mine V Reef [3]	GN Mine C Reef
Measured	2 %	0 %	6 %
Indicated [1]	3 % - 18 %	6.3 % - 21.3 %	13.7 % - 28.7 %
Inferred	30 %	33.7 %	33.7 %

Notes:
[1] AGA subdivide their Indicated Mineral Resources into three sub-classes for their internal reporting. Each of these sub classed is assigned a different geological loss, hence the ranges listed;
[2] The same losses are applied to the V Reef, C Reef and Zaaiplaats; and
[3] GN Mine is predominantly mining pillars, where the geological losses are assumed to be adequately defined in the Measured Mineral Resource blocks.

The Mineral Resource tabulations are based on the 31 December 2016 declaration by AGA, but have been depleted to the effective date. The depletion is based on the actual production result up till 30 September 2017, and planned production from October 2017 to December 2017. The Mineral Resources have been depleted for planned and actual production from stopes and reef development. The Mineral Resources are reported in Table 4.14 and Table 4.15 for Au and U_3O_8 respectively.

Table 4.14: MK, GN Mine and Zaaiplaats Project Mineral Resource Statement for Au effective as at 1 January 2018

Operation	Reef type and area	Category	Quantity (Mt)	Au Grade (g/t)	Contained Au (Moz)
Zaaiplaats	V Reef	Measured	-	-	-
		Indicated	8.96	24.83	7.15
		Inferred	3.32	34.47	3.68
MK	V Reef	Measured	2.16	20.06	1.39
		Indicated	4.68	19.46	2.93
		Inferred	0.79	16.83	0.43
GN	V Reef	Measured	0.86	16.42	0.45
		Indicated	1.39	15.35	0.69
		Inferred	0.24	14.31	0.11
GN	C Reef	Measured	0.01	7.50	0.00
		Indicated	0.29	16.51	0.15
		Inferred	0.16	17.49	0.09
Total Underground		**Measured**	**3.03**	**18.97**	**1.85**
		Indicated	**15.33**	**22.17**	**10.93**
		Inferred	**4.51**	**29.71**	**4.31**

Notes:
[1] Mineral Resources are reported inclusive of any Mineral Reserves derived from them;
[2] A Mineral Resource is not a Mineral Reserve, and there is no guarantee that all or part of it will be converted to a Mineral Reserve;
[3] All figures are rounded to reflect the relative accuracy of the estimate;
[4] Mineral Resources are reported above a Au cut-off grade of 700 cm.g/t, which is derived using a Au price of USD1 447 per oz of Au, and exchange rate of USD/ZAR 14.75, and Au recoveries of 96 percent;
[5] The Mineral Resources at Zaaiplaats Project are currently below infrastructure; and
[6] 1 troy oz = 31.103486g.

Table 4.15: MK, GN Mine and Zaaiplaats Project Mineral Resource Statement for U_3O_8 effective as at 1 January 2018

Operation	Category	Quantity (Mt)	U_3O_8 Grade (kg/t)	Contained U_3O_8 (M Lb)
		Underground Operations		
	Measured	-	-	-
Zaaiplaats V Reef	Indicated	15.08	0.85	28.28
	Inferred	8.16	0.81	14.58
	Measured	-	-	-
MK Mine V Reef	Indicated	6.84	0.81	12.25
	Inferred	0.79	0.89	1.56
	Measured	-	-	-
GN Mine V Reef	Indicated	2.25	0.54	2.67
	Inferred	0.24	0.51	0.27
	Measured	-	-	-
GN Mine C Reef	Indicated	0.31	0.61	0.41
	Inferred	0.16	0.68	0.23
	Measured	**-**	**-**	**-**
Total Underground	**Indicated**	**24.48**	**0.81**	**43.61**
	Inferred	**9.35**	**0.81**	**16.61**

Notes:
[1] Mineral Resources are reported inclusive of any Mineral Reserves derived from them. A Mineral Resource is not a Mineral Reserve, and there is no guarantee that all or part of it will be converted to a Mineral Reserve;
[2] All figures are rounded to reflect the relative accuracy of the estimate;
[3] The Mineral Resources are reported above the Au cut-off regardless of the U_3O_8 grade as U_3O_8 is reported as a by-product; and
[4] The Mineral Resources at Zaaiplaats Project are currently below infrastructure.

4.5.2 Mineral Resources Statement for Surface Sources

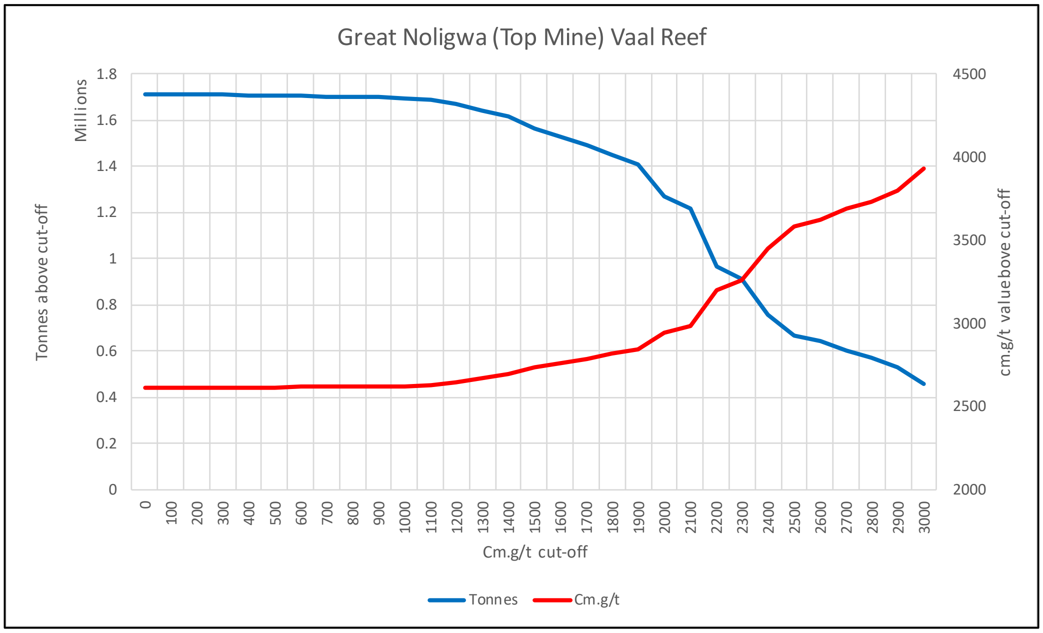
The GN MOD, RWD and Mispah 2 have no declared Mineral Resources stated during the period which is currently under review. See Table 4.16 below.

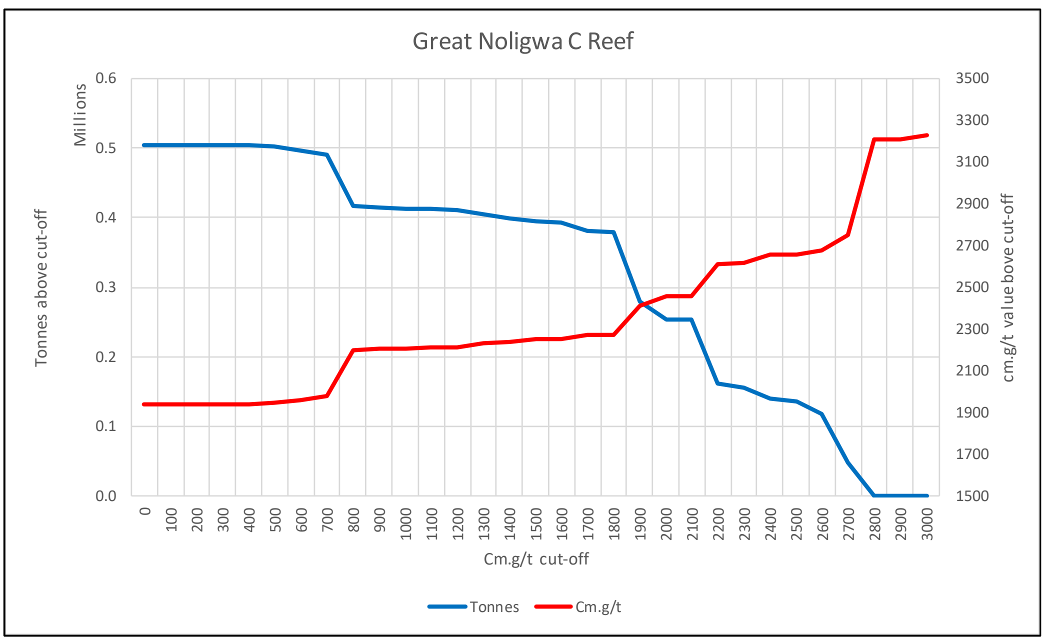
Table 4.16: Mineral Resource for Surface Operations as at 31 December 2016

Operation	Category	Quantity (Mt)	Au Grade (g/t)	U_3O_8 Grade (kg/t)	Contained Au (Moz)	Contained U_3O_8 (M Lb)
			Surface Operations			
Mispah 1	Indicated	73.15	0.30	0.12	0.71	19.35
KPD	Indicated	10.98	0.20	0.13	0.07	3.15
Moab MOD	Inferred	7.35	0.37	-	0.09	-
Total Surface Operations		**91.49**	**0.29**	**0.13**	**0.87**	**22.50**

4.5.3 GN, MK, Mine and Zaaiplaats Project Grade Tonnage Curves

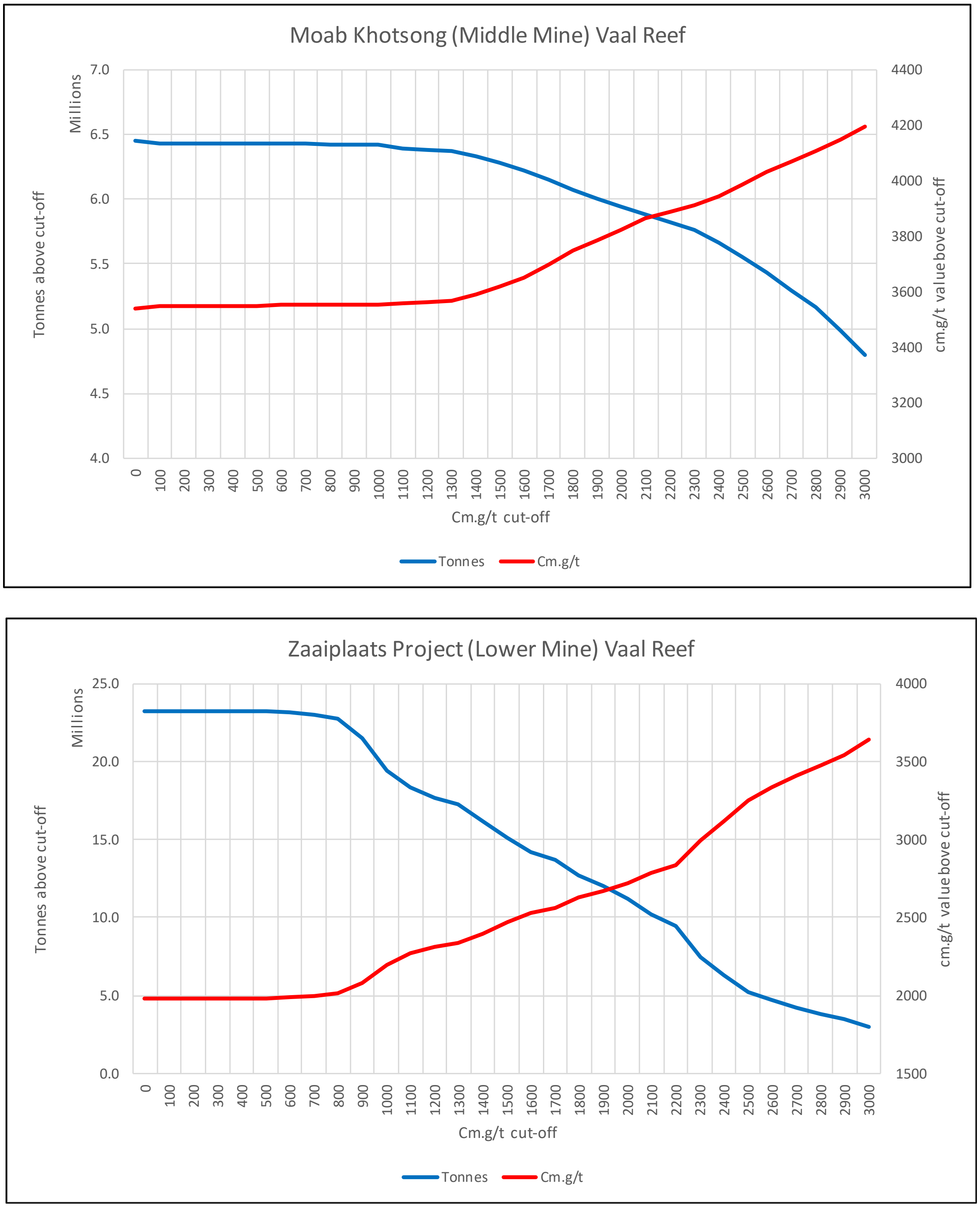
The Mineral Resources at GN Mine, MK Mine and Zaaiplaats Project are sensitive to the selection of the reporting cut-off grade at higher cut-off values, but relatively insensitive below the current reporting cut-off value. The C Reef Mineral Resources are sensitive to the reporting cut-off grade. To illustrate this sensitivity, the global model quantities and grade estimates for each mine are illustrated in Figure 4.10 and Figure 4.11 at different cut-off grades. The reader is cautioned that the figures presented in this table should not be misconstrued with a Mineral Resource Statement. The figures are only presented to show the sensitivity of the block model estimates to the selection of cut-off grade.





srk consulting	Grade tonnage Curves	Project No. 522673

Figure 4.10: Grade Tonnage Curves for GN (Top Mine) V Reef and C Reef



srk consulting	Grade tonnage Curves	Project No. 522673

Figure 4.11: Grade Tonnage Curves for MK (Middle Mine) and Zaaiplaats Project (Lower Mine) V Reef

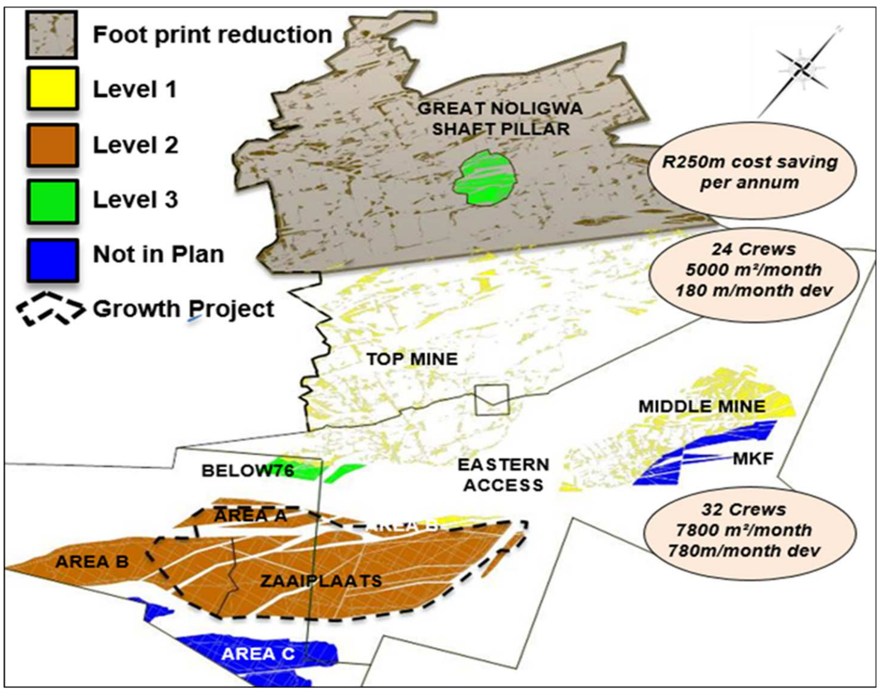
5 Mining and Mineral Reserves

[SR5.1 (i) (ii)] [SV1.9, SV1.10]

5.1.1 Moab Khotsong and the Great Noligwa Shafts

MK, AGA's newest South African mine, is located in the Free State and has a single shaft system mining to a depth of 3 100 m. Given the geological complexity of the V Reef, the mine's principal reef, scattered mining is employed.

The tabular nature, along with the depth and structural complexity of the orebody dictates the mining method utilised at MK Mine. Mining at MK Mine is based on a scattered mining method together with an integrated backfill support system that incorporates bracket pillars. The economic reef horizons are exploited between 1 791 m and 3 052 m below surface. The reef horizon is holed though on 68 level to GN Mine but no air is returned to GN Mine from the Top Mine workings. A schematic layout of MK Mine is provided in Figure 5.1.



srk consulting	A schematic layout of the MK Mine	Project No. 522673

Figure 5.1: A schematic layout of the MK Mine

The Top Mine is accessed by three production levels with limited development being done and with mainly scattered stoping and vamping operations taking place. Currently the Top Mine comprises mostly of scattered pillar mining with a big percentage down-dip panels and very few sequential grid panels. The Middle Mine is accessed by three main levels from the shaft as well as three inter levels. All work in the Lower Mine section has been halted except for the Eastern Access development.

5.1.2 Mine Infrastructure, Access and Mining Method

[SR5.2 (i) (v)]

The tabular nature, along with the depth and structural complexity of the orebody dictates the mining method utilised at MK Mine.

MK Mine exploits the V Reef to the east and south east of GN and Kopanang Mines on the down throw side of the Die Hoek /Jersey Fault complex. The “Top Mine” area operates as a main shaft system with three main production levels, 70 Level, 73 Level, and 76 Level. The “Middle Mine” Level 1 project operates as a main shaft system and a sub rock vent shaft system with three main production levels, 85 Level, 95 Level and 101 Level and three inter levels 88 Level, 92 Level and 98 Level.

The mining method applied at the MK Mine is scattered conventional utilizing backfill support. The 50 meter rule is applied at all times. Double-sided mining does take place but there is no “simultaneous double sided” mining i.e. panels opposite each other (east-west across a raise line) cannot be mined simultaneously. The panel length is 25 m mainly due to the dip of the reef. Cross-cuts are spaced 200 m apart, but are dependent on the geological structure and in some places additional development is required to open up IBGs.

The declared Mineral Reserves for MK Mine are based on a comprehensive LoM plan as presented Figure 5.2. The LoM plan produces Au as the main mineral while U_3O_8 is produced as a by-product. The waste is currently hoisted with reef at the MK Mine operation.

SRK comments

- The scattered conventional mining method is proven and SRK believes it is suitable for the characteristics of the orebodies found at the MK Mine. The method has been practised at the mine since it was commissioned in 2003 and the operations crews are experienced in the method; and
- The mining is taking place at the extremities of the mine. The effective shift time for the production crews is low due to the time it takes to reach the workings. The traveling time to the workings is about three hours for the farthest stopes.

5.2 Life of Mine Plan and Mineral Reserve

[SR5.1 (ii)]

The declared Mineral Reserves have been estimated by AGA. The Mineral Reserve estimates are based on the AGA approach to the conversion of Mineral Resources to Mineral Reserves. The LoM plan is based on Mineral Resources sourced from the MK mining areas and the remnant pillars referred to as IBGs. The MK LoM plan has a duration of five years and ends in 2022.

5.2.1 Life of Mine Planning Process

[SR5.1 (i) (ii)] [SR5.2 (i) (ii)]

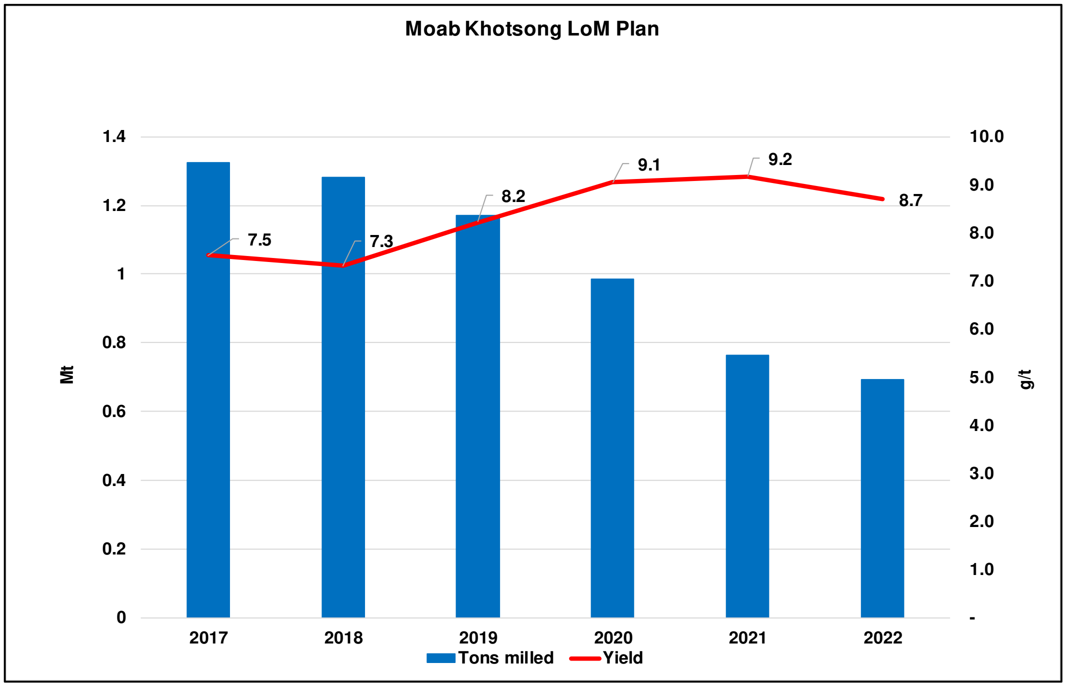
The LoM plan is based on the tonnage allocated from the MK and GN Mine Mineral Resources. The LoM plan is carried out in CADsMine ® which is a mine design, planning and scheduling software package. Planning briefs are issued for any planning cycle. Area C is not included in the LoM plan as it is not viable under the current economic climate.

The LoM plan produces Au as the main mineral while U_3O_8 is produced as a by-product.

5.2.2 Mineral Reserve Modifying Factors

[SR5.2 (ii) (iv)]

Historical performance was used in the determination of the modifying factors used in the estimation of the Mineral Reserves. There are Inferred Mineral Resources included in the production schedule for practical purposes. These Inferred Mineral Resources have, however, not been included in the valuation. The declared Mineral Reserves for MK Mine are based on a comprehensive LoM plan which is presented in Figure 5.2. Au is the main mineral while U_3O_8 is produced as a by-product. The development waste is currently hoisted with reef at the MK Mine operation.



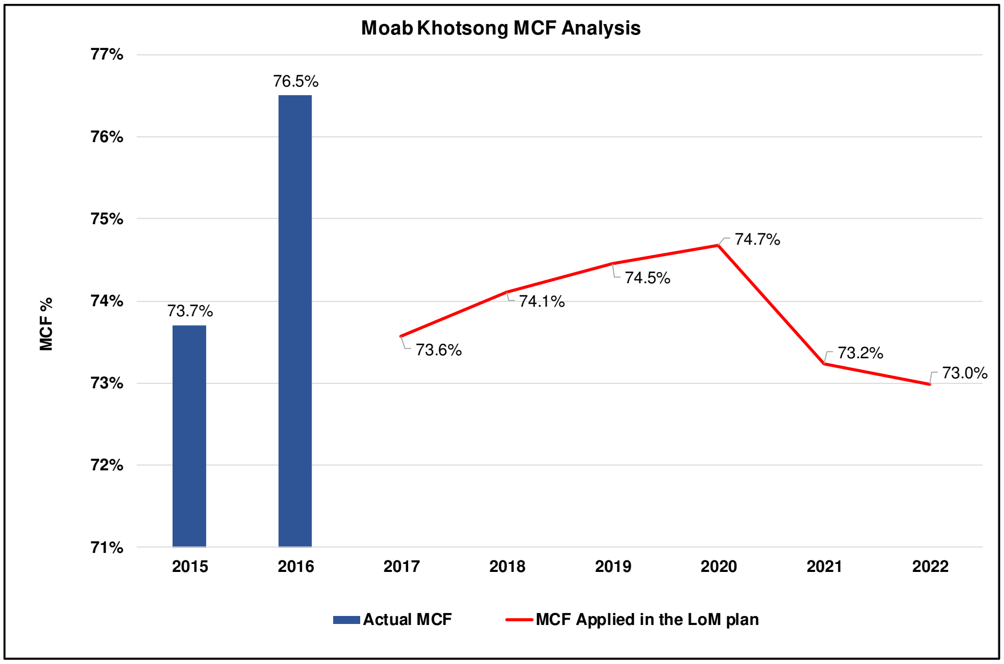
srk consulting	MK LoM Plan	Project No. 522673

Figure 5.2: MK LoM Plan

The production and team efficiencies applied in the LoM plan correlate with those realised in the past. The efficiencies applied in the LoM plan are based on the historical performance statistics including the Section 54 stoppages.

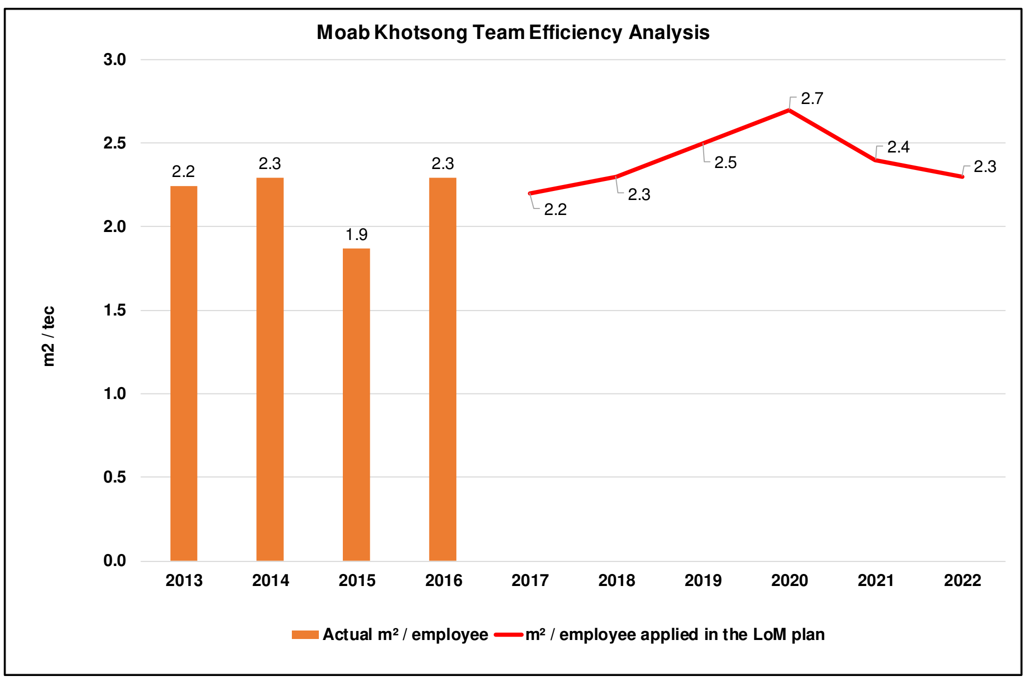
Moab Khotsong Modifying factors

The declared Mineral Reserves for MK Mine are based on an elaborate and comprehensive LoM plan, the plan is provided in Figure 5.2. The historical and applied MCF and modifying factors applied in the MK Mine plan are provided in Figure 5.3 and Table 5.1. The MCF is respectively applied for each facies being mined in each period and takes cognisance of the mining conditions. The average stoping width applied over the LoM is 183 cm. The LoM plan is based on crew efficiencies which correlates with the productivity performance of the crews realized in the past. An analysis of the crew efficiencies from 2013 to the end of the LoM is provided in Figure 5.4. The crew efficiencies applied in the LoM takes the production delays, the travelling time to the working places and Section 54 stoppages imposed by the Department of Mineral Resources (DMR) into account.



srk consulting	MK LoM Plan	Project No. 522673

Figure 5.3: MK Mine MCF applied in the LoM plan



srk consulting	MK Mine stoping crew efficiency	Project No. 522673

Figure 5.4: MK Mine stoping crew efficiency

Table 5.1: MK Mine Mineral Reserve modifying factors applied in the LoM plan

MK	Au price	Au Cut-off grade	Au Cut-off value	Stoping width	Dilution	MCF	Metallurgical Recovery Factor
	ZAR/kg	(g/t)	(cm.g/t)	(cm)	(%)	(%)	(%)
V Reef – Middle Mine	530 000	4.07	700	172.0	62.7	77.9	96.1
V Reef – Top Mine	530 000	4.09	700	171.0	54.3	77.8	96.4
V Reef – GN	530 000	4.55	700	154.0	38.2	61.4	96.2
C Reef – GN	530 000	5.83	700	120.0	53.9	61.9	95.6

SRK comments

- LoM planning is carried out with adequate Due Diligence (DD) at the mine. Apart from the rigorous internal review processes. AGA uses external independent consultants to review the short-term and LoM plans. This review exercise is conducted annually. SRK supports this initiative as it provides an independent view on the planning process and highlights potential risk factors that can impact its achievability. This external review reduces uncertainty in the declared Mineral Reserve estimates;
- The production and team efficiencies applied in the LoM plan correlates with those realised in the past. The efficiencies applied in the LoM however includes all the delays realised in the historical performance statistics. The actual figures includes the Section 54 stoppages imposed by the DMR on the shaft;
- The developed Mineral Reserves from 2018 to 2022 averages 27 months. This is higher than the industry standard of developed Mineral Reserves of 24 months. In 2022, the developed Mineral Reserves reduces to 20 months;
- No material changes were observed in the modifying factors from 2016 to the Effective Date of 1 January 2018; and
- SRK is of the view that the LoM plan is realistic and achievable. The plan is based on sound technical and economic parameters gleaned from historical operational performance. No significant risk factors to its achievability were identified.

5.2.3 Mineral Reserve for Moab Khotsong

The Mineral Reserves are fully included within the Measured and Indicated Mineral Resources, and are not in addition to them. The Mineral Reserve statement for the MK Mine operation is based on the SAMREC Code. The Mineral Reserves as at 1 January 2018 for Au and U_3O_8 are provided in Table 5.2 and Table 5.3.

SRK however found inconsistencies with the code in the declaration of the U_3O_8 Mineral Reserves. The 2016 declared U_3O_8 Reserve did not correlate with the published Resource categories. The U_3O_8 Mineral Reserves have been declared under the probable category to align with the Resource categories.

The Mineral Reserves are based on the 31 December 2016 declaration by AGA. They have been depleted up until 30 September 2017 and forecasted to December 2017.

Table 5.2: MK Mine Mineral Reserve statement for Au as at 1 January 2018

Operation	Reef type and area	Category	Tonnes (Mt)	Grade (g/t)	Content (Moz)
MK	V Reef - Middle mine	Proved	1.10	9.92	0.35
		Probable	2.10	9.87	0.67
		Total	**3.21**	**9.88**	**1.02**
	V Reef - Top mine	Proved	0.14	7.09	0.03
		Probable	0.20	6.12	0.04
		Total	**0.35**	**6.35**	**0.07**
GN	V Reef	Proved	0.77	6.69	0.17
		Probable	0.23	6.02	0.04
		Total	**1.01**	**6.47**	**0.21**
	C Reef	Proved			
		Probable	0.31	6.01	0.07
		Total	**0.31**	**6.33**	**0.07**
Total MK and GN Mines		**Proved**	**2.02**	**8.47**	**0.55**
		Probable	**2.84**	**8.87**	**0.82**
		Total	**4.86**	**8.71**	**1.37**

Notes:
The modifying factors applied in the LoM plan are as follows:
[1] The average stoping width applied over the LoM is 183 cm and the channel width 93 cm;
[2] The applied MCF is 73.95% and the overall dilution 54%;
[3] Exchange rate is ZAR14.99/USD; and
[4] The pay limit@ level 4 costing on a real basis is 14.4 g/t.

Table 5.3: MK Mine Mineral Reserve estimate for U_3O_8 as at 1 January 2018

Category	Tonnes (Mt)	Grade (kg/t)	U_3O_8 Content (M Lb)
Probable	4.48	0.31	0.63

Notes:
[1] The following parameters have been applied for the U_3O_8 estimates;
[2] The recovery is 70%; and
[3] MCF of 100%

Pre-Feasibility Studies (PFS) have been completed for the Zaaiplaats Project, the latest of which was 2017.

The Zaaiplaats Project is not included in the Mineral Reserve in this CPR as the project was not NPV positive at the applied real discount rate of 7.5%.

The GN Shaft pillar is excluded from the Mineral Reserves as it is at a concept level of study and has not been studied to the level of a PFS. The estimated Au content included in the Mineral Resources in the GN Shaft pillar is approximately 0.39 Moz. The shaft barrel at MK Mine has to be available for pumping until the end of the LoM.

SRK comments

- The scattered conventional mining with backfill support is proven and SRK believe it is suitable for the characteristics of the orebodies at the MK Mine. The operational crews are experienced in the method;
- The mine planning process at MK LoM is conducted with diligence and sound modifying factors are applied to convert the Mineral Resources to Mineral Reserves. The modifying

factors are reasonable and take cognisance of past performance. SRK is of the view that the LoM plan is realistic and achievable. No significant risk factors were identified; and

- SRK believes the methodology applied to convert the Mineral Resources to Mineral Reserves meets the requirements of the SAMREC Code.

5.2.4 Operating costs

Moab Khotsong

The historical and projected operating costs on an All in Sustaining Cost (AiSC) basis for the MK Mine operation are provided in Table 5.5. The AiSC includes production costs plus all costs relating to sustaining current production. Project capital expenditure is excluded from these costs. Costing at MK Mine is done on a zero based approach where the business plan is resourced to deliver on the set targets. The MK Mine allocated cost (in nominal terms) is provided in Table 5.4.

The allocated costs are shared between the AGA assets within the region and allocated to the mine according to the produced tonnage.

Table 5.4: MK Mine allocated cost (nominal) history and projection from 2017 to 2022 in ZAR million

Cost centre	2014	2015	2016	2017	2018	2019	2020	2021	2022
Medical	13.98	1.25	-0.25	3.28	3.63	4.00	4.02	4.20	4.65
Industry Charges	86.10	91.32	88.82	98.22	107.95	114.88	119.42	119.41	138.11
Metallurgy	154.20	179.74	197.73	210.85	265.30	282.30	296.18	417.21	409.84
Workshops	4.62	3.17	2.68	6.70	2.50	2.56	2.64	2.55	4.60
Regional Services	252.41	319.71	379.25	400.49	356.08	388.33	416.64	407.03	471.79
Accommodation	90.69	76.87	84.59	86.32	87.30	98.25	84.95	71.46	70.91
Engineering Services	32.89	32.20	32.31	37.90	36.52	38.86	43.81	47.57	52.33
Sustainable Development	43.80	23.23	21.85	39.20	40.73	43.88	47.83	59.10	57.80
Training									
Boring	14.05								
Corporate Overheads	3.75	9.07	13.91	15.60	19.18	20.90	20.57	17.10	15.65
Overheads	5.83	3.06	0.11						
Total Nett Revenue By Products	-94.89	-88.87	25.41	23.45	21.69	18.29	6.65	20.11	131.49
Au in Process Movement	35.79	-9.29	15.85	-5.37	-9.66	-13.38	26.03	29.65	29.20
Total Non Cash Taxes	94.57	62.69	81.83	120.27	157.04	215.37	141.27	89.71	99.82
Rehabilitation and Other Non Cash Costs	58.76	106.87	-6.74	77.79	75.20	81.19	80.02	71.58	80.23
Current Rehabilitation	35.23	79.32	-42.16	37.62	37.43	40.54	40.55	33.99	33.06
Other Non Cash Costs	23.53	27.55	35.43	40.16	37.77	40.66	39.47	37.58	47.17
Retrenchment Cost	48.63	31.67	46.38	26.59		11.11	64.14	40.30	29.88
Total	**903.94**	**949.56**	**976.98**	**1 219.08**	**1 238.68**	**1 387.75**	**1 434.20**	**1 468.56**	**1 676.53**

Table 5.5: MK Mine historical and projects operating costs from 2014 to 2022

Cost element	Units	2014	2015	2016	2017	2018	2019	2020	2021	2022
Tonnes milled	Tonnes	658 940	927 380	963 005	927 380	1 281 967	1 170 504	985 358	762 989	694 272
Kg produced	Kilograms	7 276	7 885	8 717	9 986	9 381	9 626	8 922	6 998	6 046
Total Salary and Wages	**ZAR/tonne**	**2 032**	**1 191**	**1 237**	**1 337**	**1 011**	**1 151**	**1 325**	**1 637**	**1 723**
Total Labour	ZAR/tonne									
Total Management Labour	ZAR/tonne	146	78	63	87	77	103	127	199	225
Total Official Labour	ZAR/tonne	296	184	182	207	158	179	216	265	284
Total Union Men Labour	ZAR/tonne	310	199	205	210	158	179	211	223	231
Total Workmen Labour	ZAR/tonne	1185	730	787	834	619	690	772	950	983
Contractors Labour	ZAR/tonne	95	0	0	0	0	0	0	0	0
Total Consumables	**ZAR/tonne**	**866**	**705**	**749**	**841**	**654**	**789**	**987**	**1329**	**1498**
Explosives and Accessories	ZAR/tonne	31	15	15	20	15	18	23	27	29
Support and Construction Materials	ZAR/tonne	19	95	96	101	75	88	111	131	141
Steel	ZAR/tonne	13	13	16	21	16	18	23	27	29
Other Consumables	ZAR/tonne	186	122	142	157	119	141	164	273	307
Other Consumable Adjustments	ZAR/tonne	-1		-1						
Fuel and Lubricants	ZAR/tonne	5	3	3	2	2	2	2	2	2
Total Power	ZAR/tonne	592	442	462	522	413	506	647	851	972
Total Water	ZAR/tonne	20	13	14	17	14	16	16	17	19
Total Services	**ZAR/tonne**	**325**	**180**	**198**	**140**	**166**	**190**	**186**	**211**	**238**
Total Contractors	**ZAR/tonne**	**93**	**64**	**68**	**79**	**60**	**67**	**76**	**99**	**110**
Contractor Labour	**ZAR/tonne**	**89**	**58**	**45**	**41**	**31**	**35**	**40**	**57**	**65**
Contractor Services	**ZAR/tonne**	**4**	**6**	**23**	**38**	**29**	**32**	**36**	**42**	**46**
Total General Services	**ZAR/tonne**	**232**	**115**	**130**	**62**	**106**	**123**	**110**	**112**	**128**
Compressed Air	ZAR/tonne	15	8	10	10	7	9	10	9	16
Total Credits	**ZAR/tonne**	**-562**	**-62**	**-67**	**-68**	**-53**	**-54**	**-21**	**-60**	**-65**
Work order Settlement	**ZAR/tonne**	**228**								
Medical	**ZAR/tonne**	**21**	**1**	**0**	**4**	**3**	**3**	**4**	**6**	**7**
Industry Charges	**ZAR/tonne**	**131**	**98**	**92**	**106**	**84**	**98**	**121**	**157**	**199**
Metallurgy	**ZAR/tonne**	**234**	**194**	**205**	**227**	**207**	**241**	**301**	**547**	**590**
Workshops	**ZAR/tonne**	**7**	**3**	**3**	**7**	**2**	**2**	**3**	**3**	**7**
Regional Services	**ZAR/tonne**	**383**	**345**	**394**	**432**	**278**	**332**	**423**	**533**	**680**
Regional Services	ZAR/tonne	236	182	187	209	113	155	201	310	404
Regional Costs Secondary Allocation	ZAR/tonne	0	0	0	0	0	0	0	0	0

Cost element	Units	2014	2015	2016	2017	2018	2019	2020	2021	2022
Community Training Secondary Allocation	ZAR/tonne	0	0	0	0	0	0	0	0	0
Community Training	ZAR/tonne	70	56	48	67	50	55	70	126	156
K & IT Corporate SAP	ZAR/tonne	78	57	49	75	58	55	64	98	120
District Costs	ZAR/tonne	0	50	109	81	56	66	88	0	0
Accommodation	**ZAR/tonne**	**138**	**83**	**88**	**93**	**68**	**84**	**86**	**94**	**102**
Engineering Services	ZAR/tonne	50	35	34	41	28	33	44	62	75
Sustainable Development	ZAR/tonne	66	25	23	42	32	37	49	77	83
Training	ZAR/tonne	0	0	0	0	0	0	0	0	0
Boring	ZAR/tonne	21	0	0	0	0	0	0	0	0
Corporate Overheads	ZAR/tonne	6	10	14	17	15	18	21	22	23
Overheads	ZAR/tonne	9	3	0	0	0	0	0	0	0
Total Nett Revenue ByProducts	ZAR/tonne	-144	-96	26	25	17	16	7	26	189
Au in Process Movement	ZAR/tonne	54	-10	16	-6	-8	-11	26	39	42
Total Non Cash Taxes	ZAR/tonne	144	68	85	130	123	184	143	118	144
Rehabilitation and Other Non Cash Costs	ZAR/tonne	89	115	-7	84	59	69	81	94	116
Current Rehabilitation	ZAR/tonne	53	86	-44	41	29	35	41	45	48
Other Non Cash Costs	ZAR/tonne	36	30	37	43	29	35	40	49	68
Retrenchment Cost	ZAR/tonne	74	34	48	29	0	9	65	53	43
Amortization Tangible	ZAR/tonne	947	639	754	1 784	829	1 079	1 088	905	863
Inventories	ZAR/tonne	-4	3	-15	-2	1	-1	-1	-2	-3
All-In Costs History	**ZAR/tonne**	**4 995**	**3 553**	**3 768**	**4 187**	**3 183**	**3 623**	**4 082**	**5 095**	**5 813**
All-Sustaining Costs History	**ZAR/tonne**	**4 957**	**3 543**	**3 746**	**4 149**	**3 178**	**3 617**	**4 082**	**5 095**	**5 813**
Total cash costs ZAR/kg Nominal	ZAR/kg	27 2046	326 118	342 232	311 082	356 241	371 139	406 015	497 918	580 904
Total cash costs USD/oz Nominal	USD/oz	782	798	729	656	727	733	777	917	1 030
All-in Sustaining costs excl inventory write downs ZAR/kg Nominal	R/kg	339 397	417 285	415 125	382 363	429 948	431 101	445 982	527 351	608 295
All-in Sustaining costs excl inventory write downs USD/oz Nominal	USD/oz	974	1 018	884	806	877	851	854	971	1 078
All-in Costs ZAR/kg Nominal	ZAR/kg	340 774	420 062	417 792	384 867	429 948	431 101	445 982	527 351	608 295
All-in Costs USD/oz Nominal	USD/oz	979	1 025	890	812	877	851	854	971	1 078
Total cash costs ZAR/kg Real	ZAR/kg	328 252	372 639	366 612	311 082	356 241	349 307	360 502	417 078	459 048
Total cash costs USD/oz Real	USD/oz	829	828	741	656	727	720	749	866	953
All-in Sustaining costs excl inventory write downs ZAR/kg Real	ZAR/kg	409 518	476 812	444 697	382 363	429 948	405 742	395 989	441 732	480 693

Cost element	Units	2014	2015	2016	2017	2018	2019	2020	2021	2022
All-in Sustaining costs excl inventory write downs USD/oz Real	USD/oz	1031	1057	899	806	877	837	823	918	998
All-in Costs ZAR/kg Real	ZAR/kg	411 179	479 985	447 554	384 867	429 948	405 742	395 989	441 732	480 693
All-in Costs USD/oz Real	USD/oz	1 037	1 064	905	812	877	837	823	918	998

Margaret Water Company

The operating costs for the MWC are provided in Table 5.6. The costs are shared equally between Harmony Gold, Village Main Reef and AGA gold mining companies. AGA is currently one third shareholder in the MWC which operates the Margaret Shaft dewatering system for the KOSH area. AGA has expressed an intension to dispose of this shareholding as part of the sale. Currently, each 1/3 share incurs costs totalling in the region of ZAR13 million pa in operational costs and ZAR3.3 million pa in capital cost for the MWC. This assumes that the current revenue of ZAR32.4 million in this year is maintained. These costs are based on the current budgeted dewatering rate at MWC of 24.4 Ml/day, which is considerably lower than the 50 Ml/day predicted on closure. The average cost of pumping for the 2016/2017 financial year, excluding capital expenditure, is ZAR 8.03 /kl.

