15 Possible Mitigation Measures that Could be Applied

The proposed Expansion Project will occur within the Mogalakwena Mine area, which has already been affected by current mining activities. The specialist studies assessed potential environmental and social impacts that may occur as a result of the proposed Expansion Project. Appropriate mitigation and management measures to avoid and /or minimise the identified impacts associated with the project were developed and included in the EMPr (Part B, Section 29).

The mitigation hierarchy was applied throughout the scoping and EIA/EMPr Process. The mitigation hierarchy is an approach to mitigation planning and can be summarised into the following steps:

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

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

In the Impact Assessment Phase, the findings and recommendations of the specialist studies were used to develop the environmental and operational controls which are focused on impact minimisation and restoration (as part of mine rehabilitation and closure). The mitigation measures are fully described in Part B of this report.

With the mitigation measures applied, the residual risk significance for the assessed impacts and risks is generally low or medium.

16 Motivation Where No Alternatives Where Considered

Alternatives relating to location, infrastructure and transportation were considered in the previous EMPrs compiled for Mogalakwena Mine. The location of the proposed Expansion Project is therefore constrained to the location of the existing infrastructure which has been positioned based on the location of the mineral resource, and proven reserve. As such, no property alternatives were considered for this project. In addition, the infrastructure and activities associated with the proposed Expansion Project will be situated within the current mining rights and surface lease areas. Existing technologies will also be applied to the expansion activities and therefore no technology alternatives are available at this stage of the study. AAP are currently exploring new technology options which could be implemented at Mogalakwena Mine but are not part of the proposed Expansion Project.

17 Statement Motivating the Preferred Site

Alternatives relating to location, infrastructure and transportation were considered for the authorisation of the previous Mogalakwena Mine EMPrs. The location of the proposed project is therefore constrained to the location of the existing infrastructure which has been positioned based on the location of the mineral resource, and proven reserve. As such, no property alternatives were considered for this project. For this reason, no site selection was undertaken. The additional infrastructure will assist Mogalakwena Mine in the optimal mining of their existing and future reserves.

18 Environmental Impact Assessment

This section provides an overview of the impact assessment methodology, specialist findings and recommendations. It also includes the findings of the impact assessment phase which includes both positive and negative impacts identified for the various phases of the project (pre-construction, construction, operation and decommissioning and closure).

18.1 Approach

18.1.1 Prediction of significant environmental issues

Potential environmental issues or impacts associated with the proposed Expansion Project were identified during the EIA phase through a review and consideration of the following:

- The nature and profile of the receiving environment which included both a desktop evaluation (available documents, existing EMPrs, GIS maps) and a site visit to areas where the proposed mining activities will be constructed and operated;
- Understanding of the direct and indirect effects of the project as a whole;
- Inputs received from the I&APs and the authorities during the pre-application phase, scoping phase and EIA phase;
- Inputs received from specialists appointed to conduct the various studies for the proposed Expansion Project; and
- Legal context.

Environmental and social issues have been highlighted in Section 18.2 for each environmental aspect considered. In addition to this, the cumulative impacts have been briefly described in Section 18.4.

18.1.2 Mitigation of impacts

A detailed assessment was conducted to evaluate possible impacts with input from the project team, the specialist studies and I&APs making use of the impact assessment methodology described in section 18.3.

Practical mitigation measures were identified with the following objectives:

1) To firstly strive to prevent the occurrence of the impact; and
2) If the impact cannot me prevented, then measures need to be put in place to minimise the significance of the impact

The mitigation measures associated with the proposed Expansion Project have been included Table 18-3 to Table 18-11.

18.2 Summary of environmental and social impacts identified during the EIA process

The infrastructure associated with the proposed Expansion Project and the areas to be disturbed fall within the Mogalakwena Mine's mining right area, hence the impacts associated with the proposed Expansion Project in these areas are considered to be limited . With the exception of the proposed North WRD and Blinkwater 2 TSF, all other proposed activities will take place within areas which are already disturbed. If managed according to the proposed management measures in Table 18-3 to Table 18-11 and Part B, Section 31, negative impacts associated with construction, operation, closure and post closure phases of the proposed Expansion Project activities can be mitigated and positive impacts can be enhanced.

Table 18-1 includes a summary of the expected impacts, prior to the implementation of management measures, for the various phases of the proposed Expansion Project which have been extracted from

the specialist's studies, as well as from the comments received during the stakeholder engagement activities undertaken to date. These impacts have been assessed in line with the impact assessment methodology in Section 18.1.

Table 18-1: Expected impacts arising from project related activities during different project phases

Project Phase	Activity
Pre-construction	• Influx of job seekers into the study area, low levels of employment, loss of cultural heritage, alteration of the physical quality of the living environment, impact on health and social well-being of the communities • Disturbance of soils due to site clearing and preparation • Sedimentation of rivers due to preparation of the site for clearing • Dust generation and emissions due to construction vehicles moving on bare land • Potential impact of several aspects of cultural heritage
Construction	• Natural vegetation loss, loss of habitats, impact on the flows of rivers located in close proximity to proposed infrastructure areas, impact on migration options for animals and birds in the area; • Possible impacts to groundwater from seepage, reduced recharge of groundwater due to increased run-off • Increase in ambient noise levels due to clearing and stripping of topsoil and construction of infrastructure • Influx of job seekers into the study area, limited employment creation • Loss of soil utilisation potential and sterilisation due to placement/construction of permanent structures or hydrocarbon contamination, soil erosion • Pollution to rivers from hydrocarbon spills from construction machinery, deterioration of surface water quality • Dust generation and emissions due to construction vehicles moving on bare land • Visual impacts from the construction mainly due to the generation of dust, vehicle moment and gradual increase in structure footprint which increases visibility
Operation	• Natural vegetation loss, loss of habitats, impact on the flows of rivers located in close proximity to proposed infrastructure areas, impact on migration options for animals and birds in the area • Possible impacts to groundwater from seepage, • Increase in ambient noise levels due to the operation of the Expansion Project activities • Unfavourable perception of the project, opportunities for capacity building, impact on health and social well-being of surrounding communities • Loss of soil utilisation due to contamination from spillage of raw products or by-products, hydrocarbons, reagents and unprotected overland flow of dirty water • Reduced availability of water to downstream water users, • Dust generation due to mine vehicles travelling on bare roads, stockpiling of ore and waste rock • Sedimentation of watercourses due to operational activities; • Visual impacts mainly due to the generation of dust and vehicle moment from the transportation of materials
Closure/ Rehabilitation	• Increase in ambient noise levels due to the operation rehabilitation machinery • Loss of income to surrounding businesses and mine employees, • Pollution to soils from hydrocarbon/reagent spillage from rehabilitation equipment • Pollution to surface water from hydrocarbon spillage from rehabilitation equipment • Impact of dust generated from rehabilitation machinery and from bare areas which need to be vegetated • Visual impacts will include dust generation and visibility of equipment used for demolition
Post-closure	• Improvement of noise, air quality, visual and surface water impacts due to limited or no activities taking place at the sites • Uncontrolled access to rehabilitated sites by animals, vehicles, people will result in compaction and erosion of unprotected/non vegetative sites (over grazing etc.)

Project Phase	Activity
	• Post closure groundwater impacts

18.3 Impact assessment methodology

The EIA impact assessment will focus on the direct and indirect impacts associated with the project. All impacts will be analysed with regard to their extent, intensity, duration, probability and significance. The significance of potential impacts that may arise from the proposed project will be determined in order to assist decision-makers (typically by a designated authority or state agency, but in some instances, the proponent). The significance of an impact is defined as a combination of the consequence of the impact occurring (described as magnitude below) and the probability that the impact will occur.

The impact assessment methodology used, has been formalised to comply with Regulation 31(2)(l) of the National Environmental Management Act (Act 107 of 1998) as amended (NEMA), which states the following:

" (2) An environmental impact assessment report must contain all information that is necessary for the competent authority to consider the application and to reach a decision …, and must include –

(i) an assessment of each identified potentially significant impact, including –
- (i) cumulative impacts;
- (ii) the nature of the impact;
- (iii) the extent and duration of the impact;
- (iv) the probability of the impact occurring;
- (v) the degree to which the impact can be reversed;
- (vi) the degree to which the impact may cause irreplaceable loss of resources; and
- (vii) the degree to which the impact can be mitigated."

Based on the above, the EIA Methodology will require that each potential impact identified is clearly described (providing the nature of the impact) and be assessed in terms of the following factors:

- Extent (spatial scale) - *will the impact affect the national, regional or local environment, or only that of the site?*
- Duration (temporal scale) - *how long will the impact last?*
- Magnitude (severity) - *will the impact be of high, moderate or low severity?*; and
- Probability (likelihood of occurring) - *how likely is it that the impact may occur?*
- To enable environmental significance (importance) of each identified potential impact to be quantified, a numerical value has been linked to each factor. The ranking scales applicable are shown in Table 18-2.

Table 18-2: Impact Ranking Scales

	Duration	Probability
Occurrence	5 – Permanent	5 – Definite/don't know
	4 – Long -term (ceases with the operational life)	4 – Highly probable
	3 – Medium -term (5-15 years)	3 – Medium probability
	2 – Short-term (0-5 years)	2 – Low probability
	1 – Immediate	1 – Improbable
		0 – None
Severity	**Extent/Scale**	**Magnitude**
	5 – International	10 – Very high/uncertain
	4 – National	8 – High
	3 – Regional	6 – Moderate

	2 – Local	4 – Low
	1 – Site only	2 – Minor
	0 – None	

Once the above factors had been ranked for each identified potential impact, the environmental significance of each impact can be calculated using the following formula:

Significance = (duration + extent + magnitude) x probability

The maximum value that can be calculated for the environmental significance of any impact is 100.

The environmental significance of any identified potential impact is then rated as either: high, moderate or low on the following basis:

- More than 60 significance value indicates a high (H) environmental significance impact;
- Between 30 and 60 significance value indicates a moderate (M) environmental significance impact; and
- Less than 30 significance value indicates a low (L) environmental significance impact.

In order to assess the degree to which the potential impact can be reversed and be mitigated, each identified potential impact will need to be assessed twice.

- Firstly, the potential impact will be assessed and rated prior to implementing any mitigation and management measures; and
- Secondly, the potential impact will be assessed and rated after the proposed mitigation and management measures have been implemented.

The purpose of this dual rating of the impact before and after mitigation is to indicate that the significance rating of the initial impact is and should be higher in relation to the significance of the impact after mitigation measures have been implemented. In order to assess the degree to which the potential impact can cause irreplaceable loss of resources[15], the following classes (%) will be used:

- 5 100% - Permanent loss
- 4 75% - 99% - significant loss
- 3 50% - 74% - moderate loss
- 2 25% - 49% - minor loss
- 1 0% - 24% - limited loss.

18.4 Environmental and social impacts and mitigation measures

The main environmental disturbance / impact will occur during the pre-construction and construction phase of the project as a result of clearing the area as well as the movement of construction vehicles and trucks on the mine during the establishment the various activities associated with the Proposed Expansion Project.

Since Mogalakwena Mine is already an operational mine there are very few additional environmental and social impacts arising from the proposed Expansion Project that have not already been identified as part of previous EMPrs (See Appendix 8) will occur as a result of the proposed activities.

The identified impacts associated with the proposed Expansion Project are provided in The table below list the main project related activities that will be undertaken during the pre-construction phase of the project.

[15] The Loss of Resources aspect will not affect the overall significance rating of the impact.

Pre-construction	Site clearing and grubbing of the footprint areas associated with the proposed expansion project infrastructure and river diversion in preparation of the constructing of these infrastructures.
	Preparation for the construction and upgrade of crossings for powerlines, conveyors, pipelines and roads
	Preparation of the ground and surface water management measures for the NWRD to receive waste rock
	Preparation of the Blinkwater 2 TSF to receive tailings including ground and surface water management measures.
	Preparation of the ground and surface water management measures for the buffer dam
	Preparation of the wetland protection measures

Table 18-3 to Table 18-11.The rating of impacts, as per the methodology described in section 18.3, is also provided. In addition, mitigation measures that may alleviate or result in avoidance of the potential impacts have been included.

The footprint areas that will be disturbed in terms of the pre-construction, construction and operation of the proposed infrastructure are summarized below:

- M3C plant and associated infrastructure including crusher and bulk ore sorting facility: 42 ha;
- North WRD, ore stockpiles and haul roads: 210 ha;
- Buffer dam and associated pipeline system: 30 ha;
- Blinkwater 2 TSF: 245 ha;
- Upgrade of the MSC plant and associated infrastructure: 3.5 ha;
- Upgrade of the STP: 0.2 ha;
- Expansion of the workshop area: 0.9 ha;
- Establishment of a temporary lay-down area: 2 ha;
- Potential contractor's camp: 7 ha;
- Upgrade of mine access road: 4 ha;
- Realignment of the Sandsloot River: 15 ha; and
- Linear infrastructure (crossings, roads, conveyors): 0.65 ha.

Therefore, a total of approximately 561 ha may be disturbed during the construction and operation of the above infrastructure which forms part of the proposed Expansion Project.

The following sections provide further details on the potential impacts (negative and positive), in terms of the various environmental and social aspects for each aforesaid activity and the associated actions that will be undertaken during the implementation of the project.

The potential identified impacts were rated, as discussed in Section 18.3, in terms of the Probability, Duration, Extent and Magnitude that may be associated with the potential impact. The following abbreviations were used in the Impact Assessment Tables to indicate the said impact assessment aspects:

- Pr→ Probability;
- D→ Duration;
- E→ Extent; and
- M→ Magnitude.
- LoR→ Loss of Resource

The table below list the main project related activities that will be undertaken during the pre-construction phase of the project.