Table 5.6: Historical Operating costs for the Margaret Water Company

Cost element	2012 (ZAR)	2013 (ZAR)	2014 (ZAR)	2015 (ZAR)	2016 (ZAR)
Administration and management fees			-329		
Administration	255 408				
Auditors and remuneration	101 345	113 974	118 057	154 128	152 294
Bad debts	167 052				
Bank charges	11 773	17 226	15 857	17 339	16 674
Consulting and professional fees	127 257	90 355	96 937		
Consumable	898 014	697 778	596 827	781 193	695 824
Depreciation, amortization and impairments	3 957 454	6 904 240	8 843 927	9 179 708	5 013 398
Employee costs	13 772 159	14 310 051	15 600 753	16 798 690	18 010 602
Repairs and maintenance				2 322 781	1 509 653
Safety, health, environment and quality (SHEQ)				1 010 716	1 135 066
Entertainment	15 455	8 218	5 863		
It expenses	111 038	325 751	374 580		
Insurance	412 355	254 518	257 227	276 992	328 000
Legal expenses	350 402	11 273	4 542		
Outsourced services	1 769 362	1 901 397	2 241 313	3 078 731	3 261 598
Gifts				3 820	6 000
Loss and disposal of assets		25 244			
Postage	827	2 067	1 415	919	1 234
Software expenses				5 572	16 163
Printing and stationery	13 944	23 129	29 280		
Repairs and maintenance	3 026 821	2 254 310	2 398 429		
Security	592 674	766 334	957 823		
Staff welfare	44 510	62 350	55 000		
Subscriptions	15 210	40 689	13 802	14 131	12 443
Sundries	998	946	4 249		
Telephone and fax	93 246	68 126	64 634	37 985	32 762
Training	89 178	67 744	46 298	80 921	27 268
Travel - cost	2 720				
Utilities	41 779 579	39 802 959	35 681 028	36 375 209	35 186 216
Total (ZAR)	**67 608 781**	**67 748 679**	**67 407 512**	**70 138 835**	**65 405 195**

SRK comments

- The projected operating costs are based on the historically achieved actuals. The actual cost incurred for the six months for MK Mine as at June 2017 on an AiSC basis was USD998/oz. The actual cost incurred at December 2016 was USD890/oz. This is an increase of about 12% and largely as a result of the lower ounces produced and inflation related escalation;
- The MWC costs are included in the TEM as part of regional services costs incorporated within allocated costs; and
- SRK believes the costs applied in the LoM plan are reasonable.

5.2.5 Geotechnical Design and Considerations

[SR5.2 (vii) (viii)]

Review

The following information served as the basis for the review:

- MK Mine - COP005 - Combat Rockfall and Rockburst Accidents;
- GN Mine Shaft pillar - design outcomes (R2);
- MK Mine-16-025 (Rules of the Game);
- MK Mine-821 Rock Engineering Design for the GN Mine Shaft pillar extraction (2);
- MK Mine-2016-895 BP2017 BP Book 6 Rock Engineering; and
- RE_RES_GN Mine Structure Calibration_201009.

Top and Middle Mine

Code of Practice for Rockfalls and Rockbursts

The Code of Practice (CoP) to combat rock fall and rock burst accidents comprises an essential component of the rock engineering strategy for any South African mine. The MK Mine CoP became effective in August 2005 and was last revised in February 2016.

The subject matter contained within the document complies with the guideline issued by the DMR, last revised in 2002 (reference DME 16/3/2/1-A3).

Compliance to the CoP is monitored through a number of platforms, namely:

- Monthly scrutiny meetings attended by the Production Manager - Rock Engineering Manager; and
- Monthly planning meetings led by the Section Manager;

Generally, the progression of the meetings is as follows:

- The Rock Engineering Manager with his Senior Rock Engineering Officer (SREO) team prepare by reviewing the plans with the last month mining face positions plotted by survey and identifying deviations from the guidelines;
- The meeting begins with where the compliance is reviewed by the Rock Engineering Manager;
- Deviations are discussed and the Production Manager/Mine Manager has the opportunity to make a call on the corrective actions and give instructions to the Section Managers accordingly; and

- The Section Managers and SREOs ensure that these instructions/decisions are communicated at the monthly planning meeting to ensure implementation by the mining team.

This approach appears to be appropriate for this mining operation and appears to satisfactorily address both the rockfall and rockburst hazard.

Seismological setting of the mine

A seismic network is in operation at MK Mine to record events to a planned horizontal accuracy of within 25 to 50 m. A surface geophone station is in place. The largest event ever recorded at Top Mine was a local magnitude (mL) 5.5, which occurred in August 2014 and was located very deep in the footwall below a mined out area to the east of the mine. Little damage occurred in the underground workings. In 2005, a seismic event similar to the recent earthquake-type event occurred on the western boundary of Top Mine as part of a flurry of events. The other three seismic events had the following magnitudes, respectively; mL4.0, mL.8 and mL3.8. These events appeared to be located some 1 500 to 2 000 m beneath the mining areas.

In most cases of large events with a mL of more than 2, minimal to no damage occurs to the operational stopes; however, some damage has occurred to off reef-excavations. Face bursting is very rare and no trend has been found to indicate that face bursting is a significant hazard at the MK Mine.

Seismicity does not appear to be a major risk at MK Mine and this risk appears to be adequately contained by the mining strategies (discussed in the next paragraph) that have been put in place.

A review of the information regarding the seismic monitoring system at MK Mine indicates that the required seismic stations and infrastructure is in place to provide the seismic monitoring requirements as per the CoP.

Seismic risk associated with an increase in production

The seismic response rate has been found to be directly proportional to the mining rate. This relationship was determined in the West Wits area however, professional experience in Vaal River confirms the observation is relevant to the current review.

Furthermore, it implies that if there is an increase in production, the seismicity will increase in proportion to the production rate and there will not be an asymptotic increase in seismicity.

Mining strategies

Two mining methods are being used at MK Mine. The first method is the mining of IBGs created by earlier mining activities on the Top Mine and the second is a scattered mining method.

Mining Isolated Blocks of Ground

High localised field stresses exist in the majority of the IBGs. Where the IBGs are being extracted there are major structures; the Zuiping A, B and C faults. In addition to these structures, numerous small-scale faulting and sympathetic joints exist in this area. These IBGs are at times situated adjacent to the large geological structures. The mining strategy used for the extraction of the IBGs is driven by an optimised mining sequence designed to both minimise seismic emissions along the geological structures as well as to minimise the formation of high stress areas within the IBGs.

The hazards associated with these IBGs have been identified and the mining strategy used has significantly reduced the risk associated with these hazards, allowing a large number of these IBGs to be safely extracted.

Scattered mining

Scattered mining is used in the Middle Mine area, subsequently backfill is being placed in the Middle Mine area. Each individual area has a mining strategy and these mining strategies are comprehensive and provide viable strategic requirements for each of the mining areas.

Great Noligwa Shaft pillar

Mining of the GN Shaft pillar was included in the AGA MK Mine LoM. The following issues were considered in the pillar extraction plan:

- GN Shaft system is the emergency second outlet for MK Mine;
- Dewatering operations have to be maintained through the GN Shaft system;
- The existing compressed air feed from GN to MK Mines on 76 Level must be maintained;
- GN Mine assists MK Mine with ventilation; and
- GN Mine underground refrigeration plants may be required to provide cooled service water for shaft pillar extraction.

The mining strategy for the pillar is based on a design to protect the shaft barrel as follows:

- Partial extraction of the Shaft pillar has been planned. This is because several major geological structures, generating significant losses, exist within the Shaft pillar and therefore, complete extraction of the pillar is restricted. This is to ensure that both the shaft barrel and the major infrastructure that is required for the dewatering operations are protected;
- A numerical assessment of several options for partial extraction was carried out by AGA. This assessment identified the mineable areas, the support requirements of all critical excavations and infrastructure under changing stress conditions;
- A back-analysis was previously carried out where modelling of the seismic hazard on major structures on GN Mine was used to develop a calibrated modelling criterion. The calibrated modelling criterion was then used in a numerical assessment to understand the potential seismic hazard; and
- The results of the numerical modelling were used to design an optimised mining layout to ensure protection of the shaft barrel and other infrastructure. It must be noted that this design identified geological structures that would potentially be seismically active and as a result, would require that a 20 m bracket pillar be left on either side of the structures to reduce this risk. In addition to this, some of the essential infrastructure would be exposed to seismicity and this would require the installation of the appropriate support regime.

The appropriate numerical modelling methodology and the appropriate criteria were used. Furthermore, the process followed to determine the potential mining areas conforms to industry norms. The seismic hazard associated with the designed pillar extraction has been assessed in a reasonable fashion and the requirements appear to be adequate to restrict any potential seismic damage.

MK Mine Shaft barrel

The MK Mine Shaft barrel is spilt by a brattice wall which has had problems in the past, especially in the vicinity of the reef intersection that has been stoped out. The brattice wall has previously been a concern as movement associated with the stoped out area has caused instability in the brattice wall. To remedy the situation, the brattice wall was removed in the area where damage has occurred. The rest of the brattice wall is monitored (measured) monthly and no movement has occurred in the recent past.

Lower Mine, Project Zaaiplaats

The Lower Mine, Project Zaaiplaats, is situated below 101 Level and is discussed further here. The V Reef in this area is situated in a highly disturbed, geologically complex strip bounded by major faults.

The strike extent is approximately 4 km while the block is about 500 m wide on plan in the dip direction. The major faults include the Zuiping E, H and G faults, the De Hoek fault and the Jersey fault. The Jersey fault strikes ENE-WSW and dips to the SSE at about 40° and separates the Zaaiplaats Project blocks from the southern margin of the GN Mine blocks. The interaction between major south and north dipping fault sets, along with a number of intrusive bodies and sympathetic structures makes for a complex geological setting. Given that the internal geology in these blocks is unknown (structures<25 m are not identified) the sequential grid mining method that is considered for the extraction of this area may overestimate the extraction that will be obtained. Sequential grid mining involves breast ledging and breast mining between dip pillars spaced at 180 m intervals (skin to skin) with a minimum pillar width of 30 m and a width to height ratio equal to or greater than 20. This sequential grid mining planning does not include the structures < 25 m which will reduce the total extraction due to fault losses and bracket pillars that may be required along these structures.

Mining Design

The rock engineering design for both the off reef and the on reef excavations appears to have been designed to the required standard for a PFS level of study. All the rock mechanics parameters and guidelines for the PFS work aimed at minimising seismicity and damage as result of seismicity have been taken into account. It is also noted that the CoP for MK Mine would need to be revised to include the Zaaiplaats Project area if the project went ahead.

Findings

The rock engineering CoP is comprehensive and no risks to LoM plan were identified.

The CoP for MK Mine will have to be revised to include the Zaaiplaats Project area if the project goes ahead.

The mining strategies for the LoM are comprehensive and provide viable strategic requirements for each of the mining areas.

No risk issues were identified with regard to extraction of IBGs.

The GN Mine Shaft pillar has been included in the LoM plan. The mining of the pillar has been justified in a rock engineering report and this justification appears reasonable. The quantification and interpretation of the seismic risk associated with this extraction has been adequately covered.

The MK Shaft is spilt by a brattice wall which has had problems in the past in the vicinity of the reef intersection (stoped out) with the shaft. It appears that this area is now stabilised and no further issues are expected.

A geotechnical design at a PFS level has been completed for the Zaaiplaats Project area.

5.2.6 Ventilation and Cooling Requirements

[SR5.2 (vii) (viii)]

The focus of the technical review was to evaluate the effectiveness of risk control measures with emphasis on work place ventilation design. These are aimed at minimizing all occupational hygiene exposures to below Occupational Exposure Limits (OELs) as contemplated in all mandatory CoPs and Regulation 9.2 of the Mine Health and Safety Act (Act no. 29 of 1996).

The risk control measures include the following:

- Ventilation designs to provide ventilation and cooling for the LoM plan;
- Mine production plan aligned with ventilation and cooling supply;
- Emergency preparedness/second outlets;
- Provision for critical spares; and
- Provision for adequate sustaining capital.

Legislation Compliance

Compliance with the MHSA and associated legislation was confirmed.

Ventilation and Cooling Designs/Controls for the Life of Mine Production

MK and GN Mines can be classified as ultra-deep level mines where the provision of sufficient ventilation and cooling is an essential requirement for production. The ventilation and cooling infrastructure for both mines was originally designed for larger tonnage outputs. Production at GN Mine was stopped in 2015.

Summary of the Ventilation and Cooling Parameters

The ventilation and cooling designs are outlined in Table 5.7 and Table 5.8.

Table 5.7: Current ventilation designs for MK and GN Mines

Category	MK Mine	GN Mine
Main fans	800 kg/s @ 6.8 kPa (3 out of 3 fans)	1000 kg/s @ 4.5 kPa (3 out of 3 fans)
Main downcast shaft open area.	60.7 m²	69.7 m²
Vent. design velocity	10.0 to 13.0 m/s	10.0 to 13.0 m/s
Total quantity down shaft	800 kg/s	1000 kg/s
Air speed in shaft	13.2 m/s	14.3 m/s
Main up-cast shaft open area. Surface to 100 level	26.9 m²	42.8m²
Recommended up-cast design velocity	20.0 to 22.0 m/s	20.0 to 22.0 m/s
MK Mine up-cast design	20.0 to 29.0 m/s	
Actual velocity @ 800kg/s	29.7m/s	23.0 m/s
Booster fans required to overcome up-cast shaft resistance	85 level: 2 x 125 kg/s 95 level: 2 x 125 kg/s	61 and 68 level fans stopped.
Top Mine		
Tonnage	10.1 ktpm	No production
Mining method	Scattered mining	
Rock breaking depth	2 280 m	
Rock temperature	46.4°C	
Distance from shaft	3 300 m	
Planned air to kiloton ratio	6.5 kg/s/kt	
Required ventilation quantity	150 kg/s	
Actual air per kiloton ratio	14.8 kg/s	
Average stope face air speed	0.70 m/s	
Middle Mine		
Tonnage	62.3 ktpm	

Category	MK Mine	GN Mine
Mining method	Scattered mining	
Rock breaking depth	2 860 m	
Rock temperature	53.5°C	
Distance from shaft	3 500 m	
Planned air to kiloton ratio	6.7 kg/s/kt	
Required ventilation quantity	490 kg/s	
Actual air per kiloton ratio	7.8 kg/s	
Average stope face air speed	0.90 m/s	
Lower Mine		**-**
Current mining	Development	-
Rock breaking depth	3 045 m	
Rock temperature	55.4°C	
Available ventilation quantity	70 kg/s	
Total ventilation quantity		
Top Mine	150 kg/s	
Middle Mine	490 kg/s	
Lower Mine	70 kg/s	
Other commitments (pump chambers, leakage etc.)	90 kg/s	650 kg/s
Total	**800 kg/s**	**650 kg/s**
Maximum available quantity	800 kg/s	1000 kg/s
Critical spares		
Main fans	1 spare motor. 1 impeller	1 standby fan

SRK comments

- Airflow rates in the shafts and the main haulages are reported in mass flow (kg), rather than quantity flow (m^3/s). Mass flow remains constant throughout the mine network, whereas the quantity flow varies with density;
- The total ventilation quantity for production at MK Mine is limited to 800 kg/s. The up-cast shaft with an open area of 26.9 m^2 is the limiting factor;
- Operating three main fans without a fourth spare fan at MK Mine may be regarded as a possible risk. However, should a main fan malfunction, the mine will not lose 33% of the ventilation quantity. As a result of the reduced air quantity and lower system resistance, the air quantity will reduce by approximately 20% (800 to 640 kg/s). The mine has the required critical spares to replace damaged fan components within 24 hours to mitigate the risk; and
- **Shaft air speeds** - The usefulness of air as a cooling medium decreases with depth. At the MK Mine mining depths, ventilation air has to be supplemented with refrigeration. The minimum practical ventilation quantity should be circulated at these depths. Ventilation and cooling systems based on economical and practical criteria should be selected. AGA adopted this approach when designing the infrastructure for the MK Mine. The air speed designs are industry recommendations from an economical and employee in shaft conveyance point of view. At MK, the slightly higher intake downcast velocity (13.2 m/s) is not considered a risk. The increased velocity has a slight impact on energy costs. The MK Mine up cast shaft and main fans were designed to handle a velocity of +-29 m/s. There are no conveyances in the shaft.

Table 5.8: Current cooling (refrigeration) designs for MK and GN Mine

Category	MK Mine	GN Mine
Available refrigeration capacity		
Surface plant type and capacity	5 x Hitachi (4 units @ 10.5 MW with 1 standby) Total: 42 MW 6 x Mycom Ammonia plants @ 5.5 MW.Total: 33 MW	4 x 6 MW plants feeding the surface bulk air cooler
61 level underground plant type and capacity	No UG plants	5 x 3.5 MW and 3 x 2.8 MW plants provide chilled service water
Total cooling capacity	75 MW (surface)	50 MW
Heat load	42 MW	25 MW
Total cooling required	42 MW	25 MW
Design reject temperature	30.5°C	
Top Mine average stope face WB temperatures (Standard: 28.5°C)	28.4°C	
Top Mine average specific cooling power (standard: 300 W/m²)	275 W/m²	
Middle Mine average stope face WB temperatures (Standard: 27.5°C)	28.5°C	
Middle Mine average specific cooling power (standard: 300 W/m²)	285 W/m²	
Water reticulation		
Type (on level)	High pressure closed loop 10 MPa	Semi closed loop system
Service water consumption	Ave: 1.8 tonne/tonne Peak: 3.6 tonne/tonne	
Water temperature to shaft (design)	1.2ºC	
Water flow rate down the shaft	600 l/s	130 l/s
Energy recovery systems	3 units	2 units
Service water pressure reducing	Pressure reducing stations downstream from spot air coolers	On intake levels
Underground air cooling		
Spot coolers	500 kW High pressure 300 kW Low pressure	300 kW low pressure
Surface bulk air cooler		
Maximum capacity	27 MW	24 MW
Inlet water temperature	1.5ºC	3.0°C
Water flow rate	600 l/s	500 l/s
Air temperature to shaft	7.0ºC	12.0°C
Airflow capacity	750 kg/s	600 kg/s
Middle Mine average specific cooling power (standard: 300 W/m²)	285 W/m²	
Critical spares		
Refrigeration plants	1 standby plant	6 standby plants

Specific cooling power

VROs make use of Specific Cooling Power (SCP) which is dependent on wet bulb temperature and face air speed for employee heat stress management. Employees doing hard work on the face, generate metabolic heat of ±200 W/m². Cooling power of the environment in excess of 200 W/m² needs to be provided to prevent a heat stress condition. A target of 240 W/m² and above will provide acceptable environmental conditions. Examples are 0.50 m/s at 30.0°C wet bulb equals 240 W/m² and 1.0 m/s at 31.0°C equates to 240 W/m².

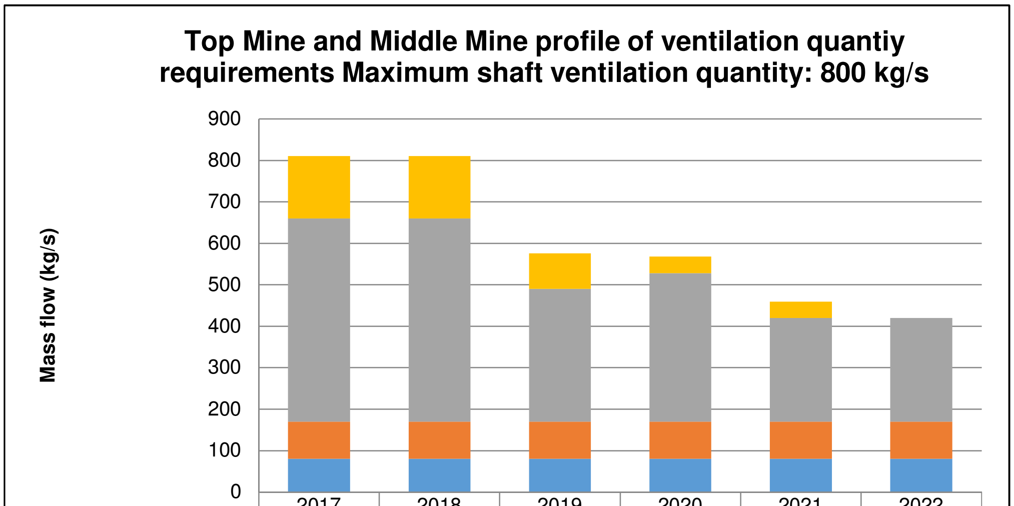
Moab Khotsong Mine

Current ventilation and cooling distribution

In 2003, the infrastructure was designed for a production rate of 160 ktpm. The 2017 LoM plan production rate has reduced to an average 81 ktpm. However, the original ventilation and cooling infrastructure remains in place and will be utilized for the current and future production.

Ventilation

The LoM production plan and ventilation requirements are outlined in Figure 5.2 and Figure 5.5.



	2017	2018	2019	2020	2021	2022
Top Mine	150	150	86	40	40	0
Middle Mine	490	490	320	358	250	250
Pump chambers etc.	90	90	90	90	90	90
Leakage	80	80	80	80	80	80

srk consulting | MK Mine 2017 BP profile of ventilation quantity requirements | Project No. 522673

Figure 5.5: MK Mine 2017 BP profile of ventilation quantity requirements

Top Mine

- As from 2015, GN Mine production was integrated into the MK Mine plan (now referred to as the Top Mine). The Top Mine section is ventilated from the MK Mine infrastructure, i.e. intake and return air is moved through the MK Shaft. GN Mine is holed with the Top Mine on 70 and 76 level. Approximately 60 kg/s comes from the GN Shaft;
- IBGs are mined in the Top Mine. The section is accessed by three levels with 76 and 73 level being the main intake airways. 70 level is the main return level with approximately 50 kg/s returned on 73 level (on a twin haulage system layout);

- The current air per kiloton ratio of 14.8 kg/s indicates that the mine is over-ventilated. The reason for the high air per kiloton ratio is that the pillar mining is scattered over a large footprint, one sided mining is practised and at the majority of pillars, one panel is mined. The ventilation requirement for one or four panels is similar; and
- Down-dip mining is being planned below 76 level. In terms of the 2017 LoM plan, the current ventilation quantity is sufficient to maintain production to 2022.

Possibility of ventilating the Top Mine with the GN Mine infrastructure

The planned air quantity for the Top Mine is 150 kg/s.

The current airway capacity to GN Mine is limited. Only two levels (70 and 76 level) connected to GN Mine. 71 level was closed in 2003. A maximum additional quantity of 50 to 75 kg/s can be provided from GN Mine. Additional capital will be required to open more levels to GN Mine, should the production rate be increased in the future.

Middle Mine

- The Middle Mine is an IBGs located south east of the MK Shaft;
- The Middle Mine is accessed by three main levels from the shaft as well as three inter levels. 4 Booster fans operating in a semi parallel system supply 490 kg/s. Fresh (cooled) air is added per level on the upper mining levels to maintain face wet bulb temperatures within 27.5°C;
- Backfill: 70% backfill. Distance to face: 4.6 m;
- Production will come from the following levels: 85, 88, 92, 95, 98 and 101 level;
- Intake airways: 101, 95 and 85 level;
- Return airways: 95 (twin airways) and 85 level; and
- The current air per kiloton ratio of 7.8 kg/s indicates that the mine is over-ventilated. However, the geological complexity and the scattered configuration of the mining footprint, requires more ventilation then would normally be the case. The ventilation network can be described as a “tight” system with the emphasis on strict door control.

Ventilation and cooling constraints

Top Mine

- The Top Mine 76 level intake airway has a bottleneck close to the station;
- Intake and return airway capacity is limited to 225 kg/s; and
- Currently there are no cooling constraints.

Middle Mine

- The current production for the Middle Mine is limited to the available airway capacities and air quantity of 490 kg/s;
- Short term remedial measure - Ventilation holes were recently completed to reduce velocities on 95 level and to establish returns on 88 and 85 level. An additional hole is being drilled from 88 level to 92 level to assist with the effective ventilation of the development sections;
- Strict compliance with the vamping and sealing plan is required to have sufficient ventilation for the production stopes;
- Currently cooling supplied to the production sections is below design. The identified causes are as follows:

- o The surface bulk air cooler is not operating at the optimal design (400 l/s instead of 600 l/s);
- o The Middle Mine distance (3 500 m) from the main shaft; and
- o Cooling obtained from service water and spot coolers is below the design. A pipe insulation plan is being implemented to reduce outlet temperatures at the cooler installations. The consequence is that face wet bulb temperatures cannot be maintained within 27.5°C.

The above cooling concerns are being addressed.

Conclusion

The total air quantity required for MK Mine is within the capacity of the shaft and if the production plan remains unchanged, a main fan and refrigeration plant can be stopped by 2019.

Great Noligwa Mine

Ventilation and cooling distribution

The mine ventilation and cooling infrastructure was originally designed for a production rate of 200 ktpm. No production or hoisting of ore is taking place at the GN Mine Shaft. The original ventilation and cooling infrastructure remains in place and can be utilized for mining of the Shaft pillar. Two out of three main fans and 3 out of 4 surface bulk air cooler are operational to provide ventilation and cooling to the underground pump chamber and refrigeration plant levels.

Emergency preparedness for MK and GN Mines

- **Prevention of fires** – Approved code of practice for the prevention of fires is in place;
- **Early warning systems** – Electronic fire and gas detection devices in place; and
- **Self-rescuer devices and refuge bays** – All employees are issued with self-rescuer devices. Refuge bays located at 750 m intervals; and
- **Flammable gas** – Approved CoP in place. Intersections are limited to isolated pockets. Not a high risk.

Second outlets

- The MK Top Mine employees are evacuated via 70 and 76 level to GN Shaft;
- The MK Middle Mine has a single shaft from surface to 101 level and an additional RV (rock and ventilation) Shaft from 76 level to 101 level. Employees from the Middle Mine and Lower Mine can be conveyed to 76 or 70 level via the RV or Main Shaft and from 76 level evacuate to GN Shaft; and
- The GN Mine has a twin shaft system. Either of the shafts can be used for evacuation. In addition to the twin shafts, employees can also be evacuated via MK Shaft.

LoM capital requirements

Top and Middle Mine – Self-rescuer replacement cost for MK: ZAR14.1 million. Possible liability. In terms of the LoM plan, no additional capital is required for the ventilation infrastructure.

GN Mine – In terms of the LoM plan, no additional capital is required for the ventilation infrastructure.

5.2.7 Safety and Occupational Health

[SR5.2 (vii) (viii)] [SV1.10]

Summary of principle objectives

Safety

MK Mine can be classified as an ultra-deep mine (Depth in excess of 2000 m) with additional safety and health challenges when compared to shallower mines.

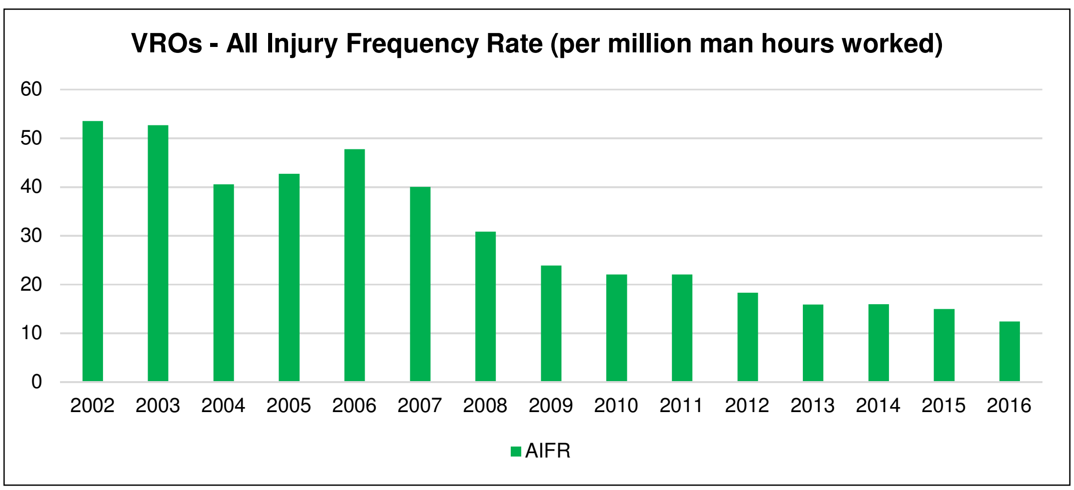
Successes to date

- In terms of the combined safety statistics there has been a significant decrease in fatalities and injuries from 2002 to 2016;
- MK Mine achieved a fatal free 2016 totalling 15 consecutive fatal free months;
- NUFCOR achieved 800 consecutive white flag days (no injuries); and
- The Labour Court of South Africa, Johannesburg handed down an important decision in November 2016, when it granted AGA an interdict of a Section 54 work stoppage that had been issued by the Department of Mineral Resources (DMR). The judge found that the Section 54 applied at Kopanang Mine lacked “proportionality”; in other words it was unfair to close the entire mine when the safety incidents had occurred at only one level (44 level). This should result in a reduction in the number of lost shifts as a result of Section 54 stoppages in the Vaal Reefs area.

Safety statistics

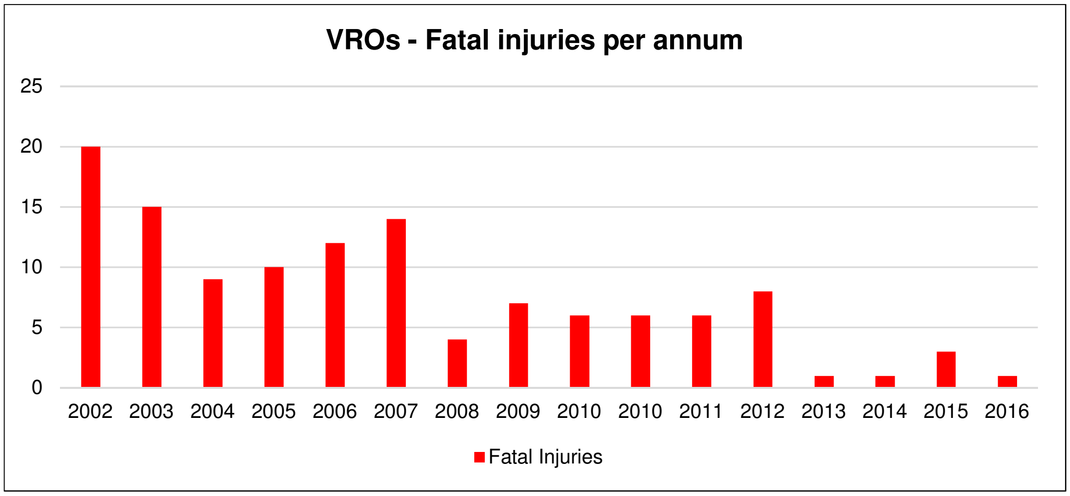
The reporting of serious injuries to the DMR is done via SAMRAS.

A summary of the all injury frequency rate and fatal injuries is reflected in Figure 5.6 and Figure 5.7.



srk consulting	All injury frequency rate trends for the VROs	Project No. 522673

Figure 5.6: VROs All Injury Frequency Rate over time from 2002 to 2016



srk consulting	Fatal injury trends for the VROs	Project No. 522673

Figure 5.7: VROs fatal injuries over time from 2002 to 2016

DMR safety stoppages (Section 54)

During 2015, the number of stoppages were at an all-time high for VROs.

The number of stoppages and the effects on production at MK Mine during 2015 are reflected in Table 5.9.

Table 5.9: MK Mine DMR safety stoppages for 2015

2015	Lost Shifts		Production lost	
	Full Days	Partial Days	Oz	Kg
MK	27	21	33 667	1 047

Note:
[1] Full day lost: Entire mine stoppage for duration of the shift; and
[2] Partial day lost: Any partial stoppage of a work place, MO section etc.

SRK comments

The frequent Section 54 stoppages continued in 2016 to the extent that AGA applied, in November 2016, to the Labour Court for an interdict regarding a Section 54 work stoppage at its Kopanang Mine. The judge found that it was unfair to close the entire mine when safety abuses had occurred at only one level. The shifts lost due to stoppages has shown improvement since the judgement.

As a result of safety improvement initiatives, there have been significant reductions in injuries and fatalities since 2002.

Occupational Health

- Silica dust with a crystalline silica content of 18 to 70% is one of the main occupational health risks in the Vaal Reefs area. The mitigating action to reduce the Silicosis risk is the continuation of dust suppression programme;
- The working environment for the MK Mine is similar to other deep level Au operations and the identified occupational health risks are also similar; and

- Identified occupational health risks are as follows – Silicosis, Occupational TB, Noise induced hearing loss (NIHL), Barotrauma (ear discomfort due to pressure changes), Radiation and heat related illnesses;

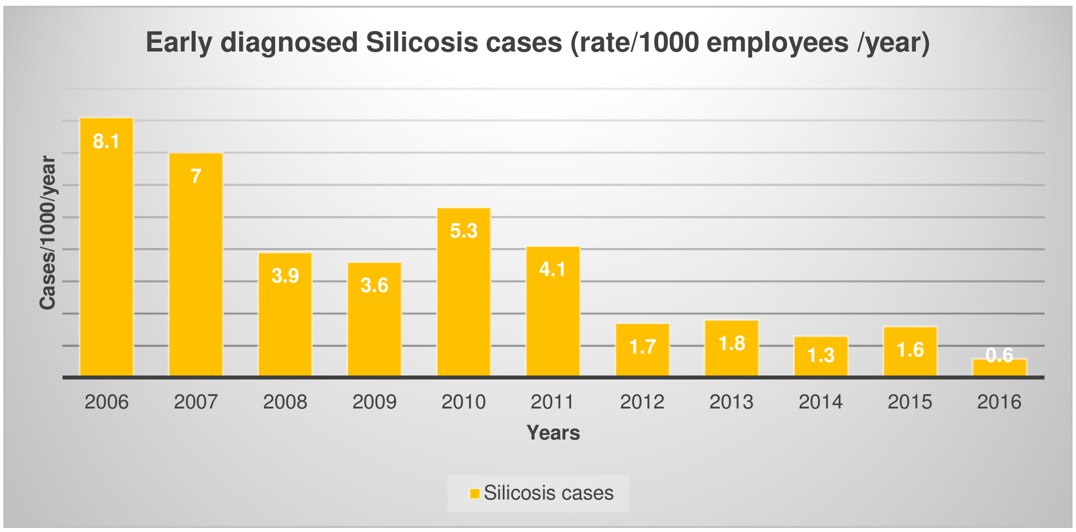
Successes

The “All Occupational Diseases Frequency Rate” is decreasing year on year for the combined AGA South African Gold Mines.

Health surveillance results

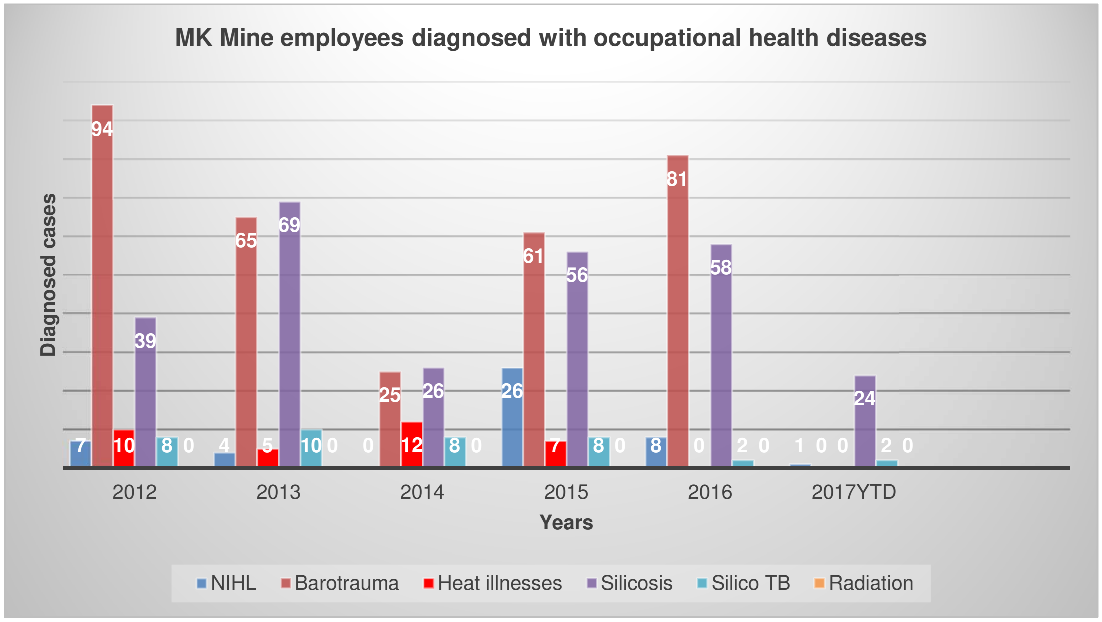
In terms of the South African Mine Health and Safety Act, a manager must establish and maintain a system of medical surveillance of employees exposed to health hazards. VROs comply with the requirements.

The annual health surveillance results are reflected in Figure 5.8 to Figure 5.10.



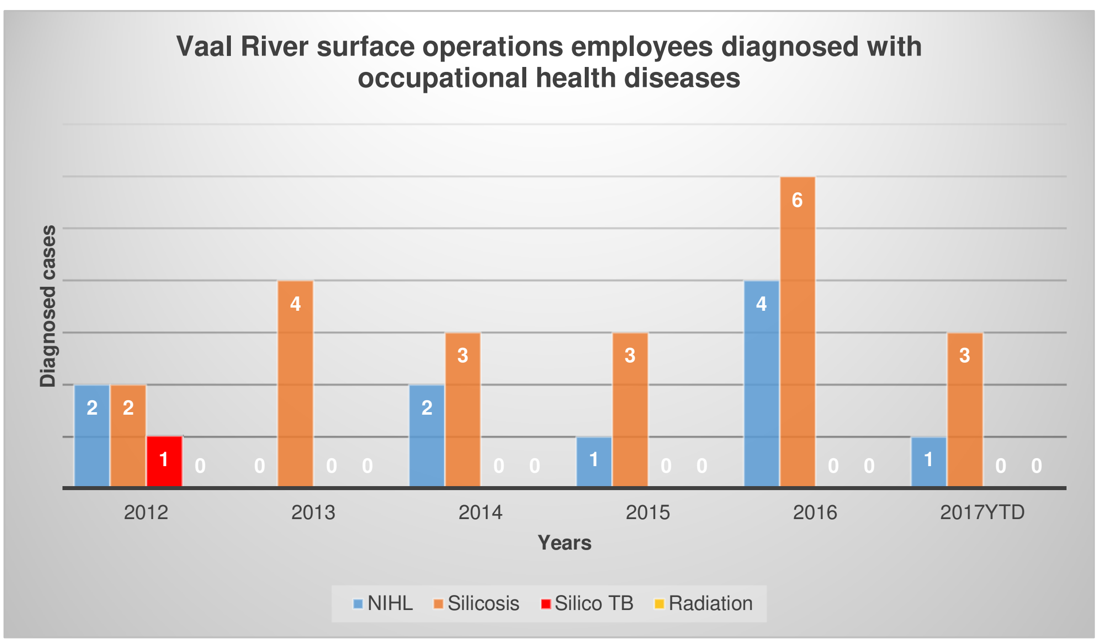
srk consulting	Early diagnosed Silicosis cases	Project No. 522673

Figure 5.8: Early diagnosed Silicosis cases for AGA South Africa over time from 2006 to 2016



srk consulting	MK Mine employees diagnosed with occupational health diseases	Project No. 522673

Figure 5.9: MK Mine health surveillance results (diagnosed cases) from 2012 to 2016



srk consulting	Vaal River surface operations employees diagnosed with occupational health diseases	Project No. 522673

Figure 5.10: Vaal River surface operations health surveillance results

SRK comments

- **Silicosis** – Dust created from Au bearing ore with an average crystalline silica content of 15 to 70% is a cause of the lung disease Silicosis. Exposure to onset of the disease can take 10 to 20 years. The disease is irreversible, untreatable and it progresses despite ceasing exposure.

The AGA Mines have an industry leading Silica dust suppression and enhanced medical surveillance programme in place in their quest towards zero harm. Although employee exposure to Silica dust is being reduced, more initiatives are required to get all measurement results below the Occupational Exposure Limit (OEL). Early diagnosed cases have been on the decline since 2006. Short term fluctuations are difficult to explain in a disease with a 10 – 20 year lag period;

- **Noise induced hearing loss (NIHL)** – All AGA Mines have a comprehensive noise control programme in place. Noise levels of all noise emitting equipment have been reduced to below the benchmark of 110 dB and all production employees have been issued with personal hearing protection devices and have to wear these devices in noise zones. Occupational exposure to noise appears to be controlled and NIHL cases should be on the decrease. However, there was a steady decrease from 2012 to zero cases in 2014 followed by a sharp increase to 26 cases in 2015. The fluctuations can be ascribed to non-occupational and social noise;
- **Thermal stress (Heat illnesses) –** In deep level mining, heat stress causes discomfort, decreased productivity, increased accident rates, abnormal physiological strain on workmen. The ultimate consequence of excessive heat stress is a collapse of the body's temperature regulating system which results in death due to heat stroke. The provision of thermal conditions to minimize the dangers and adverse effects of heat stress is thus one of the major reasons for installing ventilation and cooling systems in deep hot mines. Heat discomfort starts at a wet bulb temperature above 27.5ºC;
- The annual rates continue to come down from 10 diagnosed cases in 2012 to zero cases in 2016 and 2017 YTD;
- **Barotrauma –** Ear Barotrauma is a pressure related injury to the middle ear following rapid descent/ascent in deep-level mines. The MK Shaft with the world's longest single wind (Depth to Lower Mine: 3 045 m) can cause Barotrauma. Most patients make a full recovery, with no permanent hearing loss. There were no diagnosed cases in 2017 YTD;
- **Radiation –** All working places are monitored on a quarterly basis. Radiation levels do not exceed the maximum permissible levels. No Radiation related illnesses were diagnosed in the review period (2012 to 2017 YTD). Cannot cause Tuberculosis. Most employees contract Tuberculosis when they have low immune systems. Typical examples are employees who have underlying illnesses such as HIV Aids and Silicosis. Therefore, not all the diagnosed cases can be classified as an occupational related health disease;
- **Occupational (Silico) TB –** Annual rates reflect a sustained improvement of 70% since 2004. Pulmonary Tuberculosis is caused by bacteria. The silica dust or any dust for that matter cannot cause Tuberculosis. Most employees contract Tuberculosis when they have low immune systems. Typical examples are employees who have underlying illnesses such as HIV Aids and Silicosis. Therefore, not all the diagnosed cases can be classified as an occupational related health disease; and
- All diagnosed occupational health disease cases are thoroughly investigated to determine if the illnesses are worked related, inherited or non-occupational illnesses before the cases are certified and compensated.
-

5.2.8 Groundwater and Surface Water

[SR5.2 (vii) (viii)]

Introduction

The Vaal River is situated to the north of the mining operations and the topography of the mine area slopes towards the Vaal River basin. The two villages and a training centre which are part of the transaction VROs are situated to the north of the Vaal River. The MWC also included in the assets, is situated to the north of the Vaal River.

A description of the surface and groundwater management and controls are described in this section as well as the potential risks which include contamination of water resources as well as ongoing liability to treat the water emanating from the shaft.

Site Setting

The Mispah TSFs, MK and GN Mine assets are located south of the Vaal River and are adjacent to the Kopanang Shaft and associated infrastructure. The Vaal River will be the main receptor of any pollution from the TSF and Plant/Shaft complexes.

The water samples that have been collected classify into distinctive upstream and downstream discharge qualities. The downstream water quality in the Vaal River has a definite increase in SO_4 concentration, indicating impacts from Au mining operations. The Vaal River will be the foremost receptor that will be impacted by the tailings and shaft/plant areas included in the transaction.

Main Water Features for the Site

Potable water is supplied by Midvaal Water Company. Water supplied by the Midvaal Water Company is utilised by the VROs for domestic purposes as well as for mining and metallurgical processing. The VROs use about 8 million m^3/a, of which about 680 000 m^3/a is used for potable water use and the remaining water is used for processing. The GN and South Uranium Plant which form part of the transaction use approximately 2.3 million m^3/a.

Process water for the GN plant is supplied by the Eye Dam, sewage treatment water, and boreholes as well as return water from the Mispah Tailings dam complex. There is also presently, water from the Kopanang shaft which supplies the GN plant with process water as well as potable water. Once the assets have been procured, there will be a need for reticulation changes, as the water from the Kopanang Mine may no longer be available. There is also water that is piped to Kopanang plant that will have to be reused in the procured assets. Currently more water is transferred to the Kopanang complex than is received.

The villages are supplied with water from the Midvaal Water Company.

The VROs shafts, at average depths of 2 500 m, are situated in the lower parts of the Klerksdorp Goldfield and could receive groundwater from the larger catchment as many of the shafts are interlinked. As mines and shafts close, re-watering of the underground works would take place. Figure 5.8 describes the volume of fissure or deep groundwater pumped from various shafts that could impact on the VROs and the companies responsible for pumping (Adendorff, 2011).

Table 5.10: Volume of Fissure water pumped from various shafts

Shaft	Estimated fissure water Ml/day	Current Pumping Ml/day	Company responsible for pumping
Margaret Shaft	50.0	50.0	MWC - Part of the assets to Harmony
BGM 10#/Eastern Shaft	9.0	8.0	Simmers & Jack
Hartebeestfontein 2# (BGM)	5.0	3.5	Simmers & Jack
Hartebeestfontein 7# (BGM)	0.7	0.7	Simmers & Jack
Aurora 7#	1.5	0.0	AGA
Aurora 3#	0.8	0.0	AGA
GN and MK Mines	1.0	1.0	- Part of the assets to Harmony
Total	**68.0**	**63.7**	

Dewatering to surface at GN Mine is limited by the pumping capacity of the 3000 Level pump station capacity, being a maximum of 183l/s or 15.8 Ml/day. (Reference: GN Mine Major Infrastructure Dossier for AGA South African operations detail - Noligwa Mine, April 2016).

With the proposed new assets: the MWC, GN and MK Mine water will be Harmony's responsibility.

Groundwater management

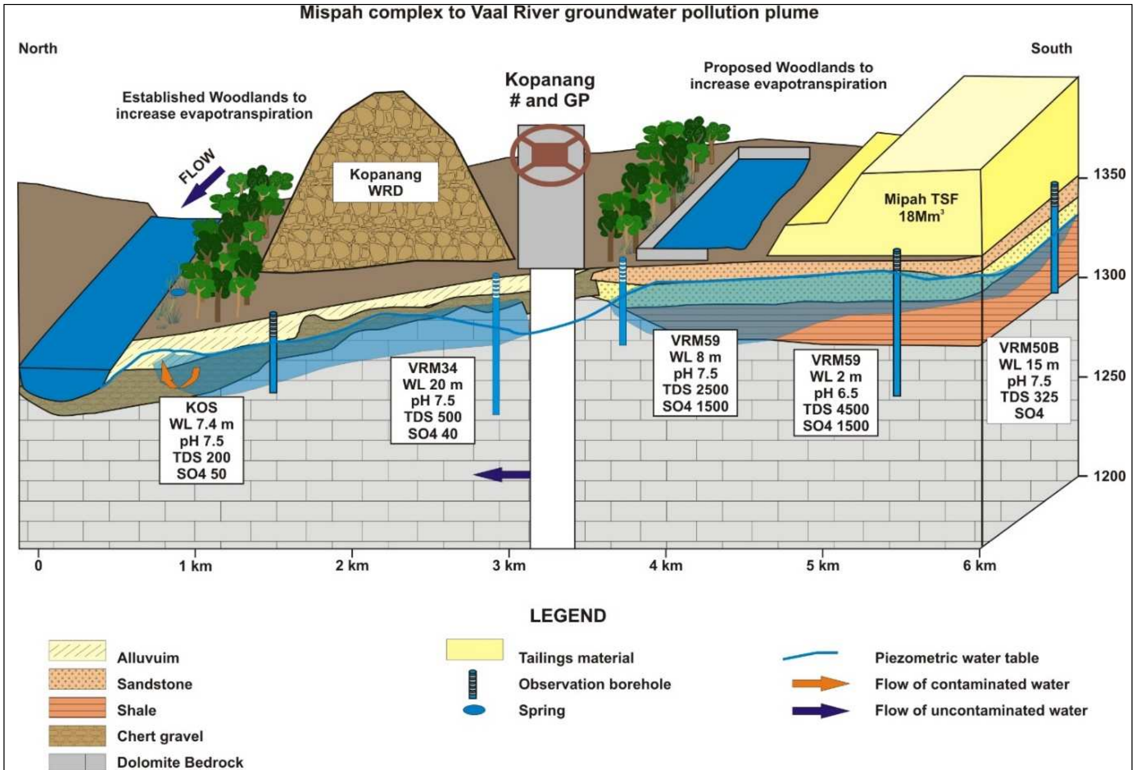
The VROs are located within an area characterized by the Ventersdorp lavas and the Dolomitic aquifer systems. The general water-bearing horizon is relatively shallow and most of the boreholes are less than 30 m deep, with a static water level less than 10 m. The groundwater flow is predominantly towards the Vaal River.

Two major rock units outcrop in the area. These are, stratigraphically from bottom to top the Malmani Subgroup of the Transvaal Sequence (chert rich and chert poor dolomites) and the Karoo formations in the south of the area.

The Mispah TSFs area is underlain by the following lithology:

- Aeolian sand overburden;
- Ferricrete;
- Karoo lithology (sandstone and siltstone);
- Weathered dolomite and chert; and
- Unweathered dolomite.

Aeolian sand (approximately 2 m thick) overlies the Karoo and older Malmani dolomite deposits in the southern portion of the area. Figure 5.11 illustrates a conceptual overview of the Mispah and Kopanang areas.



srk consulting	Conceptual Model of the Groundwater plume	Project No. 522673

Figure 5.11: Conceptual Model of the Groundwater plume

The assets south of the Vaal River consist of the more recent operational shafts, metallurgical plants and TSFs. The southern area is also divided into four sub-areas. These sub-areas have been selected according to the local surface drainage and topographical settings and can therefore be seen as local mini sub-catchment areas. Figure 5.9 supplies a description of each plume, the main sources, pathway and main receivers.

The sub-areas are discussed below in terms of the sources of pollution, the pathway or aquifer and the impacts/risks of the receivers or receptors.

Table 5.11: Sub-areas discussed in terms of sources of pollution, pathway or aquifer and impacts/risks of the receivers or receptors

Sources of Pollution	Pathway	Underlying geology	Main receptor
Plume 5 (GN)	GN Au Plant, Uranium Plant and MODs.	Dolomite – both chert rich and chert poor.	Vaal River
Plume 6 (Kopanang) – Not part of the assets but in close proximity to the other infrastructure	Kopanang Au Plant and MO's.	Dolomite – both chert rich and chert poor.	Vaal River
Plume 7 (Mispah)	Mispah TSFs and return water system.	Dolomite – both chert rich and chert poor and Karoo formation.	Vaal River
Plume 8 (MK)	MK MOD	Dolomite – both chert rich and chert poor.	Vaal River

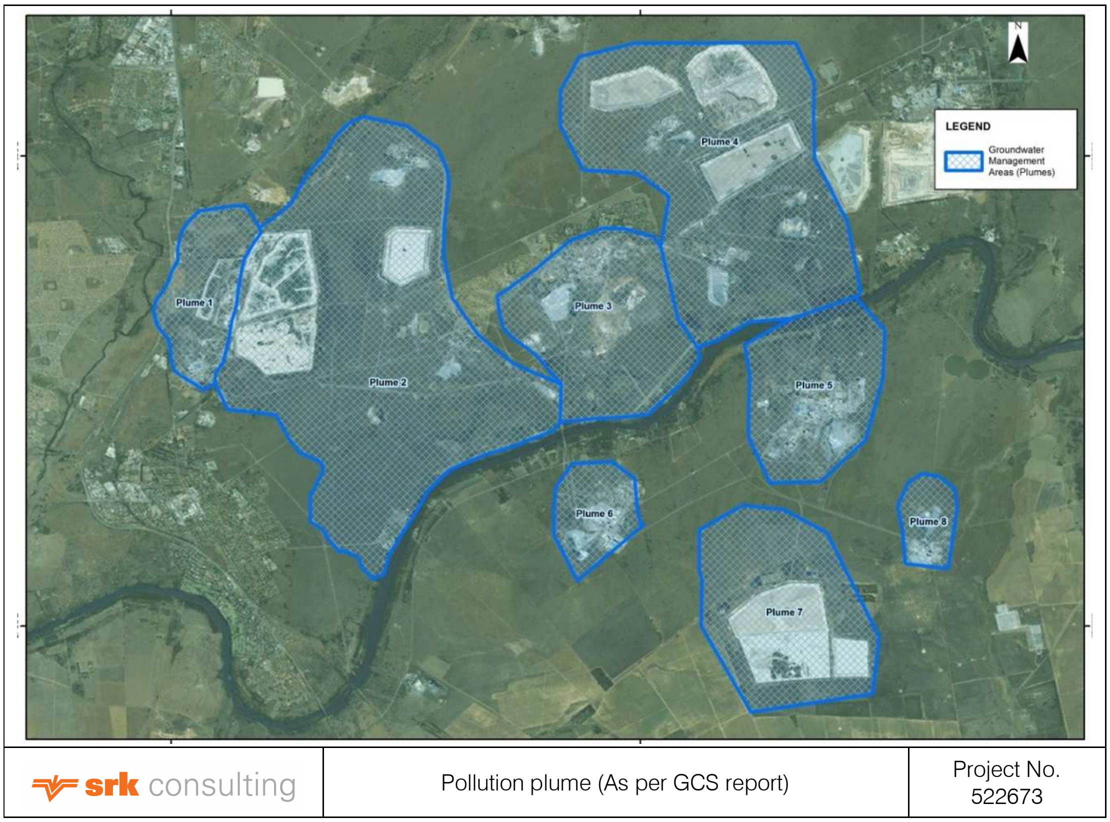


Figure 5.12: Pollution plume (As per GCS report)

Stormwater management

Detailed clean/dirty water assessments were completed for the high risk areas. From these clean/dirty water assessments conceptual infrastructure recommendations were made to address the deficiencies in storage and the effective separation of clean and dirty water based on the 1:50 storm event. The recommendations for the assets to be purchased are as follows:

- A clean water trench upstream of the Mispah tailings dam to divert runoff away from the TSF complex. The trench will be about 2 km long;
- Cut-off drains upstream of the MK Shaft of about 1.3 km long; and

- Cut-off drains upstream of the GN Mine Waste Rock Dump, shaft and plant RWDs of approximately 1.5 km long.

Water Quality

The quality of groundwater at VROs has been severely impacted by mine operations over the last 100 years. No baseline information is available. The first groundwater sampling from boreholes was conducted in 1998, however from extrapolations and qualities of isolated non polluted sources it can be deducted that the quality of groundwater pre-mining was good for all use or at least Class 1 domestic use.

It is evident that median groundwater quality is currently not fit for any use. The deposition of sulphite and sulphate minerals as tailings on TSFs followed by the oxidation of this material by water and air result in Saline Rock Drainage (SRD). In the Vaal River the pH of the draining groundwater is buffered by the presence of carbonates in dolomite in the baserock of the TSFs. The $CaCO_3$ in dolomite neutralizes the acid, but the salts are still mobilized to contribute to SRD.

Permitting

A water licence is available for the entire VROs and this water licence will have to be divided into two separate licences. One of the challenges is that the conditions in the Water Use Licences (WUL) are usually extremely stringent and often cannot be practically met especially regarding water quality limits of water within the tailings dam circuit. When the new water licences are applied for the conditions will have to be challenged and more reasonable conditions requested especially regarding quality within the circuit.

Risks to surface and groundwater

There are numerous pollution control measures that are required to meet compliance of the WUL conditions. These items where identified in numerous audits and internal compliance audits. The following capital items are required to meet the compliance for the carved out assets:

- Separation of clean and dirty water at the TSFs, RWD and KPD at a cost of ~ZAR15 million. This will include the pollution plumes which have been identified and which will have to be remediated. AGA indicate that even after mitigation risks associated with the pollution plume will remain high, with a resultant legal and reputational risk;
- Water treatment of the TSF decant water prior to the storage in the RWD to comply with the WUL. Operational compliance with WUL conditions is not possible without treating the decant prior to storage in the Return Water Dam. While not practical and unlikely to be implemented the CAPEX of a treatment plant would be in the order of ZAR100 – ZAR200 million and the annual OPEX approximately ZAR20 million; and
- Upgrading of the Pollution Control Dam (PCD) to limit discharge at approximately ZAR50 million.

5.2.9 Unquantified Risks and Liabilities

There may be additional risks associated with the following:

- In situ clean-up of water courses at ZAR50 million;
- Potential for sinkhole formation management of ZAR10 million to ZAR50 million; and
- As the mine is located on dolomitic geology, there is a risk that sink holes may form as a result of mining activities particularly watering and dewatering of the dolomitic aquifers.

The closure costs including the water aspects are included in the closure section

Table 5.12 and Table 5.13 shows a summary of the costs for water (Working capital - included in OPEX if Harmony acquire) and additional aspects that may be required as post closure costs/liabilities respectively.

Table 5.12: Summary of the Costs for Water (Working capital- included in OPEX if Harmony acquire)

Cost of Compliance OPEX in Near Term	High Risk[1]	Low Risk[2]
Aspect	**Cost (ZAR million)**	
Separation of reticulation from the AGA assets	75	
Separation of clean and dirty water at TSF to be reprocessed	15	
Water treatment of TSF decant prior to storage in RWD to comply to WUL		150
10 years of OPEX to treat TSF prior to storage in RWD		200
Construction of interception measures at Mispah	50	
Upgrading of PCD to limit discharge	50	
Total	**190**	**350**

Notes:
[1] These items will be required during separation to comply with current legislation.
[2] These items are required to comply with the WUL. These requirements are impractical and unlikely to be enforced.

Table 5.13: Additional aspects that may be required as post closure costs/liabilities

CAPEX	
Aspect	**Cost (ZAR million)**
In situ clean-up of water courses	50
Sinkhole formation management	10 - 50
Total	**100**

SRK Comments

The greatest liability to the transaction will remain the treatment of water from underground and the remediation of the groundwater plume. There will have to be changes to the reticulation systems that will require a separation from the other AGA assets as well as ensuring that there are no groundwater inflows emanating from adjacent operations in the future.

5.2.10 Tailings Storage Facilities

[SV1.10]

This section includes discussion and comment on the tailings engineering aspects associated with the transaction. Specifically, detail and comment is focussed on the design, construction, geotechnical integrity, remaining capacity and management practices governing the tailings facilities. Key source data for the review comprised the engineering design constraints, where available, as prepared by the appointed tailings dam review consultants at each of the operations (including in certain cases SRK). Site-specific issues are summarised below.

The Mispah TSFs consist of three compartments, namely Mispah 1 (Northern compartment constructed in early 1990s), Mispah 2 (Southern compartment constructed in 2007) and the third short-life Kopanang Pay Dam (commissioned in 2007) which was developed and operated on the eastern flank of Mispah 2 and has a relatively small footprint of approximately 30 ha.

There was concern over the geotechnical founding conditions of the Mispah 1 site and this was mitigated by extensive geotechnical investigations and design that resulted in the following recommendations being implemented:

- The TSF was located on the southern side of the proposed preferred site where the cover of Karoo rocks over the dolomite is thickest;
- Daily process water should be stored on the TSF during operations;
- The installation of an agricultural drain to the north of the site to intercept the sub-surface water expected on the interface of Aeolian sand and residual Karoo soils;
- The active sinkhole on the site was backfilled with waste rock and a plug of concrete cast against the layer of diamictite; and
- Water control measures should be maintained on an ongoing basis.

It was reported that there is only one mention of a sinkhole or doline in the reviewed data, and the stability analysis report concludes that "*This tends to confirm that the general area is not prone to sinkholes or dolines*".

The TSF complex is being operated as a day-wall sub-aerial deposition system and the reviewed documentation indicates that the TSF complex is being managed in accordance with the industry norms. Audit reports are being produced, risks being identified and prioritised, and remedial actions implemented.

The reviewed CoP and Operating Manual identifies roles and responsibilities, and the minimum prerequisite operational procedures.

Mispah 1 was designed with an initial rate of rise of 1.8 m/annum and increasing to 2.8 m/annum at closure. While Mispah 2 was designed with an initial rate of rise of 2.5 m/annum reducing to 1.4 m/annum when termination height is achieved at 22.0 m.

Mispah 1 and 2 have dedicated stormwater containment dams and return water dam complexes that look in good condition when viewed via Google earth.

The stability analyses undertaken by Jones and Wagner during the design of Mispah 1 and the external stability analyses undertaken by Metago during 2010 indicate that the minimum side slope Factor of Safety (FoS) over the life of the facility would be 1.55 with a closure FoS of 1.6 at a height of 30 m. No stability reports were presented for review of Mispah 2, however, it can be assumed that the FoS will be similar to Mispah 2 due to its lower closure height.

Based on an independent assessment undertaken by SRK, the expected remaining LoM tailings tonnages (excluding the marginal rock dumps) could be safely stored on the combined top operational surface of Mispah 1 and 2, resulting in a maximum rate of rise and height increase of 0.5 m/annum and 3.0 m respectively. Consideration could be given to depositing remaining LoM tailings tonnage onto either Mispah 1 or Mispah 2, Mispah 2 being preferable due to its current reduced height. If Mispah 2 was operated as the preferred single facility the maximum rate of rise for the remaining life of the facility would be approximately 0.9 m/annum with a height increase of approximately 5.0 m. This reduced annual rate of rise is directly linked to the reduced remaining LoM tailings deposition tonnage profile.

It is anticipated that Harmony will process MOD material through the Mispah Gold Plant but this was not included in the technical-economic model provided for review, as stated by the Metallurgist. For information purposes SRK determined that this maximum 30 million tonnes of tailings originating from MODs could be accommodated on Mispah 1 and 2 with a combined height increase of 12 m, subject to the following:

- A revised and approved permit for the TSF;

- The maximum termination elevations do not exceed the revised and approved permit elevations;
- Foundation loading acceptance in light of the underlying soils;
- Acceptable dolomite risks. It should be noted that the way dolomite risks are assessed has changed over the years. If the dolomite investigations and risks have not been revisited since the 1990s then they may no longer be in line with current best practice. SRK is of the opinion that the dolomite risk should be investigated irrespective of treatment of MODs and has incorporated it into a geotechnical review as part of the capital expenditure below;
- The maximum treatment tonnage rate of the MODs matches a design maximum rate of rise of the tailings storage facilities. It is assumed that the grading of the MODs will be similar to the underground tailings grading; and
- Completion of design review of the tailings dams.

It can be concluded that the Mispah TSFs are being operated by a competent team and in a professional manner, notwithstanding the above.

Capital Expenditure

No major capital expenditure has been identified for the Mispah TSFs.

The capital expenditure identified is as follows, subject to there being no latent risks associated with the foundation dolomites, necessitating the identification and development of a new TSF:

- Replacement of corroded and damages delivery and return water pipes – Estimated capital ZAR0.5 million/annum;
- Annual audits, piezocone testing and stability assessments – ZAR2.0 million/annum; and
- Specialist studies, including geophysics to revisit the integrity of the dolomite foundation materials under the TSF – Estimated capital ZAR2.0 million.

The following additional capital expenditure would be required should the MODs tailings report to the existing tailings storage facilities:

- Specialist studies for permit amendments with the Regulating Authorities to increase the termination elevation of the tailings storage facilities beyond the current approved elevation/s - Estimated capital ZAR4.0 million; and
- Installation of two elevated penstocks – Estimated capital ZAR10.0 million.

Risks

The following risks have been identified:

- The existence of a backfilled sink hole in the TSF area;
- Possibility of further sink hole and/or doline formations due to mismanagement of water or other factors;
- Should the dolomite geotechnical investigation indicate a deterioration in the existing TSF foundation conditions, then serious consideration may need to be given to redirecting the tailings to another existing facility, curtail tailings deposition or investigate and construct a new TSF; and
- Increased height increases of tailings storage facilities above the permit conditions and more so should MODs be introduced into the future plans.

5.3 Metallurgical Processing

[SR5.3 (i) (ii) (iii) (iv) (v) (vi)] [SV1.9, SV1.10]

5.3.1 Introduction

In terms of the transaction, Harmony is acquiring the following AGA mineral processing facilities:

- GN Gold Plant;
- GN Uranium Plant (also known as South Uranium Plant);
- GN Backfill Plant;
- Mispah Gold Plant;
- GN Central Smelt-house; and
- Nuclear Fuels Corporation of South Africa (NUFCOR).

These are all mature assets with substantial operating history.

SRK visited these and other AGA processing facilities between 08 and 14 June 2017. This section of the report addresses the metallurgical and mineral processing aspects relating to plant capacity, metallurgical performance, operating costs and capital expenditure of the AGA mineral processing assets included in the transaction.

5.3.2 Mineral Processing Facilities

Great Noligwa Gold Plant

Ore Sources

Until recently, ore from GN, MK and Kopanang underground mines was processed through the GN Gold Plant. With the closure of Kopanang Mine, future plant feed will principally comprise underground ore from the MK and GN Mines. Marginal ore could also be processed. Ore will be delivered via the extensive Vaal River rail transport system.

Processing Facility

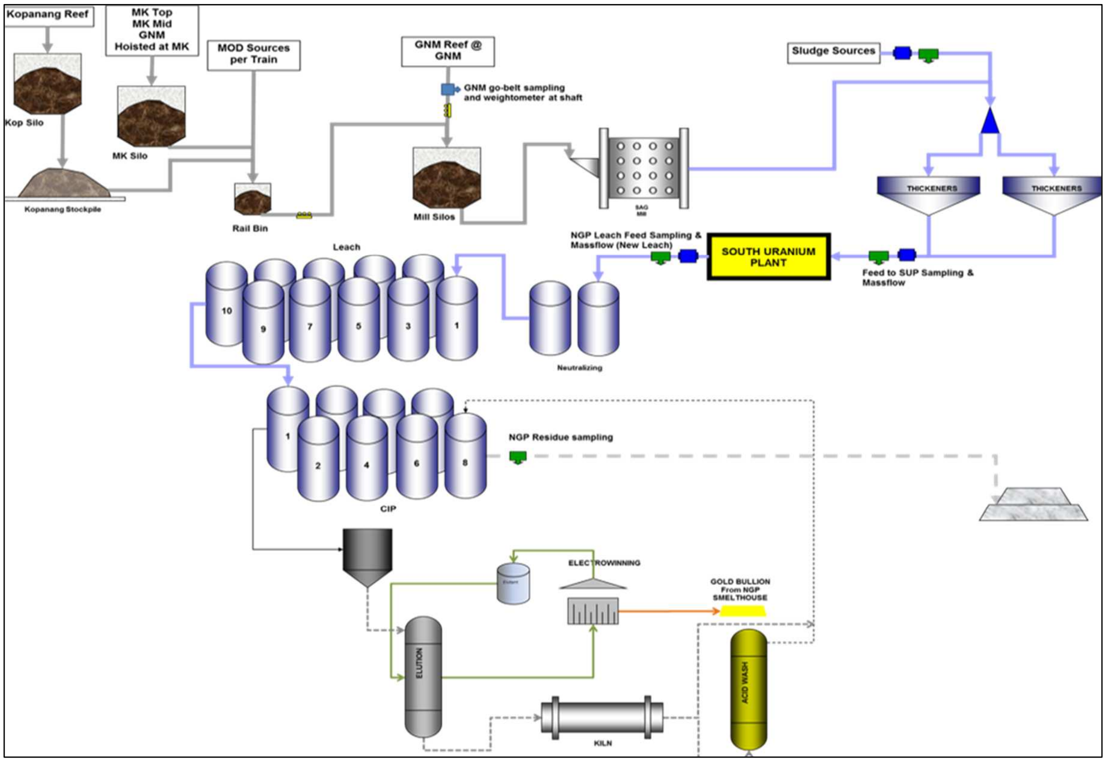
Underground ore is processed through the GN Gold Plant and the GN Uranium Plant in a so called Reverse Leach arrangement. Ore is milled in the Gold Plant then forwarded to the Uranium Plant for U_3O_8 extraction and returned to the Gold Plant for Au extraction. The GN Gold Plant was commissioned in 1971 and was originally designed to process 210 ktpm. Six mechanically agitated leach tanks were installed in 2003 as part of the Mill Upgrade Project. In 2004, two Run of Mine (RoM) mills replaced the conventional crushing and milling circuit.

The current GN Gold Plant has a capacity of 240 ktpm and includes the following unit processes:

- Ore receipt;
- RoM milling;
- Pre-leach thickening;
- Pumping of thickened pulp to the GN Uranium Plant for U_3O_8 extraction ahead of neutralisation and return to the Gold Plant;
- Mechanically agitated cyanide leaching;
- CIP adsorption;
- ZADRA elution and electrowinning;

- Carbon regeneration;
- Carbon acid wash;
- Smelting of electrowinning cathode sludge in the GN Central Smelt-house; and
- Backfill production and Tailings storage.

The schematic flow diagram of the GN Gold Plant is shown in Figure 5.13.



srk consulting	Schematic Flow Diagram – GN Gold Plant	Project No. 522673

Figure 5.13: Schematic Flow Diagram – GN Gold Plant

Great Noligwa Uranium Plant

Ore Sources

Thickened pulp from the GN Gold Plant is pumped to the adjacent GN Uranium Plant for extraction of U_3O_8 before being returned to the Gold Plant for Au extraction.

Processing Facility

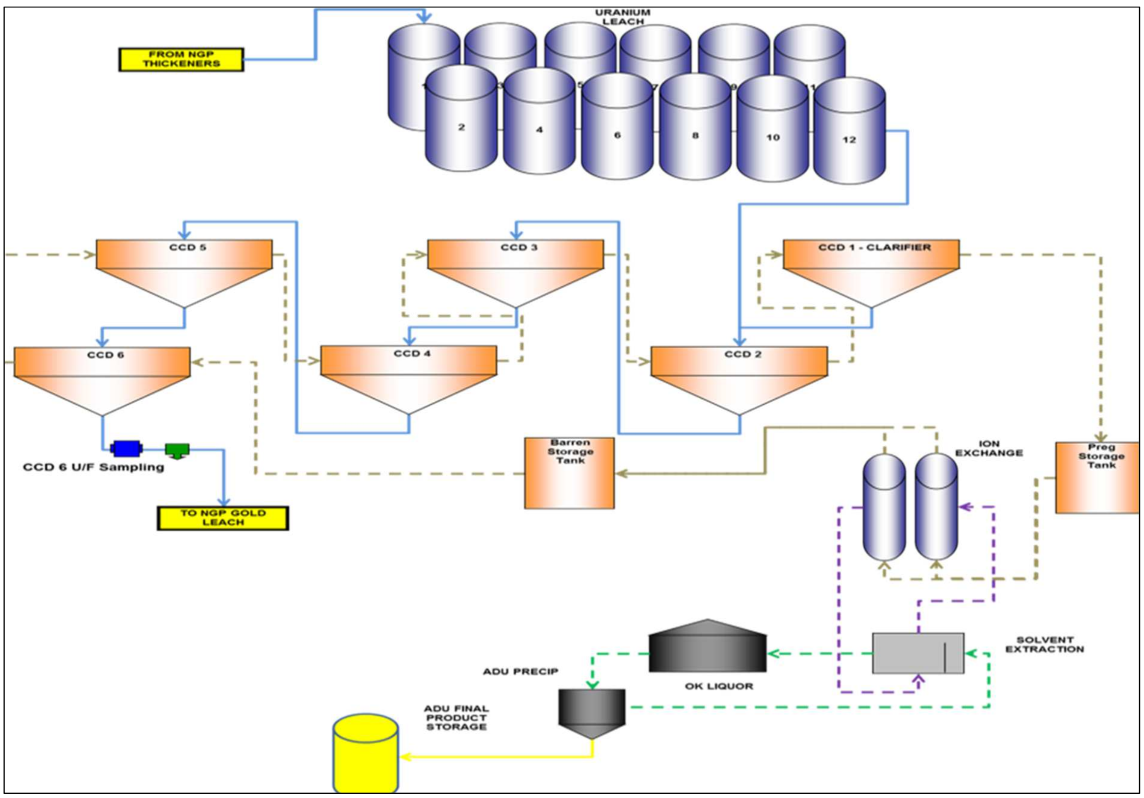
The GN Uranium Plant (also known as the South Uranium Plant) was commissioned in 1978 and was originally designed to process 200 ktpm. The plant was upgraded in 1991 to increase its capacity to 300 ktpm. In 2007, the Counter Current Ion Exchange (CCIX) circuit was commissioned.

The GN Uranium Plant includes the following unit processes:

- Leaching – Thickened slurry is received from the Gold Plant at RD of ±1.55 t/m^3. Sulphuric acid is added to leach the U_3O_8 in steam heated, mechanically agitated tanks.
- Counter Current Decantation (CCD) - The dissolved U_3O_8 is washed from the pulp in five CCD thickeners and one clarifier using barren solution from the CCIX section as wash water.

- Counter Current Ion Exchange (CCIX) – Dissolved U_3O_8 is loaded onto ion exchange resin in CCIX columns. U_3O_8 is eluted from loaded resin using sulphuric acid. Eluted resin is regenerated and returned to CCIX columns.
- Solvent Extraction (SX) - SX is used to further concentrate and purify the U_3O_8 in a counter current process of mixing and separation via settling of aqueous and organic solutions.
- Ammonium Diuranate (ADU) Precipitation – ADU is precipitated by adding aqueous ammonium hydroxide to the SX rich electrolyte. A multi-stage centrifuging system is used to reclaim ammonium sulphate and to wash out the impurities from the ADU.
- ADU filtration and despatch - The final ADU product, also known as yellowcake, is sent to NUFCOR for further processing.

The schematic flow diagram of GN Uranium Plant is shown in Figure 5.14.



srk consulting | Schematic Flow Diagram – GN Gold Plant | Project No. 522673

Figure 5.14: Schematic Flow Diagram – GN Uranium Plant

Backfill Plant

Feed Source

Tailings from the GN Gold Plant are processed through the GN Backfill Plant to produce backfill for underground mining support.

Processing Facility

The GN CIP residue is pumped to two backfill feed tanks that feed the primary cluster cyclones. The coarser cyclone underflow is the backfill product while the finer cyclone overflow is forwarded to tailings storage. The backfill product is pumped to the MK Mine for support in the stoping panels.

Typically backfill requirements are budgeted at around 8% of the CIP residue tonnage. Actual backfill provided to MK Mine has typically been around 5% of the CIP residue tonnage. The amount of fill used and needed will depend on the mining volumes but, with the addition of waste to the reef in the mills and given the spare capacity in the milling circuit, generally no supply bottlenecks are experienced.

Mispah Gold Plant

Ore Sources

Previously stockpiled MOD are processed through the Mispah Gold Plant.