Pre-construction	Site clearing and grubbing of the footprint areas associated with the proposed expansion project infrastructure and river diversion in preparation of the constructing of these infrastructures.
	Preparation for the construction and upgrade of crossings for powerlines, conveyors, pipelines and roads
	Preparation of the ground and surface water management measures for the NWRD to receive waste rock
	Preparation of the Blinkwater 2 TSF to receive tailings including ground and surface water management measures.
	Preparation of the ground and surface water management measures for the buffer dam
	Preparation of the wetland protection measures

Table 18-3: Pre-construction impacts applicable to all the proposed expansion activities during site clearing and grubbing of infrastructure areas

Aspect	Nature of the impact	Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance		P	D	E	M	LoR	Significance		
Geology	The site clearing activities is unlikely to materially affect or be affected by the local geology. No material impact anticipated.								No mitigation measures are required as no material impact is anticipated.								
Topography	The site clearing activities is unlikely to materially affect or be affected by the local geology. No material impact anticipated.								No mitigation measures are required as no material impact is anticipated.								
Air Quality	Dust and gaseous generation from clearing of land, levelling of ground, vehicle entrainment of dust on roads and vehicle tailpipe emissions potentially resulting in nuisance and health effects on receptors located near to the proposed infrastructure areas	-	2	3	2	4	2	**18**	**Low**	The footprint of the proposed infrastructure area must be clearly demarcated to restrict vegetation clearing activities as far as practically possible Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area Moisture control will be necessary on large bare areas during dry season pre-construction and construction, in order to reduce the frequency and amount of dust suspended in the ambient air Apply dust suppressants or vegetate bare areas not being used for construction Locate soil stockpiles within site boundaries considering the location of potential sensitive receptors and the predominant wind direction Comply to the mine-set speed limits within the various proposed infrastructure areas to minimise the creation of fugitive dust within the project boundary Continue to implement the routine air quality monitoring program and assess air quality results routinely	2	3	1	4	1	**16**	**Low**	11.1
Soils, land use and land capability	Loss of vegetative cover and topsoil protection - Vegetation clearing within the proposed footprint areas as well as for associated roads as part of the site preparation prior to commencement of activities which may lead to soil erosion	-	4	5	2	6	1	**52**	**Moderate**	The construction footprint must be kept as small as possible in order to minimise impact on the surrounding environment The footprint of the proposed infrastructure areas will be clearly demarcated to restrict vegetation clearing activities as far as practically possible Clearing of vegetation will take place in a phased manner as to keep bare soil areas as small as possible to limit the erosion potential Moisture control will be necessary on large bare areas during dry season pre-construction and construction, in order to reduce the frequency and amount of dust suspended in the ambient air	1	4	3	6	1	**13**	**Low**	75.0

Aspect	Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
		P	D	E	M	LoR	Significance		P	D	E	M	LoR	Significance	
								Soils will be stripped and utilisable soils will be stockpiled separately from subsoils and soft overburden							
								All disturbed areas adjacent to the infrastructural areas can be re-vegetated with an indigenous grass mix, to re-establish a protective cover, in order to minimise soil erosion and dust emission.							
								Soils from the infrastructure footprint must be stripped and stockpiled at a designated area							
								Soil stockpiles will be treated with temporary soil stabilization and erosion control measures. Stockpiles must be revegetated to establish a vegetation cover as an erosion control measure							
								Soil stockpiles will be kept alien vegetation free to prevent loss of soil quality							
								Implement the soils utilisation plan as detailed in Section 18.4.1							
								The existing topsoil stockpile located within the footprint where the proposed buffer dam will be located will be relocated to an appropriate designated area.							
								Strip soils with vegetative cover intact (inclusive of seed pool and organic matter), stockpile utilisable soils separately from soft overburden, restrict stockpiles and berms to less than 1,5m high where possible, or to 15m high where soils are to be stored for extended periods of time (>3 years)							
								A medicinal plant survey will be undertaken in consultation with the community to identify medicinal plants being used by community members. Once the survey has been completed a medicinal plant management plant could possibly be developed.							
Biodiversity	Vegetation clearing within the proposed expansion infrastructure and activities footprints as well as in areas planned for the construction of associated roads as part of the site preparation prior to commencement of activities which may lead to natural vegetation loss	-	4	2	1	8	5	**44** **Moderate**	The construction footprint must be kept as small as possible in order to minimise impact on the surrounding environment	3	2	1	6	4	**27**	**Low**	38.6
									The footprint of the proposed infrastructure areas will be clearly demarcated to restrict vegetation clearing activities as far as practically possible								
									Clearing of vegetation will take place in a phased manner as to keep bare soil areas as small as possible to limit the erosion potential								
									Moisture control will be necessary on large bare areas during dry season pre-construction and construction, in order to reduce the frequency and amount of dust suspended in the ambient air								
									All disturbed areas adjacent to the infrastructural areas can be re-vegetated with an indigenous grass mix, to re-establish a protective cover, in order to minimise soil								

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
										erosion and dust emission. This can be achieved by conducting a vegetation assessment.								
										Continue to implement the routine air quality monitoring program and assess air quality results routinely								
										Identified protected species located within the construction site must be individually identified and marked before clearing and relocated once permit has been obtained for removal and relocation								
										Proliferation of alien and invasive species is expected within disturbed areas. These species should be eradicated and controlled to prevent their spread beyond the site boundary. Alien and invasive vegetation control should take place throughout all phases of the project.								
										Unnecessary barriers in migration corridors should be avoided where possible								
Surface water	Impact on water quality due to an increase in runoff from the cleared and stripped areas in close proximity to the watercourses	-	3	4	1	6	2	**33**	**Moderate**	The footprint of the proposed infrastructure area must be clearly demarcated to restrict vegetation clearing activities as far as practically possible	2	1	4	6	2	**22**	**Low**	33.3
										Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area								
										Vegetation clearance will be undertaken in a phased manner								
										Clean water diversion bunds will be constructed upstream of the construction site prior to clearing areas for new infrastructure								
										Areas disturbed by pre-construction activities, which will not be required for construction, will be rehabilitated immediately on completion of construction of each area								
										Bunded containment and settlement facilities will be provided for hazardous materials, such as fuel and oil								
										Spill-sorb or a similar product will be kept on site and used to clean up hydrocarbon spills in the event that they will occur								
										The groundwater and surface water quality monitoring programme will continue in line with requirements of the Water Use Licence								
										Sufficient on-site ablution, sanitation and waste management facilities will be provided								
Groundwater	Site clearing of vegetation and stockpiling of topsoil resulting in increased runoff and less recharge from rainfall to groundwater	-	4	2	2	4	2	**32**	**Moderate**	The footprint of the proposed infrastructure area must be clearly demarcated to restrict vegetation clearing activities as far as practically possible	2	1	1	2	1	**8**	**Low**	75.0
										Adequate storm water management associated with the proposed infrastructure should be implemented as detailed in Section 8.26								

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
										It is recommended that any additional groundwater monitoring points/boreholes required in the WUL (as part of the water monitoring network) should be installed before the starting of the construction activities on site, were practically possible								
Noise	Increase of ambient noise levels due to the commencement of groundworks for clearing and stripping of topsoil and vegetation and placement of the topsoil from footprint sites at the proposed expansion infrastructure/activity areas	-	3	2	1	4	2	**21**	**Low**	Pre-construction activities at the various proposed expansion sites are to be undertaken during the day and night time provided that the prevailing ambient noise levels at the boundary of the mine is not exceeded Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels The area where construction will take place will have to be declared as a noise zone should the threshold value of 85.0dBA be exceeded Appropriate hearing protection devices will have to be issued to all workers working in these areas Withdraw equipment for maintenance if change in noise emission characteristics is noticeable Maintain complaints and grievance register and act promptly to complaints regarding noise. The proposed noise management plan as detailed in Section 31.4.4 must be in place during the construction and operational phases so as to identify any noise increase on a pro-active basis.	2	2	1	4	2	**14**	**Low**	33.3
Heritage	The majority the sites identified during the fieldwork are located within the development footprint areas currently proposed. While it is known that these development footprint areas will still be amended pending the recommendations of the project specialists, for the purposes of this impact assessment all identified sites were assumed to be located within the development footprint areas with the result that they would be destroyed by the development if not mitigated. Heritage sites assessed to have a low heritage significance are not included in this impact assessment. The reason for this is that sites of low significance will not require mitigation. These sites are MMEP 1, MMEP 8, MMEP 15, MMEP 20, MMEP 25, MMEP 32, MMEP 37, MMEP 52, MMEP 56, MMEP 58, MMEP 60, MMEP 63, MMEP 65 and MMEP 67 (Refer to Figure 14-20)	-	4	5	4	8	3	**68**	**High**	Prior to the commencement of the pre-construction phase, an appropriately qualified archaeologist shall accompany the construction team and indicate where sensitive cultural heritage and archaeological sites are located A social consultation process to assess whether any local residents or the wider public is aware of the presence of graves at these sites must be undertaken . If graves are located at these sites then the following mitigations are applicable: • The procedure includes the following: A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation. • Bilingual site and newspaper notices indicating the intent of the relocation. • Obtain permits from all the relevant and legally required authorities. • An exhumation process that keeps the dignity of the remains and family intact. An exhumation process that safeguards the legal rights of the families as well as that of the mining company	3	5	2	4	2	**33**	**Moderate**	54.2

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
										• The process must be done by a reputable company well versed in the mitigation of graves Consultation with members of Sekuruwe should be conducted before construction of the Blinkwater 2 TSF commences								
Social	Employee and community exposure to hazards and risks including hazardous materials and substances during preparation for construction of the proposed expansion activities as well as associated gravel roads and main access roads	-	3	4	2	4	2	30	Moderate	Inform affected community about potential risks and impacts from the project activities in a culturally appropriate manner, including collaborating with the community and government agencies in their efforts to respond effectively to emergency situations Where possible, AAP should avoid or minimise the potential for community exposure to hazardous materials and substances that may be released by the project (i.e. contaminated water). AAP should also avoid or minimise the potential for community exposure to water-borne, water-based, water-related, and vector-borne diseases, and communicable diseases that could result from project activities by developing action plans to address these risks. For example, AAP should endeavour to avoid or minimise transmission of communicable diseases that may be associated with the influx of temporary or permanent project labour and should develop an Influx Management Plan to reduce this. The necessary safety precautions should be taken, and first aid supplies should be made available on site All project employees (including contractors) should undergo health, environment and safety training on induction and thereafter on a regular basis Instruct contractors on how to work in line with the health, environmental and safety documents and site rules Development or updating of routine emissions and ambient air quality monitoring program to determine whether there are any significant increases in emissions and impacts at sensitive receptors	2	4	2	2	1	16	Low	46.7
	Influx of job seekers into the study area: There is a likelihood that job seekers will move into the study area and seek accommodation in the villages located near the mine. This may cause conflict with existing community members who currently feel that they have not been fairly considered for job opportunities at the mine.	-	3	2	3	6	2	33	Moderate	AAP should consider undertaking a Community Health and Safety Impact Assessment in line with Anglo American Standards and Policies AAP should consider the establishment of a Community Management Forum (CMF) in order to monitor the construction phase and the implementation of the recommended mitigation measures. The CMF should include the following: • Enforcing local employment as far as practically possible • Avoid the establishment of camps, hostels or temporary accommodation for workers	2	2	2	4	1	16	Low	51.5

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
										• Provide employees with adequate health support from the project team for work-related health problems, including the dissemination of the Health and Safety Policy - including HIV/AIDS policy, and any awareness training required as part of the general employment contract with contract or permanent staff								
										AAP should consider updating its Contractor Social Management Procedure to align with this Project								
										Provide clear expectations in all platforms of communication of the number of jobs available and in what categories or fields of the mine. This would allow a clear indication of what types of jobs would be available.								
										Provide clear indications of the requirements and processes involved in recruitment processes								
	Social differentiation and inequality due to competition over scarce resources such as employment and procurement opportunities leading to social differentiation and conflict	-	4	4	3	10	4	68	High	AAP must ensure that management practises do not exploit or exacerbate the level of mistrust or conflict within the different community groups	4	3	2	8	4	52	Moderate	23.5
										AAP should ensure that employment and procurement policies are clearly communicated and implemented in a transparent manner								
										Communities must be engaged on fair and transparent terms whilst respecting traditionally and democratically appointed leadership within the community								
										Communities should furthermore be informed and educated about the various ways in which AAP contributes to socio-economic development, not only within their own communities, but also through contributions towards their SLP goals, CSI as well as taxation								
										Communities should be capacitated through inter alia Zimele programme to obtain training and entrepreneurial skills which will allow them to gain opportunities through AAP initiatives or procurement processes								
	Impacts on health and well-being - a lack of information is causing uncertainty and anxiety in terms of potential project impacts and benefits	-	4	3	3	8	4	56	Moderate	Ensure that current resourcing gaps within the SP team is assessed and sufficiently addressed to ensure appropriate engagement in line with impacts identified in the SIA including to ensure that all stakeholder concerns and inputs especially for vulnerable groups are taken into consideration	3	1	2	6	3	27	Low	51.8
										The SP team should receive additional training (i.e. International Association of Public Participation modules) to enhance communication techniques with the community. Where possible, members from the SP team should also be able to access								

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
										counselling or the input from a psychologist to assist with conflict management training								
	Lack of employment creation and increase in unemployment - limited employment creation/job qualifications. During the operational phase existing employment from MSC will be retained as the labour from the MSC will be transferred to the proposed M3C. It is not anticipated that the construction of the proposed additional activities at MM mine will create employment for a significant number of people however, some employment opportunity may be available for unskilled, semi-skilled and skilled labour during the construction phase.	-	2	2	2	4	4	16	Low	MM should consider reviewing their policies to ensure full compliance with Anglo American Standards and Policies. Specifically, consider updating its Contractor Social Management Procedure to align with this Project Emerging employment opportunities should be targeted at local residents as well as people from the surrounding communities in cases where the skills cannot be obtained from immediately adjacent communities The SP Team at AAP can communicate with the leadership of each village in the surrounding villages and request that a database of services that they can provide be drawn up to submit to the mine. This can be relevant in the sourcing of skills from surrounding communities Sourcing these employees should be undertaken in a coherent fashion and the purpose of the labour desk should be clarified. The labour desk should either be given the mandate to source CVs from the local community, or MM must clearly communicate that they do not have the mandate, in which case the proper channel of submitting CVs should be communicated MM should continue to provide the surrounding communities with practical skills training so that they have the opportunity to upskill themselves and apply for jobs with the mine. Recruitment of labour should be guided by AAP's recruitment policies which should promote the employment of local labour. The recruitment process must be transparent and communicated to stakeholders in order to limit opportunities for conflict situations. MM's contractor management plan also needs to be implemented to ensure that appointed contractors also employ locally as far as practically possible. Support for local businesses through SMME development should be prioritised, with support from other surrounding mines, business forums and the municipality. The appointment of local business and the use of their products and services should be promoted as far as practically possible, as it will potentially open up opportunities for local employment Continued participation of labour unions in Work Place Skills Plans and Annual Training Reports should be encouraged, and feedback provided to employees at mass meetings	4	3	2	6	2	44	Moderate	175.0