MOD material is delivered by rail, truck and grasshopper conveyor.

Processing Facility

The Mispah Gold Plant was commissioned in 2006 with a design capacity of 140 ktpm. The circuit includes the following unit processes:

- Ore receipt;
- ROM milling;
- Pre-leach thickening;
- Mechanically agitated cyanide leaching;
- CIP adsorption;
- ZADRA elution and electrowinning;
- Carbon acid wash;
- Carbon regeneration;
- Smelting of electrowinning cathode sludge in the GN Central Smelt-house; and
- Tailings storage.

The schematic flow diagram of the Mispah Gold Plant is shown in Figure 5.15.

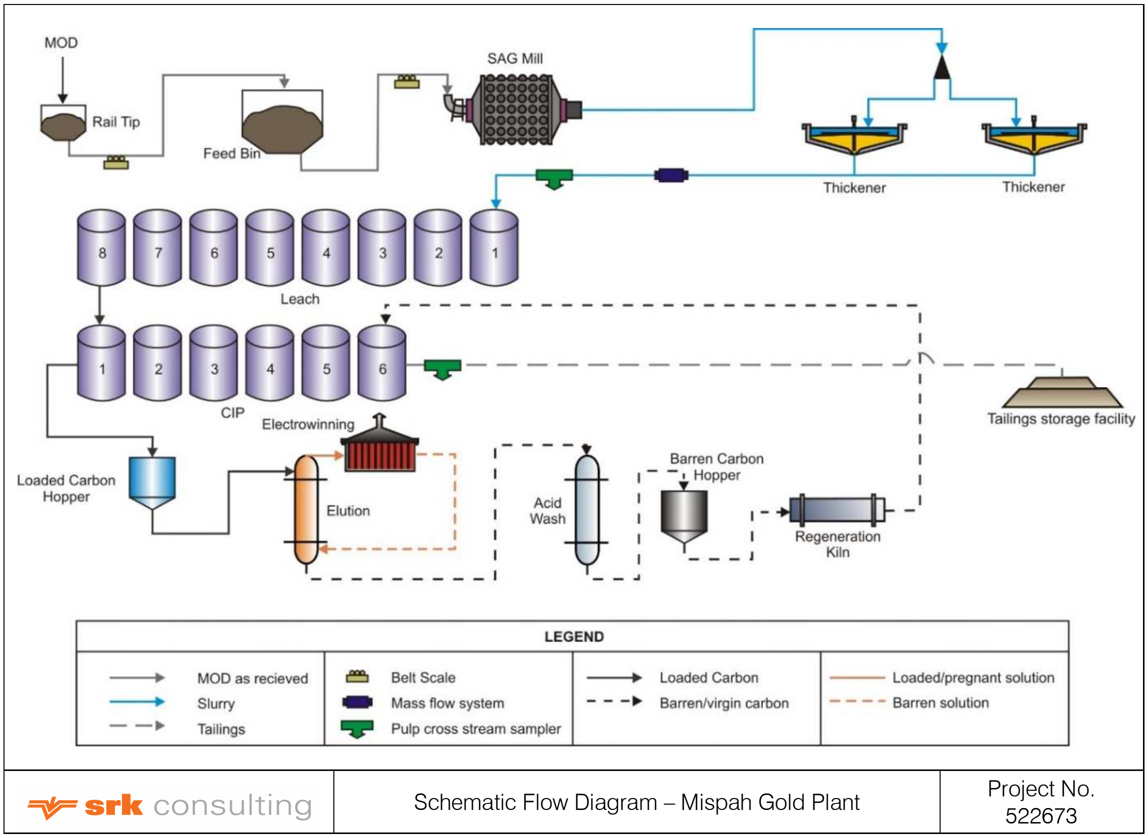


Figure 5.15: Schematic Flow Diagram – Mispah Gold Plant

Great Noligwa Central Smelt-house

Feed Source

The GN Central Smelt-house processes cathode slime from the GN Gold Plant and the Mispah Gold Plant.

Processing Facility

The GN Central Smelt-house includes the following unit processes:

- Electrowinning;
- Acid treatment of cathode sludge;
- Calcining of acid treated cathode sludge;
- Fluxing and smelting of calcined cathode sludge; and
- Doré despatch.

The smelt-house previously serviced the extensive VROs and should have more than adequate capacity for planned Au production.

NUFCOR

Feed Source

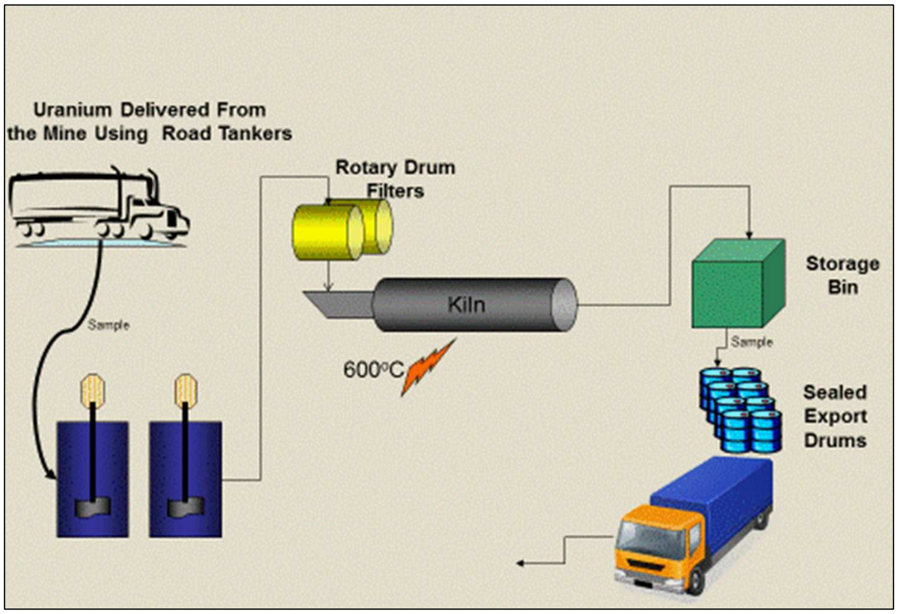
NUFCOR is wholly owned by AGA. The principal source of feed to NUFCOR is ADU produced at the GN Uranium plant, although toll treatment of third party ADU has occurred in the past and may occur in the future.

Processing Facility

The Nufcor processing facility is relatively simple comprising the following unit processes:

- ADU offloading and storage;
- Filtration;
- Drying;
- Calcining; and
- Packaging of U_3O_8 in drums.

The NUFCOR process flow diagram is shown in Figure 5.16.



srk consulting	NUFCOR process flow diagram	Project No. 522673

Figure 5.16: NUFCOR process flow diagram

5.3.3 Metallurgical Performance

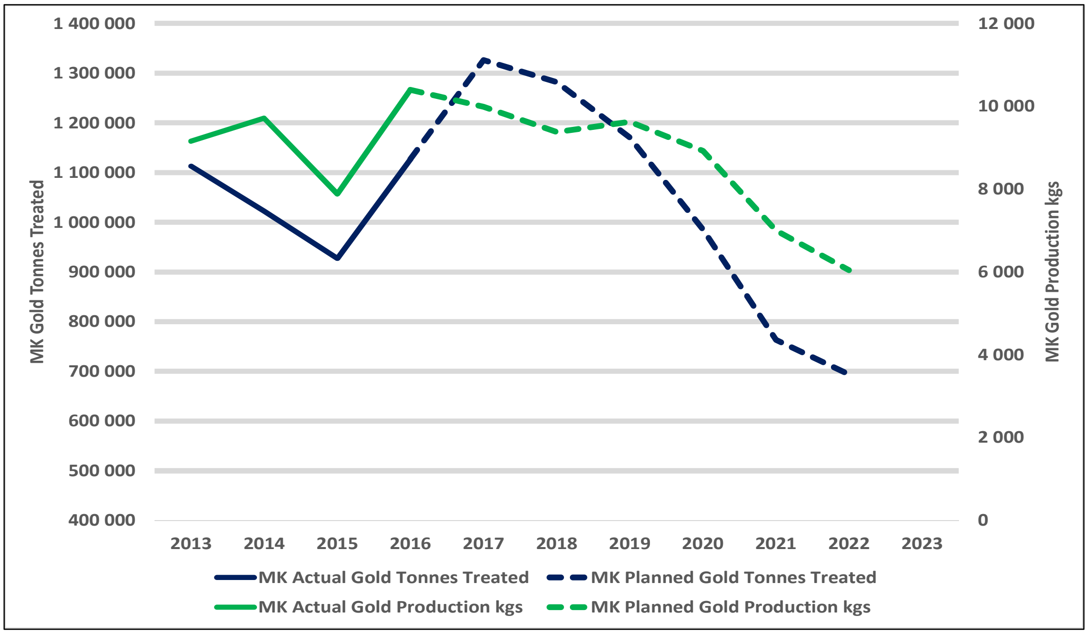
The mineral processing assets included in this transaction are mature and the metallurgical characteristics of future ore is unlikely to be significantly different from that processed in the past.

Great Noligwa Gold Plant

Underground ore is processed through the GN Gold Plant and the GN Uranium Plant in a so called Reverse Leach arrangement. This arrangement was motivated historically by a reported improvement in Au recovery of approximately 2% after U_3O_8 leaching with sulphuric acid.

The Au and U_3O_8 content in the delivered ore is separately accounted for using automatic belt samplers ("Go-Belt" samplers) at each shaft. The ores are milled and treated together and hence lose identity in the process. A detailed description of the metal accounting procedures is beyond the scope of this review but in essence the final Au and U_3O_8 recovered is back allocated to each ore source. Back allocation is done on the basis of the metal content in the delivered ore, to which ore specific recovery factors have been applied. The ore specific recovery factors in turn, have been developed through regression analysis of historical operating data.

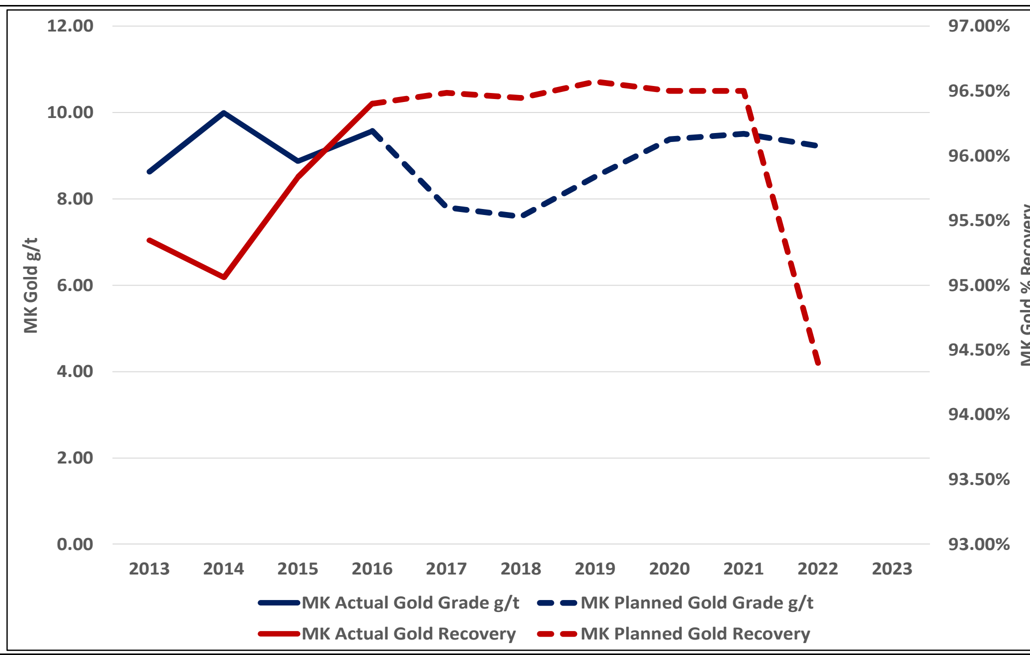
The metallurgical performance of MK Mine ore through the GN Gold Plant is shown Figure 5.17 and Figure 5.18 respectively.



srk consulting	Annual Actual and Planned Treated Tonnage (tonnes) and Au Production (kg)	Project No. 522673

Figure 5.17: MK Mine – Annual Actual and Planned Treated Tonnage (tonnes) and Au Production (kg)

It is seen that the feed tonnage and Au production increases sharply in 2017 and then drops steadily as the mine nears the end of its operating life.



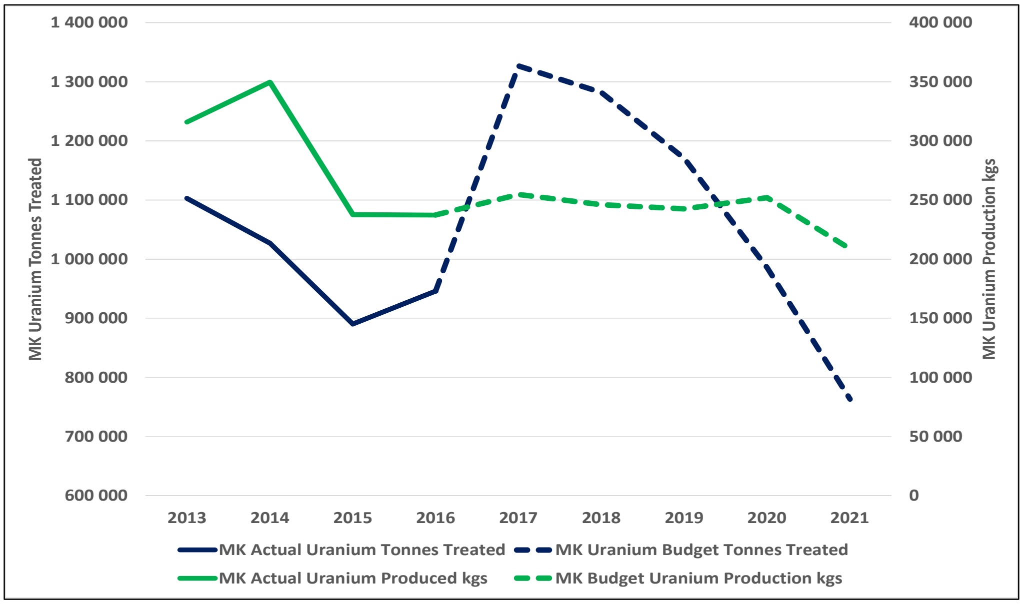
srk consulting	Annual Actual and Planned Au Grade (g/t) and Au Recovery (%)	Project No. 522673

Figure 5.18: MK Mine – Annual Actual and Planned Au Grade (g/t) and Au Recovery (%)

It is seen that the planned Au grade drops off initially but then increases to levels achieved recently. Au recovery is in line with recent achievements until the last year of operation.

Great Noligwa Uranium Plant

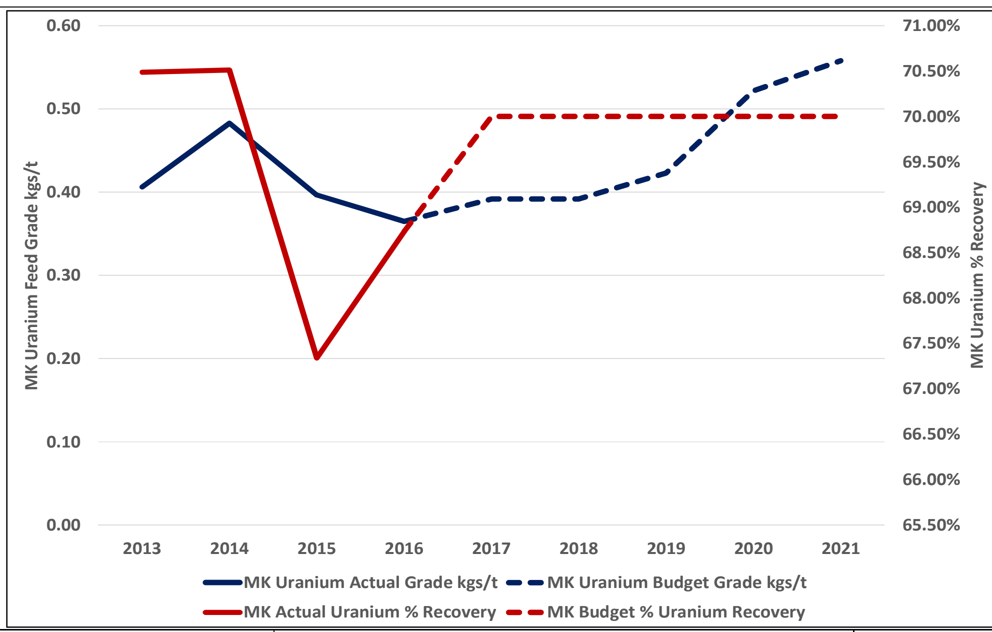
The metallurgical performance of MK Mine ore through the GN Uranium Plant is shown in Figure 5.19 and Figure 5.20 respectively.



srk consulting	Annual Actual and Planned Treated Tonnage (tonnes) and U_3O_8 Production (kg)	Project No. 522673

Figure 5.19: MK Mine – Annual Actual and Planned Treated Tonnage (tonnes) and U_3O_8 Production (kg)

It is seen that the feed tonnage increases sharply in 2017 and then drops steadily as the mine nears the end of its operating life. U_3O_8 production remains fairly steady largely due to increases in recovery and grade.



srk consulting	Annual Actual and Planned U_3O_8 Grade (kg/t) and U_3O_8 Recovery (%)	Project No. 522673

Figure 5.20: MK Mine – Annual Actual and Planned U_3O_8 Grade (kg/t) and U_3O_8 Recovery (%)

It is seen that the planned U_3O_8 grades increase over the remaining mine life. Recoveries are constant and in line with historical achievements.

Mispah Gold Plant

Three plants have historically processed MODs namely, Kopanang, Mispah and West Gold. Metallurgical performance was historically presented for the combined MOD plants. It is anticipated that Harmony will process MOD material through the Mispah Gold Plant but this was not included in the technical-economic model provided for review. We have accordingly not included an analysis of production or costs associated with the processing of MODs.

5.3.4 Process Operating Costs

Great Noligwa Gold Plant

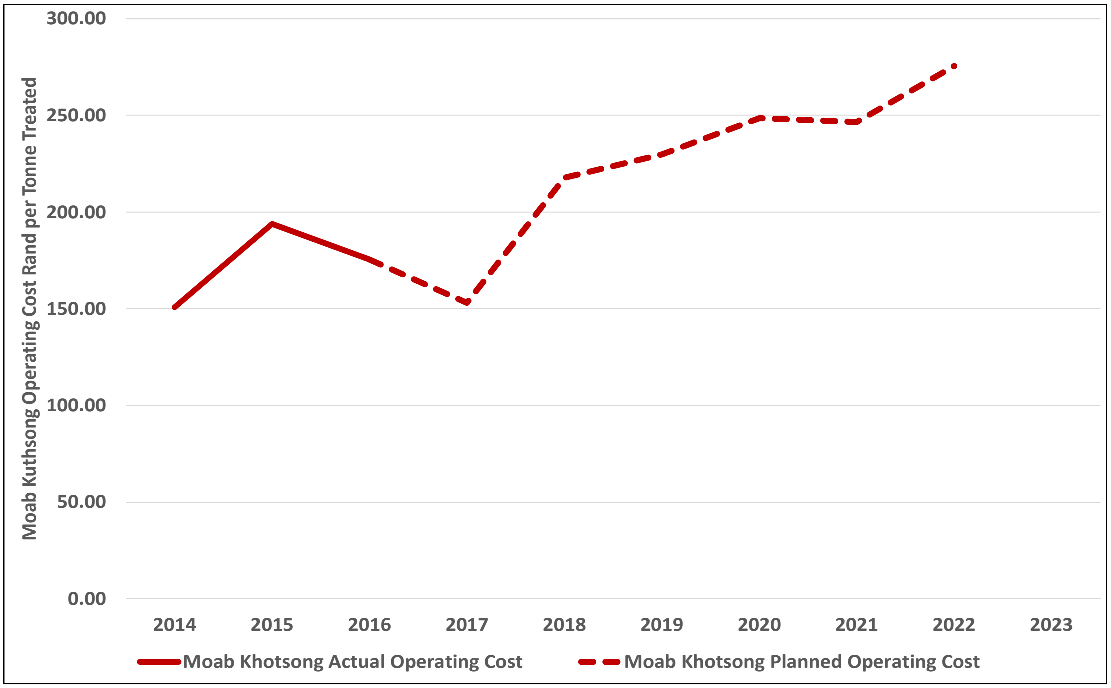
For the purpose of technical-economic evaluation, Harmony undertook an activity based estimate of Au processing costs based largely on their experience of operating other similar plants. Estimated Au processing costs expressed in nominal terms per unit of tonnage ore milled are summarised in Table 5.14.

Table 5.14: Au Processing Costs (nominal per unit tonnage milled)

Activity	2014 ZAR/tonne	2015 ZAR/tonne	2016 ZAR/tonne	2017 ZAR/tonne	2018 ZAR/tonne	2019 ZAR/tonne	2020 ZAR/tonne	2021 ZAR/tonne	2022 ZAR/tonne
Gold Plant									
Fixed									
Labour				30.99	34.30	40.20	51.10	70.61	83.03
Contractors				0.45	0.50	0.59	0.75	1.03	1.21
Power				20.51	23.38	28.22	35.87	49.57	58.28
General				7.16	7.93	9.29	11.81	16.32	19.19
Variable									
Consumables				50.93	50.93	50.93	50.93	50.93	50.93
Subtotal				*110.03*	*117.04*	*129.23*	*150.45*	*188.45*	*212.65*
Smelt-house									
Fixed									
Labour				2.41	2.67	3.13	3.98	5.50	6.46
Contractors				0.08	0.08	0.10	0.12	0.17	0.20
Power									
General				0.23	0.25	0.29	0.37	0.52	0.61
Variable									
Consumables				3.77	4.17	4.89	6.22	8.59	10.10
Subtotal				*6.48*	*7.18*	*8.41*	*10.69*	*14.77*	*17.37*
Backfill									
Fixed									
Labour				2.74	3.03	3.55	4.51	6.24	7.34
Contractors									
Power				1.60	1.83	2.20	2.80	3.87	4.55
General				0.75	0.83	0.98	1.24	1.72	2.02
Variable									
Consumables				3.79	3.79	3.79	3.79	3.79	3.79

Activity	**2014 ZAR/tonne**	**2015 ZAR/tonne**	**2016 ZAR/tonne**	**2017 ZAR/tonne**	**2018 ZAR/tonne**	**2019 ZAR/tonne**	**2020 ZAR/tonne**	**2021 ZAR/tonne**	**2022 ZAR/tonne**
Subtotal				*8.88*	*9.48*	*10.52*	*12.35*	*15.62*	*17.70*
Other									
Fixed									
Additional Labour					56.23	53.82	47.18		
Variable									
Vaal River Laboratory				4.00	4.00	4.00	4.00	4.00	4.00
Metallurgical Management				0.24	0.24	0.26	0.29	0.29	0.28
Vaal River Tailings				8.50	8.50	8.50	8.50	8.50	8.50
Rail Transport				15.00	15.00	15.00	15.00	15.00	15.00
Subtotal				*27.74*	*83.96*	*81.58*	*74.97*	*27.79*	*27.78*
TOTAL (nominal)	**150.84**	**193.81**	**175.49**	**153.14**	**217.67**	**229.75**	**248.47**	**246.64**	**275.50**
TOTAL (real)	**150.84**	**193.81**	**175.49**	**148.40**	**198.05**	**197.21**	**201.20**	**188.42**	**198.55**

Historical costs were not provided for review in the same format or at the same level of detail. Total actual and planned process operating costs (nominal per ton) for MK Mine ore processed through the GN Gold Plant are shown in Figure 5.21.



srk consulting	Actual and Planned Au Processing Costs (nominal per tonne)	Project No. 522673

Figure 5.21: MK Mine – Actual and Planned Au Processing Costs (nominal per tonne)

Unit operating costs are seen to increase in nominal terms due to Consumer Price Index (CPI) increases but also due to reduced throughput.

Great Noligwa Uranium Plant

Actual and planned process operating costs (nominal per tonne) for MK Mine ore processed through the GN Uranium Plant plus NUFCOR are shown in Figure 5.22.

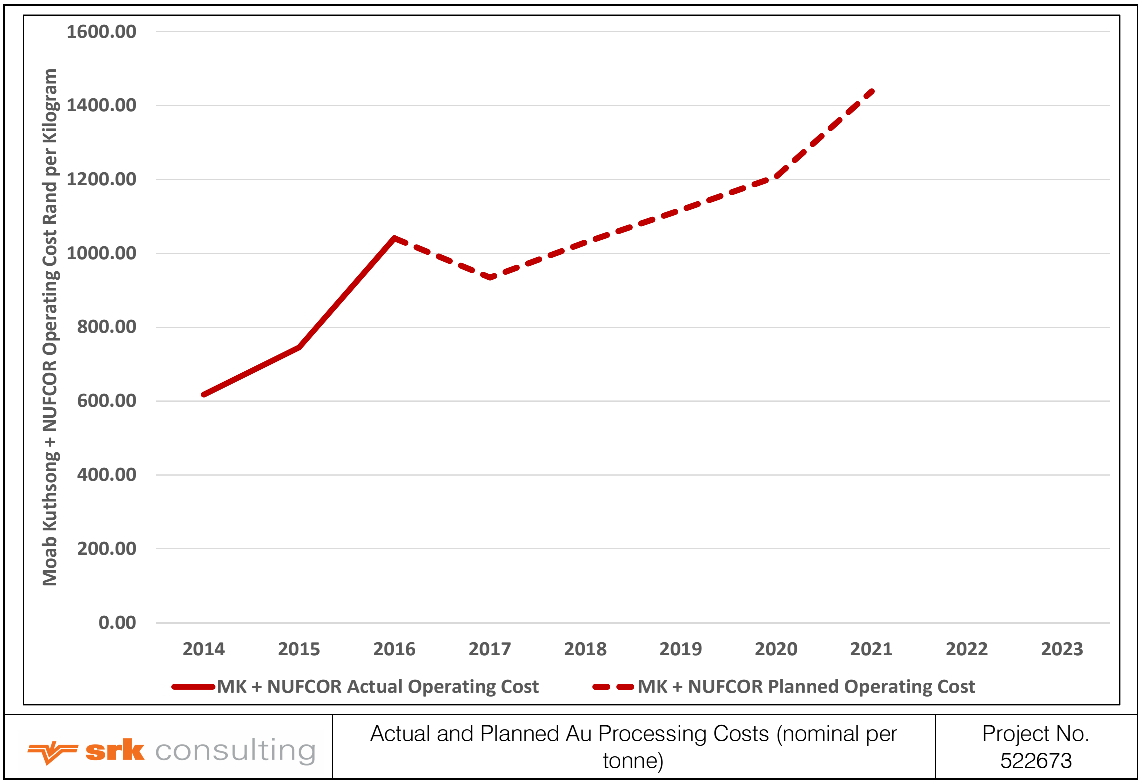


Figure 5.22: GN U_3O_8 – Actual and Planned U_3O_8 Processing Costs (nominal per kilogram)

Unit operating costs are seen to increase in nominal terms due to CPI increases but also due to reduced throughput.

Mispah Gold Plant

It is anticipated that Harmony will process MOD material through the Mispah Gold Plant but this was not included in the technical-economic model provided for review. We have accordingly not included an analysis of production or costs associated with the processing of MODs.

Backfill Plant

Backfill costs are included in Total GN Gold Plant costs shown in Table 5.14.

Noligwa Central Smelt-house

GN Central Smelt-house costs are included in Total GN Gold Plant costs shown in Table 5.14.

NUFCOR

The operating costs of NUFCOR were included in the overall U_3O_8 production cost shown in Figure 5.22.

5.3.5 Process Capital Expenditure

SRK is not aware of any material capital projects planned at the mineral processing assets included in the transaction.

5.3.6 SRK Comments

The mineral processing assets included in this transaction are generally in fair condition, with capacity that generally exceeds the planned throughput requirements.

Surplus capacity is likely however, to impact negatively on operating costs. This has been acknowledged in projected operating costs but there is a risk that process operating costs may increase at reduced throughput. It will accordingly be important to minimise overheads. There may, however, be an opportunity to manage operating costs as throughput reduces by shutting down surplus capacity.

The metallurgical characteristics of planned ore is unlikely to be significantly different from that processed in the past. Should ore with inferior metallurgical characteristics be introduced, however, Au recovery would be negatively influenced. In this regard the metallurgical characteristics of any new ore types should be investigated in advance.

There is a risk that Au recoveries will be lower than planned in periods of lower Au grade.

U_3O_8 processing is currently not profitable. Ongoing operation has been motivated by a historically observed improvement in Au recovery of approximately 2% after U_3O_8 leaching with sulphuric acid. There is accordingly a risk that Au recovery would drop should U_3O_8 processing be discontinued. It is recommended that forward leach be compared with reverse leach and the optimal process route be selected.

It is likely that Harmony will process Marginal Dump Ore through the GN and Mispah Gold Plants. This has not been included in the technical-economic model and accordingly may represent upside potential.

5.4 Engineering Infrastructure

[SR5.4 (i) (ii)] [SV1.10]

At the existing mining operations, access to the operating sites is well established via a network of national highways and local tarred roads.

Underground mining operations at MK Mine comprise access infrastructure to convey personnel, materials and equipment to and from the working areas and associated services to support mining operations. Underground Infrastructure includes shafts, footwall haulage levels, cross-cuts and declines/inclines. Infrastructure required for ore flow and services include rock passes, conveyor belts, rail conveyances, crushing stations, ore bins, loading stations, water dams, pump stations, backfill stations, backfill transportation and placement systems, ventilation fans and refrigeration plant, workshops and GN Mine are managed from MK Mine and all personnel working underground at GN Mine access the working areas from MK Mine. The GN Mineral Reserves are now incorporated into the MK Mineral Reserves and only essential services are maintained in the GN shaft, in order to keep it open for pumping, ventilation and emergency egress.

Surface infrastructure includes headgears and winding systems, primary ventilation and refrigeration plants, process facilities, office blocks and training centres, workshops and stores, lamp rooms, change houses and accommodation. There are also a number of services and supply centres. These include compressed air supply stations and workshops at the shaft and the GN Mine processing complex for repairs to plant and equipment. There is a compressed air ring main connecting MK, GN and Kopanang Mines.

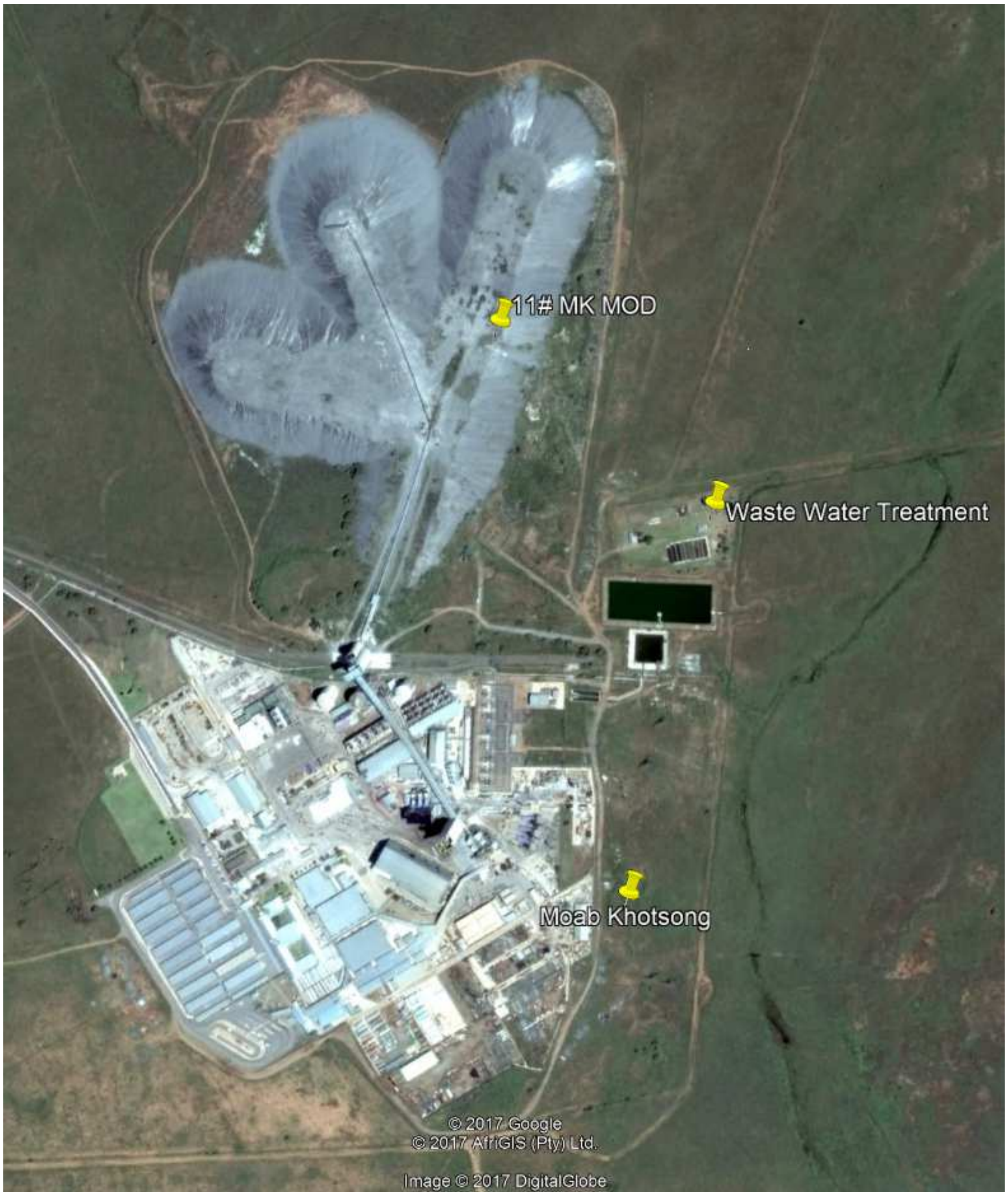
In addition to production infrastructure above, the assets include the following infrastructure:

- Shaft based Primary Healthcare Centres;
- Low density accommodation units and associated infrastructure in the Vaal River Village, the uMuziMuhle Village and properties in Klerksdorp and Orkney;
- MWC;
- The GN Processing Plant infrastructure;
- High density accommodation units at GN, the Vaal River Boarding House, the East Single Quarters and the Vaal Lodge;
- The Vaal River District Offices;
- The Gateway Training Centre, the Trackless Mining Training Centre and the ATDS Engineering Training Centre;
- The Vaal River Regional Services related to MK and GN Mines including compressed air, waste management, outside services, potable water, road transport including the transport yard and the blacksmith shop, sewerage plants, surface lighting and all related infrastructure;
- The SAMTS Office;
- The Central Warehouse situated in the GN Uranium Plant;
- All critical spares relating to MK, GN and the GN plant complex; and
- All infrastructure at NUFCOR (Pty) Limited.

In conjunction with planned maintenance programmes including specific remedial action and expenditure of projected ongoing capital allowances, the current infrastructure is considered by SRK to be adequate to satisfy the requirements of the LoM plans.

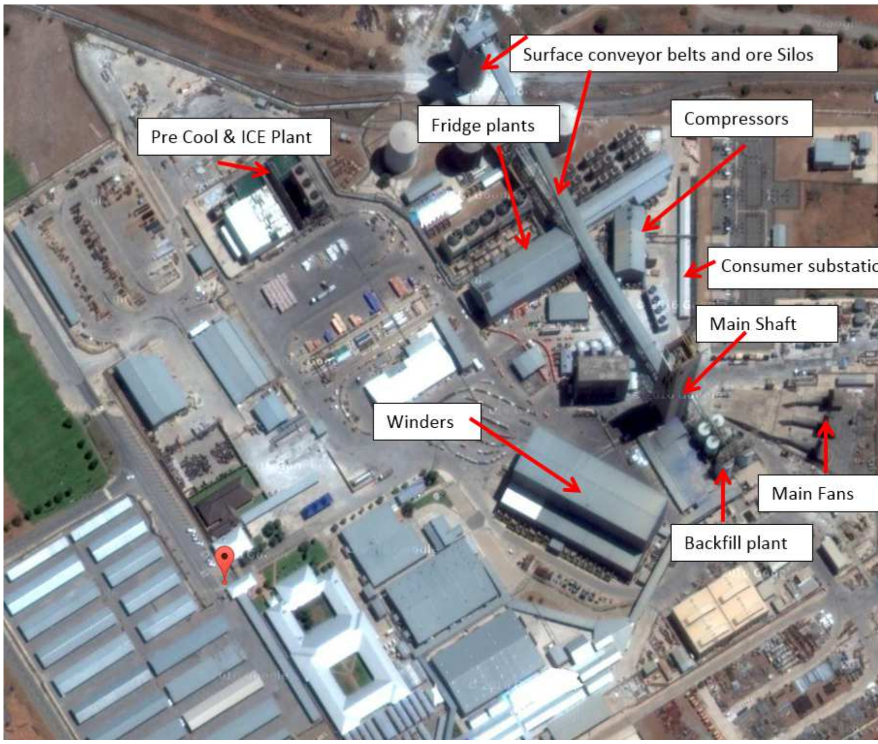
5.4.1 Moab Khotsong Mine

The MK Mine surface footprint is shown in Figure 5.23. The main operational surface infrastructure is shown in Figure 5.24 and a section through the MK and GN Mines is shown in Figure 5.25.



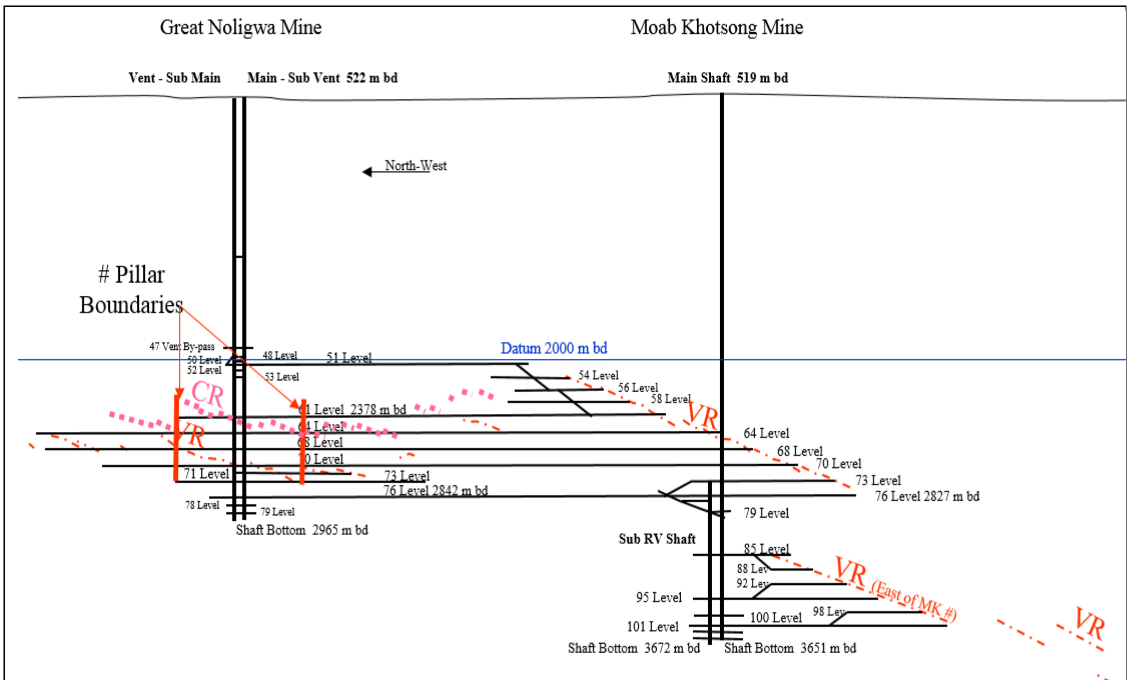
srk consulting	MK Mine surface footprint	Project No. 522673

Figure 5.23: MK Mine surface footprint (Source: Google Earth – image date 9 February 2017)



srk consulting	MK Mine main surface infrastructure	Project No. 522673

Figure 5.24: MK Mine main surface infrastructure (Source: AngloGold Ashanti)



srk consulting	Section through MK and GN Mines	Project No. 522673

Figure 5.25: Section through MK and GN Mines (Source: AngloGold Ashanti)

Moab Khotsong Shafts

MK Mine underground operations are accessed by the surface vertical Main Shaft, 3 106 m deep. The shaft is partitioned with a concrete brattice wall from surface to below 77 Level, with downcast fresh air in the winding compartments, with an upcast return air section behind the brattice wall.

From surface to below 77 Level, the shaft contains two 3-deck man/material conveyance compartments with capacity for 58 persons per deck, two 4-deck service conveyance compartments with capacity for 18 persons per deck, and two rock conveyance compartments with capacity for 18 tonne payloads.

Below 77 Level, the 10.5 m diameter shaft reduces to 6.8 m diameter to accommodate the man/material conveyances, which travel from surface to 102 Level at 3 102 m below surface.

The surface double drum rock winder operates at a maximum speed of 16 m/s and has a design hoisting capacity of 5 760 t per day or approximately 150 ktpm, based on 26 days per month, which is well within the planned maximum hoisting capacity of approximately 107 ktpm reef and waste over the LoM.

From below 76 Level down to 101 Level, ore and waste from the Middle Mine and the Lower Mine is hoisted through a Rock/Ventilation Sub Vertical Shaft (RV Shaft). This 8.5 m diameter shaft is bratticed with an unequipped upcast ventilation section and a downcast section equipped with two 13 t capacity rock conveyance compartments and one 2-deck service conveyance with capacity for 50 persons per deck.

The RV Shaft double drum rock winder operates at a maximum speed of 15 m/s and has a design hoisting capacity of 6 552 tpd or approximately 170 ktpm, based on 26 operating days per month, which is well within the planned maximum hoisting capacity of 107 ktpm reef and waste over the LoM.

In addition, there is a 2.4 m diameter raise bored dedicated backfill shaft from 64 Level to 76 Level containing ten 80 mm diameter backfill ranges, with space for 18 more ranges, and a maintenance conveyance. Emergency second outlet is via internal access up to 76 Level and then via 76 level and 70 Level to GN Mine Main Shaft. An alternative second outlet is currently via 70 Level from GN to Kopanang Mine.

Moab Khotsong Services

The majority of services are reticulated through MK Mine Main Shaft to the various levels. Main Shaft accommodates chilled cooling/service water pipe columns, hot water return pipe columns, backfill ranges down to 64 Level, electrical feeder cables and communication systems.

The RV Shaft accommodates backfill ranges from 76 Level to the selected levels requiring backfill. Compressed air is supplied by one 30 000 cfm Sulzer compressor and one 60 000 cfm Demag compressor. In addition, MK Mine is connected to a surface ring feed that includes the compressors at GN and Kopanang Mine. MK Mine also currently receives compressed air from GN on 76 Level.

The water reticulation at MK Mine is complex and the infrastructure consists primarily of:

- Ice and chilled water plants on surface;
- A dual Three Chamber Pipe Feeder System (3CPFS) on the intermediate pumping level (1 200 Level) with hot water dams and chilled water dams;
- A dual 3CPFS on 77 Level with hot water dams and chilled water dams;
- Closed circuit chilled water cooling/service water reticulation to the operating levels;
- Settlers and mud handling on 76 Level; and

- Settlers, mud handling and clarified hot water pumping on 102 Level.

Chilled water and ice are used for cooling by means of a bulk air cooler on surface and strategically placed cooling car banks underground. Service water is normally abstracted from the return side of the cooling cars.

Classified uncemented hydraulic backfill is provided on surface from the backfill preparation plant at the GN Plant Complex and this reports to the backfill storage tanks at the MK Main Shaft bank. The backfill is conditioned and reticulated through backfill ranges in the Main Shaft to a storage facility at 64 Level. From 64 Level a dedicated raise bored backfill shaft contains ranges that reticulate backfill to the working levels though the RV shaft. The underground system is designed to reticulate the uncemented backfill by gravity under full flow conditions.

Historically, MK Mine has received sufficient backfill from GN Mine to meet its needs. SRK, however, recommends that an updated mass balance be prepared to ensure that sufficient backfill will continue to be available in the future. SRK is aware that there have been historical instances of poor quality due to degradation of the backfill in the reticulation, which SRK understands have been resolved.

Conventional underground tracked equipment is used to transport rock on the levels for discharge into tips over ore passes. Persons reach their underground working places through the shafts and, depending on the location, by foot, man carriages and chairlifts. Conveyor systems are used to transfer ore and waste from the RV Shaft to the Main Shaft and on the loading level.

5.4.2 Great Noligwa Mine

The GN Mine surface footprint is shown in Figure 5.26. The main operational surface infrastructure is shown in Figure 5.27. A section through the MK and GN Mines is shown in Figure 5.25.

srk consulting	GN Mine surface footprint	Project No. 522673

Figure 5.26: GN Mine surface footprint

Figure 5.27: GN Mine surface footprint (Source: AngloGold Ashanti)

Great Noligwa Shafts

The Surface Main Shaft at GN Mine is situated directly above a Sub Ventilation Shaft and the Surface Ventilation Shaft is situated directly above a Main Sub Vertical shaft. The two shaft centrelines are approximately 76 m apart. On 51 Level, the upcast ventilation crosses from the sub Ventilation Shaft to the Surface Ventilation Shaft, and on the same level, but separately from the upcast ventilation, services, rock, persons and material cross over the other way. All the shafts are 8.5 m diameter. Figure 5.28 shows the GN Shaft configuration.

Both surface shafts are 1 451 m depth and both sub vertical shafts are 991 m depth. The Main Shaft is equipped with two 3-deck man/material conveyance compartments with capacity for 50 persons per deck and two rock conveyance compartments with capacity for 25 tonne payloads. The Sub Ventilation Shaft is bratticed and the downcast section is equipped with two 3-deck service conveyance compartments with capacity for 24 persons per deck.

The Surface Ventilation Shaft is equipped with two 3-deck service conveyance compartments with capacity for 35 persons per deck and the Sub Vertical Main Shaft is equipped with two 2-deck man/material conveyance compartments with capacity for 50 persons per deck, two rock conveyance compartments with capacity for 15 tonne payloads and a compartment for an Otis winder and counterweight.

All rock winders run at a maximum speed of 15 m/s, all man winders run at a maximum speed of 10 m/s and all service winders run at a maximum speed of 5 m/s. The Main Shaft Rock Winder has a design hoisting capacity of 14 112 tpd or approximately 367 ktpm, based on 26 days per month, and the Sub Vertical main Shaft Rock Winder has a design capacity of 13 920 tpd or approximately 360 Mtpm, based on 26 days per month.

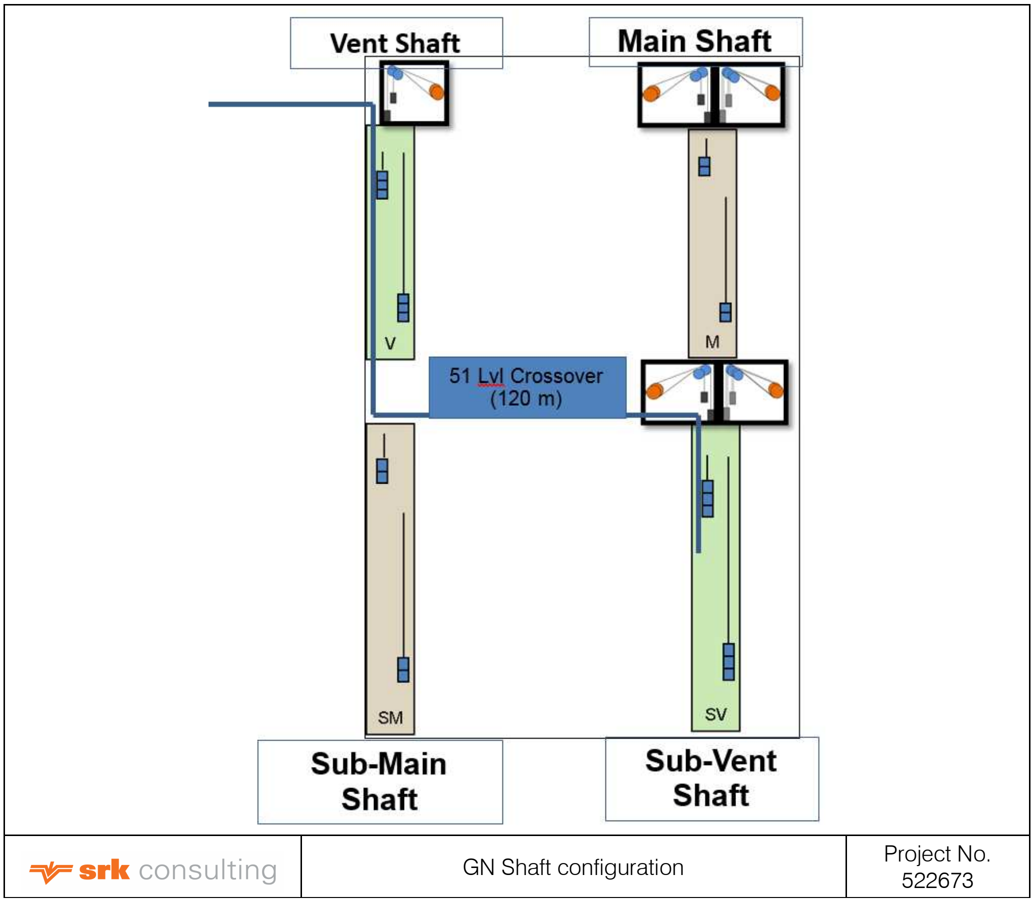


Figure 5.28: GN Shaft configuration

Great Noligwa services

GN Mine has the capacity to supply the following underground services:

- Ventilation: Three main fans are installed on surface. Two fans are normally running with one fan on standby. Each fan is capable of providing 350 m^3/s air. Each fan motor rating is 2.24 MW;
- Surface refrigeration to a bulk air cooler: The total plant cooling capacity is 22 MWr;
- Underground refrigeration plant: There are four Hitachi HM20 machines and one York machine, providing 14 MWr and 3.3 MWr respectively, situated on 61 Level;
- Potable water storage: GN Shaft receives potable water from the AGA Vaal River reservoirs and the ring feed pipeline;
- Compressed air: Three 40 000 cfm Brown Boveri VWS715 compressors are installed. This air is connected to 76 Level MK Mine and the surface ring feed;
- Dewatering: Settlers and dams on 76/78 Levels, main dewatering pumps on 78 Level, transfer dam, pumps and refrigeration plant feed on 61 Level and transfer dams and pumps on 3000 Level pumping to surface. Mud pumping utilises single acting reciprocating Triplex plunger sludge pumps;
- Chilled water is reticulation on 61 Level and below with closed circuit cooling cars distributed around the mine. Service water is supplied from the return side of the cooling cars;

- Four chairlifts are installed in series from 51 Level down to 68 Level with a nominal capacity of 600 persons per hour;
- Conventional Trident battery locomotives are used in the Top Mine, and one Goodman double header 27 t trolley locomotive;
- Three booster fans are installed, two at 210 kW and one at 315 kW; and
- The systems for conveying ore underground and on surface have been decommissioned, as GN Mine is no longer hoisting rock.

5.4.3 Margaret Shaft

Margaret Shaft is a rectangular section timbered shaft with a concrete headframe. The shaft extends from surface to 18 Level at 1 293 m below collar. A pump station is installed at 16½ Level, 1 273 m below collar and another pump station is installed at 10½ Level, 919 m below collar. The shaft is a pumping shaft only, for the purpose of controlling the ground water level in the region.

Eight pumps are installed on 10½ Level connected to five shaft columns which discharge on surface. Six pumps are installed on 16½ Level connected to three shaft columns which discharge on 10 Level. Pumping volumes are approximately 50 Ml/day.

The shaft is equipped with two double drum man winders for transporting pump operators, maintenance personnel and equipment. The original headframe mounted Koepe winder has been removed.

There are no nearby operating shafts, hence there is no emergency escape route if the shaft is damaged or inoperable. In 2006, MWC applied to the Department of Minerals and Energy for an extension to the exemption from the relevant regulation regarding outlets and travelling ways, but by that time, the regulations had been repealed. As a result of that, MWC performed an Issue Based Risk Assessment and this was followed by a number of revisions, culminating in a 5^{th} revision in November 2014. As a result of those risk assessments, a number of emergency procedures were put in place. In July 2015, SRK was engaged by MWC to assist in a further risk assessment, which resulted in additional recommendations which have not been subsequently audited.

5.4.4 Other Surface Infrastructure

Other surface infrastructure, excluding process plants and TSFs, comprises:

- All unincorporated low density accommodation units and associated infrastructure in the Vaal River Village and uMuziMuhle Village;
- Low density units and properties housing people working at GN and MK Mines, but situated in Klerksdorp and Orkney;
- High density accommodation units, specifically the GN Mine residencies, including visiting wives centre, the Vaal River Boarding House, the East Single Quarters and the Vaal Lodge;
- All infrastructure forming part of the Vaal River Regional district offices, as situated on the mining rights areas of MK and GN Mines;
- The Gateway Training Centre and the Trackless Mining Training Centre, both on the mining rights area of MK and GN Mines;
- Security equipment and infrastructure, excluding the helicopter, related directly to MK Mine, GN Mine and the GN Plant Complex;

- Vaal River Regional Services which relate directly to MK Mine, GN Mine, GN Plant Complex and related infrastructure, specifically:
  - Compressed air services;
  - Waste management;
  - Outside services;
  - Potable water;
  - Road transport, including the Transport Yard and Blacksmith Shop;
  - Sewerage Plants; and
  - Surface lighting.
- The SAMTS offices and infrastructure;
- The central warehouse at the GN Uranium Plant as well as consumables and critical spares relating to GN Mine and MK Mine; and
- All infrastructural assets of NUFCOR (Pty) Ltd.

5.4.5 Zaaiplaats Project Infrastructure and Capital

The infrastructure for Zaaiplaats Project is described in "AngloGold Ashanti Vaal River Mine Growth Opportunity Pre-Feasibility Study", prepared by Advisian in January 2017 and is summarised below directly from the PFS:

The existing mine infrastructure is planned to be used during the project development phase and for the duration of the LoM. As most of this infrastructure will be expected to continue operating for a significant time period exceeding its original design life, a reliability and maintainability strategy will have to be defined going forward. This would include detailed condition assessments of critical systems and a programme for replacement for the duration of the production period.

The following is a high level summary of the main new infrastructure areas required for the new project mining area. The detailed assumptions and description of the new services, installations, etc. are described in more detail in the PFS infrastructure Section 3.6.

- A quadruple heading (haulages and RAW) and all associated development consisting of connecting cross-cuts and muck bays from the eastern access in a south-westerly direction towards the Zaaiplaats Project orebody;
- Diagonal development from the 101 Level main station, consisting of a twin heading (haulage and RAW) and all associated development to access Area A;
- Two vertical shafts to access the Zaaiplaats Project orebody;
- Development on five levels (103, 105, 108, 111 and 114 Levels) from the shaft stations to the east – west breakaways; and
- Utilities on Levels 101, 103, 105, 108, 111, 114, 115 and 116.

The PFS indicates a project capital requirement of ZAR11.63 billion from 2018 to 2030, Mineral Reserve Development of ZAR16.14 billion from 2022 to 2040, and sustaining capital varying from 1.3% to 5.5% of operating costs.

Key Assumptions made in the PFS

- No major additional or modified infrastructure required to the existing infrastructure;

- Extent of the underground operations will remain within the existing mining rights issued;
- No additional Waste Rock Dump would be established. The establishment of a new waste rock dump would require extensive EIAs and amendment/addendum to the Vaal River EMP and result in increased closure liability. The lead-time for regulatory approval could be up to two years;
- The current TSF would be adequate to cater for the extended life of MK. The establishment of a new TSF would require extensive EIAs and amendment/addendum to the Vaal River EMP and result in increased closure liability. The lead-time for regulatory approval could be up to two years;
- Should any major changes be made to the required quantities and/or qualities of water required for the project, or should any major water intersection result from the project, appropriate provision should be made in the Vaal River water balance. If justified in terms of volume and/or quality requirements, consideration might have to be given to expansion in water holding capacity, treatment or other engineering controls. In addition, this would require potential changes to the Vaal River Water Use Licence/Exceptions as issued by the Department of Water Affairs; and
- The existing flooding risks resulting from potential inter-mine flooding and the longer term decant issues post mine closure might be extended and inflated by the extended LoM for MK. The "last man standing" scenario would require appropriate institutional arrangement to be established well before mine closure – issues currently being addressed for existing operations as part of regional closure planning in the larger Vaal River area.

Disclaimer

The contribution of the Zaaiplaats Project to the viability of the MK-GN assets is considered to be marginal at best and therefore, has not been included in the financial model presented or the valuation of the assets. SRK has therefore not interrogated or reviewed the PFS and cannot opine on the adequacy of the proposed design and the accuracy of the capital estimation.

If it is decided to proceed on the basis of this study, it will be necessary to upgrade the PFS to a full feasibility in order to finalise the project design and financial parameters.

5.4.6 Power Supply

General

All power supply agreements for MK Mine, GN Mine, NUFCOR plant, GN and Mispah plant and South Uranium plant that are currently in place between AGA and Eskom, will have to be renegotiated and transferred to Harmony during the asset transfer phase.

Moab Khotsong Mine

The current agreed Notified Maximum Demand with Eskom is 77.5 MVA, with reviewed electricity bills indicates that the mine on average had power consumption of 71.75 MVA. There is an installed capacity of 8 x 132/6.6 kV 20 MVA transformers at the main electrical consumer substation. There is sufficient power supply at the mine to cater for the LoM requirements.

MK Mine is also connected to an emergency ring network supplied by emergency generators located at MK Mine and old V Reef No.1 shaft. There are 2 x 5 MVA emergency generators that can supply sufficient power in an emergency to provide for surface ventilation fans, pumping at MK Mine and emergency winding of men out of the mine. There is also an additional 200 kW 400V shaft emergency generator.

Great Noligwa Mine

There is an installed capacity of 6 x 132/6.6 kV 20 MVA transformers at the main electrical consumer substation. Although GN Mine is currently under care and maintenance, the installed power supply capacity has previously proven to be sufficient to supply full power requirements during the full production period of the mine, and is thus deemed enough to supply any future power requirements should the mine be brought back into production.

GN Mine is also connected to an emergency ring network supplied by emergency generators located at MK Mine and the old V Reef No.1 shaft. In addition to the emergency ring network, the shaft does have an additional 3 x 132 kW generators for local power supply in the event of an Eskom failure to supply the following:

- Surface offices;
- Surface winders; and
- Underground winders.

Zaaiplaats Project

A complete load list for the existing infrastructure and new Zaaiplaats Project was created and the results were the following:

- Existing mine infrastructure connected load : 100.95 MVA;
- New Zaaiplaats Project connected load : 21.26 MVA; and
- Total mine connected load : 122.21 MVA.

It can be concluded from the above that the installed main electrical infrastructure (8 x 132/6.6 kV 20 MVA) at the main consumer substation is sufficient for the requirements of the Zaaiplaats Project.

Great Noligwa and Mispah Plants

The electrical infrastructure was originally designed and installed to treat ore from GN, MK Mines and some from Kopanang Mine, as well as MOD material. Mispah and GN Gold plants were designed to treat 140 ktpm and 240 ktpm of ore respectively. The electrical infrastructure was designed and installed to treat the above mentioned tonnages. History on feed tonnages as indicated in the metallurgical section of this report shows that although the feed tonnages increases sharply in 2017 (about 112 ktpm for GN plant), and then drops steadily as the mine comes to the end of its life, the planned throughput is well below design capacity. The installed electrical supply is more than enough to support future plant requirements.

Emergency power supply is also available for critical equipment such as the backfill circuit, thickeners, security, CIP and underground water.

South Uranium Plant

The South Uranium Plant is equipped with its own main incoming substation. This existing electrical infrastructure has been able to supply the plant over the years of full production, and is considered to be sufficient for future requirements.

NUFCOR Plant

The NUFCOR plant is located in the West Rand south-east of Bekkersdal township. The existing electrical infrastructure, including the main incoming substation, has been able to supply the plant over the years of full production, and is considered sufficient for future requirements.

Margaret Shaft

Pumping is carried out during off peak hours to try and keep the electricity costs to a minimum. Although there are currently no emergency generators installed at Margaret Shaft, the following options are available should emergency power be required at the shaft:

- Ring feed from Scorpion substation;
- Eskom supply from Potchefstroom substation under essential loads; and
- Generator supply from Mine Waste Solutions.

High density accommodation units

The following high density accommodation units will form part of the transaction:

- GN Mine residences (including visiting wives centre);
- Vaal River boarding house;
- East single quarters and;
- Vaal Lodge (Gold house).

The existing power supply to the above units will remain as is, however metering points will have to be transferred to Harmony's ownership during the asset acquisition. Harmony will then be responsible for the maintenance and operating costs of the whole electrical infrastructure supplying the above mentioned high density accommodation units.

Low density accommodation units

The following low density accommodation units will form part of the transaction deal between AGA and Harmony;

- The houses in the Vaal River Village;
- The houses in uMuziMuhle Village and;
- Properties located in the towns of Orkney and Klerksdorp housing people working at MK and GN Mines, including people working at GN plant complex.

Redistribution of operating and maintenance costs for the electrical infrastructure supplying the accommodation units will be part of the transaction.

5.4.7 Engineering Maintenance

[SR5.4 (ii) (ii), (iii)]

The AGA standard is to carry out secondary injection tests on MV switchgear every five years or when changes are made to protection settings or hardware. Other electrical maintenance include but are not limited to infra-red scanning on electrical equipment and transformer oil sampling and analysis.

Many of these services are also offered by private companies should Harmony not be equipped with internal technical people who can carry out these services.

5.4.8 Logistics

[SR5.4 (iii)]

The operating assets are mature and contracts and systems are in place to ensure logistical integrity.

5.4.9 Engineering Maintenance

The site visit confirmed a high standard of engineering maintenance, which is currently controlled by means of SAP.

5.4.10 Capital Expenditure

Project capital

The capital requirements for MK and GN Mines are limited to:

- Sustaining capital (SIB and Items of a Capital Nature);
- ORD;
- Exploration Capital; and
- Environmental and Closure Capital.

Table 5.15: Capital Expenditure Schedule

Capital	Units	Total	2018	2019	2020	2021	2022
Stay-in-business Capital MK Mine (SIBC)	(ZAR million)	234	90	47	29	23	45
Items of a Capital Nature (ICN)	(ZAR million)	50	16	11	12	10	
ORD Capital	(ZAR million)	956	444	346	122	39	5
Exploration Capital	(ZAR million)	12	5	7			
Total Project Capital	**(ZAR million)**						
Total Sustaining Capital (SIBC+ICN)	**(ZAR million)**	**284**	**106**	**58**	**41**	**33**	**45**
Total Other Capital	**(ZAR million)**	**968**	**450**	**353**	**122**	**39**	**5**
Total Capital	**(ZAR million)**	**1 252**	**556**	**411**	**163**	**72**	**49**

Notes:
[1] The figures above are in real terms;
[2] The environmental and closure capital includes some funds already provided for in the rehabilitation and closure fund; and
[3] Sustaining capital for MK Mine varies from ±4% of C1 operating costs in 2018, dropping in the last years of the LoM for the MK mining areas. This is considered to be adequate.

Sustaining capital

Sustaining capital for MK Mine varies from ±4% of C1 operating costs in 2018, dropping in the last years of the LoM of MK. This is considered adequate.

Electrical Operating Costs

Electricity costs are shown in Figure 10.1 in Section 5. These electricity operating cost estimates indicate that there is a year on year electricity cost increase, which is due to anticipated Eskom tariff increases, and also to reduced throughput.

AGA reviews all of their operations Notified Maximum Demand annually in line with the business plan and energy forecast. AGA has also implemented the following measures in trying to reduce the electrical operating costs;

- Pumping during off peak hours at Margaret shaft;
- Installation of energy recovery turbines;
- Heat recovery from compressors;
- Installation of heat pumps;
- Station control valves for air and water and;
- Rationalisation of the compressed air grid and relocating base units to optimize positional efficiency.

Energy usage is currently being managed from the central energy control room at MK Mine.

5.4.11 SRK Comments

Mechanical

The infrastructure is mature, well maintained and adequate to support the LoM. The capacity of the MK Mine hoisting and rock handling system is more than adequate to support the LoM.

Electrical

The electrical infrastructure for the assets forming part of the transaction are of good engineering standard and do not seem to pose any significant risks into future operations. The electrical infrastructure is well designed and adequately sized for future operation of the assets as mentioned above. All power supply agreements for the related assets will have to be transferred from AGA to Harmony.

5.5 Environmental Studies, Permitting and Social Impact

[SR5.4 (i) (ii) (iii) (iv)] [SV1.10, SV1.15]

5.5.1 Introduction

This section addresses the status quo regarding permitting and environmental management. Key environmental and social issues that deemed modifying factors are presented.

5.5.2 Environmental authorisations and licenses

[SR5.4 (i) (ii)]

Mining Rights

VROs, including MK and GN Mines, possess two Mining Rights issued by the DMR in terms of the Mineral and Petroleum Resources Act, No. 28 of 2002 (MPRDA). The Moab Extension Mining Right (MW30/5/1/2/2/15MR) was granted based on a Section 102 application to exclude the portion forming Kopanang Mine. The Vaal River Mining Right (MW30/5/1/1/2/16MR) was granted based on a Section 102 application to exclude the portion forming part of Kopanang Mine.

5.5.3 Environmental and Social Approvals

[SR5.4 (i) (ii)]

Environmental authorisations and licences

The VROs has a DMR approved Environmental Management Programme (EMP) report dated February 2012 under the MPRDA. This VROs EMP includes existing underground mining activities, shaft surface infrastructure MOD, metallurgical plants and TSFs. An EMP consolidation for VROs was developed and submitted to DMR in 2016.

Other key approvals relate to water use, atmospheric emissions and radiative material at VROs. A Water Use Licence (WUL) was issued to VROs in 2013 (Licence No. 01/C24J/BFJ/2000) by the Department of Water Affairs, in terms of the National Water Act, No. 36 of 1998. The WUL is valid for a period of 20 years. An Atmospheric Emission Licence (AEL) was issued in 2014 (NWPG/ANGLOGOLDASHANTI/AEL 4.13/FEB 14) to VROs in terms of Section 47 of the National Environmental Management: Air Quality Act, No 39 of 2004. The AEL is valid for a period of six years, expiring in March 2020. The National Energy Regulator issued a Certificate of Registration No. COR-2 in 2006 to VROs for activities associated with radioactive material. A COR-16 has also been issued for NUFCOR, which is authorised to calcine Ammonium Diuranate. The certificates were issued in terms of the National Nuclear Regulation Act, No. 47 of 1999 and audits have been conducted. There is no record of any Waste Management Licences issued in terms of the National Environmental Management: Waste Act, No 59 of 2008.

As an AEL ceases to be of effect with the change of ownership, it would be necessary to amend the AEL to take account of processes relating to the Uranium Plant, NUFCOR. Following the acquisition, Harmony will have to commence with the requisite applications to transfer environmental authorisations and licences held by AGA.

Social and Labour Plan

AGA, is in compliance with the provisions of Section 23 of the Mineral and Petroleum Resources Development Act 2002 (Act 28 of 2002) and has an approved 2015-2019 SLP for its VROs MK, GN and Kopanang mines.

The development of the 2015-2019 SLP, was guided by the performance targets of the approved 2010 – 2014 SLP, where for example, by the end of September 2014 the Mining Charter target of 5%

of payroll spend on Human Resource Development (HRD) was exceeded with a reported achievement of 7.84 %. On this basis, AGA set the 2015 - 2019 targets for the HRD higher than the Mining Charter requirement of 5%, i.e. between 5.6% of payroll in 2015 and 6% of payroll in 2019.

The Socio-Economic Development budget for 2015-2019 is ZAR62.1 million, broadly allocating approximately 80% of the budget to development in the host communities and approximately 20% to the company's major Labour Sending Areas. While the Local Economic Development (LED) projects are focused on infrastructure, poverty eradication, community development, and income generation, the company has added two other components in terms of the Mine Community Development funding, namely, Enterprise and Supplier Development and the Social and Institutional Fund to cater for the social and economic development challenges in its host and Labour Sending Areas. In addition, a total amount of ZAR30.3 million has been rolled over from underspend on the 2010-2014 LED budget allocation. This, together with a total amount of ZAR54.9 million arising from the Section 102/Regulation 44, will be rolled over into the 2015-2019 SLP, resulting in an overall financial provision of ZAR147.3 million for the 2015-2019 SLP period.

From discussion with the AGA senior management, indications are that the implementation of the 2015-2019 SLP is progressing well and that to date no Section 93 Directives have been issued by the DMR.

The SLP will have to be revised to remove commitments related to Kopanang, but still maintain the current commitments for the remainder or 2017, and for 2018 and 2019. Consideration might be given to alignment of the HRD financial provisions with the Mining Charter target of 5% of payroll. This will however have to be addressed in formal engagement with DMR, the Municipality and other key role players to manage expectations.

5.5.4 Environmental and Social Management Approach

[SR5.4 (iv)]

VROs has developed an Environmental Management System (EMS) which has received ISO 14001 certification. In compliance with applicable laws, regulation and requirements, the EMS commits VROs to continual improvement of environmental management and performance, and to identify, monitor and control all aspects of mining activities. The EMS and EMP requirements are implemented by dedicated environmental staff. SRK is of the opinion that the policies and procedures that comprise the EMS provide environmental personnel with the means to proactively identify and manage issues that arise in compliance with all certificates, licences and permits.

There is evidence of VROs undertaking environmental audits to determine the level of compliance with EMP and WUL commitments, noting a number of non-compliances. In addition, the legal review dated July 2016 and WUL audit dated December 2016 identified non-compliances relating GN704 compliance, water quality, licencing of the pollution control dam (PCD), authorisation of water uses and submission of water quality results. It is unclear how these non-compliances have been addressed. Compliance with the AEL is unknown as no performance audit assessment documentation was available for review.

A recent audit alludes to the preparation of a stakeholder engagement plan and grievance mechanism. It is understood from discussion with AGA senior management that a Stakeholder Engagement framework was put in place in 2012 to formalize structured engagement with local authorities. It is, however, unclear whether a formal Stakeholder Engagement Plan and grievance procedure for external stakeholders has been prepared and is being implemented.

Although it appears that stakeholder engagement is mainly associated with compliance processes, there is evidence in the 2015-2016 Community Report of proactive and ongoing stakeholder engagement that aims to manage issues and build community relations. At present, AGA hosts an annual “state of business” event at the Town Hall, open to all stakeholders, and is also proactively engaged in a number of forums including:

- Future Forum (established in 2012, meets quarterly);
- Matlosana Local Municipality (active since signing MoU in 2011 and meets quarterly);
- SMME forums (meet quarterly);
- NGO Forum (meets quarterly);
- AGA Community Consultation Forum comprising NGOs, NPOs, SMMEs and other community representative bodies;
- Merafong City Local Municipality; and
- North West Air Pollution Control Forum.

Based on the 2015-2016 Community Report, it appears that AGA currently has a well-resourced social/community engagement team, supported by interns and community workers. It is, however, unclear whether the offsite social capacity would be available should the mine be purchased. In order to ensure continuity in social relations management, Harmony should consider retaining key personnel and provide continued support for strategic stakeholder forums.

5.5.5 Environmental and Social Issues and Risks

[SR5.4 (v)]

The following environmental issues would need to be managed to mitigate any material risk:

- **Permitting**: VROs operates under an approved EMP and a suite of associated permits and licences. The acquisition of AGA-owned assets would necessitate the updates to and transfer of key environmental authorisations and licences. Some licences, such as the AEL, will lapse upon transfer of assets and applications will need to be submitted to the relevant authorities. It would also be necessary to review the legal register to identify any permit gaps and to address these as part of the transitional arrangements to avoid future risk of directives;
- **Performance monitoring**: The EMP identifies a range of biophysical and socioeconomic impacts that currently require management by AGA environmental and social personnel. Although it is evident that performance audits are being conducted, it is important that audits are undertaken in fulfilment of permit requirements as well as to monitor environmental performance. This will include annual SLP audit reports for submission to the DMR. Areas of non-compliance that are identified in legal audits and performance assessments need to be addressed in order to avoid future risk of directives;
- **Pollution control**: It is noted in Section 10 that there are several pollution plumes arising from VROs structures (e.g. GN plants and MODs, Mispah TSFs and return water system and MK MOD). The upgrade of the return water system, which will include increasing the capacity of the PCD and treatment of TSF decant prior to storage in the RWD, is important to remediate pollution plumes. Upon transfer of the assets to Harmony there would be a need to fast track the upgrading of water management infrastructure to effectively control potential pollution sources and thereby avoid directives. It would also be necessary to engage DWS on the WUL conditions regarding the treatment of TSF decant water. Should the company not be able to amend the WUL conditions it may need to commit significant CAPEX and OPEX to a treatment plant;

- **Flooding**: In section 10 of the report it is noted that the VROs shafts are situated in the lower parts of the Klerksdorp Goldfields and could receive groundwater from larger catchments as many of the shafts are interlinked. As mines and shaft close, re-watering of the underground works would take place, which could incur additional CAPEX and OPEX costs for pumping. Attention should also be given to managing any impacts arising from neighbouring mines;
- **Unplanned closure due to community unrest**: Given the evidence of historic unrest, e.g. in 2012 strikes persisted from September to October, it is important to ensure proactive engagement and a mechanism to address grievances. The risks of not having this in place may lead to delayed action by the mine in mitigating environmental and social impacts, legal cases that can contribute to financial and reputational damage and discontent by communities, which could escalate to strikes, demonstrations and unrest, with resultant mine stoppage, loss of productivity and significant financial impact; and
- **Social dependencies resulting in closure liabilities**: The high social dependencies may carry significant liabilities during closure. Given the extensive property portfolio that VROs service and maintain, significant financial liability could exist at closure. Failure to manage the process carefully could lead to social unrest and possible disruptions, as well as reputational risk. However, opportunities exist to reduce social dependencies by proactively supporting initiatives aimed at transferring ownership of land/properties to municipalities, employees and other parties. A reduction in the property portfolio will mean that the costs associated with servicing and maintaining these properties will also be reduced.

5.5.6 Mine Closure, Planning and Financial Provision

Legislative Framework

There are a number of legal and regulatory frameworks with which VROs must comply with the following presenting what SRK considers the key legislation, which could materially affect rehabilitation and closure:

- Constitution of the Republic of South Africa (Act 108 of 1996) (Constitution);
- National Environmental Management Act (Act 107 of 1998);
- National Environmental Management Amendment Act (Act 62 of 2008) (NEMA);
- National Environmental Management Act: Regulations pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations (GN 1147) which replaces the Mineral and Petroleum Resources Development Act (Act 68 of 2002) (MPRDA) – closure and financial provision elements repealed;
- Environmental Impacts Assessment Regulations, 2014
- Mineral and Petroleum Resources Development Act (Act 68 of 2002) (MPRDA) as it pertains to the social and labour plan;
- National Environmental Management: Waste Act (59 of 2008) and supporting regulations;
- Waste Classification and Management Regulations;
- National Environmental Management: Air Quality Act (Act 39 of 2004);
- National Environmental Management: Biodiversity Act (Act 10 of 2004);
- National Environmental Management: Protected Areas Act (Act 57 of 2003);
- National Water Act (Act 36 of 1998) (NWA);

- The Nuclear Energy Act (Act 131 of 1999) and National Nuclear Regulatory Act (Act 47 of 1999);
- The National Radioactive Waste Disposal Institute Act (Act 53 of 2008); and
- Mine Health and Safety Act (Act 29 of 1996).

Historically the requirement of Section 41 of the Minerals and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002) and Regulations 53 and 54 of R527 of the MPRDA was used to govern the assessment of the quantum of the closure liability for a mining operation. During November 2015, new Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations (Financial Provision Regulations) under the National Environmental Management Act (NEMA) (Act 107 of 1998) were promulgated with the purpose of the regulations being:

"to regulate the determine [sic] and making of financial provision as contemplated in the Act for the costs associated with the undertaking of management, rehabilitation and remediation of environmental impacts from prospecting, exploration, mining or production operations through the lifespan of such operations and latent or residual environmental impacts that may become known in the future."

These require a more strategic approach to closure than was previously required under the MPRDA and require that an operations liability be fully funded at all times through guarantees or contributions to trust funds. GNR 1147 also requires that operations must develop plans for the rehabilitation the operations intends to undertake in the forthcoming year and then make provision for the rehabilitation as well as affect the rehabilitation. ,

Temporary dispensation in the Transitional Arrangements has been granted to holders of existing financial provisions approved under the MPRDA, as the Financial Provision Regulations specify that these must be regarded as having been approved under the Regulations. Therefore, there is no immediate obligation to comply with these regulations. However, the financial provision must be reviewed and aligned to the Regulations by February 2019 at the latest, and annually thereafter. GNR 1147 is due to be amended and SRK understands will only take effect in February 2019.

Mine Closure, Planning and Financial Provision

VROs undertakes an annual assessment of the premature and planned closure liability, for the biophysical closure of the operations. This assessment does not include internal or external social closure requirements, as these are considered under the SLP. Furthermore, the assessment does not include post closure water management. The annual update is informed by the closure obligations contained in the operations EMP and where these are lacking, information contained in the operations Interim Closure Plan (last updated in 2016).

Annually, each aspect of the operation is considered to understand what changes have occurred since the last review, focussing on infrastructure constructed or demolished as well as understanding additional disturbance created or rehabilitation undertaken. This review is used to update the closure quantities for each of the operational areas. Rates are then applied to the quantities to determine the resultant liability for the aspects. SRK understands that a full review of rates is only undertaken every third year, with the rates adjusted between full review by the prevailing inflation rate. The last rate update was undertaken in 2014 and is due again in 2017.

Based on SRK's understanding of the process and observations made during interactions with VROs staff and information received, SRK is comfortable that a robust process is followed to determine the liability and that the resultant quantum is an appropriate reflection of the closure liability. SRK has not undertaken an exhaustive detailed review of the rates, but is of the opinion that the unit rates are generally the correct order of magnitude for the closure activities and are therefore appropriate to utilise in a unit rate based liability assessment.

SRK is of the opinion that the approach to determining the closure quantum returns an estimate that has an accuracy of -25% to +25%. Further accuracy would only be obtained by undertaking detailed closure planning, including the development of detailed closure designs and obtained market related quotes based on the design.

The process that VROs follows complies with legal requirements as contained in the MPRDA relating to the quantification of liability and is sufficiently robust that it could be adapted to meet the requirements of GN 1147, once these come into effect in February 2019.

During the annual update of the liability AGA consider all biophysical aspects associated with VROs including those that are the subject of the transaction under consideration. Using the information available, the premature closure liability, as calculated at the end of 2016, for the assets under consideration is ZAR639 million, with the apportionment of the liability presented in the table below.

Table 5.16: Estimate of premature liability for assets included in transaction

Aspect	AGA 2016 Premature Liability Estimate (ZAR million)
Shafts	104.9
Metallurgical Plant	124.8
Water Dams	30.2
SAMTS Offices	2.6
TSF	137.3
Waste Rock dump	39.3
Sustainable Development	27.8
Engineering Services	11.1
Properties	45.8
Land Management	0.5
Incorporated	27.6
Residences	7.7
Business Services	79.6
TOTAL	**639.2**

As required by legislation, AGA has made provisions to fund the liability using a combination of funds contributed to a Trust Fund and Bank Guarantees. Currently, AGA has ZAR835 million in Trust and ZAR943 million in Bank Guarantees for the liability of the entire VROs, which includes assets not part of this transaction. Approval is awaited from the South African Revenue Service for the transfer of ZAR 340 million to the Harmony rehabilitation fund.