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
	Lack in capacity building and perceived lack of support to local communities, especially women and youth to enable them to access opportunities at the mine	+	3	4	2	6	2	36	Moderate	AAP can consider providing proposal writing workshops as a part of the training and skills development programmes such that community members with small businesses can develop this skill, leading to a higher and more promising level of proposals received from the surrounding communities	4	4	3	8	1	60	High	66.7
										Skills development for employees and community members wishing to obtain employment through the project should, include more than technical skills (e.g. Life skills training and financial literacy)								
										Awareness should be created within the communities of the contribution that AAP makes to skills development and training opportunities								
										Learnerships/internships at AAP should be considered for matriculants wishing to obtain work experience								
	Gender relations - insufficient women in the workplace: Women still face barriers to entering and participating in the mining sector even though South African legislation compels companies to employ women at all levels. Gender equality needs to be considered in the planning phase of the project to ensure that equal employment outcomes for both women and men and to ensure that women are also employed in management positions at the mine.	-	3	4	2	6	2	36	Moderate	MM's HR policy should support preferential employment opportunities for women, as well as measures to increase accessibility and safety considerations for women working in mines. Training and skills development focused on women should take place to increase their participation in the labour force	4	4	3	6	1	52	Moderate	44.4
										Continue the implementation of the management measures to ensure equitable remuneration packages for women and their male counterparts. Institute a well-designed gender equality strategy for the project								

Table 18-4: Pre-construction impacts applicable to specific expansion activities including the 3rd Concentrator, Debottlenecking Plant, Blinkwater 2 TSF, Buffer Dam and North Waste Rock Dump

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
Pre-construction impacts applicable to the 3rd Concentrator																		
Surface water	Impact on water quality due to an increase in runoff from the cleared and stripped areas in close proximity to the watercourses (specifically the Mohlosane River)	-	3	4	2	6	2	36	Moderate	The footprint of the proposed infrastructure area must be clearly demarcated to restrict vegetation clearing activities as far as practically possible	2	2	3	4	1	18	Low	50.0
										Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area								
										Vegetation clearance will be undertaken in a phased manner								
										Clean water diversion bunds will be constructed upstream of the construction site prior to clearing areas for new infrastructure								
										Areas disturbed by pre-construction activities, which will not be required for construction, will be rehabilitated immediately on completion of construction of each area								
										Bunded containment and settlement facilities will be provided for hazardous materials, such as fuel and oil								
										Spill-sorb or a similar product will be kept on site and used to clean up hydrocarbon spills in the event that they will occur								
										The groundwater and surface water quality monitoring programme will continue in line with requirements of the Water Use Licence								
										Sufficient on-site ablution, sanitation and waste management facilities will be provided								
	Increased erosion from areas of exposed soils during site clearing resulting in potential increase in sedimentation to surface water resources (specifically the Mohlosane)	-	4	3	2	6	3	44	Moderate	Where practical activities should be limited to months of low rainfall (dry season) to reduce probability of potential impact	3	1	2	4	2	21	Low	52.3
										Areas disturbed by activities should be rehabilitated immediately on completion of each area								
										Erosion control measures in the form of temporary erosion prevention berms should be implemented during construction.								
Pre-construction impacts applicable to the proposed construction of the Debottlenecking Plant at the South Concentrator																		
Surface water	Impact on water quality due to an increase in runoff from the cleared and stripped areas in close proximity to the watercourses	-	3	4	1	6	2	33	Moderate	The footprint of the proposed infrastructure area must be clearly demarcated to restrict vegetation clearing activities as far as practically possible	2	1	4	6	2	22	Low	33.3
										Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area								
										Vegetation clearance will be undertaken in a phased manner								
										Clean water diversion bunds will be constructed upstream of the construction site prior to clearing areas for new infrastructure								
										Areas disturbed by pre-construction activities, which will not be required for construction, will be rehabilitated immediately on completion of construction of each area								
										Bunded containment and settlement facilities will be provided for hazardous materials, such as fuel and oil								
										Spill-sorb or a similar product will be kept on site and used to clean up hydrocarbon spills in the event that they will occur								
										The groundwater and surface water quality monitoring programme will continue in line with requirements of the Water Use Licence through all phases of the project								
										Sufficient on-site ablution, sanitation and waste management facilities will be provided								
Pre-construction impacts applicable to the proposed construction the Blinkwater 2 TSF																		

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
Biodiversity	The habitat in this area will be further modified due to the pre-construction activities which will include clearance of vegetation. Concern is with the encroachment of the granite outcrops – as was indicated in 2011 and 2015 studies, these areas are important biodiversity "hot spots" and islands where all biota find refuge	-	5	2	2	10	4	70	High	Where possible, rehabilitate exposed areas during construction to promote vegetation growth	5	2	2	8	4	60	High	14.3
	There will be some vegetation loss due to the clearance activities.	-	5	2	2	8	4	60	High	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees If possible, relocate protected species once a permit has been obtained for its removal	5	2	2	6	4	50	Moderate	16.7
Heritage	Relocation of identified burial grounds associated with the Blinkwater 2 TSF (refer to Section 14-9 for details relating to identified heritage sites). If constructed, these site will have to be relocated to a suitable area. Non-tangible heritage sites which may be located within the Blinkwater 2 TSF include a sacred tree and sacred water site located near Sekuruwe, and which may be located within the Blinkwater TSF footprint area.	-	4	5	4	8	3	68	High	All construction staff are to be made aware of the locations of the sensitive cultural and archaeological sites as specific management measures are required for these sites as detailed below. In order to mitigate the impact associated with relocation of the burial grounds and single graves, the procedure detailed in Section 24 will need to be followed. The procedure includes the following: • A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation. • Bilingual site and newspaper notices indicating the intent of the relocation. • Obtain permits from all the relevant and legally required authorities. • An exhumation process that keeps the dignity of the remains and family intact. An exhumation process that safeguards the legal rights of the families as well as that of the mining company • The process must be done by a reputable company well versed in the mitigation of graves • Consultation with members of Sekuruwe should be conducted before construction commences	2	5	4	6	2	30	Moderate	55.9
	Potential destruction of five of the twelve identified stone age sites within the north-western corner of the proposed Blinkwater 2 TSF	-	4	5	3	4	4	48	Moderate	Prior to the commencement of the pre-construction phase, an appropriately qualified archaeologist shall accompany the construction team and indicate where sensitive cultural heritage and archaeological sites are located The engineering design of the TSF will be altered to avoid the majority of the stone ages sites identified. The remaining sites which will have to be mitigated must be assessed in the field by a suitably qualified Stone Age specialist prior to site clearance Any recommendations made by the Stone Age specialist must be adhered to Such recommendations may include the archaeological recording of a surface layout plan, surface collection of lithics, etc. Consultation with members of Sekuruwe should be conducted before construction of the Blinkwater 2 TSF commences	3	5	2	2	2	27	Low	43.8
	Potential destruction of one Late Iron Age stonewalled site located to the west of the proposed Blinkwater 2 TSF	-	4	5	2	4	2	44	Moderate	Prior to the commencement of the pre-construction phase, an appropriately qualified archaeologist shall accompany the construction team and indicate where sensitive cultural heritage and archaeological sites are located An archaeological site layout plan must be compiled using accepted archaeological techniques During the recording of the archaeological site layout plan, an attempt must be made to identify any archaeological middens associated with this site.	3	5	2	2	1	27	Low	38.6

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
										Should such middens be identified, archaeological test excavations would be required. If no such middens are found, the next two mitigation measures comprising an archaeological excavation permit application and archaeological test excavations would not be required								
										A permit application to SAHRA for archaeological test excavations to take place. Once the permit is received, limited archaeological test excavations may also be required, should a deposit be identified.								
										An archaeological mitigation report must be compiled. A destruction permit application must be lodged with (SAHRA) to allow for the destruction of the site								
										Consultation with members of Sekuruwe should be conducted before construction of the Blinkwater 2 TSF commences								
	Destruction of a site containing a natural boulder with cupules and stonewalling for the development of the Blinkwater 2 TSF	-	4	5	3	6	3	56	Moderate	Prior to the commencement of the pre-construction phase, an appropriately qualified archaeologist shall accompany the construction team and indicate where sensitive cultural heritage and archaeological sites are located	3	5	2	4	2	33	Moderate	41.1
										A social consultation process to assess whether any local residents or the wider public is aware of the site and can provide information for the improved interpretation of the site must be implemented and recorded								
										The site must be archaeologically recorded by way of a site layout plan, site photographs and the recording of the arrangement and layout of the cupules and grinding surfaces on the boulder								
										A mitigation report must be compiled which includes the findings of the social consultation process as well as the records, plans and photographs resulting from the archaeological recording of the site								
										This report must also provide recommendations as to whether any additional mitigation would be required for the site to be destroyed as part of the development								
										Consultation with members of Sekuruwe should be conducted before construction of the Blinkwater 2 TSF commences								
	Potential destruction of a possible rain making site located in the north west corner of the Blinkwater 2 TSF	-	4	5	4	8	4	68	High	If any of the sites need to be relocated or destroyed, the following must be undertaken: • An archaeological site layout plan must be compiled using accepted archaeological techniques • A permit application must be submitted to SAHRA for archaeological mitigation to take place. Such mitigation may include test excavations and surface collection. Once the permit is received, the archaeological mitigation measures can be undertaken Such mitigation would be aimed at better understanding such rain-making sites • The archaeological research must be underpinned by a social consultation process to assess whether any local residents or the wider public is aware of the site and can provide information for the improved interpretation of the site • An archaeological mitigation report must be compiled. If no alternatives for the preservation of the site can be found, a destruction permit application must be lodged with (SAHRA) to allow for the destruction of the site. It is presently certain that such a permit application would succeed • Consultation with members of Sekuruwe should be conducted before construction commences	4	5	3	6	3	56	Moderate	17.6

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
	Potential destruction of a historic farmstead associated with a historic homestead and graves located	-	4	5	4	8	3	68	High	Prior to the commencement of the pre-construction phase, an appropriately qualified archaeologist shall accompany the construction team and indicate where sensitive cultural heritage and archaeological sites are located It has been strongly recommended by the specialist that the development footprint be modified to allow for the in situ preservation of this site It is also recommended that a concerted effort be made to adhere to this recommendation. The fact that the site is located on the far western boundary of the development footprint area, should make adherence to this mitigation measure feasible Consultation with members of Sekuruwe should be conducted before construction of the Blinkwater 2 TSF commences	2	5	3	6	3	28	Low	58.8
Social	Loss of cultural heritage due to clearance of vegetation and soil in preparation for construction	-	4	4	2	8	4	56	Moderate	Local residents should be consulted to inform mitigation measures when addressing any potential impact on cultural heritage sites or graves Mitigation measures recommended in the Heritage Impact Assessment Study to be implemented Implement the existing chance finds procedure to deal with how to protect graves and heritage sites accidentally unearthed during construction	3	2	2	4	3	24	Low	57.1
Pre-construction impacts applicable to the proposed construction of the Buffer Dam																		
Soils, land use and land capability	Loss of soil resource and utilisation potential due to loss of existing topsoil stockpile located near to the proposed buffer dam	-	5	3	2	6	5	55	Moderate	The existing topsoil stockpile located within the footprint where the proposed buffer dam will be located will be relocated to an appropriate designated area. Restrict stockpiles height, vegetate and manage ingress of dirty water and erosion	4	3	2	2	3	28	Low	49.1
Pre-construction impacts applicable to the proposed construction of the North Waste Rock Dump																		
Heritage	Relocation of identified burial grounds associated with the North Waste Rock Dump (refer to Section 14-9 for details relating to identified heritage sites) . If constructed, these site will have to be relocated to a suitable area.	-	4	5	4	8	3	68	High	All construction staff are to be made aware of the locations of the sensitive cultural and archaeological sites as specific management measures are required for these sites as detailed below. In order to mitigate the impact associated with relocation of the burial grounds and single graves, the procedure detailed in Section 24 will need to be followed. The procedure includes the following: • A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation • Bilingual site and newspaper notices indicating the intent of the relocation. • Permits from all the relevant and legally required authorities. • An exhumation process that keeps the dignity of the remains and family intact. An exhumation process that safeguards the legal rights of the families as well as that of the mining company • The process must be done by a reputable company well versed in the mitigation of graves.	2	5	4	6	2	30	Moderate	55.9
	Possible grave sites have been identified as part of the heritage specialist assessment which may need to be relocated depending on confirmation of the burial sites.	-	3	5	3	8	3	48	Moderate	Prior to the commencement of the pre-construction phase, an appropriately qualified archaeologist shall accompany the construction team and indicate where sensitive cultural heritage and archaeological sites are located A social consultation process to assess whether any local residents or the wider public is aware of the presence of graves at these sites. If graves are located at these sites then the following mitigations are applicable: • A grave relocation process must be undertaken	2	5	2	4	2	22	Low	54.2

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
										• A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation • Bilingual site and newspaper notices indicating the intent of the relocation • Obtain permits from all the relevant and legally required authorities • An exhumation process that keeps the dignity of the remains and family intact. An exhumation process that safeguards the legal rights of the families as well as that of the mining company and the process must be done by a reputable company well versed in the mitigation of graves								
	Complete destruction of a rubbing post located within the proposed ore stockpile area associated with the NWRD.	-	3	5	3	6	3	42	Moderate	Prior to the commencement of the pre-construction phase, an appropriately qualified archaeologist shall accompany the construction team and indicate where sensitive cultural heritage and archaeological sites are located The site must be re-visited and archaeologically recorded by way of photographs and rubbings of the rubbing stone Intensive archaeological walkthroughs must also be undertaken of the immediate surroundings of the site, to confirm the current assessment that no engravings or Stone Age sites are associated with the rubbing post A mitigation report must be compiled which includes the findings of the social consultation process as well as the records, plans and photographs resulting from the archaeological recording of the site. This report must also provide recommendations as to whether any additional mitigation would be required for the site to be destroyed as part of the development	3	5	2	2	2	27	Low	35.7
Surface water	Sedimentation of Witrivier due to a potential increase of solids that can be transported via surface runoff due to site clearing	-	3	4	3	6	2	39	Moderate	Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area	1	4	3	6	1	13	Low	66.7
Social	Loss of cultural heritage due to clearance of vegetation and soil in preparation for construction	-	4	4	2	8	4	56	Moderate	Local residents should be consulted to inform mitigation measures when addressing any potential impact on cultural heritage sites or graves Mitigation measures recommended in the Heritage Impact Assessment Study to be implemented Implement the existing chance finds procedure to deal with how to protect graves and heritage sites accidentally unearthed during construction	3	2	2	4	3	24	Low	57.1
Pre-construction impacts applicable to the proposed construction of the Groot Sandsloot River diversion																		
Surface water	Impact on water quality due to an increase in runoff from the cleared and stripped areas in close proximity to the watercourses (specifically the Sandsloot (Pholotsi) river) during preparation for river diversion	-	3	4	2	6	2	36	Moderate	The footprint of the proposed infrastructure area must be clearly demarcated to restrict vegetation clearing activities as far as practically possible Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area Vegetation clearance will be undertaken in a phased manner Clean water diversion bunds will be constructed upstream of the construction site prior to clearing areas for new infrastructure Areas disturbed by pre-construction activities, which will not be required for construction, will be rehabilitated immediately on completion of construction of each area Bunded containment and settlement facilities will be provided for hazardous materials, such as fuel and oil Spill-sorb or a similar product will be kept on site and used to clean up hydrocarbon spills in the event that they will occur	2	2	3	4	1	18	Low	50.0

Aspect	Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
		P	D	E	M	LoR	Significance		P	D	E	M	LoR	Significance	
								The groundwater and surface water quality monitoring programme will continue in line with requirements of the Water Use Licence							
								Sufficient on-site ablution, sanitation and waste management facilities will be provided							

The table below list the main project related activities that will be undertaken during the construction phase of the proposed project.