In addition to the liability for the VROs, SRK understands from AGA, that the liability for NUFCOR is ZAR13 million as calculated at the end of 2015. However, there is currently no legal requirement under the Nuclear Energy Act to provide for closure liability.

As stated above, the liability associated with internal and external social closure and post closure aspect and post closure water management are not included in the liability estimate of ZAR639 million. AGA recognises that there is a contingent liability for post closure water management, but has not yet quantified this liability. As the MWC is also included in the transaction, the liability for the operation of the MWC during the remaining life of the operations as well as post closure will rest with Harmony. During the operational period, SRK understands that some of the costs incurred will be offset by water sales to the Mine Waste Solution operations. However, once these cease and other mining activities cease, there is likely to be a need to maintain pumping to maintain the water levels in the regional workings at a level below decant to manage environmental impacts. During the post closure period, it is also likely that the water extracted from the MWC will require treatment to a quality that will either allow discharge or will allow the water to be used for potable uses. The contingent liability for water treatment at closure (based on work undertaken by other Consultants in 2015) could be as much as ZAR1.5 billion for the capital costs and ZAR2 billion for the operating costs and that these could be incurred approximately 10 years after the conclusion of underground mining. Whilst it appears likely that some of these costs will be mitigated through water sales, customers (external and internal) may exist for the pumped water prior to the commencement of treatment. These plans are conceptual and the final impact cannot be readily quantified.

Harmony may have a requirement to address contamination plumes associated with mining activities at the assets included in the transaction (plumes 5, 7 and 8 in Section 10). This could increase the liability by approximately ZAR75 million (CAPEX ZAR25 million and OPEX ZAR50 million).

Although, the post closure water management will add significantly to the overall closure liability of the assets included in the transaction, there may be opportunities to reduce the water liability by changing the pumping strategy to abstract from a higher level or alternatively allow the workings to fill to a level at which a controlled decant occurs and then manage and treat the decant.

As stated above, SRK is of the opinion that the estimate of ZAR639 million for the biophysical closure is an appropriate reflection of the costs to close the assets. However, there is a risk that the authorities may impose more stringent closure measures on the mine residue deposits and stockpiles associated with the assets. Historically, mine residues have been managed under the MPRDA as opposed to NEMA, which is responsible for the management of other industrial waste, including hazardous waste. However, with the inclusion of mine residue deposits and residue stockpiles in the National Environmental Management: Waste Amendment Act (Act 26 of 2014) (NEM-WAA) the authorities can now regulate residue deposits and residue stockpiles under the National Environmental Management Waste Act (Act 59 of 2008) (NEM-WA) and its supporting regulations.

Schedule 3 of NEM-WA defines all mine residues and stockpiles as hazardous, irrespective of the mining or metallurgical activity responsible for the generation of the residue. SRK does however, understand that the definition as hazardous (or general waste) does not pre-dispose particular waste management options; there is still the potential to re-use, recycle or recover the waste. Furthermore, the classification as hazardous does not define the design characteristics of the facility in which the waste is disposed. This is defined based on the chemical characteristics which are compared to values in the Norms and Standards for Assessment of Waste for Landfill Disposal to determine the “Type” of the waste, with “Type” then defining the “Class” of Landfill as considered under the Norms and Standards for Disposal of Waste to Landfill. The Norms and Standards requires that barrier systems be included in the landfill design, with the requirements ranging from simple, which consists of compacted clay, to complex, which includes a multi-component system with multiple layers of HDPE. SRK understands that the mining industry is challenging this requirement, through the Chamber of Mines (CoM). In response to initial pressure from the mining industry, the Department of Environmental Affairs (DEA) released draft regulations which provide a mechanism to change the classification of specific mine residues, from hazardous to general (non-hazardous), if it could be demonstrated that the intrinsic properties of the residue were not hazardous. These regulations have however, not yet been promulgated.

The implication of the new requirements for mine residues is that where new residue management facilities are required, the costs will be significantly higher than for a similar facility which did not previously require a barrier system to be incorporated in the design. Irrespective of whether the mining industry challenge to NEM-WA is successful or not, SRK’s observation is that the Department of Water and Sanitation (DWS) is using the requirements of the Norms and Standards (Assessment and Disposal) to enforce the National Water Act (Act 36 of 1998) (NWA) requirements in Section 19 of the act to prevent contamination of water resources. Thus, even if Schedule 3 of NEM-WA is materially altered, the DWS requirements to prevent contamination of water resources will still require barrier systems to be included in the design of new mine residue management facilities, which will materially increase construction costs.

While it is unlikely that any new residue facilities would be required during the closure phase of VROs assets, there is a risk that the authorities may apply the principles in the Norms and Standards in relation to closure cover designs, with the intent of these designs being to maximise compliance with the aforementioned Section 19 of the NWA. This presents a risk that the authorities could force very stringent closure requirements if the authorities do not accept a risk based approach to motivate that stringent cover designs do not add a significant level of environmental protection. Should this risk materialize, VROs may be required to fundamentally change closure approach and include complex engineered alternatives, which could materially increase closure liability.

Stringent closure measures may also be driven by the authorities through the implementation of the Regulations Regarding the Planning and Management of Residue Stockpiles and Deposits. These Regulations state that (7(4) b) the design must include a capping layer for residue stockpiles in order to prevent the generation and mobilisation of chemicals of concern. There is, however, no definition of the design characteristic of this capping layer. As the Regulations state that the barrier systems below a residue deposit or stockpile must comply to the Norms and Standards for the Assessment of Waste for Landfill Disposal and the Norms and Standards for Disposal of Waste to Landfill, there is the risk that the VROs may be required to design capping systems similar to those of the barrier systems.

Similarly, the Norms and Standards for the Remediation of Contaminated Land and Soil Quality in the Republic of South Africa (Notice 467 of 2013) requires remediation of contaminated lands If contaminated land exists and has the potential to impact of water resources, it is likely that DWS under Section 19 of the NWA will require the remediation of these soils. SRK understands that an assessment of the risk to water resources from contaminated soils has not been undertaken and therefore, no significant provision is made for the remediation of these soils at closure. Should soil remediation be required, the closure liability could increase. The CPR captures the impact of the current situation.

The impact across the mining industry of more stringent regulations with regards to Remediation of Contaminated Land and Soil Quality and the Planning and Management of Residue Stockpiles and Deposits, is such that it is unlikely that they will be introduced in the near future.

5.6 Market Studies and Economic Criteria

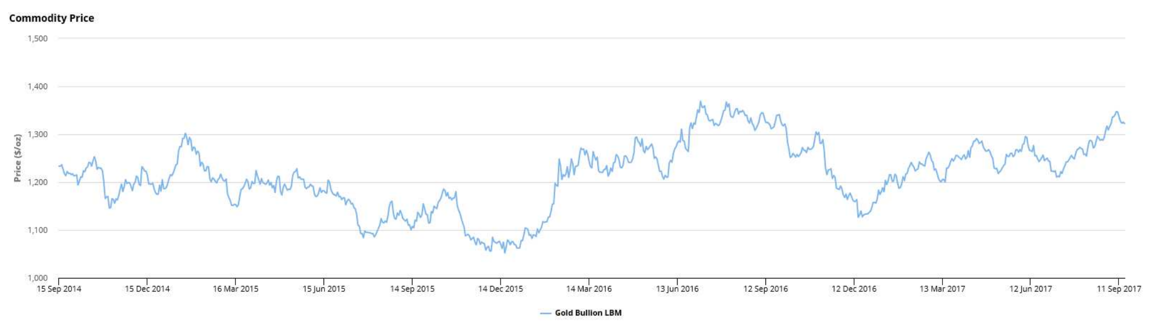
[SR5.6 (i) (ii) (iii)] [SV1.10, SV1.18]

Au is the primary valuable product being mined with U_3O_8 and silver as by products. Au is delivered to Rand Refinery being the largest integrated single-site precious metals refining and smelting complex in the world. Since 1920, Rand Refineries have refined nearly 50 000 tonnes of Au - almost one third of all the gold mined worldwide. Their longstanding history as one of the world's leading refiners has seen Rand Refinery receive global accreditation, international referee status.

The Au produced from this transaction is replacement Au and not additional supply to the market and is therefore not going to have a material impact on global supply and demand.

Au is generally sold at the prevailing spot rate in a highly liquid market. It is possible to hedge either the price in USD or to hedge the exchange rate although both of these practices have largely fallen out of favour. There are no active hedges in place that relate to MK.

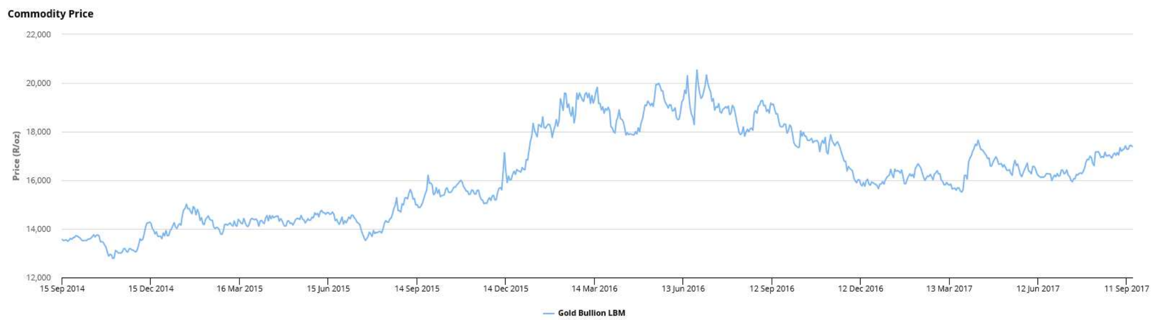
Figure 5.29 shows the Au price in USD/oz over the past three years. The overall trend is slightly positive, which can partly be ascribed to inflation. Au exploration declined dramatically over the past five years but appears to be slowly picking up. This, in combination with global political uncertainty, suggests that the price may rise but this is not yet being reflected in the forecasts.



srk consulting	USD/oz Au price for the past three years	Project No. 522673

Figure 5.29: USD/oz Au price for the past three years

Figure 5.30 shows the Au price in ZAR/oz. The price has increased over the period but is off recent peaks.



srk consulting	ZAR/oz Au price for the past three years	Project No. 522673

Figure 5.30: ZAR/oz Au price for the past three years

There are no marketing or sales concerns. The price received is expected to be higher than required for profitable operation and the market is liquid.

5.7 Risk Analysis

[SR5.7 (i)] [SV1.15]

5.7.1 Consolidated Risk Factors

The technical risk factors and the mitigating measures identified by SRK for MK Mine are provided in Table 5.17.

SRK has not explicitly included conceptual risks or opportunities in the TEM as the magnitude or timing cannot be accurately determined. These risks and opportunities have been described for the information of the reader along with the indicative NPV impacts.

Table 5.17: Consolidated risk factors for the VROs targeted assets

Discipline	Risk factor	Mitigation measure
Regulatory and Political	Foreign and domestic geopolitical activity	Growing trend to consolidate assets in the face of a volatile Au price. This should not deter efficient business practices, prudent cost generation and sustainable development. Job losses should be assessed against the broader context of the industry, re-structuring is most preferred.
	Proposed amendments to framework legislation: Carbon Tax, MPRAA, Charter III, Mine Closure Regulations.	Sustainable and equitable restructuring of operations to accommodate empowerment objectives and carbon emissions reduction. Compliance with the New Regulations will commence in 2019, review residual liability and closure costs.
	Electricity	Price uncertainty. Financial modelling must consider the appropriate escalation – current adjudication of Eskom's request b 7 December 2017.
	Commercial	Further capital allocation to ongoing and immediate pollution control (water). Decanting operations at GN.
Water Management	Pollution of Water resources from Mispah TSFs and the two plants	• Seepage collection facility below the tailings dam; and • Separation of clean and dirty water by constructing cut-off drains
	Long Term Pumping of water at the MWC will be expensive and long term	• Harmony are developing a commercial case from the treatment of water; and • The groundwater review indicated some scope to reduce the amount of water from being discharged with plugging
	Some conditions in the Water Use License cannot be met especially the expected water quality values within the Harmony circuit	• Challenge the requirements with DWS; and • Include a liability amount (low risk) to meet the requirement
Safety	• There is no Shaft pillar at MK. The shaft runs through the stoped out area between the 49 and 50 raise lines; • The open area around the shaft is sealed with Silicate backfill; and • Possible risk: scaling of backfill, ventilation leakage and possible shaft stoppage.	• The mine to continue with examinations of this section of the shaft; and • The mine to continue with examinations of this section of the shaft.
	Safety stoppages – The possible continued use of negative enforcement by the regulating authority will add to operational pressure, which will actually increase the risk.	• The recent court rulings against the DMR should reduce the number of questionable safety stoppages; • Continue reducing the number of injuries; and • Ensure workplace compliance with safety and health standards.
Occupational Health	Silicosis – Although the number of diagnosed Silicosis cases is on the decrease, the mines may continue to face revenue loss implications for cases of occupational lung diseases in current and former employees.	The mines are continuing with renewed dust suppression initiatives in the quest towards zero harm.

<table>
<tr><th>Discipline</th><th>Risk factor</th><th>Mitigation measure</th></tr>
<tr><td></td><td>Radiation - The Top Mine (previously GN Mine) was classified as a Radiation Special Case Area. There is a high risk of exposure to Radiation and accumulations of Carbon Monoxide gas when opening worked out areas in the Top Mine area.</td><td>This risk has to be managed when considering to increase production.</td></tr>
<tr><td>Mineral Processing</td><td>• Au recoveries may be lower in periods of lower head grade;
• Au recovery could drop should U_3O_8 processing be discontinued;
• Au recovery could drop if ore with inferior metallurgical characteristics is treated;
• Process costs may be underestimated; and
• Process operating costs may increase at reduced throughput</td><td>• Apply historical head grade/ recovery relationship;
• Compare forward versus reverse leach and select optimal process route;
• Investigate metallurgical characteristics of new ore types;
• Confirm overhead allocation, Confirm power consumption; and
• Minimise overheads, investigate equipment rationalisation</td></tr>
<tr><td rowspan="2">Environmental and Social</td><td>Legal aspects and permitting: The government could issue directives for legal non-compliance following the acquisition if permits are not transferred and stringent environmental conditions are not moderated.</td><td>• Following the acquisition, commence with the requisite applications to transfer environmental authorisations and licences held by AGA; and
• Amend requisite permits including the Environmental Management Programme, Social Labour Plan and Water Use Licence.</td></tr>
<tr><td>Social dependencies: The extensive residential property portfolio at VROs may result in the mine being burdened with high social dependencies at closure.</td><td>Support initiatives to transfer ownership of land and properties thereby reducing social dependencies and financial liability at closure.</td></tr>
<tr><td>Mine Closure</td><td>Closure costs: The authorities many impose more stringent closure measures on the mine residue deposits and stockpiles associated with the assets resulting in a significant increase in closure costs.</td><td>Engage with relevant authorities to discuss the applicability of Norms and Standards in relation to cover designs.
If required, change closure approach and include complex engineered alternatives.</td></tr>
<tr><td>Electrical Infrastructure</td><td>Year on year electricity price increases.</td><td>Escalations in the financial model to be above Consumer Price Index (CPI) to cover for uncertainty in Eskom price increases.</td></tr>
<tr><td>TSFs</td><td>• The existence of a backfilled sink hole in the TSF area;
• Possibility of further sink hole and/or dolomite formations due to mismanagement of water or other factors;
• Should the dolomite geotechnical investigation indicate a deterioration in the existing TSF foundation conditions, then serious consideration may need to be given to redirecting the tailings to another existing facility, curtail tailings deposition or investigate and construct a new TSF; and
• Increased height increases of tailings storage facilities above the permit conditions and more so should MODs be introduced into the future plans.</td><td>To firstly determine if this is the case by undertaking a comprehensive dolomite investigation of the site, confirming the zone/s of influence and ensuring the emergency response plans are up to date and everyone aware of this possibility.</td></tr>
<tr><td>Mineral Resources</td><td>• The structural complexity of MK Mine remains a risk as the mining is progressing towards major faults, which can lead to further intensity of faulting;
• The Zaaiplaats Mineral Resources are based on extrapolation of the estimation domains and grades from mined areas to the north. There is a risk that the plainspastic</td><td>None</td></tr>
</table>

Discipline	Risk factor	Mitigation measure
	reconstruction may not be accurate, and that the extrapolated domain boundaries may be incorrect. As a result, it is possible that the estimated grades may be incorrect; and • The Mineral Resources are declared with a significant discount for geological losses at both MK Mine and Zaaiplaats. There is a risk at Zaaiplaats, given that the entire project area is bounded by major faults, that the structural complexity is greater than anticipated, and hence the ability to mine at the planned stope widths and volumes may be constrained; and • The grades of the waste dumps are assumed from previous production history, and may be materially different from that reported.	None
Mechanical Infrastructure	No intolerable risks identified	
Mining and Mineral Reserves	A higher incidence of rockfalls associated with the mining of remnant pillars.	Adherence to safety standards and risk assessments.
Geotechnical	• Seismic response rate is directly proportional to the mining rate, hence if production increases, seismicity will increase in proportion to the production rate; • Uncertainty regarding off reef excavations and subsequently uncertainty regarding support requirements for off reef excavations; and • Uncertainty regarding characteristics of complex geological features in vicinity of bracket pillar.	• Further investigation into seismic regime, ensure compliance to code of practice; and • Further investigation into rockmass properties and behaviour using numerical modelling etc.
Capital Cost	No intolerable risks identified	
Operating costs	The VROs mine infrastructure was designed for higher production rates. The decrease in production over the LoM will result in an increase in the overheads and allocated costs over the smaller footprint.	The overhead and allocated cost should be managed effectively and right sized to the operations.
Market Related	Au price (Exchange rate)	The Rand Au price is dependent on both the USD Au price and the USD:ZAR exchange rate. The USD Au price and the USD:ZAR exchange rate are both volatile and this has contributed to substantial variation in the ZAR Au price. The value of the asset is most dependent on the price received. The SA gold industry does not typically hedge either factor although it is possible to do so. The risk is not unique to MK Mine and a new owner would arguably not be expected to explicitly manage the risk by hedging. The relatively short life and reasonable operating margin provide some protection and a substantial decline would be required before an operating profit would no longer be realised.

5.8 Economic Analysis – Valuation

[SR5.8 (i) (ii) (iii) (iv)] [SV1.14]

This section presents the valuation of the VRO assets included in the transaction. A summary from the Techno-Economic Model (TEM) is included along with a discussion of the outcome. SRK believes that its opinion must be considered as a whole and that the selection of portions of the analysis or factors considered by it, without considering all factors and analyses together, could create a misleading view of the process underlying the opinions presented in this document.

The derivation of a technical review is a complex process and should not be subjected to partial analysis or summary. The technical review in this report is effective at 31 October 2017 and is based on information provided by AGA, Consensus Economics and the other consultants who contributed to the technical sections of the report throughout the course of SRK's investigations. The inputs to the TEM reflect the various technical-economic conditions prevailing at the date of this report.

Inspection visits to the mine, processing facilities, surface structures and associated infrastructure have been undertaken by several members of the SRK team, followed by discussion and enquiry with key on-mine personnel. Forecast planning and scheduling information was analysed, together with associated costs and capital assumptions.

In consideration of all financial statements and financial position at the technical-review date, legal tenure and mineral rights, and other aspects relating to the assets under review, SRK has placed reliance on the managers and staff of the assets.

5.8.1 Compliance

This valuation complies with the guidelines contained in the SAMVAL code.

5.8.2 Valuation Approach

The following methods are recommended in the SAMVAL code for the valuation of mineral assets:

Table 5.18: Valuation Approaches

Valuation Approach	Early stage exploration	Advanced stage exploration	Development properties	Production properties	Dormant properties		Defunct properties
					Economically viable	Not viable	
Income	Not generally used	Less widely used	Widely used	Widely used	Widely used	Not generally used	Not generally used
Market	Widely used	Widely used	Less widely used	Quite widely used	Quite widely used	Widely used	Widely used
Cost	Widely used	Widely used	Not generally used	Not generally used	Not generally used	Less widely used	`Quite widely used

Source: The SAMVAL Code

The Income Approach and Market Approach have been selected for the valuation of MK Mine.

The valuation is presented in USD, which is the currency of the transaction. The MK Mine is valued as a single operating entity and includes all the assets listed in the Description of Assets.

There are a number of potential opportunities discussed below, including the mining of the GN Shaft pillar, the development of the Zaaiplaats Project and the treatment of the surface Mineral Resources. SRK consider these opportunities to offset the potential risks of additional closure or environmental costs. Any extension of the LoM would reduce the NPV impact of these risks and allow additional time to fund. The potential opportunities have not been studied to the required level and have therefore not been detailed in the CPR and also not included in the base case valuation.

Significant risks to the NPV include the contingent liability for the pumping and treatment of water from the Vaal Reefs area via the MWC (approximately 50Ml/day). Mitigation opportunities exist, through commercialisation of the water and extension of the LoM. The TEM assumes that the treated water will be sold on a commercial basis. Construction of the water treatment plant is assumed to commence in 2029, with commissioning in 2032. Water sales are assumed to offset OPEX from 2042. This is based on a high level study commissioned by AGA. CAPEX and the first 10 years of OPEX amounts to USD45 million. Failure to commercialise the water by 2042 would reduce the base NPV in this TEM by a further USD5 million.

5.8.3 Techno-Economic Model Parameters

SRK makes use of Consensus Economics Inc., a global macroeconomic survey firm, to inform their views on Au and U_3O_8 prices. The seven analysts consulted by Consensus Economics gave a range of long-term price forecasts of USD845 to USD1 419/oz. An exchange rate forecast has been provided by UBS, global firm providing financial services to private, corporate and institutional clients, and the spot rate has also been considered. The TEM developed for the valuation is in rea-terms but some real-terms inflation has been allowed for power and labour, which have historically increased at higher than CPI.

The parameters used in the analysis are shown in Table 5.19. The forecasts from Consensus Economics for the Au and U_3O_8 prices from Quarter 3, 2017 are:

Table 5.19: Au and U_3O_8 Consensus Economics price forecasts and the UBS ZAR:USD

Commodity	Units	SPOT 18 September 2017	2017	2018	2019	2020	2021	LTP
Au	(USD/oz)	1 307	1 250	1 250	1 220	1 220	1 200	1 180
U_3O_8	(USD/lb)	21	22	24	29	34	34	29
ZAR:USD			14.23	13.73	13.42	13.11	13.89	13.89

SRK has made use of the Consensus Economics forecast in conjunction with the above exchange rates from UBS as a base case. The spot rates prevailing on 18 September for the Au price and 20 September 2017 for the exchange rate, USD1 307/oz and 13.30 ZAR:USD respectively, were also evaluated using the TEM. The NPV obtained, USD309 million, with the spot rate and price and was confirmed as positive and still within the selected valuation range.

The U_3O_8 price forecast shows a long-term price of USD29/lb. The forecast is quite volatile currently with several market commentators predicting large gains and a price of USD40-60/lb in the long term. U_3O_8 is produced at MK Mine primarily to improve the Au yield. An improvement in the U_3O_8 price would improve returns.

The Income Approach and Market Approach have been selected for the valuation of MK Mine, a producing property. The valuation is presented in USD, which is the currency of the transaction. The MK Mine is valued as an entity and includes all the assets listed in the description of assets.

5.8.4 DCF Valuations

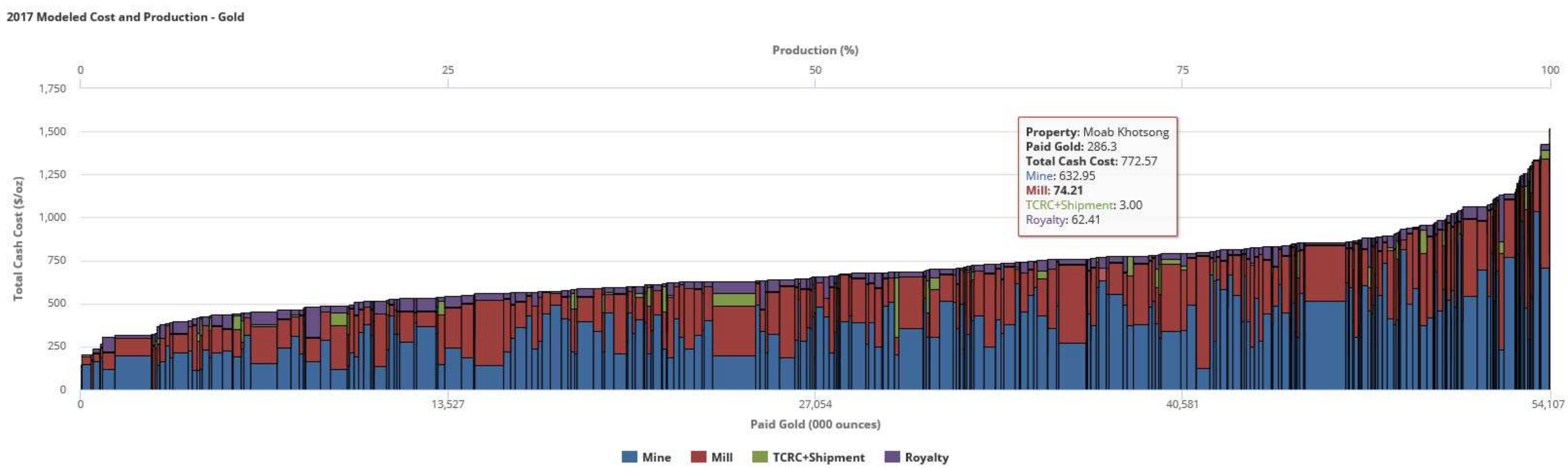
The summary cash flows for MK Mine are shown in Table 5.20. The cash flows are shown from 2018 through to 2023 with 2022 being the last year of production. The Zaaiplaats Project has been excluded from the cash flows as the NPV is negative at a real discount rate of 7.5%. The possible extraction of the GN Shaft pillar is not shown as it is only at concept stage. Surface Mineral Resources would have reported to the MWS plant but this cannot be assumed for a new owner and no cash flows are shown for this material.

Table 5.20: Summary of Cash Flows for MK

REAL	Unit	Sum	2018	2019	2020	2021	2022	2023
REVENUE (Au)	**ZAR**	**21 769 420 738**	**5 178 035 926**	**5 066 676 797**	**4 586 704 365**	**3 751 160 803**	**3 186 842 847**	**-**
Au Sold	kg	40 973	9 381	9 626	8 922	6 998	6 046	-
Au Price	ZAR/kg	531 311	551 971	526 353	514 089	536 033	527 099	527 099
Forex	ZAR:USD	13.58	13.73	13.42	13.11	13.89	13.89	13.89
Au Price	USD/oz	1 218	1 250	1 220	1 220	1 200	1 180	1 180
DIRECT SHAFT COSTS (COST 1)	**ZAR**	**10 400 752 659**	**2 248 288 060**	**2 254 865 607**	**2 130 250 298**	**1 949 941 110**	**1 817 407 584**	**-**
Labour	ZAR	**5 959 453 296**	**1 354 233 402**	**1 325 583 459**	**1 211 243 453**	**1 087 389 443**	**981 003 539**	**-**
Consumables	**ZAR**	**3 866 096 785**	**762 272 241**	**792 224 329**	**787 180 631**	**774 794 434**	**749 625 149**	**-**
Explosives & Accessories	ZAR	83 559 572	17 728 957	17 981 521	18 023 788	15 526 449	14 298 856	-
Support & Construction Materials	ZAR	411 143 581	87 394 613	88 364 648	88 615 735	76 391 999	70 376 586	-
Lime	ZAR	70 490	15 127	15 438	15 165	12 911	11 848	-
Steel	ZAR	85 998 459	18 362 174	18 578 466	18 556 733	15 899 012	14 602 073	-
Other Consumables	ZAR	724 040 488	138 415 242	141 472 491	131 147 843	159 317 578	153 687 335	-
Fuel & Lubricants	ZAR	8 337 587	2 082 155	1 967 880	1 688 423	1 359 673	1 239 457	-
Power	ZAR	2 488 851 716	482 111 141	508 195 171	516 302 427	496 101 753	486 141 224	-
Water	ZAR	64 094 892	16 162 832	15 648 714	12 830 517	10 185 060	9 267 770	-
Total Services	**ZAR**	**775 459 868**	**193 309 144**	**191 152 945**	**148 784 249**	**122 952 580**	**119 260 951**	**-**
Credits	**ZAR**	**(200 257 290)**	**(61 526 727)**	**(54 095 126)**	**(16 958 036)**	**(35 195 347)**	**(32 482 055)**	**-**
OTHER COSTS	**ZAR**	**5 140 970 415**	**1 100 353 863**	**1 076 338 125**	**1 015 522 253**	**965 547 166**	**983 209 009**	**-**
By-products	ZAR	119 903 022	28 222 683	21 268 800	1 456 714	7 118 009	61 836 816	-
Royalties	ZAR	549 472 448	142 175 088	145 161 526	132 049 312	85 152 037	44 934 484	-
Skills Development Levy	ZAR	35 551 712	8 239 931	7 989 725	7 160 771	6 423 401	5 737 883	-
Non-cash Credits	ZAR	75 472 944	16 183 871	16 609 986	14 856 422	14 595 233	13 227 432	-
Carbon Tax	ZAR	144 374 597	28 516 765	28 401 172	28 809 384	29 341 510	29 305 766	-
Allocated Costs	ZAR	4 216 195 692	877 015 525	856 906 915	831 189 650	822 916 974	828 166 627	-
TOTAL OPERATING COSTS	**ZAR**	**15 541 723 074**	**3 348 641 923**	**3 331 203 731**	**3 145 772 551**	**2 915 488 276**	**2 800 616 593**	**-**
Rehabilitation, retrenchment and inventories	ZAR	560 679 222	49 424 750	61 474 642	103 627 887	71 274 713	59 411 542	215 465 688
TOTAL PRODUCTION COSTS	**ZAR**	**16 102 402 295**	**3 398 066 673**	**3 392 678 373**	**3 249 400 438**	**2 986 762 988**	**2 860 028 135**	**215 465 688**
CAPITAL	**ZAR**	**1 251 526 112**	**556 351 152**	**410 830 181**	**163 094 431**	**71 800 720**	**49 449 630**	**-**

REAL	Unit	Sum	2018	2019	2020	2021	2022	2023
Stay-in-business Capital (SIBC)	ZAR	233 867 099	90 233 340	46 924 639	28 892 777	22 868 758	44 947 585	-
Items of a Capital Nature (ICN)	ZAR	49 973 388	16 474 682	11 073 709	12 274 555	10 150 441	-	-
ORD Capital	ZAR	955 824 675	444 384 846	346 229 165	121 927 099	38 781 520	4 502 045	-
Exploration Capital	ZAR	11 860 951	5 258 283	6 602 668	-	-	-	-
FREE CASH FLOW BEFORE TAX	**ZAR**	**4 415 492 330**	**1 223 618 101**	**1 263 168 243**	**1 174 209 496**	**692 597 095**	**277 365 082**	**(215 465 688)**
INCOME TAX	**ZAR**	**509 862 571**	**-**	**-**	**313 831 466**	**163 649 334**	**32 381 770**	**-**
FREE CASH FLOW AFTER TAX	**ZAR**	**3 905 629 759**	**1 223 618 101**	**1 263 168 243**	**860 378 029**	**528 947 761**	**244 983 312**	**(215 465 688)**

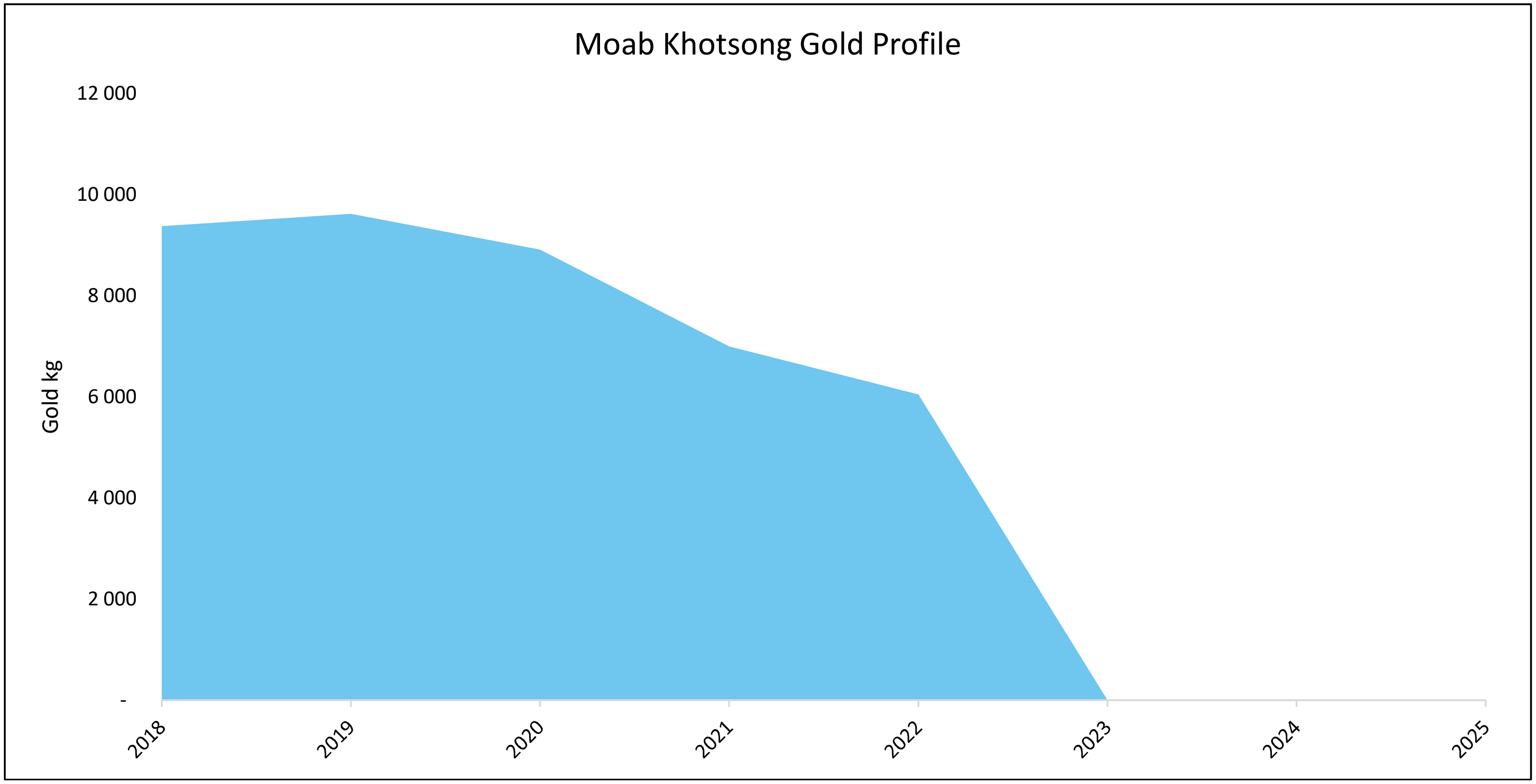
The position on the cost curve is shown in Figure 5.35. The Mine is positioned in the higher part of the third cost quartile. It is currently relatively well placed in the South African industry but costs would normally be expected to increase as tonnages decline.



srk consulting	Position on the Cost Curve	Project No. 522673

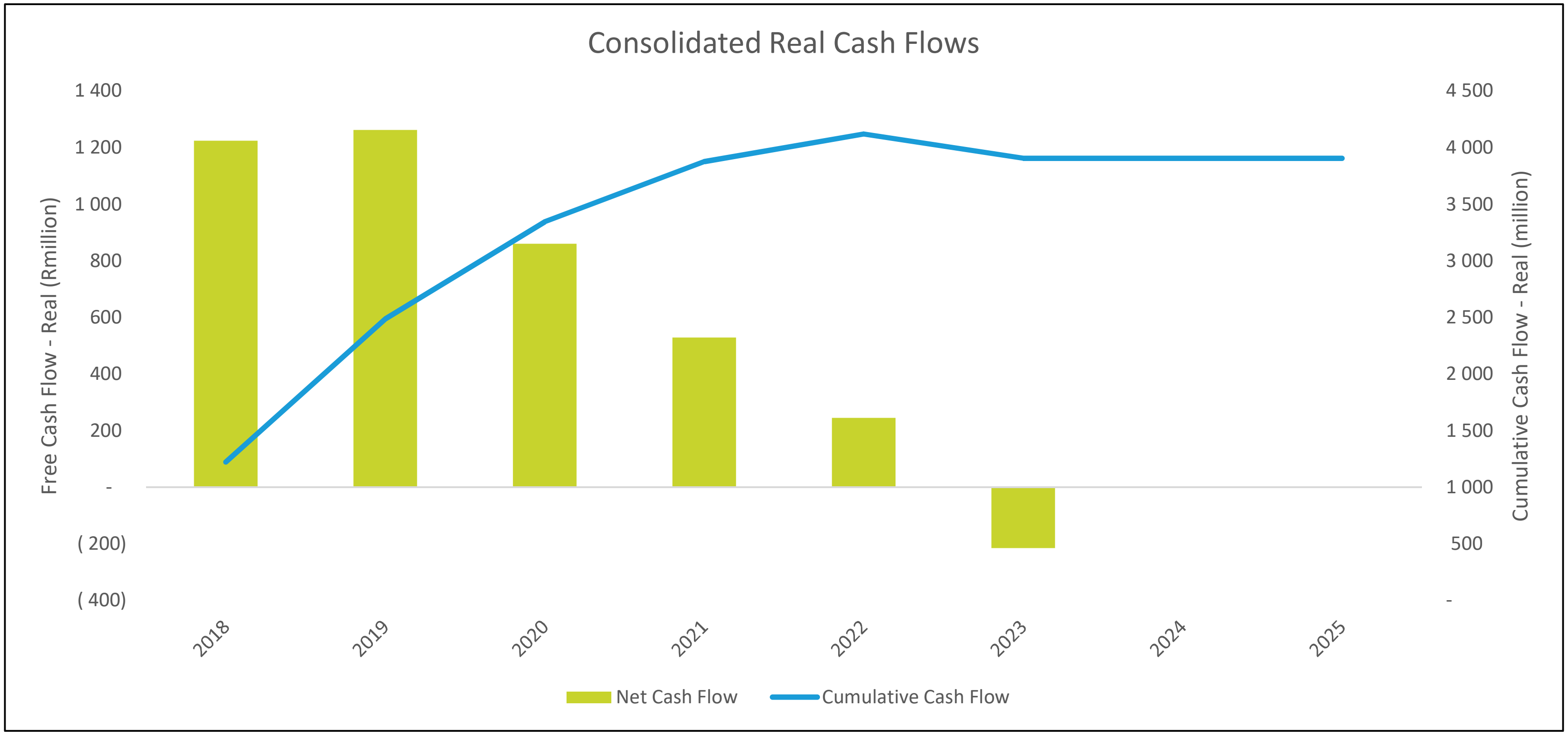
Figure 5.31: Position on the Cost Curve (Ref: http://www.snl.com/Sectors/metalsmining/Default.aspx/pdf/MiningConsulting.aspx)

Note: SNL Metals & Mining is the most trusted source of global mining information and analysis with more than three decades of providing global insights and intelligence.



srk consulting	Au production profile for MK	Project No. 522673

Figure 5.32: Au production profile for MK



srk consulting	Consolidated Real Cash Flows for MK	Project No. 522673

Figure 5.33: Consolidated Real Cash Flows for MK

The Au production profile, Figure 5.32, for MK Mine shows production dropping from nine to ten tonnes down to the current planned closure in 2023. Total Au recovered is just under 41 tonnes, equivalent to approximately 1.32 Moz.