Construction	Construction of the infrastructure as part of the Expansion Project including associated infrastructure such as crossings, water management, containment and protection infrastructure, including protection measures associated with the wetland, and reticulation of electricity to new infrastructures that require power to operate
	Construction of the pipeline systems associated with the proposed infrastructure including treated sewage effluent, water supply, return water, process water pipelines and associated booster pump stations. Including connecting the buffer dam with the M3C, RWDs of the Vaalkop TSF and Dam 1160.
	Diverting the Groot Sandsloot River.

Table 18-5: Construction impacts applicable to all the proposed expansion activities

Aspect	Nature of the impact	Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance		P	D	E	M	LoR	Significance		
Palaeontology	The study area where the proposed infrastructure associated with the proposed Expansion Project will be located partially incorporates outcrop area of the Chuniespoort Group of the early Proterozoic Transvaal Supergroup, which includes Malmani Subgroup dolomites and limestones that are considered to be of high palaeontological sensitivity. There is a high likelihood that stromatolitic fossil assemblages may be present in most of the outcrop areas. Consequently, the following infrastructure and associated activities may be affected: • Proposed Third Concentrator Site • Buffer Dam • Contractors Laydown Area • Upgrading of a section of an existing mine road • Upgrade of the South Concentrator								Although the proposed study area is exempted from further paleontological assessment, areas where the footprint is underlain by Malmani Subgroup sediments and excavations more than 1 meter deep into the Malmani Subgroup bedrock needs to be monitored by a professional paleontologist as part of a Phase 1 assessment in case of chance exposure of stromatolite fossil remains, while such excavations are still open							
Air Quality	During the construction phase the activities will comprise a series of different activities including material loading and hauling, compacting, grading(etc.). These activities will have the potential to release dust. However, dust particles will be suspended and thereafter deposited close to the construction activities. Climatic conditions, such as rainfall and wind, may influence the impact of dust generation in and around the project area.	-	2	3	2	4	2	18	Low	Moisture control will be necessary on large bare areas during dry season construction, in order to reduce the frequency and amount of dust suspended in the ambient air. Apply dust suppressants or vegetate bare areas not being used for construction Comply to the mine-set speed limits area to minimise the creation of fugitive dust within the project boundary Continue to implement the routine air quality monitoring program and assess air quality results routinely	2	3	1	4	1	16	Low	12.5
Noise	Increase in ambient noise generated by machinery due to the construction of the proposed expansion infrastructure/activities	-	3	2	1	4	2	21	Low	Construction activities may be carried out during the day and night time provided that the prevailing ambient noise levels at the boundary of the mine is not exceeded When the prevailing ambient noise is exceeded such activities will have to be acoustically screened off Machinery with low noise levels to be used	2	2	1	4	2	14	Low	33.3
Groundwater	Potential contamination of groundwater resources due to potential accidental spillages of hazardous substances from the vehicles and equipment used for construction activities	-	3	3	3	4	3	30	Moderate	Prevention of contamination through hazardous material spills and leaks through the implementation of vehicle maintenance plans Undertake effective, timeous spills management and clean-up Implement a staff and contractor awareness training programme Undertake effective mechanical maintenance on all critical equipment to prevent leaks, abnormalities and risk of failure Provide adequate secondary containment measures associated with pollution point sources	2	2	1	2	1	10	Low	66.7
	Site clearing of vegetation and stockpile of topsoil resulting in increased runoff and less recharge from rainfall to groundwater	-	4	2	2	4	2	32	Moderate	The footprint of the proposed infrastructure area must be clearly demarcated to restrict vegetation clearing activities as far as practically possible Adequate storm water management associated with the proposed infrastructure should be implemented as detailed in Section 8.26	2	1	1	2	1	8	Low	75.0
		-	5	5	3	8	5	80	High	Footprint impact should be mimimsed	4	3	2	4	3	36	Moderate	55.0

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
	Impact due to the loss of vegetative cover and topsoil protection in the proposed expansion infrastructure/activity areas. Possible erosion and the permanent loss of resource downslope/downstream and impact of sedimentary load on streams and river systems could occur. Potential indiscriminate disposal of hazardous and non-hazardous materials wastes within freshwater resources, leading to altered water quality, possible changes to flow patterns as a result of blockages caused by solid wastes/rubble could also occur									All utilisable soil must be removed and stockpiled and the re-vegetation and/or rock cladding /cover to all stored materials (more than three years) should be considered Suitable indigenous grass should be used as an erosion prevention medium ahead of clearing where erosion is a considered risk. Comply to the waste management plan which has been developed for MM Waste storage areas must be clearly marked with signage boards and fenced off Waste will be removed off site by a licensed contractor to a suitable licensed facility All construction related waste and material should be disposed of at a registered waste facility No waste or construction rubble is to be dumped in the freshwater features or surrounding habitats Burying or burning of any waste including rubble, domestic waste, empty containers on the site will be strictly prohibited and all construction rubble waste must be removed and managed through the mines existing waste program. Sufficient on-site ablution, sanitation and waste management facilities will be provided Implement the soils utilisation plan as detailed in section 18.4.1								
Soils, Land Use and Land Capability	Loss of soil resource and utilisation potential due to contamination by hydrocarbon/reagent spills and/or dirty water runoff	-	5	3	2	6	5	55	Moderate	Movement and servicing of vehicles should be restricted or minimised to identified areas. Spillage from haulage systems and vehicles should be restricted and if it does happen be cleaned according to the mines existing procedure All services areas should be bunded.	4	3	2	2	3	28	Low	49.1
	Loss of resource and its utilisation potential due to compaction by heavy construction vehicles used over unprotected ground/soils in the proposed expansion infrastructure/activity areas	-	5	5	2	4	4	55	Moderate	Minimise the footprint of impact Restrict vehicle movement over unprotected soils and to areas of need Remove all (to depth) utilisable soil, stockpile and store prior to construction of facilities/structures Implement concurrent rehabilitation of all areas once usefulness is completed	4	3	2	2	3	28	Low	49.1
	Loss of soil utilisation potential and sterilisation due to emplacement/construction of permanent structures in the proposed expansion infrastructure/activity areas	-	5	5	2	10	5	85	High	Removal/stripping of all utilisable soil from footprint of permanent structures and the stockpiling/storage of the resource. Protect from erosion, compaction and contamination (dirty water) Stockpile soils upslope of dirty water runoff and use vegetative cover (indigenous grass etc.) to protect soils	5	5	2	4	5	55	Moderate	35.3
	Loss of soil utilisation potential and land capability due to leaching and de-nutrification of stripped and stockpiled soils on in the proposed expansion infrastructure/activity areas	-	5	5	2	4	5	55	Moderate	Strip soils with vegetative cover intact (inclusive of seed pool and organic matter), stockpile utilisable soils separately from soft overburden, restrict stockpiles and berms to less than 1,5m high where possible, or to 15m high where soils are to be stored for extended periods of time (>3 years) Vegetate and/or rock clad stores of soil and overburden and manage the ingress of dirty water and erosion	4	3	2	4	2	36	Moderate	34.5
Surface water	Deterioration of surface water quality due to erosion, spillages and accidental discharges at the crossings	-	4	2	1	6	3	36	Moderate	Where practical construction should take place in the low flow period (dry season) to reduce probability of potential impact	2	2	4	4	2	20	Low	44.4

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
										Stormwater culverts at watercourse crossings should be designed and constructed to accommodate the 1:50 year storm event and emergency action plans should be drawn up to deal with spillages								
	Increased erosion from areas of exposed soils during site clearing resulting in loose materials being washed into the surface water resources	-	4	2	1	6	3	36	Moderate	Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area	3	2	1	4	2	21	Low	41.7
	Reduction in water quality due to an increase in turbidity as a result of an increase in erosion form the clearing of areas in close proximity to the watercourses	-	3	4	1	6	2	33	Moderate	The footprint of the proposed infrastructure area must be clearly demarcated to restrict vegetation clearing activities as far as practically possible Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area Vegetation clearance will be undertaken in a phased manner Clean water diversion bunds will be constructed upstream of the construction site prior to clearing areas for new infrastructure Areas disturbed by pre-construction activities, which will not be required for construction, will be rehabilitated immediately on completion of construction of each area Bunded containment and settlement facilities will be provided for hazardous materials, such as fuel and oil Spill-sorb or a similar product will be kept on site and used to clean up hydrocarbon spills in the event that they will occur The groundwater and surface water quality monitoring programme will continue in line with requirements of the Water Use Licence Sufficient on-site ablution, sanitation and waste management facilities will be provided	2	1	4	6	2	22	Low	33.3
	Increased potential for damming and flooding and subsequent damage to property and infrastructure due to hardstanding	-	3	2	1	2	1	15	Low	Areas should be appropriately graded to prevent ponding. Stormwater measures should be appropriately designed to allow for free flow of water as per the Stormwater Management Plan for MM.	2	2	1	2	1	10	Low	33.3
Biodiversity	Areas with spoils will allow penetration of water into the groundwater which could result in pollution to groundwater	-	4	2	3	8	3	52	Moderate	Vegetate and/or rock clad stores of soil and spoils and manage the ingress of dirty water and erosion.	2	2	3	4	2	18	Low	65.4
	Further loss of faunal SCC through niche habitat and food resource destruction	-	4	2	2	4	4	32	Moderate	The footprint and daily operation of the proposed infrastructure must be strictly monitored to ensure that footprint creep and edge effects does not affect the surrounding sensitive faunal habitat Restrict vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed development No indiscriminate driving through the veld and undisturbed areas should be allowed Ensure that the ephemeral drainage lines are demarcated as no go zones for personnel and mine vehicles No faunal species may be hunted, trapped, snared or captured for any purpose whatsoever Fences and boundaries must be monitored on a regular basis in order to locate and remove snares and traps	2	2	2	4	4	16	Low	50.0
Visual	Visual impact associated with constructing the proposed expansion infrastructure/activities:	-	2	3	2	2	1	14	Low	Adhere to the air quality management measures provided in the air quality section	2	2	2	2	1	12	Low	16.7

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
	Construction visual impacts are typically limited to the immediate area surrounding the site and the construction period. Dust generated at the site (e.g. dust from earthworks and trucks travelling on haul roads and dust deposited on off-site vegetation) is visually unappealing and may further detract from the visual quality of the area									Plant vegetation such as trees and shrubs on periphery of villages directly next to the mine to provide a screen/buffer of direct views towards the plants Point lighting inwards and not to villages to avoid nocturnal impacts Natural vegetation, wherever possible, should be retained on and around the mine property as well as along the boundary of the mine								
Social	Insufficient essential services throughout the project life cycle: The mine together with local government need to agree on an approach to respond or assist with developing areas of need such as the requirement for more schools/training facilities and health care facilities and assistance in decreasing the HIV/AIDs rate in the community.	-	4	4	3	6	4	52	Moderate	Consult with provincial and national departments on sector specific programs for alignment. The MLM IDP (2019) highlights the need for roads and stormwater management as well as water and sanitation Provision is made for infrastructure development projects in the SLP (2016-2020) with the aim of handing over these facilities to the MLM	3	3	2	4	3	27	Low	48.1
	Community and employee exposure to hazards and risks, including hazardous materials and substances	-	3	4	2	4	2	30	Moderate	Inform affected community about potential risks and impacts from the project activities in a culturally appropriate manner, including collaborating with the community and government agencies in their efforts to respond effectively to emergency situations Where possible, AAP should avoid or minimise the potential for community exposure to hazardous materials and substances that may be released by the project (i.e. contaminated water). AAP should also avoid or minimise the potential for community exposure to water-borne, water-based, water-related, and vector-borne diseases, and communicable diseases that could result from project activities by developing action plans to address these risks. For example, AAP should endeavor to avoid or minimise transmission of communicable diseases that may be associated with the influx of temporary or permanent project labour and should develop an Influx Management Plan to reduce this. The necessary safety precautions should be taken, and first aid supplies should be made available on site All project employees (including contractors) should undergo health, environment and safety training on induction and thereafter on a regular basis Instruct contractors on how to work in line with the health, environmental and safety documents and site rules Development or updating of routine emissions and ambient air quality monitoring program to determine whether there are any significant increases in emissions and impacts at sensitive receptors	2	4	2	2	1	16	Low	46.7
	<u>Social networks</u> There is a likelihood that job seekers will move into the study area and seek accommodation in the villages located near the mine. This may cause conflict with existing community members who currently feel that they have not been fairly considered for job opportunities at the mine.	-	3	2	3	6	2	33	Moderate	AAP should consider undertaking a Community Health and Safety Impact Assessment in line with Anglo American Standards and Policies AAP should consider the establishment of a CMF in order to monitor the construction phase and the implementation of the recommended mitigation measures. The CMF should include the following: • Enforcing local employment as far as practically possible • Avoid the establishment of camps, hostels or temporary accommodation for workers • Provide employees with adequate health support from the project team for work-related health problems, including the dissemination of the Health and Safety	2	2	2	4	1	16	Low	51.5

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
										Policy - including HIV/AIDS policy, and any awareness training required as part of the general employment contract with contract or permanent staff								
										AAP should consider updating its Contractor Social Management Procedure to align with this Project								
										Provide clear expectations in all platforms of communication of the number of jobs available and in what categories or fields of the mine. This would allow a clear indication of what types of jobs would be available.								
										Provide clear indications of the requirements and processes involved in recruitment processes								
	Feelings in relation to the project A lack of information from the mine is causing uncertainty and anxiety in terms of potential project impacts and benefits.	-	4	3	3	8	4	56	Moderate	Ensure that current resourcing gaps within the SP team is assessed and sufficiently addressed to ensure appropriate engagement in line with impacts identified in the SIA including to ensure that all stakeholder concerns and inputs especially for vulnerable groups are taken into consideration	3	1	2	6	3	27	Low	51.8
										The SP team should receive additional training (i.e. International Association of Public Participation modules) to enhance communication techniques with the community. Where possible, members from the SP team should also be able to access counselling or the input from a psychologist to assist with conflict management training								
	Waged labour or employment creation: During the operational phase existing employment from MSC will be retained as the labour from the MSC will be transferred to the proposed M3C. It is not anticipated that the construction of the proposed additional activities at MM mine will create employment for a significant number of people however, some employment opportunity may be available for unskilled, semi-skilled and skilled labour during the construction phase	-	2	2	2	4	4	16	Low	MM should consider reviewing their policies to ensure full compliance with Anglo American Standards and Policies. Specifically, consider updating its Contractor Social Management Procedure to align with this Project	4	3	2	6	2	44	Moderate	175.0
										Emerging employment opportunities should be targeted at local residents as well as people from the surrounding communities in cases where the skills cannot be obtained from immediately adjacent communities								
										The SP Team at AAP can communicate with the leadership of each village in the surrounding villages and request that a database of services that they can provide be drawn up to submit to the mine. This can be relevant in the sourcing of skills from surrounding communities								
										Sourcing these employees should be undertaken in a coherent fashion and the purpose of the labour desk should be clarified. The labour desk should either be given the mandate to source CVs from the local community, or MM must clearly communicate that they do not have the mandate, in which case the proper channel of submitting CVs should be communicated								
										MM should continue to provide the surrounding communities with practical skills training so that they have the opportunity to upskill themselves and apply for jobs with the mine. Recruitment of labour should be guided by AAP's recruitment policies which should promote the employment of local labour.								
										The recruitment process must be transparent and communicated to stakeholders in order to limit opportunities for conflict situations. MM's contractor management plan also needs to be implemented to ensure that appointed contractors also employ locally as far as practically possible.								
										Support for local businesses through SMME development should be prioritised, with support from other surrounding mines, business forums and the municipality. The appointment of local business and the use of their products and services								

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
										should be promoted as far as practically possible, as it will potentially open up opportunities for local employment								
										Continued participation of labour unions in Work Place Skills Plans and Annual Training Reports should be encouraged, and feedback provided to employees at mass meetings								
	Capacity building and skills transfer Lack in capacity building and perceived lack of support to local communities, especially women and youth to enable them to access opportunities at the mine	+	3	4	2	6	2	36	Moderate	AAP can consider providing proposal writing workshops as a part of the training and skills development programmes such that community members with small businesses can develop this skill, leading to a higher and more promising level of proposals received from the surrounding communities	4	4	3	8	1	60	High	66.7
										Skills development for employees and community members wishing to obtain employment through the project should, include more than technical skills (e.g. Life skills training and financial literacy)								
										Awareness should be created within the communities of the contribution that AAP makes to skills development and training opportunities								
										Learnerships/internships at AAP should be considered for matriculants wishing to obtain work experience								
	Gender relations - insufficient women in the workplace: Women still face barriers to entering and participating in the mining sector even though South African legislation compels companies to employ women at all levels. Gender equality needs to be considered in the planning phase of the project to ensure that equal employment outcomes for both women and men and to ensure that women are also employed in management positions at the mine.	-	3	4	2	6	2	36	Moderate	MM's HR policy should support preferential employment opportunities for women, as well as measures to increase accessibility and safety considerations for women working in mines. Training and skills development focused on women should take place to increase their participation in the labour force	4	4	3	6	1	52	Moderate	44.4
										Continue the implementation of the management measures to ensure equitable remuneration packages for women and their male counterparts. Institute a well-designed gender equality strategy for the project								
	Social differentiation and inequality Competition over scarce resources such as employment and procurement opportunities leading to social differentiation and conflict	-	4	4	3	10	4	68	High	AAP should ensure that management practises do not exploit or exacerbate the level of mistrust or conflict within the different community groups	4	3	2	8	4	52	Moderate	23.5
										AAP should ensure that employment and procurement policies are clearly communicated and implemented in a transparent manner								
										Communities must be engaged on fair and transparent terms whilst respecting traditionally and democratically appointed leadership within the community								
										Communities should furthermore be informed and educated about the various ways in which AAP contributes to socio-economic development, not only within their own communities, but also through contributions towards their SLP goals, CSI as well as taxation								
										Communities should be capacitated through inter alia Zimele programme to obtain training and entrepreneurial skills which will allow them to gain opportunities through AAP initiatives or procurement processes								
	Reduced access to ecosystem services due to conversion of land use	-	4	4	2	8	4	56	Moderate	Develop a management plan to address situations where land currently used by communities, within the mining and surface lease areas, will be lost due to the proposed project activities. The management plan should ensure that there is no net negative impact on the land user	4	4	2	6	3	48	Moderate	14.3
										Facilitate informed participation of all affected persons. Consultation to continue through the implementation, monitoring and evaluation phases								

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
										APP must communicate their grievance mechanism to the affected persons in order to address concerns raised by affected parties								
										Take into account surrounding land uses and design post-mining land use options to support and enhance long-term development options								
	<u>Dust exposure</u> Tipping and hauling of waste rock to the northern waste rock dump | Crushing activities at the Primary crusher | Additional traffic and hauling vehicle traffic *Increase in dust in the immediate vicinity of the mining activities*	-	4	4	3	8	4	60	High	Maintain the existing dust management/mitigation measures on-site. Should dust levels increase the management/mitigation measures should be reviewed to ensure dust levels remain below the respective standards	4	4	2	6	3	48	Moderate	20.0
										Adhere to the air quality management measures provided in the air quality section								
										Implement MM's social incident management procedure for the Project including the existing grievance procedures to capture community and stakeholder concerns and grievances regarding environmental impacts								
										Where practicable, stockpiles of soils and materials should be located as far as possible from sensitive receptors, taking account of prevailing wind directions and seasonal variations in the prevailing wind								
	<u>Noise exposure</u> Tipping and hauling of waste rock to the northern waste rock dump; 3rd Concentrator plant activities; Crushing activities at the Primary crusher; De-bottlenecking plant; Additional traffic and hauling vehicle traffic; Blasting activities *Increase in noise in the immediate vicinity of the mining activities*	-	4	4	2	8	4	56	Moderate	Implement the Environmental, Health and Safety Guidelines prescribed Noise Impact Management Plan	3	4	2	6	3	36	Moderate	35.7

Table 18-6: Construction impacts applicable to the specific expansion activities

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
Construction impacts applicable to the proposed construction of the 3rd Concentrator and Bulk Ore Sorter																		
Noise	Impacts associated with the construction activities at the upgrade of the access road from the Bakenberg Road turnoff (going toward the MNC) to the M3C area to manage traffic congestion during the construction	-	3	2	1	4	2	21	Low	Construction activities at the upgrade of the access road may be carried out during the day and night time provided that the prevailing ambient noise levels at the boundary of the mine is not exceeded When the prevailing ambient noise is exceeded such activities will have to be acoustically screened off.	2	3	2	4	2	18	Low	14.3
	Noise generated due to construction activities at the additional primary crusher	-	3	2	1	4	2	21	Low	Construction activities at the additional primary crusher may be carried out during the day and night time provided that the prevailing ambient noise levels at the boundary of the mine is not exceeded	2	2	1	4	2	14	Low	33.3
Social	Availability and access to water: Due to the construction of the 3rd Construction, contamination of the Mohlosane River from potential hydrocarbon spills from construction machinery Reduced availability of water to downstream water users due to dirty runoff from site reporting into Mohlosane River	-	4	4	3	10	5	68	High	During normal operation dirty water should be contained as specified in the design report and as per the requirements of the WUL Paddocks should be constructed to minimise uncontrolled runoff from the site entering the clean water system Where practical construction should take place in the low flow period (dry season) to reduce probability of potential impact Stormwater culverts at watercourse crossings should be designed and constructed to accommodate the 1:50 year storm event Emergency action plans should be developed to deal with spillages Contractors should be made aware of the WUL conditions that apply during construction and made liable for environmental damages caused by spillages Contaminated runoff should be contained and reused as necessary	4	4	2	6	3	48	Moderate	29.4
Surface water	Contamination of the Mohlosane River from potential hydrocarbon spills from construction machinery and spillage from the conveyor and road crossings over the Mohlosane River	-	2	1	2	4	2	14	Low	Contaminated runoff should be contained and reused as necessary e.g. for dust suppression Hazardous substances and potentially polluting materials should be stored in appropriately bunded areas located outside of the riparian zone Contractors should be made aware of the WUL conditions that apply during construction and made liable for environmental damages caused by spillages Emergency action plans should be developed to deal with spillages Avoid spillage from conveyors across the Mohlosane River	2	2	2	2	2	12	Low	14.3
Heritage	Impact on possible heritages sites	-	3	5	3	8	3	48	Moderate	Prior to the commencement of the construction phase, an appropriately qualified archaeologist must undertake a heritage assessment at the site where the bulk ore sorter will be situated. If any heritage sites are identified it must be managed according to the specific requirements detailed in the management measures	2	5	2	4	2	22	Low	54.2
Biodiversity	The project will have no major impact on the natural vegetation on a regional level. Impacts to surface water resources are expected with regard to increased run-	-	4	2	2	4	1	32	Moderate	Encroachment into the Mohlosane river should be avoided Sheet runoff from access roads should be slowed down by the strategic placement of berms	2	2	1	2	1	10	Low	68.8

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
	off on hard surfaces, possible erosion and pollution which may result in habitat changes to the drainage lines									Soils must be managed according to the management measures detailed under soils land use and land capability and should include erosion / run-off control for construction phase Where practical construction should take place in the low flow period (dry season) to reduce probability of potential impact Monitor all areas outside of the development footprints for erosion and incision								
	Pollution of water resources due to increased run off from hard polluted surfaces: Surface impacts (such as excavation for foundations of the M3C) has the potential to lead to the contamination of freshwater resources due to chemicals/ hydrocarbons contamination and/or increased sedimentation. This will have a negative impact on riparian and in-stream habitat and/or biota (specifically the Mohlosane River).	-	4	2	2	8	3	48	Moderate	Sheet runoff from access roads should be slowed down by the strategic placement of berms Soils must be managed according to the management measures detailed under soils land use and land capability and should include erosion / run-off control for construction phase Monitor all areas outside of the development footprints for erosion and incision	2	2	2	4	2	16	Low	66.7
Construction impacts applicable to the proposed construction of the Debottlenecking Plant at the South Concentrator																		
Surface water	Contamination of the Groot Sandsloot River due to erosion, spillages and accidental discharges at the crossings	-	4	2	1	6	3	36	Moderate	Monitor all areas outside of the development footprints for erosion and incision Stormwater culverts at watercourse crossings should be designed and constructed to accommodate the 1:50 year storm event Emergency action plans should be developed to deal with spillages Adhere to the applicable requirements and conditions specified in the WUL	2	2	4	4	2	20	Low	44.4
Biodiversity	The habitat at the site is already modified and therefore the upgrade of the MSC is not anticipated to have a significant impact on the habitat in the area	-	4	2	1	2	1	20	Low	Where possible, rehabilitate exposed areas during construction to promote vegetation growth Removal of alien and weed species must take place in accordance with existing legislation process and procedures	2	2	1	2	1	10	Low	50.0
	Vegetation is severely modified in this area and therefore very little impact is expected on the natural vegetation.	-	4	2	1	6	4	36	Moderate	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees Removal of alien and weed species must take place in accordance with existing legislation process and procedures	3	2	1	4	2	21	Low	41.7
	Due to the loss of vegetative cover and topsoil protection in MSC areas, possible erosion, the permanent loss of resource downslope/downstream and impact of sedimentary load on streams and river systems could occur. Potential indiscriminate disposal of hazardous and non-hazardous materials wastes within freshwater resources, leading to altered water quality, possible changes to flow patterns as a result of blockages caused by solid wastes/rubble	-	4	2	1	6	1	36	Moderate	All development footprint areas and areas affected by the proposed development should remain as small as possible Where practical construction should take place in the low flow period (dry season) to reduce probability of potential impact The mines existing procedures must be followed for the management of oil/diesel leaks	2	2	1	4	1	14	Low	61.1
Construction impacts applicable to the proposed construction the Blinkwater 2 TSF																		
Groundwater	Construction of Blinkwater 2 TSF - shallow contaminated seepage from unlined Blinkwater TSF with trafficability/construction problems	-	3	2	2	4	2	24	Low	Development and implementation of scavenger wells planned around the TSF Develop and implement appropriate groundwater monitoring programme monitoring the effectiveness of scavenger wells and if not effective evaluate other alternatives.	3	1	1	2	1	12	Low	50.0