Figure 5.33 shows the Mine is cash positive from 2018 until the final year where there is a slight negative cash flow.

The sensitivity of the post-tax, pre-finance, NPV in USD million at a 7.5% real discount rate to key variables is shown in Table 5.21, Table 5.22, Table 5.23, and Table 5.24.

Table 5.21: Two-factor sensitivity to Au Price and Exchange Rate

	USD/oz	**974**	**1 096**	**1 218**	**1 340**	**1 461**
ZAR:USD		**-20%**	**-10%**	**0%**	**10%**	**20%**
10.86	-20%	(175)	(66)	36	137	218
12.22	-10%	(66)	49	160	246	326
13.58	0%	36	160	257	343	429
14.94	10%	137	246	343	438	539
16.30	20%	218	326	429	539	641

Table 5.22: NPV Sensitivity to Recovery

Recovery adjustment	-10%	-5%	0%	5%
NPV (USD million)	155	206	257	302

Table 5.23: NPV Sensitivity to OPEX

OPEX adjustment	-10%	-5%	0%	5%
NPV (USD million)	322	289	257	225

Table 5.24: NPV Sensitivity to Real Discount Rate

Real Discount rate	5.0%	6.5%	7.5%	8.5%	10.0%
NPV (USD million)	267	261	257	253	248

The base case cost and economic assumptions applied to the Mineral Reserves in the TEM produce an NPV of USD257 million.

The returns are relatively insensitive to the discount rate, as a result of the short LoM and the absence of any initial capital investment.

The NPV is sensitive to changes in grade, recovery, price or exchange rate. The effects of changes in any of these is similar with a change in revenue resulting without an associated impact on cost. A 10% reduction in revenue reduces NPV to USD160 million and a 10% increase in price improves NPV to USD343 million. Table 5.25 shows the impact of reducing the OPEX. The allocated costs, including various regional services, represent an opportunity to reduce costs. Various procurement initiatives were also underway at AGA to reduce costs. A 5% saving in OPEX (equivalent to reducing the allocated costs excluding metallurgical costs by 20%) would see NPV increase to USD289 million.

In addition to the above sensitivities, there are a number of other sources of risk and opportunity that have been considered.

SRK understands that the nature of the transaction will result in a portion of the purchase price being deductible from tax payable during the operating phase. SRK has been advised that, conservatively, 70% of the purchase price will be deductible. The value to the purchaser is USD46 million in NPV. This has been included in the base case cash flow since it would accrue to any purchaser of the entity and is reliant only on AGA choosing to sell MK Mine in this way. It is thus not considered to be synergy or sentiment value.

The specifics of the financing would also impact the value realised by a purchaser but this cannot be readily generalised. This would be unique to each transaction and cannot be determined generally. Nevertheless, it is a source of value that could accrue to a purchaser who may choose to adjust the price that they offer. Debt repayments would be deductible from taxable revenue and the proportion of debt and base currency may impact the effective Weighted Average Cost of Capital (WACC).

The liability of pumping water is currently partially offset by sales to other AGA divisions. It is not certain that this would continue under any new owner although it might be negotiated by a purchaser. Approximately USD4 million in NPV is at stake. Perhaps more significantly, the cost of pumping water is assumed to stop at the end of the current life. The mine would then flood for approximately ten years at which point pumping and treating would need to begin. It is assumed that the construction of a treatment plant and the funding of the first ten years of pumping will be required after which the sale of water will cover the cost of treatment and pumping. This would have minimal impact in NPV terms but would be a significant indefinite expense should it not be possible. The assumption is considered reasonable but it is a risk.

The pumping would not be stopped as planned should mining of the pillar or of the Zaaiplaats Project go ahead. In this case pumping would most likely continue with the 10-year gap being postponed to an adjusted end of life.

The additional environmental costs that are discussed in the environmental section of the report are not included explicitly in the TEM. The primary considerations with excluding these in the base case is that in the case of the water pumping and treatment, as an example, it is possible that additional costs may be incurred. However, the possibility of Shaft pillar extraction and the modification of the plant to process surface sources would significantly change the outlook for the pumping and treatment.

Pumping would, in this instance, continue for longer than currently budgeted but would most likely be offset by additional income. Similarly, both of these extensions to the LoM could change the quantum of the closure costs and the time available to top up the rehabilitation trust fund (although it is possible that this must be replenished immediately). The high certainty environmental costs have a USD2 million impact on NPV and the low certainty a USD9 million impact. This is within the range.

It is also possible that MWS cease to purchase water from the pumping scheme however this water might be used by a new owner for the processing of surface sources with similar economics. The impact of MWS (or an alternate consumer) no longer purchasing the water would be approximately USD4 million.

A potential source of value is the mining of the GN Shaft pillar. The Shaft pillar is not currently in the Mineral Reserve. Conceptual studies indicate that there is the potential to extract several tonnes of Au from the pillar.

The Zaaiplaats Project is not included in the Mineral Reserve statement in this CPR and therefore is not included in the TEM. The project is at PFS stage and there is a possibility that a purchaser may find additional value or improve the returns and declare a Mineral Reserve. It has been valued in the Market Approach as a Mineral Resource only.

There is potential upside from treatment of surface Mineral Resources. AGA had planned to process their tailings at Mine Waste Solutions (MWS) but a new owner would not necessarily have this option. Surface Mineral Resources are mined and processed by several companies in South Africa and it is likely that a new owner would study a plant conversion in order to beneficiate this material. The additional value that may be generated would be material.

In general, the Mining Assets are subject to certain inherent risks, which apply to some degree to all participants of the gold mining industry. These include:

- Changes in the market price for Au which may be influenced inter alia, by demand for Au in industry and jewellery, actual or expected sales by central banks, sales by Au producers in forward transactions and production and cost levels for Au in major Au producing countries;
- Foreign exchange fluctuations;
- Inflation rates;
- Specific country risk including political and economic stability in the long-term;
- Changes to future legislation (tenure, mining activity, labour, health and safety and environmental) within South Africa;
- Exploration risk including the elapsed time between discovery of Au mineralisation, development of economic feasibility studies to bankable standards and associated uncertainty of outcome;
- The inability of the Mining Assets to fund the balance of their environmental liabilities from estimated operating cash flows, should operations cease prior to the stated LoM. This would result in an outstanding liability since the estimated rehabilitation expenditure exceeds the amounts available in the respective rehabilitation trust funds as at the base date; and
- Mining risks including Mineral Reserve estimate risks, uninsured risks, industrial accidents, labour disputes, unanticipated ground water conditions, human resource management, health and safety performance (including the impact of HIV/AIDS) and, particularly for the South African Region, the management of seismicity and ground control at increased depth and increased production from remnant areas.

In contrast, whilst certain of the above reflect opportunities in addition to risk, SRK recognise that as of yet, an un-quantified opportunity is the beneficial application of new technology. A more detailed risk review is included in the report. Also the LoM plans and the Tax Entities include forward-looking statements that are not historical facts. These forward-looking statements are necessarily estimates and involve a number of risks and uncertainties that could cause actual results to differ materially.

The selected range for the Income Approach is from USD160 million to USD343 million, the NPVs when reducing or increasing either the exchange rate or the Au price by 10%.

5.8.5 Market Approach

The Market Approach attempts to determine the market value of the asset in a third-party, arms-length transaction. The value is not intended to represent the value to a specific purchaser and, as such, does not consider any strategic or sentimental value nor any unique synergies.

South African Au deposits are unusual in their depth, extent and maturity. Transactions were thus filtered to limit the review to South African assets and companies excluding the sale of 50% of South Deep to Gold Fields in 2006 because of the magnitude of the transaction. South African assets with no Mineral Resources or Mineral Reserves were also excluded.

The transactions that were considered are shown in Table 5.25. Comparable transactions, even in a mature setting such as the South African gold mining industry, are generally inadequate. The values obtained can give an indicative range but few operations are truly comparable. Table 5.25 shows the percentage of in situ value paid for Mineral Resources and Mineral Reserves. The percentage is based on the price paid in the transaction divided by the value of the ounces – the number of ounces included in the transaction multiplied by the prevailing gold price. The adjustment to the current gold price is automatically made when the median percentage is applied to the number of ounces being valued at MK Mine and multiplied by USD 1307/oz. Basing the value on a percentage of in situ value that was paid eliminates the impact of a changing Au price but does not fully capture prevailing sentiment. In addition, the price paid generally includes some strategic value over and above sentiment. Both sentiment and strategic value should be excluded but no public database exists that captures the value in their absence.

Unique synergies that may be realised by a specific purchaser are also excluded. The valuation presented is for a third party in an arms-length transaction.

SRK applied the median percentages from the transactions listed in Table 5.25 to the Mineral Reserve of 1.37 Moz and the Resource of 17.1 Moz, using a Au price of USD1 307/oz, to obtain the valuations in Table 5.26. The price paid has only been applied to the Au contained.

Table 5.25: List of Transactions Considered

Target:Seller	Buyer	Percent Acquired (%)	Deal Value (USD million)	Date	% Mineral Reserve Value	% Mineral Resource value	% Mineral Reserve equivalent value	% Mineral Resource equivalent value	Mineral Reserve (Moz)	Mineral Resource (Moz)
Village Main Reef Limited:Village Main Reef Limited	Heaven-Sent Capital Management Group Co., Ltd	100.00	47.81	2015	0.62	0.06	0.14	0.03	6.2	62.6
Newshelf 1114 Proprietary Limited:Gold One International Limited	Sibanye Gold Ltd	74.00	428.55	2013	11.5	1.44	7.7	1.23	2.1	16.7
Evander Gold Mines Limited:Harmony Gold Mining Company Limited	Pan African Resources Plc	100.00	170.00	2012	1.62	0.43	1.62	0.43	8.1	30.6
First Uranium (Pty) Limited:First Uranium Corp	AngloGold Ashanti Ltd	100.00	335.00	2012	9.23	9.23	1.12	1.12	2.9	2.9
Taung Gold Ltd:Investor Group	Wing Hing International (Holdings) Limited	75.81	457.61	2011		2.73		2.73		20.2
Aflease Gold Ltd (Gold One):Sub Nigel Gold Mining Co. Ltd	Aflease Gold and Uranium Resources Ltd	80.00	51.15			9.2		9.2		1.4
Armgold (Harmony Gold Mining Co Ltd):Armgold (Harmony Gold Mining Co. Ltd)	Harmony Gold Mining Co. Ltd	100.00	674.40		55.26	27.19	55.26	27.19	3.9	8
Gold Fields of South Africa:Remgro	Anglo American Plc	11.30	159.50		68.66	5.42	68.66	5.42	0.8	10
Tau Lekoa:Village Main Reef Ltd	Tannous Investment Group	100.00	130.00		20	0.87	20	0.87	0.5	11.9
Tau Lekoa:AngloGold Ashanti Ltd	Simmer and Jack Mines Ltd	100.00	58.50		8.15	1.05	8.15	1.05	0.8	6.2
Barberton:Metorex Ltd	Pan African Resources Plc	100.00	69.80		25.57	5.62	25.57	5.62	0.56	2.5
Block 1c11:Gold Fields Ltd	AngloGold Ashanti Ltd	85.00	43.00		2.16	0.25	2.16	0.25	5.6	47.4
Average		85.51	218.78		20.28	5.29	19.04	4.60	3.15	18.37
Median		**100.00**	**144.75**		**10.37**	**2.09**	**7.93**	**1.18**	**2.50**	**10.95**

Table 5.26: Median percentages paid and implied valuation

	Median (% Paid)	Median (USD million)
Mineral Reserve	10.37	186
Mineral Reserve equivalent	7.93	142
Mineral Resource	2.09	**465**
Mineral Resource equivalent	1.18	262

The implied valuation on a Au exclusive basis is then from USD186 to USD465 million for the Mineral Resources and Mineral Reserves involved. The price paid per Mineral Resource ounce (inclusive) is USD27 (USD15 for metal equivalent) and the price paid per Reserve ounce is USD135 (USD104 per Reserve equivalent).

SRK also considered the Enterprise Value per ounce as an indication of the possible value of MK. Companies considered include AGA, Harmony and Sibanye. Sibanye now has a significant proportion of their production from non-gold assets. AGA is primarily outside of South Africa and Harmony has a large copper-gold porphyry. SRK considered the implied valuation based on these companies multiples despite the above reservations.

Table 5.27: Enterprise Value (EV) per ounce

Company	Mark Cap	EV	Mineral Reserve (total)	Mineral Resource	Mineral Resource (Incl)	EV/RSV		EV/RES	
Unit	USD million	USD million	Moz	Moz	Moz	USD/ oz	ZAR/ oz	USD/ oz	ZAR/ oz
Sibanye Gold	2 540	3 990	25.8	187.2	213	155	2 057	19	249
AGA	3 840	5 760	50	146	196	115	1 532	29	391
Harmony	830	904	9.7	48.6	58.3	93	1 240	16	206

The EV per ounce is shown in Table 5.27. RSV is for Mineral Reserve, RES for Mineral Resource and the (Incl) shows the Mineral Resource inclusive of Mineral Reserve. The EV is from the Market Capitalisation plus the latest estimate that could be obtained for each company's debt position.

Table 5.28: Implied valuations from EV per ounce

Company	EV/RSV	EV/RES	Implied valuation for ounces in transaction	
	USD/oz	USD/oz	RSV (USD million)	RES (USD million)
Sibanye Gold	155	19	212	325
AGA	115	29	158	495
Harmony	93	16	**127**	**273**

Table 5.28 implies a value of between USD127 million and USD495 million for the Mineral Reserves and Mineral Resources of the assets being considered based on the EV/oz of these three companies.

The implied values from the EV/oz for Harmony are selected as the low and preferred value, USD127 and USD273 million respectively (Table 5.28), for the Market Approach. The high value, USD465 million (Table 5.26), is selected from the median price paid for Au exclusive Mineral Resources.

5.9 Human Resources

[SR8]

This chapter presents the employee related matters reviewed for the CPR process. SRK reviewed the Human Resources (HR) function to identify material risk factors that may impact the LoM plan. The HR function was also reviewed for compliance with legislation that governs employee related matters at the assets targeted in the transaction. The following acts and regulations were reviewed:

- The Basic Conditions of Employment Act of 1998 and the subsequent amendments;
- The Labour Relations Act of 1995 and associated amendments; and
- The Employment Equity Act of 1998 and promulgated amendments.

Compliance with good practice principles as outlined in The King III Code of Corporate Governance of 2009 was also reviewed.

5.9.1 Management Structure

A regional management committee has been put in place and runs the VROs under the leadership and auspices of a district general manager. The district general manager has departmental heads reporting and supporting in the discharge of his/her duties of the position. Some functions are shared and are rendered from the centre. The purpose of shared services is to reduce operating costs of the region and to streamline reporting lines.

5.9.2 Board Committee

AGA has appointed an Executive Vice President for the management of HR at group level. In addition to this appointment, the board has authorised a remuneration and HR committee to assist it with the discharge of its duties. The purpose of the committee is to assist the board in discharging its oversight responsibilities relating to following:

- All compensation including annual base salaries;
- Annual incentive compensation;
- Long-term incentive compensation;
- Employment practices;
- Severance pay and ongoing perquisites;
- Special benefit items and equity compensation of the Company’s executives, including the Chief Executive Officer as well as retention strategies,
- The design and application of material compensation programmes, and
- Share ownership guidelines.

With respect to its mandate on HR, the Committee also have strategic oversight of matters relating to the development of the Company’s HR with the main objective of creating a competitive human resource for the AGA operations. The committee has an independent role, operating as an overseer with accountability to the board.

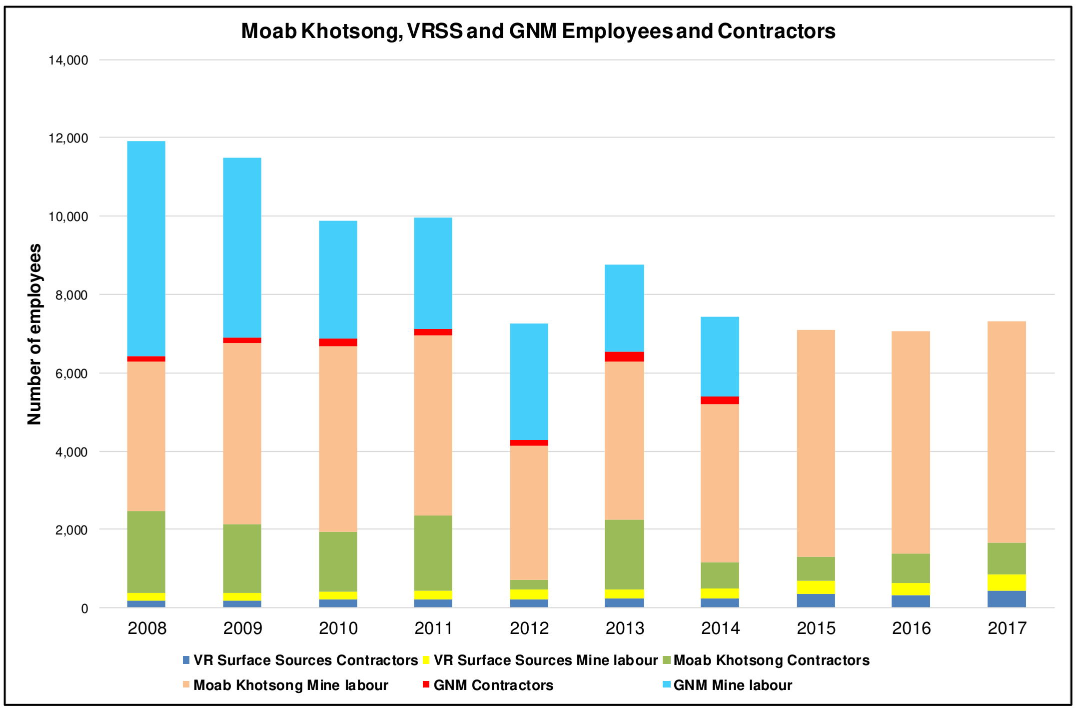
HR matters are also managed at each operation through the appointment of HR managers with subordinate support from the following functional disciplines:

- Industrial relations;
- Training, development and talent management;

- Recruitment;
- Enforcement of the company's disciplinary code;
- Assistance with the well-being of employees and employee remuneration; and
- Management of employee performance.

5.9.3 Workforce Requirements

The historical employee compliment and contractors for the MK, Vaal River Surface Sources (VRSS) and GN Mine employees and contractors from 2008 to February 2017 are provided in Figure 5.34. The breakdown of employees at the VROs as at August 2017 is outlined in Table 5.29. GN Mine was put under care and maintenance in 2015 and only staff involved in those operations were retained. There are currently about 23 employees involved with the care and maintenance of GN Mine.



srk consulting	MK, VRSS and GN Mine employees and contractors from 2008 to February 2017	Project No. 522673

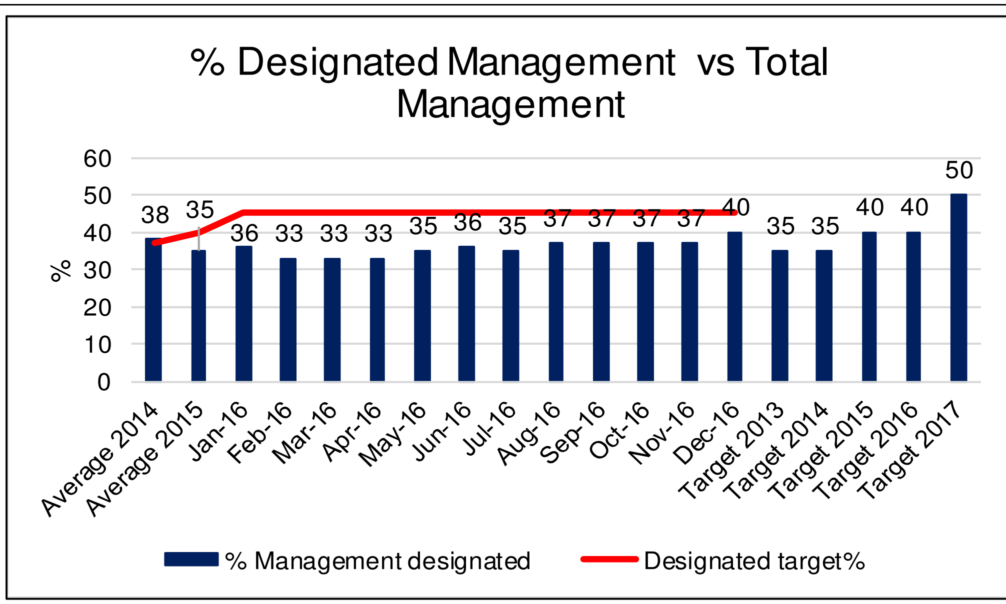
Figure 5.34: MK, VRSS and Mine employees and contractors from 2008 to February 2017

Table 5.29: VROs labour complement as at 2 August 2017

Operation	Count of Employee
MK and GN Mines	5 417
Care and Maintenance GN Mine	22
Mispah	64
South U Plant	133
Noligwa Plant	237
Nufcor	28
GN PHC	21
MK PHC	17
Noligwa Residence	112
Properties Central	22
Community and Social Development	3
ATDS Trainees - Moab and GN Mine	22
Occupational Health	58
ATDS Engineering Training	41
ATDS Gateway	50
Engineering	107
Central WH South U Plant	18
Grand Total	**6 372**

5.9.4 Employment Equity Requirement

The employment equity compliance statistics are provided in Figure 5.35 and the women in mining intake in Figure 5.36. EE compliance across the AGA group increased from 35 to 40% by December 2016. This is an increase of 14%. Compliance with regard to the use of women in mining has been above the set target of 10% between 2015 and 2016.



srk consulting	MK, VRSS and GN Mine employees and contractors from 2008 to February 2017	Project No. 522673

Figure 5.35: MK, VRSS and GN Mine employees and contractors from 2008 to February 2017

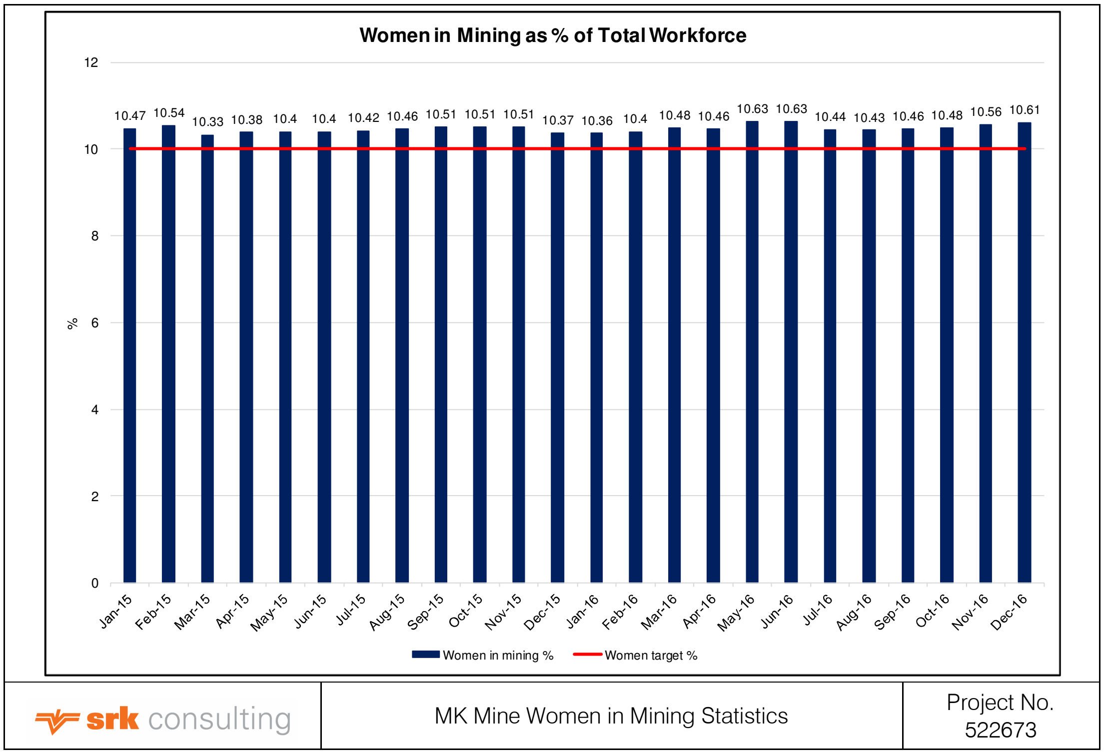


Figure 5.36: MK Mine Women in Mining Statistics from January 2015 to December 2016

5.9.5 HIV and AIDS Management

The statistics of the HIV and AIDS pandemic at the VROs from 2014 to 2017 for company employees are provided in Table 5.30. The prevalence rate for employees at the VROs has averaged 18% over the last 3 years. The cost of treating the epidemic has decreased from ZAR17.4 million in 2014 to ZAR14.7 million in 2016. This reduction in cost was mainly as a result of GN Mine being put under care and maintenance.

Table 5.30: HIV and AIDS statistics

Reporting area	2014	2015	2016	2017 (Quarter 1 & Quarter 2)
MK				
Number of employees enrolled for HIV counselling & testing (HCT)	2 598	1 949	2 510	1 032
Number of employees enrolled in HIV management programme (Wellness)	817	744	827	704
Number of employees on ART	587	507	538	723
GN Mine				
Number of employees enrolled for HIV counselling & testing (HCT)	1 043	661	now included in MK	
Number of employees enrolled in HIV management programme (Wellness)	487	357	286	220
Number of employees on ART	333	226	173	232
Metallurgy (V Reef)				
Number of employees enrolled for HIV counselling & testing (HCT)	1 209	975	1 121	787
Number of employees enrolled in HIV management programme (Wellness)	135	125	109	120
Number of employees on ART	96	91	89	86
Total: VROs				
HIV prevalence % (wellness attendance as a percentage of the workforce)	19.1%	17.8%	18.1%	17.5%
Number of employees enrolled for HIV counselling & testing (HCT)	8 094	6 258	6 483	5 602
Number of new HIV infections (laboratory confirmed)	325	252	200	68
HIV incidence (laboratory confirmed new cases as percentage of workforce)	2.9%	2.5%	2.0%	1.5%
Number of employees enrolled in HIV management programme (Wellness)	2 527	2 113	2 094	1 814
Number of employees on ART	1 718	1 464	1 483	1 786
HIV/AIDS wellness costs (ZARmillion)	17.4	15.3	14.7	7.2
Prevalence of non-communicable diseases (NCDs) as a percentage of workforce)	17.0%	16.8%	17.5%	16.6%

5.9.6 Industrial Relations Climate

There are five Trade Unions at the VROs. The Unions are:

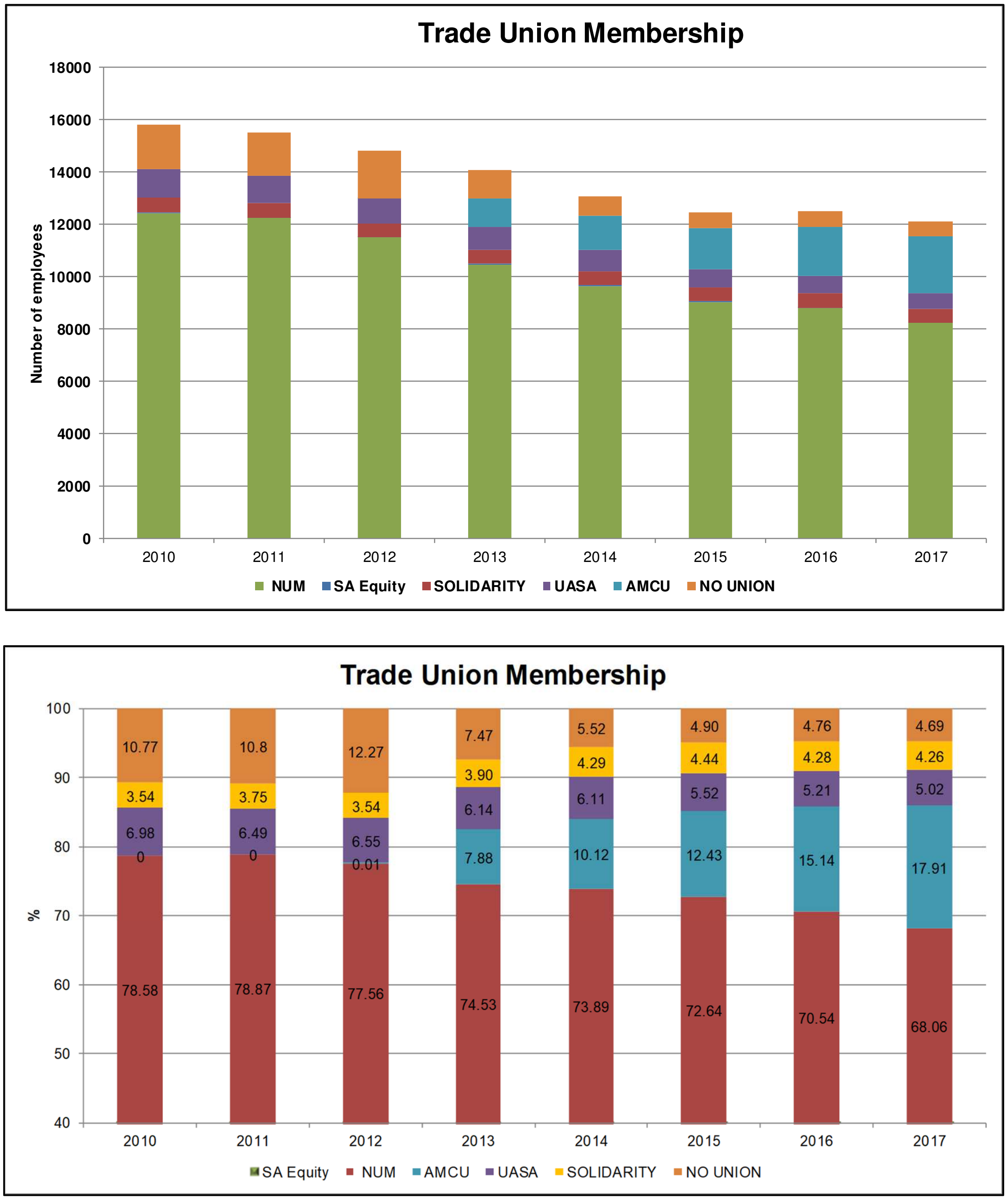
- The Association of Mining and Construction Union (AMCU);
- The National Union of Mineworkers (NUM);
- SA Equity;
- Solidarity; and
- UASA.

The NUM is the dominant union at the VROs. A breakdown and trends of the trade union membership is provided in Figure 5.37 and Table 5.31. The emergence of the AMCU was observed in 2013. As at February 2017 the NUM had membership of 68% of the workforce and AMCU tallies about 18%. There appears to be a shift in allegiance within the Union support base with the AMCU growing in membership over the years. This shift has been observed in the other sectors of the mining industry with the NUM losing support while AMCU has been gaining members over the last few years. AMCU's support at MK Mine has increased to 24% by August 2017.

The incidence of industrial action at the operations of the company is minimal and disruptions to production operations marginal.

Table 5.31: VROs trade union membership breakdown 2014 to August 2017

Period	Business Unit	S.A. EQUITY WORKERS ASS	SOLIDARITY	AMCU	N.U.M	UASA	NO UNION
1-Aug-2014	GN	0.1%	2.7%	14.0%	69.3%	9.4%	4.5%
	V Reef Metallurgy	0.3%	9.9%	0.2%	71.6%	6.3%	11.7%
	MK	0.1%	3.7%	5.3%	84.5%	2.8%	3.6%
	V Reef SARS	0.1%	4.9%	3.2%	51.5%	16.8%	23.5%
	NUFCOR	0.0%	11.1%	0.0%	66.7%	3.7%	18.5%
1-Aug-2015	GN	0.1%	2.4%	14.7%	71.3%	8.4%	3.2%
	V Reef Metallurgy	0.3%	9.6%	0.9%	74.8%	6.6%	7.8%
	MK	0.1%	3.8%	12.2%	78.1%	3.2%	2.6%
	V Reef SARS	0.1%	6.6%	8.4%	50.6%	18.5%	15.8%
	NUFCOR	0.0%	7.1%	0.0%	64.3%	7.1%	21.4%
1-Aug-2016	GN	0.1%	2.3%	16.9%	68.0%	6.7%	5.9%
	V Reef Metallurgy	0.4%	8.9%	4.9%	72.5%	6.3%	7.1%
	MK	0.1%	3.9%	16.4%	72.2%	3.0%	4.4%
	V Reef SARS	0.1%	6.8%	11.4%	47.7%	18.4%	15.6%
	NUFCOR	0.0%	7.1%	0.0%	71.4%	3.6%	17.9%
1-Aug-2017	GN	0.2%	2.6%	22.4%	66.2%	6.2%	2.4%
	V Reef Metallurgy	0.1%	8.8%	8.8%	69.0%	6.3%	7.0%
	MK	0.0%	4.0%	24.1%	65.9%	2.9%	3.1%
	V Reef SARS	0.0%	6.0%	9.8%	52.9%	16.9%	14.5%
	NUFCOR	0.0%	7.1%	3.6%	71.4%	3.6%	14.3%



srk consulting	VROs Trade Union Membership	Project No. 522673

Figure 5.37: VROs Trade Union Membership

5.9.7 Performance Management

There is a performance management system in place at the VROs. AGA has a bonus incentive system at MK Mine to drive the performance of employees and as such the mine. The bonus incentive scheme is paid over and above the employee's remuneration. The bonus incentive scheme is driving the right behaviour among employees by instilling a culture of performance. The bonus system is based on a contribution of 50% of own performance and 50% of the mine's performance. The own performance parameters are as follows:

- Safety;
- Efficiencies;
- Quality of outputs;
- Special allowances; and
- Section size.

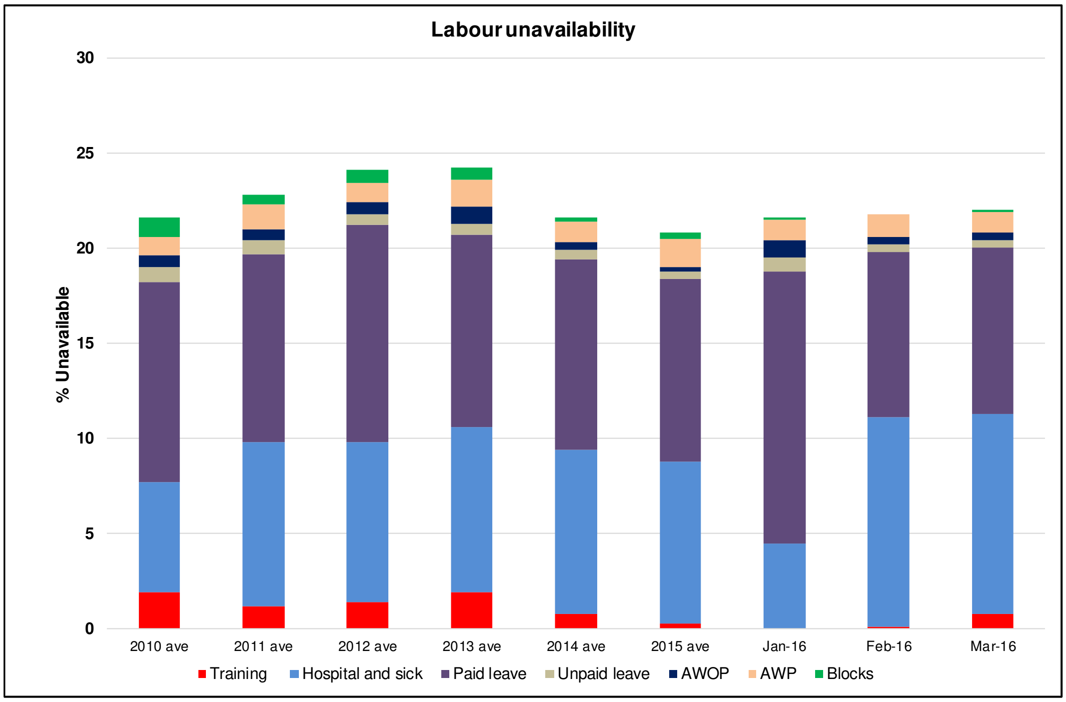
The special allowance applies to steep mining high channel width panels. The bonus is paid put on a sliding scale depending on the achievement of the teams.

There are penalties entrenched within the system and employees are penalised for substandard work, safety performance and being absent from work without permission.

AGA also has a Long-Term Incentive Plan (LTIP) in which more senior employees participate. SRK believes the scheme is aligned with the level of responsibility of the employees and also brings about a sense of ownership and pride among the employees. The LTIP assist in the retention of employees at it is made up of shares that vest after about three years of service with the company.

5.9.8 Labour Unavailability and Absenteeism

The labour non-availability and absenteeism trend is provided in Figure 5.38, the unplanned unavailables in Table 5.32 and a breakdown per operation in Table 5.33. The labour unavailability has averaged 22% from 2010 to March 2016. This rate of absenteeism and labour unavailability is regarded as within the range observed in the mining industry. SRK believes absenteeism will not impact the achievability of the LoM plans materially.



srk consulting	Labour unavailability for MK Mine from 2010 to March 2016	Project No. 522673

Figure 5.38: Labour unavailability for MK Mine from 2010 to March 2016

Table 5.32: Summary of unplanned unavailables from August 2014 to August 2017.

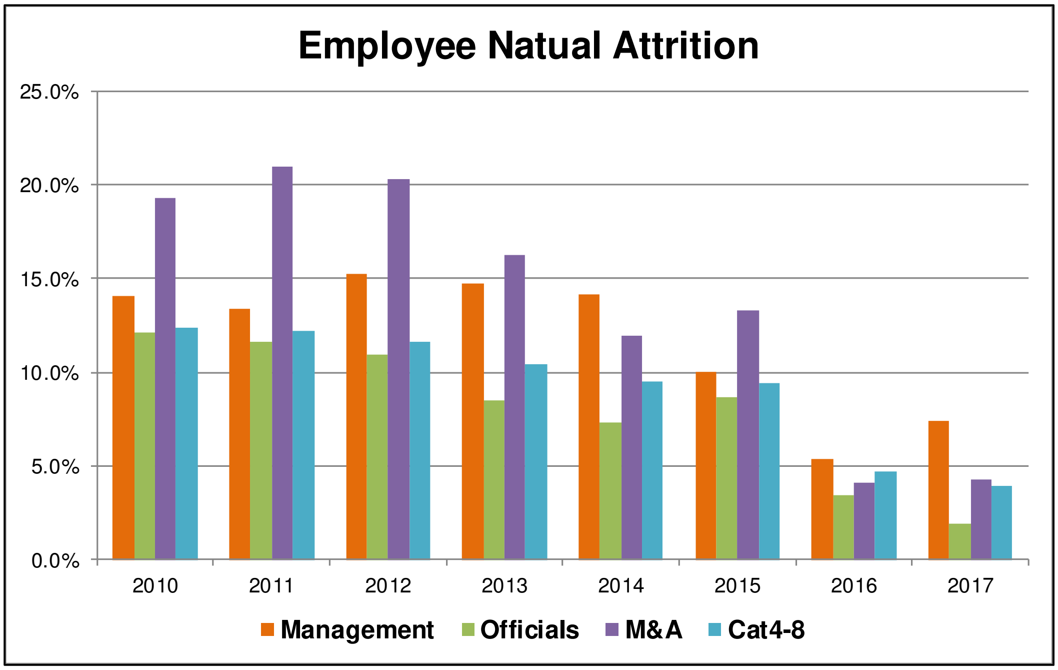
Operation	Aug-14	Aug-15	Aug-16	Aug-17
GN Mine	19.17%	18.68%		
MK Mine	21.29%	22.81%	21.76%	24.19%
Surface Sources	18.07%	19.43%	15.71%	17.81%
SARS	16.13%	17.11%	14.30%	17.80%

Table 5.33: Breakdown of unavailables from August 2016 to August 2017

Period	Parameter	Moab	SURF S	SARS
August 2016	Training (%)	0.16%	0.00%	0.09%
	Hospital & Sick (%)	10.48%	5.45%	5.59%
	Paid Leave (%)	10.47%	9.33%	8.08%
	Unpaid Leave (%)	0.65%	0.92%	0.55%
	AWOP (%)	0.39%	0.49%	0.76%
	Pool (%)	0.60%	0.37%	0.65%
	AWP (%)	1.30%	1.14%	0.87%
	Blocks (%)	0.04%	0.00%	0.23%
August 2017	Training (%)	1.30%	0.00%	0.00%
	Hospital & Sick (%)	10.77%	6.16%	6.46%
	Paid Leave (%)	11.58%	11.31%	10.96%
	Unpaid Leave (%)	0.53%	0.34%	0.38%
	AWOP (%)	0.34%	0.79%	0.95%
	Pool (%)	1.59%	1.86%	1.36%
	AWP (%)	1.50%	1.13%	0.95%
	Blocks (%)	0.05%	0.04%	0.20%
	DMR (%)	0.00%	0.00%	0.00%

5.9.9 Employee attrition

Employee natural attrition statistics for the VROs from 2010 to 1 February 2017 are provided in Figure 5.39. The statistics include dismissals, retirements, medical separations and resignations but excludes Voluntary Separation Packages (VSPs) and retrenchments. The employee turnover rate at the VROs has decreased over the years and does not pose a risk to the operations of the mines. The VROs appear to have an effective strategy to retain key skills.



srk consulting	**AGA VROs Competent Person's Report** Employee Natural Attrition for the VROs	Project No. 522673

Figure 5.39: VROs employee natural attrition trend from 2010 to 1 February 2017

6 Conclusions and Recommendations

6.1.1 Geology

Deposit Type

The V Reef is the primary economic horizon at MK Mine and the C Reef is the secondary economic horizon, which contributes less than 2% of the total mining volume. Both reefs are narrow tabular deposits forming part of the Witwatersrand Supergroup and are stratigraphically located near the middle of the Central Rand Group. The V Reef lies approximately 255 m below the C Reef.