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
	Construction of Blinkwater 2 TSF - Loss of shallow groundwater resources along Mohlosane River bed and BWSD pond	-	4	5	2	4	4	44	Moderate	Design of Blinkwater 2 TSF must investigate the diversion of the Mohlosane River channel around the footprint of Blinkwater 2 TSF to effectively separate clean and dirty water Consideration to be given to the feasibility of a sub-surface drain below the liner/barrier system to capture clean groundwater and prevent it from being contaminated from the unlined Blinkwater TSF	2	5	2	2	1	18	Low	59.1
Noise	Construction activities resulting in noise generation from machinery and construction staff	-	3	2	1	4	2	21	Low	Construction activities may be carried out during the day and night time provided that the prevailing ambient noise levels at the boundary of the mine is not exceeded When the prevailing ambient noise is exceeded such activities will have to be acoustically screened off.	2	3	2	4	2	18	Low	14.3
Surface water	Impact on the Mohlosane river due to increased erosion from areas of exposed soils which could potentially flow into the Mohlosane river to the south of the Blinkwater 2 TSF	-	4	1	2	6	3	36	Moderate	Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area Where practical activities should be limited to months of low rainfall (dry season) to reduce probability of potential impact Erosion control measures in the form of temporary erosion prevention berms should be implemented during construction. Areas disturbed by construction activities should be rehabilitated immediately on completion of construction of each area	2	4	2	2	2	16	Low	55.6
	Contamination of the Mohlosane River from potential hydrocarbon spills from construction machinery	-	4	1	3	6	2	40	Moderate	Contaminated runoff should be contained and reused as necessary e.g. for dust suppression Emergency action plans should be developed to deal with spillages Contractors should be made aware of the WUL conditions that apply during construction and made liable for environmental damages caused by spillages	2	2	4	4	2	20	Low	50.0
Biodiversity	In general, the habitat is under threat, especially where the road and berm act as a cut-off of surface flow to the wetland – this include the impacts to water resources east of the N11 that have a direct impact on flow to the areas downstream of the road	-	5	2	3	8	4	65	High	All development footprint areas and areas affected by the proposed development should remain as small as possible and should not encroach onto surrounding sensitive areas and the associated buffer zones (Refer to Section 29.1.3) The boundaries of the development footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas All sensitive areas outside the construction area must be kept off-limits to construction vehicles and personnel Future mine planning should ensure that mining activities do not lead to a reduction of stream flow or dewatering of any riparian features and connectivity of the riparian features in the vicinity of the mining activities should be maintained	5	2	3	6	4	55	Moderate	15.4
	Pollution of water resources due to increased run off from hard polluted surfaces: Surface impacts due to the construction of the Blinkwater 2 TSF has the potential to lead to contamination of freshwater resources due to chemicals/ hydrocarbons contamination and/or increased sedimentation.	-	5	2	3	8	4	65	High	Sheet runoff from access roads should be slowed down by the strategic placement of berms; Implement the soils utilisation plan as detailed in section 18.4.1 Where practical construction should take place in the low flow period (dry season) to reduce probability of potential impact Monitor all areas outside of the development footprint for erosion and incision.	5	2	3	6	2	55	Moderate	15.4
	The wetland in this area is under continuous pressure from flow modification, habitat modification and pollution		5	2	1	10	4	65	High	The boundaries of the development footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas Implement wetland protection measures included in the WUL	5	2	4	6	4	60	High	7.7

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
Social	Loss of natural and cultural heritage Loss of cultural heritage due to the construction of the Blinkwater 2 TSF	-	4	4	2	8	4	56	Moderate	Local residents should be consulted to inform mitigation measures when addressing any potential impact on cultural heritage sites or graves Mitigation measures recommended in the Heritage Impact Assessment Study to be implemented Implement the existing chance finds procedure to deal with how to protect graves and heritage sites accidentally unearthed during construction	3	2	2	4	3	24	Low	57.1
Construction impacts applicable to the proposed construction of the Buffer Dam																		
Groundwater	Construction of new Buffer Dam may result in possible long term impacts to groundwater from seepage	-	3	3	3	4	3	30	Moderate	Undertake necessary classification of the cumulative waste streams that will be stored in buffer dam Design and implement appropriate barrier system pending classification (Refer to Section 6.2.1 for details regarding the barrier system) Implement scavenger well design to include wells to capture seepage in case of leakage, downgradient of Buffer Dam Implement ground water monitoring programme as per the requirements of the WUL	2	3	2	2	1	14	Low	53.3
Biodiversity	The habitat and natural habitat at this where the buffer dam will be located is modified due to current mining activities, roads, dumping of refuse and the extensive top soil stockpile area. The natural vegetation is modified and although good basal cover is noted to the west of the site, it is dominated by pioneer species in the basal and woody layers, including some alien invasive species . Construction activities will have an impact on the vegetation	-	5	2	1	8	4	55	Moderate	Where possible, rehabilitate exposed areas during construction to promote vegetation growth Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	5	2	1	6	3	45	Moderate	18.2
	The water resources may be impacted as a result of potential seepage and increased runoff from hard surfaces	-	5	2	2	6	4	50	Moderate	Where practical activities should be limited to months of low rainfall (dry season) to reduce probability of potential impact Limit the footprint area of the proposed infrastructure to as small as possible.	5	2	2	4	4	40	Moderate	20.0
	Potential impact on water quality impact may be on a local and regional level for both the surface and groundwater resources	-	5	2	3	6	4	55	Moderate	Construct paddocks downstream of the working activities to minimise uncontrolled runoff from the site Minimise the area that are to be stripped of vegetation and construct upstream bunds upstream of the construction site. The mines existing procedures must be followed for the management of oil/diesel leaks	5	2	3	4	3	45	Moderate	18.2
Construction impacts applicable to the proposed construction of the North Waste Rock Dump and ore stockpiles																		
Groundwater	Construction of NWRD may lead to possible long term impacts due to presence of possible permeable structures within proposed footprint	-	5	5	3	8	4	80	High	Prior to final technical design and construction of Waste Rock Dump, investigate the extent, depth and permeability of the NM and Drenthe Faults (geophysics and drilling) which have been delineated within the proposed footprint and extrapolated link to the Witrivier Pending the outcome of this investigation, finalise technical design and specifications. Should the design specification change significantly, obtain approval from DWS - Civil Design Implement clean water/dirty water infrastructure to contain dirty water runoff from the waste rock dump in appropriately	5	2	2	2	1	30	Moderate	62.5

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
										designed facility as detailed in the NWRD design report and according the requirements of the WUL								
										Implement ground water monitoring programme as per the requirements of the WUL								
										Optimise blasting procedures to minimise explosive residues								
Surface water	Contamination of the Witrivier from potential hydrocarbon spills from construction machinery	-	2	2	1	2	2	10	Low	Contaminated runoff should be contained and reused as necessary e.g. for dust suppression	2	2	4	4	2	20	Low	50.0
										Hazardous substances and potentially polluting materials should be stored in appropriately bunded areas located outside of the riparian zone								
Biodiversity	Changes to habitat due to construction activities resulting in loss of vegetation and increased runoff and erosion	-	5	2	1	8	3	55	Moderate	Where possible, rehabilitate exposed areas during construction to promote vegetation growth	5	2	1	6	3	45	Moderate	18.2
	Loss of natural vegetation due to clearance during construction	-	5	2	1	8	4	55	Moderate	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	5	2	1	6	3	45	Moderate	18.2
	Impacts to water resources due to increased runoff, siltation and erosion.	-	5	2	2	6	4	50	Moderate	Construct paddocks downstream of the working activities to minimise uncontrolled runoff from the site	5	2	2	4	4	40	Moderate	20.0
										Minimise the area that are to be stripped of vegetation and construct upstream bunds upstream of the construction site.								
										The mines existing procedures must be followed for the management of oil/diesel leaks								
Social	Reduction in the environmental amenity value - reduced access to cultural ecosystem services due to conversion of land use and additional visual impact due to the construction of the NWRD.	-	4	5	2	8	4	60	High	Develop a management plan to address situations where land currently used by communities, within the mining and surface lease areas, will be lost due to the proposed project activities. The management plan should ensure that there is no net negative impact on the land user	4	5	2	6	4	52	Moderate	13.3
										Facilitate informed participation of all affected persons. Consultation to continue through the implementation, monitoring and evaluation phases								
										AAP must communicate their grievance mechanism to the affected persons in order to address concerns raised by affected parties								
										Take into account surrounding land uses and design post-mining land use options to support and enhance long-term development options								
	Availability and access to water: Due to the construction of the NWRD, contamination of the Witriver from potential hydrocarbon spills from construction machinery Reduced availability of water to downstream water users due to changes in water quality and mean annual rainfall	-	4	4	3	10	5	68	High	Hydrocarbon spills from vehicles must be cleaned immediately	4	4	2	6	3	48	Moderate	29.4
										Hazardous substances and potentially polluting materials should be stored in appropriately bunded areas located outside of the riparian zone								
										During normal operation dirty water should be contained as specified in the design report and as per the requirements of the WUL								
										Paddocks should be constructed to minimise uncontrolled runoff from the site entering the clean water system								
										Where practical construction should take place in the low flow period (dry season) to reduce probability of potential impact								
										Emergency action plans should be developed to deal with spillages								

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
										Contractors should be made aware of the WUL conditions that apply during construction and made liable for environmental damages caused by spillages								
										Contaminated runoff should be contained and reused as necessary e.g. for dust suppression								
										Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area								
Construction impacts applicable to the proposed construction of the Contractors Camp																		
Heritage	Impact on possible heritages sites	-	3	5	3	8	3	48	Moderate	Prior to the commencement of the construction phase, an appropriately qualified archaeologist must undertake a heritage assessment at the site where the contractors camp will be situated.	2	5	2	4	2	22	Low	54.2
										If any heritage sites are identified it must be managed according to the specific requirements detailed in the management measures								
Biodiversity	Impact on habitat during the construction of the temporary contractors camp	-	5	2	1	4	3	35	Moderate	Where possible, rehabilitate exposed areas during construction to promote vegetation growth	5	2	1	2	3	25	Low	28.6
	Impact on habitat during the construction of the temporary contractors camp	-	5	2	1	4	4	35	Moderate	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	5	2	1	4	3	35	Moderate	0.0
	Impacts on water resources moderate to high – runoff and pollution if not captured and recycled	-	5	2	2	4	4	40	Moderate	Construct paddocks downstream of the working activities to minimise uncontrolled runoff from the site	5	2	2	2	4	30	Moderate	25.0
										Where practical construction should take place in the low flow period (dry season) to reduce probability of potential impact								
										The mines existing procedures must be followed for the management of oil/diesel leaks								
										A biodiversity specialist must assess the area of the final location of the temporary contractors camp prior to the commencement of the construction								
Construction impacts applicable to the proposed construction of the Contractors' Laydown Area																		
Biodiversity	Habitat is severely modified over the larger area – current activities and changes for the proposed activities	-	5	2	1	4	3	35	Moderate	Where possible, rehabilitate exposed areas during construction to promote vegetation growth	5	2	1	2	3	25	Low	28.6
	The natural vegetation is modified, although some basal and woody cover to the south is present – mostly pioneers species with low diversity and numbers of the climax species	-	5	2	1	6	4	45	Moderate	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	5	2	1	4	3	35	Moderate	22.2
	The water resources will be impacted by the runoff water – potentially high pollution from soils, sediments, fuels and oil	-	5	2	2	6	4	50	Moderate	Construct paddocks downstream of the working activities to minimise uncontrolled runoff from the site	5	2	2	4	4	40	Moderate	20.0
										Where practical construction should take place in the low flow period (dry season) to reduce probability of potential impact								
	Impact on the water quality due to increase in water runoff potentially containing soils, sediments, fuels and oil	-	5	2	3	8	4	65	High	The mines existing procedures must be followed for the management of oil/diesel leaks	5	2	3	6	3	55	Moderate	15.4
Construction impacts applicable to the proposed construction of the Workshop Expansion and Change house																		
Biodiversity	The expansion will have limited impact on the general habitat in the area but clearance activities for construction will impact on whatever remaining habitats occur at this site	-	5	2	1	8	3	55	Moderate	Where possible, rehabilitate exposed areas during construction to promote vegetation growth	5	2	1	8	3	55	Moderate	0.0

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
	Very little natural vegetation remains however clearance for construction will impact on whatever remaining vegetation exists	-	5	2	1	4	5	35	Moderate	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	5	2	1	4	3	35	Moderate	0.0
	Main threat to water resources – runoff off from potentially polluted areas due to hydrocarbon spillages from construction machinery	-	5	2	3	8	4	65	High	Construct paddocks downstream of the working activities to minimise uncontrolled runoff from the site Where practical construction should take place in the low flow period (dry season) to reduce probability of potential impact The mines existing procedures must be followed for the management of oil/diesel leaks	5	2	2	6	4	50	Moderate	23.1
	Impact on water quality from runoff off from potentially polluted areas due to hydrocarbon spillages from construction machinery	-	5	2	3	10	5	75	High		5	2	3	8	3	65	High	13.3
Construction impacts applicable to the proposed construction of the Groot Sandsloot River diversion																		
Surface water	Deterioration in surface water quality due to spillages and accidental discharges into the Sandsloot (Pholotsi) from vehicles	-	2	3	2	4	3	18	Low	Contractors should be made aware of the WUL conditions that apply during construction and made liable for environmental damages caused by spillages	2	4	2	2	2	16	Low	-12.5
	Increased erosion from areas of exposed soils in the Sandsloot diversion	-	4	2	1	6	3	36	Moderate	Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area Erosion control measures in the form of temporary erosion prevention berms should be implemented during construction. Areas disturbed by construction activities should be rehabilitated immediately on completion of construction of each area Where practical activities should be limited to months of low rainfall (dry season) to reduce probability of potential impact All machinery and substances used on the site will be checked for leaks and otherwise properly maintained. Where leaks are found immediate action must be taken to stop the leaks. All contamination from leaks will be immediately removed and remediated. The river diversion will be developed in accordance with the design report submitted as part of the WUL The River diversion will be properly constructed and water will be returned to the natural course of the river immediately downstream of the construction site Paddocks should be constructed to minimise uncontrolled runoff from the site entering the clean water system The groundwater and surface water quality monitoring programme will continue in line with requirements of the Water Use Licence	3	2	1	4	2	21	Low	41.7
Biodiversity	The habitat is modified by the proximity of the mine pit and rock dump on the banks of the river and diversion of the river will further impact on the habitat. To an extent the whole river channel and associated flood plain will be lost with the development of the diversion	-	5	2	2	10	4	70	High	Where possible, rehabilitate exposed areas during construction to promote vegetation growth	5	2	2	8	3	60	High	14.3
	The development of the river diversion will have a negative impact on the river habitat and to an extent on the vegetation. The erosion of sediments (alluvial clay material) from the rock dump has modified the soils on the right-hand bank. These deposits have changed the vegetation composition and the *Grewia vernicosa* dominate of this material	-	5	2	2	8	5	60	High	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees If possible, relocate protected species once a permit has been obtained for its removal	5	2	2	6	3	50	Moderate	16.7

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
	Impact to Water resources - construction activities can lead to erosion and compacted areas will lead to increased runoff	-	5	2	3	8	4	65	High	Hydrocarbon spills from vehicles must be cleaned immediately Minimise the area that are to be stripped of vegetation and construct upstream bunds upstream of the construction site. The mines existing procedures must be followed for the management of oil/diesel leaks	5	2	3	6	4	55	Moderate	15.4
	Impact to Water quality - construction activities can lead to erosion and compacted areas will lead to increased runoff	-	5	2	3	10	5	75	High	Hazardous substances and potentially polluting materials should be stored in appropriately bunded areas located outside of the riparian zone	5	2	3	8	3	65	High	13.3
Social	Availability and access to water: Due to the construction of diversion. Reduced availability of water to downstream water users due to changes in water quality and mean annual rainfall Deterioration of surface water quality due to erosion, spillages and accidental discharges at the crossings Potential flooding of existing crossing especially culverts Deterioration in surface water quality due to spillages and accidental discharges	-	4	4	3	10	5	68	High	During normal operation dirty water should be contained as specified in the design report and as per the requirements of the WUL Paddocks should be constructed to minimise uncontrolled runoff from the site entering the clean water system Where practical construction should take place in the low flow period (dry season) to reduce probability of potential impact Stormwater culverts at watercourse crossings should be designed and constructed to accommodate the 1:50 year storm event Emergency action plans should be developed to deal with spillages Contractors should be made aware of the WUL conditions that apply during construction and made liable for environmental damages caused by spillages Contaminated runoff should be contained and reused as necessary	4	4	2	6	3	48	Moderate	29.4

The table below list the main project related activities that will be undertaken during the operational phase of the proposed project.

Operation	Operation of the infrastructure associated with the Expansion Project and general project related infrastructure, 24 hours, 7 days per week provided that the prevailing ambient noise levels at the boundary of the mine is not exceeded
	Deposition of tailings onto the Blinkwater 2 TSF:
	Deposition of waste rock on the NWRD:
	Storage of water, in the buffer dam, from the open pit, treated sewage effluent from the Polokwane and Mokopane Sewage Treatment Plants, via an extension to the existing pipeline system, return water from the Mogalakwena Mine TSF's including the proposed Blinkwater 2 TSF and runoff water collected within the plant and mining areas.

Table 18-7: Operational impacts applicable to all the proposed expansion activities

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
Air Quality	Dust generation potentially resulting in nuisance and health effects on nearby receptors due to materials handling, vehicle entrainment of dust on the haul roads and windblown dust.	-	3	4	2	4	2	30	Moderate	Treat road surfaces within the mine boundary to suppress dust entrained by vehicles. Surface treatment of roads should also be considered before and after a sensitive receptor	2	4	1	2	1	14	Low	53.3
										Use dust suppression techniques such as wet suppression or chemical suppression (must be environmentally friendly and non-polluting) to reduce dust on roads that exhibit an increase of dust emitted from the entrainment of dust								
										Ensure that the minimum moisture content is maintained through process to lower dust emissions								
										Design road alignments to minimise travel distances and eliminate unnecessary traffic;								
										Speed limits within the mine should be adhered to for both treated haul roads and unpaved roads								
										Where necessary rock cladding on the boundary of the WRD to lower the possibility of wind erosion								
										Attend to dust control when off-loading trucks at the crusher by minimising drop heights and prevention of over loading								
										Limit load size to reduce spillage and cover final product loads with tarpaulins where needed;								
										When stockpiling ore, the design specification of equipment should be considered to determine a suitable drop height to control the fall of materials which will reduce dust emissions								
										Continuation of routine emissions and ambient air quality monitoring program to determine whether there are any significant increases in emissions and impacts at sensitive receptors								
Groundwater	Reduction in groundwater quantity (real or perceived) due to increased ingresses and the dewatering (active and passive) of the mining pit area voids which will be deeper and larger	-	5	4	3	6	3	65	High	Undertake door to door hydro census annually within 1 km radius to identify and quantify groundwater users in close proximity to the mine	5	4	3	4	3	55	Moderate	15.4
										Consider installing monitoring boreholes within communities with real time data loggers to quantify localised drawdown due to increasing usage from community boreholes								
										Develop a dewatering strategy to harvest the clean water around the pit area prior to mining to prevent the groundwater from becoming contaminated should it end up as fissure water in the pit								
										Update numerical flow model with data and update dewatering strategy to correlate with the mine plans and schedule								
										The monitoring network must be consistent with mine development and as monitoring boreholes are mined out they must be replaced to ensure that there are always monitoring points between the mine pits and potential groundwater users in the communities								

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
	Pollution to groundwater as a result of the use, handling, transport and storage of hazardous materials (hydrocarbons & chemicals)	-	3	4	2	4	2	30	Moderate	Prevent spillages of any hazardous materials during the use, handling, transportation and storage thereof during all activities Implementation and maintenance of awareness and training programme	3	2	2	2	1	18	Low	40.0
	Deterioration of groundwater quality and quantity due to densification of informal settlements surrounding mine.	-	5	5	4	8	4	85	High	Maintain an effective groundwater monitoring programme Update of groundwater flow and transport model Maintain and update scavenger well plan Maintain and update dewatering plan Maintain and update the stormwater management plan Undertake an annual hydro census within 1 km radius to quantify impacts of densification on groundwater resources	4	5	3	6	3	56	Moderate	34.1
Noise	Increase traffic along the access roads to the mine		3	4	2	2	2	24	Low	Traffic noise limit at the mine to be adhered to at all times.	2	5	2	4	2	22	Low	8.3
	Noise generated by the operational activities associated with and the operation of the various Expansion activities		3	4	2	6	2	36	Moderate	All noise sources exceeding 85.0dBA to be identified and if practical to be acoustically screened off Noise survey to be done on a quarterly basis and after one year to change to an annual basis if the prevailing ambient noise level at the boundaries of the debottlenecking plant is within the threshold value of 70.0dBA.	3	4	2	4	2	30	Moderate	16.7
Visual	Visual impact associated with operating of the Proposed Expansion Project infrastructure and activities	-	2	3	2	2	1	14	Low	Adhere to the air quality management measures provided in the air quality section Plant vegetation such as trees and shrubs on periphery of villages directly next to the mine to provide a screen/buffer of direct views towards the plants Point lighting inwards and not to villages to avoid nocturnal impacts Natural vegetation, wherever possible, should be retained on and around the mine property as well as along the boundary of the mine	2	2	2	2	1	12	Low	14.3
Soils, Land Use and Land Capability	Continued loss of soil resource and its utilisation potential for all areas covered by infrastructure and operational areas	-	5	5	2	10	5	85	High	Minimise footprint and restrict area of impact to as small an area as practical and manage all stockpiles of stripped soil for erosion and contamination Maintain management measures for the identified impacts of dirty water and dust generation Implement the soils utilisation plan as detailed in section 18.4.1	5	5	2	8	5	75	High	11.8
	Loss of resource due to unprotected overland flow of dirty water (suspended solids and possible hydrocarbons/reagents) and erosion of soils by water and/or wind - potential for off site (downstream and downwind) contamination/impacts by dust and dirty water.	-	5	5	3	8	5	80	High	Manage stockpiles and berms for vegetative cover to restrict erosion, and maintain and manage stormwater control systems to prevent erosion and ingress of dirty water	5	4	2	4	3	50	Moderate	37.5
	On-going loss of soil utilisation potential from unprotected stockpiles and in-situ sites due to leaching of nutrient stores (inclusive of organic carbon stores).	-	5	4	2	8	4	70	High	On-going monitoring and maintenance of vegetative cover/rock cladding to all material stockpiles and berms, concurrent rehabilitation of all non-essential or disused areas, and the maintenance of stormwater control systems	3	4	2	4	2	30	Moderate	57.1
	Continued loss of soil utilisation due to contamination from spillage of raw product or reagents from vehicles and conveyancing systems, mechanical infrastructure	-	5	4	2	8	4	70	High	On-going management and control (auditing and monitoring) of vehicle maintenance, movement (access and haulage ways) and the covering to loads of raw materials and by-product during transportation	3	4	2	4	2	30	Moderate	57.1

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
										Minimisation or prevention of spillage from waste delivery, pipelines and conveyancing systems and haulage, and controlled maintenance of vehicles								
Surface water	Reduced availability of water to downstream water users due to changes in water quality	-	3	4	3	6	2	39	Moderate	During normal operations dirty water should be contained in (pollution control dams) PCDs designed to handle the 1:50 year event and enable settlement of solids in the contained water prior to reuse Dirty water should be contained in pollution control or return water dams designed to enable settlement of solids and handle the 1:50 year event with a minimum freeboard of 0.8 metres above full supply level	2	4	4	4	2	24	Low	38.5
	Potential flooding of existing crossing especially culverts	-	3	3	2	6	2	33	Moderate	Maintain stormwater culverts at watercourse crossings	2	3	2	4	2	18	Low	45.5
Biodiversity	Pollution of water resources due to increased run off from hard polluted surfaces: Surface impacts (permanent placement of infrastructure) has the potential to lead to the contamination of freshwater resources due to chemicals/ hydrocarbons contamination and/or increased sedimentation. This will have a negative impact on riparian and in-stream habitat and/or biota.	-	4	4	1	6	1	44	Moderate	Maintenance of berms to managed runoff from access roads Implement the soils utilisation plan as detailed in section18.4.1 Monitor areas outside of the development footprints for erosion and incision	2	4	1	4	1	18	Low	59.1
	Impact to water quality due to increased runoff from hard unvegetated areas in and around the infrastructure areas	-	4	4	2	8	4	56	Moderate	Implement the soils utilisation plan as detailed in section 18.4.1	3	4	2	6	2	36	Moderate	35.7
	Lack of the presence of vegetation during the operational phase as a result of the placement of the Expansion project infrastructure	-	3	4	1	8	3	39	Moderate	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	3	4	1	6	3	33	Moderate	15.4
	Habitats will continue to be modified/lost during the operational phase as a result of the placement of the infrastructure	-	4	4	1	6	3	44	Moderate	Ensure that the footprint areas of the water management infrastructure are kept as small as possible and does not encroach further upon the wetland zone or associated buffer zones, where possible.	4	4	1	4	3	36	Moderate	18.2
	Areas with spoils will allow penetration of water into the groundwater which could result in pollution to groundwater	-	4	4	3	8	4	60	High	The footprint and daily operation of the proposed infrastructure must be strictly monitored to ensure that footprint creep and edge effects does not affect the surrounding natural habitat	3	4	3	4	2	33	Moderate	45.0
	Impact on the faunal diversity due to the permanent placement of the Expansion project infrastructure	-	4	4	2	4	4	40	Moderate	Restrict vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed development No indiscriminate driving through the veld and undisturbed areas should be allowed Ensure that the ephemeral drainage lines are demarcated as no go zones for personnel and mine vehicles No faunal species may be hunted, trapped, snared or captured for any purpose whatsoever Fences and boundaries must be monitored on a regular basis in order to locate and remove snares and traps Where practical allow for faunal species to move through fences	3	4	2	4	2	30	Moderate	25.0
Social	Insufficient essential services throughout the project life cycle: The mine together with local government need to agree on an approach to respond or assist with developing areas of need such as the requirement for more schools/training facilities and health care facilities and assistance in decreasing the HIV/AIDs rate in the community.	-	4	4	3	6	4	52	Moderate	Where possible, AAP should endeavor to avoid or minimise transmission of communicable diseases that may be associated with the influx of temporary or permanent project labour and should develop an Influx Management Plan to reduce this. The necessary safety precautions should be taken, and first aid supplies should be made available on site All project employees (including contractors) should undergo health, environment and safety training on induction and thereafter on a regular basis	3	3	2	4	3	27	Low	48.1

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
	Social networks There is a likelihood that job seekers will move into the study area and seek accommodation in the villages located near the mine. This may cause conflict with existing community members who currently feel that they have not been fairly considered for job opportunities at the mine.	-	3	2	3	6	2	33	Moderate	AAP should consider undertaking a Community Health and Safety Impact Assessment in line with Anglo American Standards and Policies Provide clear expectations in all platforms of communication of the number of jobs available and in what categories or fields of the mine. This would allow a clear indication of what types of jobs would be available. Provide clear indications of the requirements and processes involved in recruitment processes	2	2	2	4	1	16	Low	51.5
	Social differentiation and inequality Infrastructure and expansions Competition over scarce resources such as employment and procurement opportunities leading to social differentiation and conflict	-	4	4	3	10	4	68	High	AAP must ensure that management practises do not exploit or exacerbate the level of mistrust or conflict within the different community groups AAP should ensure that employment and procurement policies are clearly communicated and implemented in a transparent manner Communities must be engaged on fair and transparent terms whilst respecting traditionally and democratically appointed leadership within the community Communities should furthermore be informed and educated about the various ways in which AAP contributes to socio-economic development, not only within their own communities, but also through contributions towards their SLP goals, CSI as well as taxation Communities should be capacitated through inter alia Zimele programme to obtain training and entrepreneurial skills which will allow them to gain opportunities through AAP initiatives or procurement processes	4	3	2	8	4	52	Moderate	23.5
	Feelings in relation to the project Infrastructure and expansions A lack of information is causing uncertainty and anxiety in terms of potential project impacts and benefits	-	4	3	3	8	4	56	Moderate	Ensure that current resourcing gaps within the SP team is assessed and sufficiently addressed to ensure appropriate engagement in line with impacts identified in the SIA including to ensure that all stakeholder concerns and inputs especially for vulnerable groups are taken into consideration The SP team should receive additional training (i.e. International Association of Public Participation modules) to enhance communication techniques with the community. Where possible, members from the SP team should also be able to access counselling or the input from a psychologist to assist with conflict management training	3	1	2	6	3	27	Low	51.8
	Waged labour or employment creation: Infrastructure and expansions Limited employment creation | Job qualifications | Working conditions	-	2	2	2	4	4	16	Low	MM should consider reviewing their policies to ensure full compliance with Anglo American Standards and Policies. Specifically, consider updating its Contractor Social Management Procedure to align with this Project Emerging employment opportunities should be targeted at local residents as well as people from the surrounding communities in cases where the skills cannot be obtained from immediately adjacent communities The SP Team at AAP can communicate with the leadership of each village in the surrounding villages and request that a database of services that they can provide be drawn up to submit to the mine. This can be relevant in the sourcing of skills from surrounding communities Sourcing these employees should be undertaken in a coherent fashion and the purpose of the labour desk should be clarified. The labour desk should either be given the mandate to source CVs from the local community, or MM must clearly communicate that they do not have the mandate, in which	4	3	2	6	2	44	Moderate	175.0