The geology at MK Mine is structurally complex with large fault-loss areas between the three mining areas. The geological setting is one of crustal extension, dominated by major south-dipping fault systems with north-dipping Zuiping faults wedged between the southdipping faults. The De Hoek and Buffels East faults structurally bound the reef blocks of the Middle Mine to the north-west and southeast respectively. The northern boundary of MK Middle Mine is a north-dipping Zuiping fault. Extensive drilling is currently underway on the extremities of Middle Mine, targeting potential preserved blocks. MK (particularly Middle Mine) requires a reduced drill spacing pattern on the order of 50 x 50 m which allows for accurate delineation of the structurally bound mineable blocks, whereby accurate and efficient mine designs can be implemented ensuring optimal extraction and maximum orebody utilisation.

Mineralisation

The mineralisation model adopted by AGA for Witwatersrand deposits is that of gold (Au) precipitation in the Witwatersrand conglomerates from hydrothermal fluids. Reactions that took place at elevated temperatures ranging between (300 – 350°C) caused the fluids to precipitate Au and other elements. Migrating liquid and gaseous hydrocarbons precipitated as a solid hydrocarbon (carbon), which was then mesophased through metamorphism and structural deformation. Carbon was preferentially precipitated in bedding–parallel fractures that most commonly followed the base of the V Reef package (A-bottom sub-facies). Au and Uranium Oxide (U_3O_8) mineralisation is also commonly observed within the A-middle and A-top sub-facies of the V Reef. Au was precipitated very soon after the carbon, giving the critical gold-carbon association that characterises the high-grade V Reef.

A geological model is employed to delineate variations (either lateral or vertical) in characteristics of the V Reef and C Reef. The current geological model thus subdivides the V Reef and C Reef into homogeneous zones based on geological and grade characteristics.

SRK have a different interpretation of the source of the Au within the Witwatersrand Reefs. SRK subscribe to the ‘modified placer’ interpretation, where the Au and U_3O_8 is syn-sedimentary alluvial metal, deposited along with the conglomerates, and concentrated in the conglomerates through repeated deposition and erosional cycles. Small scale (cm) hydrothermal re-mobilisation of the Au after deposition has occurred. Regardless of which of the two interpretations are considered however, the controls on the mineralisation are very similar, as the sedimentological characteristics which control the Au and U_3O_8 distribution in the modified placer interpretation are also interpreted as controls on the fluid flow and Au deposition in the AGA interpretation. The primary characteristics which inform the definition of estimation domains, using either interpretation, are the sedimentological and mineralogical characteristics of the conglomerates.

Geology/Mineralisation of Vaal River Surface Sources

The material contained in the TSF and MODs originate from the historic ore-bearing reefs mined at the West Wits, the V Reef, Buffelsfontein, Hartebeestfontein and Stilfontein gold mines. The material contained in the TSFs is fine grained.

Au contained in the MODs is from minor reefs that are intersected, while accessing the primary gold - bearing reef that is contained within small fault blocks that are exposed by off-reef development and cross-tramming of gold – bearing reef material to the waste tips.

6.1.2 Mining and Mineral Reserves

- The scattered conventional mining method is proven and SRK believes it is suitable for the characteristics of the orebodies found at the MK Mine. The method has been practised at the mine since it was commissioned in 2003 and the operational crews are experienced in the method;
- The mine planning process at MK LoM is conducted with diligence and sound modifying are applied to convert the Mineral Resources to Mineral Reserves. The modifying factors are reasonable and take cognisance of past performance. SRK is of the view that the LoM plan is realistic and achievable. No significant risk factors were identified; and
- SRK believes the methodology applied to convert the Mineral Resources to Mineral Reserves meets the requirements of the SAMREC Code.

6.1.3 Operating Costs

The production tonnage planned for MK Mine reduces over the duration of the LoM. The unit operating costs incurred at MK Mine increase as the production reduces. The costs are escalated by inflation over the LoM.

SRK believes the costs applied in the LoM plan are reasonable.

6.1.4 Geotechnical Aspects

The review of geotechnical aspects concluded that:

- Sufficient seismic monitoring is in place to provide the seismic monitoring requirements contained in the CoP to combat rockfall and rockburst accidents. If there is an increase in production, seismicity will increase in proportion to the production rate and there will not be an asymptotic increase in seismicity;
- The mining strategies for the business plan are comprehensive and provide viable strategic requirements for each of the mining areas. No risk issues were identified with regard to extraction of IBGs;
- The GN Shaft pillar has not been included in the LoM plan. The mining of the pillar has been justified in a rock engineering report and this justification appears reasonable. The quantification and interpretation of the seismic risk associated with this extraction has been adequately covered;
- The MK Shaft is spilt by a brattice wall which has had problems in the past in the vicinity of the reef intersection (stoped out) with the shaft. It appears that this area is now stabilised and no further issues are expected in this area; and
- The Zaaiplaats Project design is at a PFS stage.

6.1.5 Ventilation, Safety and Occupational Health modifying factors

Ventilation and cooling

- MK Mine has sufficient ventilation and refrigeration capacity to maintain current production levels during the next 5 years and should the production plan remain unchanged, a main fan can be stopped by 2019;

- In spite of having a comprehensive cooling infrastructure in place, the underground cooling obtained from spot coolers and service water is currently below design; and
- GN Mine has spare ventilation/cooling capacity to increase production at the MK Mine Top Mine and mining of the Shaft pillar if required.

Safety

- There has been a significant reduction in injuries and fatal accidents from 2002 to 2016 across all the AGA VROs, and this is a commendable achievement;
- In spite of the improvement, the number of Section 54 safety stoppages were at an all-time high in 2015 at MK. Lost shifts totalled 48 days and the production loss was 1 047 kg Au;
- The Labour Court of South Africa, Johannesburg handed down an important decision in November 2016, when it granted AGA an interdict of a Section 54 work stoppage that had been issued by the DMR. The judge found that the Section 54 applied at Kopanang Mine lacked “proportionality”; in other words it was unfair to close the entire mine when the safety incidents had occurred at only one level (44 level). This should result in a reduction in the number of lost shifts as a result of Section 54 stoppages in the Vaal Reefs area; and
- In terms of emergency preparedness, the VRO AGA mines are well placed to handle emergencies.

Occupational Health

- The VROs and all AGA mines have an industry leading silica dust suppression program in place. The decline in the number of diagnosed Silicosis cases is proof that employee exposure to silica dust is decreasing. A target of zero diagnosed cases should be achievable;
- In spite of extensive noise control initiatives, the expectation would be that the number of NIHL cases would be on the decrease. Although the number of diagnosed cases have reduced in the past ten years, there have been fluctuations since 2014. Non-occupational or social exposure to noise may be a probable cause. Unfortunately noise exposure (occupational or non-occupational) remains a liability to the company.

6.1.6 Tailings Storage Facilities

The Mispah TSFs consist of three compartments with the first compartment commissioned in the early 1990’s. No major capital expenditure or risks have been identified during this CPR exercise. However, should the dolomite risk investigation indicate that there is potential risk to the current TSF, especially at the penstocks or at the starter wall then there could be capital expenditure required for the identification and development of a new TSF.

6.2 Mineral processing

The mineral processing assets included in this transaction are mature and generally in fair condition, with capacity that generally exceeds the planned throughput requirements.

Surplus capacity is likely however, to impact negatively on operating costs. This has been acknowledged in projected operating costs but there is a risk that process operating costs may increase at reduced throughput. It will accordingly be important to minimise overheads. There may however, be an opportunity to manage operating costs as throughput reduces, by shutting down surplus capacity.

The metallurgical characteristics of planned ore is unlikely to be significantly different from that processed in the past. Should ore with inferior metallurgical characteristics be introduced however, Au recovery would be negatively influenced. In this regard the metallurgical characteristics of any new ore types should be investigated in advance.

There is a risk that Au recoveries will be lower than planned in periods of lower Au grade.

U_3O_8 processing is currently not profitable. Ongoing operation has been motivated by a historically observed improvement in Au recovery after U_3O_8 leaching with sulphuric acid. There is accordingly a risk that Au recovery would drop should U_3O_8 processing be discontinued. It is recommended that forward leach be compared with reverse leach and the optimal process route be selected.

It is likely that Harmony will process MOD through the GN and Mispah Gold Plants. This has not been include in the TEM and accordingly represents upside potential.

6.3 Engineering Infrastructure and Capital Projects

The infrastructure is mature, well maintained and adequate to support the LoM. The capacity of the MK Mine hoisting and rock handling system is more than adequate to support the LoM.

The planned capital expenditure is Sustaining Capital, ORD, environmental and closure costs, and some exploration capital. There is no project capital that has an influence on the valuation of the assets or the LoM. The Zaaiplaats Project has not been included in the financial model presented or the valuation of the assets. The GN Shaft pillar project is also not included as it is considered to be upside.

It is anticipated that the transfer of ownership of power supply agreements and metering points for those assets involved in this transaction will be a smooth exercise, as this will mostly only require name changes from AGA to Harmony. Eskom will not be required to go through the whole process such as feasibility studies as if it is a totally new application, as the electrical infrastructure is already existing.

Existing electrical infrastructure for the assets involved in this transaction is adequate to supply and maintain the mining and processing requirements going into the future.

6.4 Groundwater and Surface Water

The greatest liability to the transaction will remain the treatment of water from underground and the remediation of the groundwater plume. There will need to be changes to the reticulation systems that will require a separation from the other AGA assets as well as ensuring that the surrounding mines are not influenced by other mines. This is predominantly the groundwater from surrounding mines entering the new assets at a future date.

6.5 Environmental, Social Impact and Mine Closure

The VROs is in possession of two Mining Rights; the Moab Extension Mining Right and the Vaal River Mining Right which exclude the portion forming part of Kopanang Mine. The mine has a DMR approved EMP that includes existing underground mining activities, shaft surface infrastructure, WRD/MOD, metallurgical plants and TSFs. In 2016, an EMP consolidation was developed and submitted for DMR approval and a decision is pending. Other key approvals relate to water use, atmospheric emissions and radioactive material at VROs. Following the acquisition, Harmony will need to commence with the requisite applications to transfer environmental authorisations and licences held by AGA.

AGA, is in compliance with the provisions of Section 23 of the MPRDA and has an approved 2015-2019 SLP for the VROs. The implementation of the 2015-2019 SLP is progressing well and to date no Section 93 Directives have been issued by the DMR. In SRK's opinion there is a reasonable expectation that the relevant authorities will approve all plans and applications, including those that are required following the transfer of mine ownership.

The VROs has developed an EMS for which it has received ISO 14001 certification. In compliance with applicable laws, regulation and requirements, the EMS commits VROs to continual improvement of environmental management and performance, and to identify, monitor and control all aspects of mining activities. There is evidence of VROs undertaking environmental audits to determine the level of compliance with EMP and WUL commitments, noting a number of non-compliances. It is understood that VRO has formalized and structured engagement with local authorities. The VRO currently has a well-resourced social/community engagement team, supported by interns and community workers.

During November 2015, new Financial Provision Regulations were promulgated under NEMA. There are a number of legal and regulatory frameworks that require compliance by VROs that could materially affect rehabilitation and closure. These require a more strategic approach to closure than was previously required under the MPRDA and require that an operation’s liability be fully funded at all times through guarantees or contributions to trust funds.

The VROs undertakes an annual assessment of the premature and planned closure liability, for the biophysical closure of the operations. This assessment does not include internal or external social closure requirements, as these are considered under the SLP. Furthermore, the assessment does not include post closure water management. As the VROs follows a robust process to determine the liability, the resultant quantum is an appropriate reflection of the closure liability that has an accuracy of -25% to +25%. The process that VROs follows complies with legal requirements as contained in the MPRDA relating to the quantification of liability and could be adapted to meet the requirements of GN 1147, once these come into effect in February 2019. The premature closure liability, as calculated at the end of 2016, for the assets under consideration is ZAR639 million for biophysical closure. As required by legislation, AGA have made provisions to fund the liability using a combination of funds contributed to a Trust Fund and Bank Guarantees.

Based on SRK’s understanding, the contingent liability for water treatment at closure (based on work undertaken by other Consultants in 2015) could be as much as ZAR1.5 billion for the capital costs and ZAR2 billion for the operating costs and that these could be incurred approximately 10 years after the conclusion of underground mining. Whilst it appears likely that some of these costs will be mitigated through water sales, customers (external and internal) may exist for the pumped water prior to the commencement of treatment. These plans are conceptual and the final impact cannot be readily quantified.

6.6 Valuation

Table 6.1 shows the final selected valuation ranges.

Table 6.1: Final selected valuation ranges

Summary	Income (USD million)	Market (USD million)	Final (USD million)
Low	160	127	150
Preferred	257	273	260
High	343	465	350

The implied values from the EV/oz for Harmony are selected as the low and preferred value, USD127 and USD273 million respectively, for the Market Approach. The high value, USD465 million for the Market Approach is selected from the median price paid for Au exclusive Mineral Resources

The Income Approach range is driven by the uncertainty around the price. Whilst there are several other sources of uncertainty around cost the price uncertainty dominates. There are a number of risks associated with the mine but there are also a number of opportunities, including the mining of the GN Shaft pillar, the development of the Zaaiplaats Project and the treatment of the surface Mineral Resources. SRK considers that these opportunities have the potential to mitigate the risks associated with additional closure or environmental costs. Any extension of the LoM would reduce the NPV impact of these risks and allow additional time to fund.

The Market Approach implies a higher valuation than the Income Approach. Preference has been given to the Income Approach as this is a producing mine and given the uncertainties inherent in the Market Approach. However, the opportunities to bring in additional ounces into the Reserve through studies has led to the final selected range being between the Income and Market Approaches.

The final selected range is from USD150 to USD350 million with a preferred value of USD260 million. SRK notes that this price range is intended to exclude any sentiment, strategic or synergy value that may accrue to a purchaser.

6.7 Human Resources

The HR function at VROs appears to be adequately staffed. Non-compliances that present material risk factors to the operations and the business are addressed as they occur in an expeditious manner. The controls in the HR function are in place and effective. The internal company policies and procedures were not evaluated in detail, but there appears to be compliance at the cursory level.

The SRK review have not identified any material HR related risks factors that will impact the LoM plans negatively. The company complies with the applicable laws and regulations.

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8 Date and Signature Page

[SR9.1 (i) (ii)]

This CPR documents the Mineral Resource and Mineral Reserve statements on selected assets of AGA at VROs located approximately 170 km to 180 km from Johannesburg, near the Vaal River within the North West and Free State Provinces of South Africa as prepared by AGA, reviewed by SRK, and is effective as of January 1, 2018. A list of QPs is shown in Table 8.1.

Table 8.1: List of QPs

Author	Role	Qualifications and Affiliations	Date signed	Signature
John Roger Dixon	Principal Engineer and over all Competent Person for CPR	MSc, FSAIMM, CRIRSCO	November 27, 2017	"Signed" Roger Dixon
Joseph Mainama	Principal Mining Engineer CP (Mineral Reserves)	BSc Eng (Min), MBL, PBL, MSAIMM, MMMA	November 27, 2017	"Signed" Joseph Mainama
Andrew Van Zyl	Partner and Principal Consultant CP (Valuator)	BEng, MCom, MSAIMM	November 27, 2017	"Signed" Andrew Van Zyl
Mark Wanless	Partner and Principal Geologist CP (Underground Mineral Resources)	BSc(Hons), MGSSA	November 27, 2017	"Signed" Mark Wanless
Senzeni Mandava	Senior Resource Geologist CP (Surface Sources)	MSc Eng,GDE, MGSSA	November 27, 2017	"Signed" Senzeni Mandava

Reviewed by:

Marcin Wertz PrEng, BSc(Eng), FSAIMM, MMCC
Partner & Corporate Consultant

Appendices

Appendix A: Certificates of QPs

CERTIFICATE OF COMPETENT PERSON

Certificate of Competent Person

As the author of the report entitled Competent Person's Report on Moab Khotsong Mine and assets of AngloGold Ashanti Vaal River Operations, I hereby state:-

1. My name is Roger Dixon and I am a Corporate Consultant with SRK Consulting (South Africa) (Pty) Ltd, based at 265 Oxford Road, Illovo, Johannesburg.
2. I am a registered professional engineer with ECSA (Registration No. 20000060). I am also an Honorary Life Fellow of the SAIMM (Membership No. 700066).
3. I have a BSc (Hons) Mining from the Imperial College (1971).
4. I have worked in the South African mining industry continuously since 1971, in mining and Mineral Reserve estimation.
5. I am a 'Competent Person' as defined in the SAMREC Code.
6. I have reviewed all information in the report, supplied by suitably qualified technical experts, and I am satisfied that the report is a true reflection of the value of the assets.
7. I visited the AngloGold Ashanti Vaal River Operations in 2017, as part of this review.
8. I am responsible for the complete report.
9. I am not aware of any material fact or material change with respect to the subject matter of the Report that is not reflected in the Report, the omission of which would make the Report misleading.
10. I declare that this Report appropriately reflects the Competent Person's view.
11. I am independent of Harmony Gold Mining Company Limited and AngloGold Ashanti.
12. I have read the SAMREC Code (2016) and the Report 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 Harmony Gold Mining Company Limited or AngloGold Ashanti.
14. At the effective date of the Report, to the best of my knowledge, information and belief, the Report contains all scientific and technical information that is required to be disclosed to make the Report not misleading.
15. I hereby provide written approval for my contribution to this report to be issued into Public Report in the form, content and context in which, it appears herein.

Dated at Illovo on 27 November 2017.

SRK Consulting (South Africa) (Pty) Ltd

Roger Dixon, Pr.Eng BSc (Hons) Mining,

(Hon. Life Fellow) SAIMM,

Corporate Consultant

CERTIFICATE OF COMPETENT PERSON

Certificate of Competent Person

As the co-author of the report entitled, “Competent Person’s Report on Moab Khotsong Mine and selected assets of AngloGold Ashanti Vaal River Operations”, I hereby state:-

1. My name is Andrew van Zyl and I am a full time employee of SRK Consulting (South Africa) (Pty) Ltd, based at 265 Oxford Road, Illovo, Johannesburg.
2. SAIMM membership number 705294.
3. I have a BEng Chemical and Mineral Processing from the University of Stellenbosch (1999) and a MCom Financial Economics and Econometrics from the University of Johannesburg (2006).
4. I have worked in the South African mining industry continuously since 2000 in metallurgy, engineering, economics and valuation roles.
5. I am a ’Competent Valuator’ as defined in the SAMVAL Code.
6. I have reviewed the Techno-Economic parameters and models which underpin the valuation.
7. I have not visited the operations but the operations were visited by a cross-section of technical experts upon whom I have placed reliance for input on operating and capital costs and productivity assumptions. I met with a range of senior officials from AngloGold Ashanti in meetings held in Sandton during 2017 to discuss the assets.
8. I am responsible for the valuation and market sections of this report.
9. I am not aware of any material fact or material change with respect to the subject matter of the Report that is not reflected in the Report, the omission of which would make the Report misleading.
10. I declare that this Report appropriately reflects the Competent Valuator’s view.
11. I am independent of Harmony Gold Mining Company Limited and AngloGold Ashanti.
12. I have read the SAMVAL Code (2016) and the Report has been prepared in accordance with the guidelines of the SAMVAL Code.
13. I do not have, nor do I expect to receive, a direct or indirect interest in the Harmony Gold Mining Company Limited or AngloGold Ashanti.
14. At the effective date of the Report, to the best of my knowledge, information and belief, the Report contains all scientific and technical information that is required to be disclosed to make the Report not misleading.
15. I hereby provide written approval for my contribution to this report to be issued into Public Report in the form, content and context in which it appears herein.

Dated at Illovo on 27 November 2017.

SRK Consulting (South Africa) (Pty) Ltd

Andrew van Zyl, MSAIMM

Partner and Principal Consultant

CERTIFICATE OF COMPETENT PERSON

Certificate of Competent Person

As the author of the report entitled, “Competent Person’s Report on Moab Khotsong Mine and selected assets of AngloGold Ashanti Vaal River Operations” I hereby state:-

1. My name is Mark Wanless and I am a full time employee of SRK Consulting (South Africa) (Pty) Ltd, based at 265 Oxford Road, Illovo, Johannesburg.
2. SACNASP registration number 400178/05.
3. I have a BSc (Hons) Geology and Geochemistry from the University of Cape Town (1995)
4. I have worked in the South African mining industry continuously since 1996 in geology and Mineral Resource estimation.
5. I am a ’Competent Person’ as defined in the SAMREC Code.
6. I have reviewed the information, in which the Mineral Resource estimates are based, and the estimation process and classification of the Mineral Resources.
7. I visited the operations in 2008, and did not visit the operations as part of this review
8. I am responsible for the Geology, exploration, data collection and management Mineral Resource estimation and classification sections of this report.
9. I am not aware of any material fact or material change with respect to the subject matter of the Report that is not reflected in the Report, the omission of which would make the Report misleading.
10. I declare that this Report appropriately reflects the Competent Person’s view.
11. I am independent/not independent of Harmony Gold Mining Company Limited and Anglogold Ashanti.
12. I have read the SAMREC Code (2016) and the Report 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 Harmony Gold Mining Company Limited or AngloGold Ashanti.
14. At the effective date of the Report, to the best of my knowledge, information and belief, the Report contains all scientific and technical information that is required to be disclosed to make the Report not misleading.
15. I hereby provide written approval for my contribution to this report to be issued into Public Report in the form, content and context in which it appears herein.

Dated at Illovo on 27 November 2017.

SRK Consulting (South Africa) (Pty) Ltd

Mark Wanless, Pr.Sci.Nat

Partner and Principal Geologist

CERTIFICATE OF COMPETENT PERSON

Certificate of Competent Person

As the co-author of the report entitled, “Competent Person’s Report on Moab Khotsong Mine and selected assets of AngloGold Ashanti Vaal River Operations”, I hereby state:-

1. My name is Joseph Itumeleng Mainama and I am a full time employee of SRK Consulting (South Africa) (Pty) Ltd, based at 265 Oxford Road, Illovo, Johannesburg.
2. I am registered as a Professional Engineer with the Engineering Council of the South Africa (Registration No. 20080413). I am a Member of the Southern African Institute of Mining and Metallurgy and a Member of the Mine Managers Association of South Africa.
3. I am a graduate of the University of the Witwatersrand with a BSc (Eng) in Mining Engineering, which I obtained in 1996. I have practised my profession continuously since 1996. During the past 20 years, I have been involved in the field of mining engineering. I have experience in operational, project and review related work for underground massive and narrow reef mines.
4. I am a ’Competent Person’ as defined in the SAMREC Code.
5. I have reviewed the information in which the Mineral Reserve estimates are based, and the estimation process and classification of the Mineral Reserves
6. I visited the operations on 12 June 2017.
7. I am responsible for the Mining, and Mineral Reserve estimation and classification sections of this report.
8. I am not aware of any material fact or material change with respect to the subject matter of the Report that is not reflected in the Report, the omission of which would make the Report misleading.
9. I declare that this Report appropriately reflects the Competent Person’s view.
10. I am independent/not independent of Harmony Gold Mining Company Limited and Anglogold Ashanti.
11. I have read the SAMREC Code (2016) and the Report has been prepared in accordance with the guidelines of the SAMREC Code.
12. I do not have, nor do I expect to receive, a direct or indirect interest in the Harmony Gold Mining Company Limited or AngloGold Ashanti.
13. At the effective date of the Report, to the best of my knowledge, information and belief, the Report contains all scientific and technical information that is required to be disclosed to make the Report not misleading.
14. I hereby provide written approval for my contribution to this report to be issued into Public Report in the form, content and context in which it appears herein.

Dated at Illovo on 27 November 2017.

SRK Consulting (South Africa) (Pty) Ltd

J. I Mainama Pr.Eng

Principal Mining Engineer

CERTIFICATE OF COMPETENT PERSON

Certificate of Competent Person

As the co-author of the report entitled, “Competent Person’s Report on Moab Khotsong Mine and selected assets of AngloGold Ashanti Vaal River Operations”, I hereby state:-

1. My name is Senzeni Maggie Mandava and I am a full time employee of SRK Consulting (South Africa) (Pty) Ltd, based at 265 Oxford Road, Illovo, Johannesburg.
2. SACNASP registration number 400262/16.
3. I have an MSc in Engineering (Mining) (2016), GDE in Mining Engineering (2010) and BSc Geology and Chemistry (2002) from the University of Witwatersrand and University of Zimbabwe respectively.
4. I have worked in the Southern African mining industry continuously since 2002 in geology and Mineral Resource estimation.
5. I am a ’Competent Person’ as defined in the SAMREC Code.
6. I have reviewed the information, in which the Mineral Resource estimates are based, and the estimation process and classification of the Mineral Resources.
7. I visited the operations in 2017 as part of this review.
8. I am responsible for the Geology, exploration, data collection, management of Mineral Resource estimation, classification sections and the compilation of this Report.
9. I am not aware of any material fact or material change with respect to the subject matter of the Report that is not reflected in the Report, the omission of which would make the Report misleading.
10. I declare that this Report appropriately reflects the Competent Person’s view.
11. I am independent/not independent of Harmony Gold Mining Company Limited and Anglogold Ashanti.
12. I have read the SAMREC Code (2016) and the Report 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 Harmony Gold Mining Company Limited or AngloGold Ashanti.
14. At the effective date of the Report, to the best of my knowledge, information and belief, the Report contains all scientific and technical information that is required to be disclosed to make the Report not misleading.
15. I hereby provide written approval for my contribution to this report to be issued into Public Report in the form, content and context in which it appears herein.

Dated at Illovo on 27 November 2017.

SRK Consulting (South Africa) (Pty) Ltd

SRK Consulting (South Africa) (Pty) Ltd

Senzeni Mandava, Pr.Sci.Nat

Senior Resource Geologist

Appendix B: Security of Tenure of the Properties Mining Rights and Surface Rights

13 October 2017

PROJECT GREEN APPLE
Appendix B: Security of tenure of the properties, mining rights and surface rights

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INTRODUCTION

1. This report provides confirmation (to the extent possible) of:

   1.1 Part A - the validity and tenure of mineral rights in relation to the Moab Khotsong and Great Noligwa Mining Right Area covered by the mining rights NW30/5/1/2/2/15MR and MW30/5/1/2/2/16MR (the **"Mining Right Area"**);

   1.2 Part B - the ownership of certain properties held by AngloGold Ashanti Limited (**"AGA"**) which are covered by the Mining Right Area; and

   1.3 Part C - the validity of the surface tenure and rights in respect of certain Surface Rights Permits held by AGA covered by the Mining Right Area.

2. The report and assurances set out herein are, unless otherwise indicated, solely based on the copies of documents provided to us by AGA directly or uploaded in the data room established by AGA for the due diligence exercise (the "**Data Room**"). Fasken Martineau (**"FM"**) has not independently verified this information.

3. We assume that the copies of the documents provided or disclosed to us are identical to the original versions of such documents and have not been amended or endorsed in any way.

PART A – MINING RIGHTS

Subject to the qualifications as set out in the Introduction, we confirm that AGA is the registered holder of the mining rights NW30/5/1/2/2/15MR and MW30/5/1/2/2/16MR and is entitled to mine all material covered by the mining rights and that all necessary statutory mining authorisations are in place.

13 October 2017

PART B – OWNERSHIP OF PROPERTY

1. Subject to the qualifications as set out in the Introduction, we set out in the table below, confirmation of the ownership of certain properties held by AGA which are covered by the Mining Right Area.
2. Our findings and confirmations are strictly based on the information and documents provided to us by AGA directly or uploaded to the Data Room established by AGA for a due diligence exercise, as well as electronic Windeed searches conducted on 12 October 2017 in respect of the properties listed under No. 1 - 10 below.
3. We have not considered or reviewed any of the conditions of title appearing in respect of the Title Deeds or Windeed searches conducted in respect of the properties listed under No. 1 - 10 below.
4. We understand that the company name of AGA was previously Vaal Reefs Exploration and Mining Company Limited, and was subsequently changed to AngloGold Limited and then to AGA. As indicated in the table below, some of the Title Deeds do not contain an endorsement reflecting the change of name to AGA. This, however, does not affect our confirmation of ownership of the respective properties, which is further confirmed by the electronic Windeed searches conducted on 12 October 2017.

Schedule of Properties owned by AngloGold Ashanti Limited ("AGA") in relation to the Moab Khotsong & Great Noligwa Mining Right Area							
No.	**Property Description**	**Portion Number**	**Hectares**	**Title Deed No.**	**Zoning**	**Title Deed Holder**	**DMR Mining Right Reference and Mining Operation**

1.	Moab 279 (Viljoenskroon)	The Farm	603.6089	27272/2001	Agricultural Zoning Certificate issued by the Moqhaka Municipality (Viljoenskroon) on 2016-11-04 and the certificate is valid for a period of six months.	AGA (As confirmed on the Windeed search and Title Deed of the property.)	MW30/5/1/2/2/15MR Moab Khotsong Mine NW30/5/1/2/2/16MR Great Noligwa Mine
2.	Zuiping 394 (Viljoenskroon)	1.	92.5056	755/1981	Agricultural Zoning Certificates issued by the Moqhaka Municipality (Viljoenskroon) on 2016-11-04 and the certificate is valid for a period of six months.	AGA (As confirmed on the Windeed search and Title Deed of the property.)	NW30/5/1/2/2/16MR Great Noligwa Mine
		3.	92.5056				
		4.	92.5056				
		5.	92.5055	4179/1968		AGA (As confirmed on the Windeed search of the property. Title Deed reflects AngloGold Limited and there is no further endorsement on the Title Deed reflecting change of	

						name to AGA.)	
3.	Zaaiplaats 190 (Viljoenskroon)	RE/2	205.6457	8032/1990	Agricultural Zoning Certificate issued by the Moqhaka Municipality (Viljoenskroon) on 2016-11-04 and the certificate is valid for a period of six months.	AGA (As confirmed on the Windeed search of the property. Title Deed reflects Vaal Reefs Exploration and Mining Company Limited and there is no further endorsement on the Title Deed reflecting change of name to AGA.)	NW30/5/1/2/2/16MR Great Noligwa Mine
4.	Mispah 274 (Viljoenskroon)	The Farm	603.7393	9733/1990	Agricultural Zoning Certificate issued by the Moqhaka Municipality (Viljoenskroon) on 2016-11-04 and the certificate is valid for a period of six months.	AGA (As confirmed on the Windeed search of the property. Title Deed reflects AngloGold Limited and there is no further endorsement on the Title Deed reflecting change of name to AGA.)	NW30/5/1/2/2/16MR Great Noligwa Mine
5.	Doornkom West	RE	302.9868	755/1981	Agricultural	AGA	NW30/5/1/2/2/16MR

	446 (Viljoenskroon)				Zoning Certificate issued by the Moqhaka Municipality (Viljoenskroon) on 2016-11-04 and the certificate is valid for a period of six months.	(As confirmed on the Windeed search and Title Deed of the property.)	Great Noligwa Mine
6.	Crystalkop 69 (Viljoenskroon)	The Farm	342.6129	775/1981	Agricultural Zoning Certificate issued by the Moqhaka Municipality (Viljoenskroon) on 2016-11-04 and the certificate is valid for a period of six months.	AGA (As confirmed on the Windeed search and Title Deed of the property.)	NW30/5/1/2/2/16MR Great Noligwa Mine
7.	Pretoriuskraal 53 (Viljoenskroon)	20	21.4990	14891/1980	Agriculture Zoning Certificate issued by the Moqhaka Municipality	AGA (As confirmed on the Windeed search of the property. Title Deed reflects AngloGold Limited and	NW30/5/1/2/2/16MR Great Noligwa Mine (We note that the Mining Right

					(Viljoenskroon) on 2016-11-04 and the certificate is valid for a period of six months.	there is no further endorsement on the Title Deed reflecting change of name to AGA.)	NW30/5/1/2/2/16MR only refers to "Pretorius Kraal 53" and therefore it is unclear whether portions 20 and 27 are covered by this mining right.)
		27	284.1395	3022/1978	Agriculture Zoning Certificate issued by the Moqhaka Municipality (Viljoenskroon) on 2016-11-04 and the certificate is valid for a period of six months.	AGA (As confirmed on the Windeed search of the property. Title Deed reflects AngloGold Limited and there is no further endorsement on the Title Deed reflecting change of name to AGA.)	
		RE	531.6143	16316/2007 (We have independently obtained a copy of this title deed)	Agriculture Zoning Certificate issued by the Moqhaka Municipality (Viljoenskroon) on 2016-11-04 and the certificate is valid for a period of six	AGA (As confirmed on the Windeed search and Title Deed of the property.)	

					months.		
8.	Modderfontein 440 (North West Province)	4	2572.0794	6528/1966	1. Mining and Quarrying 2. Industrial 1 Two Zoning Certificates issued by the Director: Civil Services & Human Settlements on 1 March 2017	AGA (As confirmed on the Windeed search of the property. Title Deed reflects AngloGold Limited and there is no further endorsement on the Title Deed reflecting change of name to AGA.)	NW30/5/1/2/2/16MR Great Noligwa Mine
9.	Hoekplaats 598 (Viljoenskroon)	The Farm	244.4942	14695/2015	Agricultural Zoning Certificate issued by the Moqhaka Municipality (Viljoenskroon) on 2016-11-04 and the certificate is valid for a period of six months.	AGA (As confirmed on the Windeed search and Title Deed of the property.)	Property not covered by either NW30/5/1/2/2/16MR or MW30/5/1/2/2/15MR
10.	Anglo 593 (Viljoenskroon)	The Farm	167.3825	597/2016	Agricultural Zoning Certificate	AGA (As confirmed on the	Property not covered by either

					issued by the Moqhaka Municipality (Viljoenskroon) on 2016-11-04 and the certificate is valid for a period of six months.	Windeed search and Title Deed of the property.)	NW30/5/1/2/2/16MR or MW30/5/1/2/2/15MR

PART C – SURFACE RIGHTS

1. Subject to the qualifications as set out in the Introduction, we set out in the table below, our findings and confirmations in respect of certain of the Surface Use Permits of the properties covered by the Mining Right Area. In preparing the table below we have relied only on the information and actual Surface Use Permits disclosed to us by AGA on 12 and 13 October 2017.

Schedule of Surface Rights Permits held by AngloGold Ashanti Limited ("AGA") in relation to the Moab Khotsong and Great Noligwa Mining Right Area							
No	**Description**	**Farm**	**Old Permit Number**	**New Permit Number**	**RMT Number**	**Holder**	**FM Comment**
1.	Effluent dam with fencing	Crystalkop 69,	56/71	419/2006	0.32/71	AGA	SRP information

		Viljoenskroon District					contained in schedule confirmed
2.	Area for Waste Rock Dump	Zuiping 394, Viljoenskroon District	105/72	130/2006	0.57/72	AGA	SRP information contained in schedule confirmed
3.	Sewerage disposal works with fencing	Crystalkop 69, Viljoenskroon District	81/73	416/2006	0.100/73	AGA	SRP information contained in schedule confirmed
4.	Area for mine security offices with fencing	Zuiping 394, Viljoenskroon District	15/74	432/2006	0.116/73	AGA	Cannot confirm description as copy provided is unclear. Balance of SRP information contained in schedule is confirmed.
5.	Shaft equipment, offices and store yard with fencing	Zuiping 394, Viljoenskroon District	61/75	430/2006	0.270/74	AGA	SRP information contained in schedule

							confirmed
6.	Bantu training centre with fencing	Zuiping 394 and Crystalkop 69, Viljoenskroon District	21/76	418/2006	0.38/76	AGA	SRP information contained in schedule confirmed
7.	Bantu residential quarters with fencing	Crystalkop 69 and Zuiping 394, Viljoenskroon District	173/77	420/2006	0.201/77	AGA	SRP information contained in schedule confirmed
8.	Reduction works, underground drain, water piplines and Underground electric cables, settling dam with fencing.	Doornkom West 446, Crystalkop 69 and Zuiping 394, Viljoenskroon District	177/77	417/2006	0.219/77	AGA	SRP information contained in schedule confirmed
9.	European recreation grounds with fencing, general offices and store yard with fencing, bridge, railway line, road, underground electric cables, water pipeline, sewer pipelines	Zuiping 394 and Crystalkop 69, Viljoenskroon District	187/77	421/2006	0.255/77	AGA	SRP information contained in schedule confirmed
10.	1) Road, water pipelines, compressed air column,	Zuiping 394, Crystalkop 69 and	267/77	422/2006	0.291/77	AGA	SRP information contained in

	overhead electric power line, sewer pipeline and telephone line with fencing. 2) Road and sewer pipeline. 3) Road with fencing. 4) Road with fencing	Doornkom West 446, Viljoenskroon District					schedule confirmed
11.	Extension to waste rock dump	Zuiping 394, Viljoenskroon District	98/80	428/2006	0.142/80	AGA	SRP information contained in schedule confirmed
12.	Visiting Centre for wives of black employees with fencing	Zuiping 394, Viljoenskroon District	116/81	426/2006	0.89/81	AGA	SRP information contained in schedule confirmed
13.	Uranium plant with fencing	Doornkom West 446, Crystalkop 69 and Zuiping 394, Viljoenskroon District	10/84	423/2006	0.1/84	AGA	SRP information contained in schedule confirmed
14.	i) Shaft equipment, with fencing ii) Waste rock dump, with fencing	Mispah 274, De Hoek 114 and Zaaiplaats 190, Viljoenskroon	5/96	08/2004	0.1/96	AGA	SRP information contained in schedule

		District					confirmed
15.	Core yard with fencing	Nooitgedacht 434, Klerksdorp District	121/81	242/2006	0.110/81	AGA	SRP information contained in schedule confirmed

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