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
										case the proper channel of submitting CVs should be communicated								
										MM should continue to provide the surrounding communities with practical skills training so that they have the opportunity to upskill themselves and apply for jobs with the mine. Recruitment of labour should be guided by AAP's recruitment policies which should promote the employment of local labour.								
										Skills development for employees and community members wishing to obtain employment through the project should, include more than technical skills (e.g. Life skills training and financial literacy)								
										Support for local businesses through SMME development should be prioritised, with support from other surrounding mines, business forums and the municipality. The appointment of local business and the use of their products and services should be promoted as far as practically possible, as it will potentially open up opportunities for local employment								
										Continued participation of labour unions in Work Place Skills Plans and Annual Training Reports should be encouraged, and feedback provided to employees at mass meetings								
	Capacity building and skills transfer Infrastructure and expansions Lack in capacity building and perceived lack of support to local communities, especially women and youth to enable them to access opportunities at the mine	+	3	4	2	6	2	36	Moderate	AAP can consider providing proposal writing workshops as a part of the training and skills development programmes such that community members with small businesses can develop this skill, leading to a higher and more promising level of proposals received from the surrounding communities	4	4	3	8	1	60	High	-66.7
										Skills development for employees and community members wishing to obtain employment through the project should, include more than technical skills (e.g. Life skills training and financial literacy)								
										Awareness should be created within the communities of the contribution that AAP makes to skills development and training opportunities								
										Learnerships/internships at AAP should be considered for matriculants wishing to obtain work experience								
	Gender relations - insufficient women in the workplace: Women still face barriers to entering and participating in the mining sector even though South African legislation compels companies to employ women at all levels. Gender equality needs to be considered in the planning phase of the project to ensure that equal employment outcomes for both women and men and to ensure that women are also employed in management positions at the mine.	-	3	4	2	6	2	36	Moderate	MM's HR policy should support preferential employment opportunities for women, as well as measures to increase accessibility and safety considerations for women working in mines. Training and skills development focused on women should take place to increase their participation in the labour force	4	4	3	6	1	52	Moderate	-44.4
										Continue the implementation of the management measures to ensure equitable remuneration packages for women and their male counterparts. Institute a well-designed gender equality strategy for the project								
	Employee and community exposure to hazards and risks including hazardous materials and substances during the operation of the M3C and bulk ore sorter as well as associated gravel roads and main access roads	-	3	4	2	4	2	30	Moderate	Inform affected community about potential risks and impacts from the project activities in a culturally appropriate manner, including collaborating with the community and government agencies in their efforts	2	4	2	2	1	16	Low	46.7

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
										Where possible, AAP should avoid or minimise the potential for community exposure to hazardous materials and substances that may be released by the project (i.e. contaminated water). AAP should also avoid or minimise the potential for community exposure to water-borne, water-based, water-related, and vector-borne diseases, and communicable diseases that could result from project activities by developing action plans to address these risks. For example, AAP should endeavor to avoid or minimise transmission of communicable diseases that may be associated with the influx of temporary or permanent project labour and should develop an Influx Management Plan to reduce this. The necessary safety precautions should be taken, and first aid supplies should be made available on site All project employees (including contractors) should undergo health, environment and safety training on induction and thereafter on a regular basis Continuation of routine emissions and ambient air quality monitoring program to determine whether there are any significant increases in emissions and impacts at sensitive receptors							
	Increase in dust in the immediate vicinity of the mining activities Dust generated due to crushing activities at the Primary crusher and additional traffic and hauling vehicle traffic	-	4	4	3	8	4	60	High	Maintain the existing dust management/mitigation measures on-site. Should dust levels increase the management/mitigation measures should be reviewed to ensure dust levels remain below the respective standards Adhere to the air quality management measures provided in the air quality section Implement MM's social incident management procedure for the Project including the existing grievance procedures to capture community and stakeholder concerns and grievances regarding environmental impacts Where practicable, stockpiles of soils and materials should be located as far as possible from sensitive receptors, taking account of prevailing wind directions and seasonal variations in the prevailing wind	4	4	2	6	3	48	Moderate	20.0
	Availability and access to water Establishment of the NWRD | Groot Sandsloot (Pholotsi) River diversion | North Concentrator and Sewage Treatment Plant | Blinkwater TSF Contamination of the Wit River from potential hydrocarbon spills from construction machinery | Reduced availability of water to downstream water users due to changes in water quality and mean annual rainfall | Deterioration of surface water quality due to erosion, spillages and accidental discharges at the crossings | Potential flooding of existing crossing especially culverts | Increased erosion from areas of exposed soils in the Groot Sandsloot River diversion | Deterioration in surface water quality due to spillages and accidental discharges | Reduced availability of water to downstream water users due to changes in water quality | Contamination of the Mohlosane River from potential hydrocarbon spills from construction machinery | Reduced availability of water to downstream water users due to dirty runoff from site reporting into Mohlosane River	-	4	4	3	10	5	68	High	Hydrocarbon spills from vehicles must be cleaned immediately Hazardous substances and potentially polluting materials should be stored in appropriately bunded areas located outside of the riparian zone During normal operation dirty water should be contained as specified in the design report and as per the requirements of the WUL Paddocks should be constructed to minimise uncontrolled runoff from the site entering the clean water system Stormwater culverts at watercourse crossings should be designed and constructed to accommodate the 1:50 year storm event Emergency action plans should be developed to deal with spillages Contaminated runoff should be contained and reused as necessary Areas disturbed by activities should be rehabilitated immediately on completion of each area	4	4	2	6	3	48	Moderate	29.4

Aspect	Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
		P	D	E	M	LoR	Significance		P	D	E	M	LoR	Significance	
								AAP must communicate their grievance mechanism to the affected persons in order to address concerns raised by affected parties							
								Take into account surrounding land uses and design post-mining land use options to support and enhance long-term development options							

Table 18-8: Operational impacts applicable to the specific expansion activities

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
Operation phase impacts applicable to the proposed 3rd Concentrator																		
Groundwater	Potential contamination of shallow groundwater resources from the new PCD at concentrator due to long term liner integrity	-	5	4	2	6	2	60	High	Maintain groundwater monitoring program Update contaminant flow and transport model with monitoring data Pending spatial and temporal trend analysis, investigate and implement alternative mitigation measures if and when required	2	3	1	4	2	16	Low	73.3
Noise	Operational activities at the M3C and bulk ore sorter could increase the ambient noise levels	+	3	4	2	6	2	36	Moderate	All noise sources exceeding 85.0dBA to be identified and if practical to be acoustically screened off	3	4	2	4	2	30	Moderate	16.7
	Primary crushing activities could increase the noise levels at the noise receptors in close proximity to the M3C	-	3	4	2	6	2	36	Moderate	Noise survey to be done on a quarterly basis and after one year to change to an annual basis if the prevailing ambient noise level at the boundaries of the debottlenecking plant is within the threshold value of 70.0dBA.	3	4	2	4	2	30	Moderate	16.7
	Pumping activities associated with the water reticulation system could increase noise levels	-	3	4	2	2	2	24	Low	The activities to be managed and the noise from the pumps may not exceed the threshold value of 70.0dBA at the boundary of the mine.	2	4	2	2	2	16	Low	33.3
Biodiversity	The operation of the M3C, bulk ore sorter and sewage plant will lead to continued loss of floral diversity and floral endemics as a result of long-term habitat loss.	-	3	4	2	4	2	30	Moderate	Ensure that the footprint area of the expansion infrastructure is kept as small as possible Rehabilitate any open spaces in the footprint area and re-vegetate with indigenous grass and indigenous trees	2	2	1	2	1	10	Low	66.7
Operation phase impacts applicable to the proposed Debottlenecking Plant at the South Concentrator																		
Biodiversity	Habitats will continue to be modified during the operational phase	-	4	4	1	6	3	44	Moderate	Rehabilitate any open spaces in the footprint area and re-vegetate with grass and indigenous trees	4	4	1	4	3	36	Moderate	18.2
	Lack in the presence of natural vegetation will continue in the operational phase	-	3	4	1	8	3	39	Moderate	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	3	4	1	6	3	33	Moderate	15.4
	Impact on water resources due to runoff from disturbed areas	-	4	4	2	6	2	48	Moderate		3	4	2	4	2	30	Moderate	37.5
	Impacts on water quality of surrounding resources due to potential polluted run-off from operational areas	-	4	4	2	8	4	56	Moderate	Ensure that the footprint areas of the water management infrastructure are kept as small as possible and does not encroach further upon the wetland zone or associated buffer zones, where possible.	3	4	2	6	3	36	Moderate	35.7
	Impacts on groundwater are high due to areas where spoils are present, which will promote penetration	-	4	4	3	8	4	60	High	Maintain groundwater monitoring program	3	4	3	4	3	33	Moderate	45.0
Operation phase impacts applicable to the proposed Blinkwater 2 TSF																		
Groundwater	Potential contamination of shallow groundwater resources from extension of Blinkwater TSF, buffer dam and new PCD at the 3rd Concentrator due to long term liner integrity, as well as the effectiveness of the preparation of the base of the North Waste Rock Dump	-	5	4	2	6	2	60	High	Maintain groundwater monitoring program Update contaminant flow and transport model with monitoring data Pending spatial and temporal trend analysis, investigate and implement alternative mitigation measures if and when required Concurrent rehabilitation and intra-benching of the TSF as to reduce run-off	2	3	1	4	2	16	Low	73.3
	Contamination of groundwater due to seepage	-	3	4	3	6	2	39	Moderate	Develop a scavenger well management plan including borehole logs Quantify the effectiveness of scavenger wells in abstracting the seepage component using hydrochemistry with isotopes in a mass balance approach	1	4	3	4	1	11	Low	71.8

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
										Include boreholes in WUL if shown to be abstracting groundwater resources as well as seepage								
Noise	Operational activities at the Blinkwater 2 TSF and associated infrastructure could increase the ambient noise levels	-	3	4	2	6	2	36	Moderate	All noise sources exceeding 85.0dBA (pump/s along the pipeline) to be identified and if practical to be acoustically screened off. Noise survey to be done on a quarterly basis and after one year to change to an annual basis if the prevailing ambient noise level at the footprint boundaries are in line with the 70.0dBA threshold value	3	4	2	4	2	30	Moderate	16.7
Soils, Land Use and Land Capability	Continued loss of soil utilisation due to contamination from spillage of raw product, by-products (Tailings and waste rock) from pipelines and pumps, hydrocarbons and/or reagents from vehicles and conveyancing systems, mechanical infrastructure	-	5	4	2	8	4	70	High	On-going management and control (auditing and monitoring) of vehicle maintenance, movement (access and haulage ways) and the covering to loads of raw materials and by-product during transportation	3	4	2	4	2	30	Moderate	57.1
										Minimisation or prevent of spillage from haulage, and controlled maintenance of vehicles								
										Implement the soils utilisation plan as detailed in Section 18.4.1								
Surface water	Reduced availability of water to downstream water users due to dirty runoff from site reporting into Mohlosane River	-	3	4	3	6	2	39	Moderate	During normal operations dirty water should be contained in (pollution control dams) PCDs designed to handle the 1:50 year event and enable settlement of solids in the contained water prior to reuse	2	4	4	4	2	24	Low	38.5
										Clean water diversions, designed to handle the 1:50 year storm event, should be constructed to divert water away from TSF and Workshop area and return it to the natural environment								
Biodiversity	Encroachment of the granite outcrops – as was indicated in 2011 and 2015 studies, these areas are important biodiversity “hot spots” and islands where all biota find refuge	-	5	4	3	8	4	75	High	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	4	4	3	6	4	52	Moderate	30.7
	Permanent vegetation loss due to clearing of the footprint for the TSF	-	5	4	3	8	4	75	High		4	4	3	6	4	52	Moderate	30.7
	In general, the habitat is under threat, especially where the road and berm act as a cut-off of surface flow to the wetland – this include the severe impacts to water resources east of the N11 that have a direct impact on flow to the areas downstream of the road	-	5	4	3	10	3	85	High	Implement wetland protection measures detailed in section 14.9.1 and the WUL and implement remedial measures in areas within the mining right where erosion is occurring.	4	4	3	8	4	60	High	29.4
	Reduction in water quality due runoff and pollution to the wetland	-	5	4	2	8	4	70	High	Rehabilitate any open spaces in the footprint area, re-vegetate with indigenous grass and indigenous trees	4	4	2	6	4	48	Moderate	31.4
	The development will expose more open soils and create hard surfaces that will result in increased runoff and therefore a decrease in localised infiltration of water.	-	5	4	2	8	4	70	High	Rehabilitate flows to the site, manage areas of identified erosion, and vegetate exposed soils within the footprint area	4	4	2	6	4	48	Moderate	31.4
	The wetland in this area is under continuous pressure from flow modification, habitat modification and pollution		5	4	1	10	5	75	High		4	4	1	6	4	44	Moderate	41.3
Visual	Visual impact associated with the operation of the TSF	-	5	4	2	4	2	50	Moderate	Undertake progressive rehabilitation of the TSF if practically possible	4	2	2	4	1	32	Moderate	36.0
										Plant vegetation such as trees and shrubs on periphery of villages directly next to the proposed Blinkwater 2 TSF to provide a screen/buffer of direct views towards the proposed Blinkwater 2 TSF.								
Operation phase impacts applicable to the proposed Buffer Dam																		
Groundwater	Potential contamination of shallow groundwater resources from extension of Blinkwater TSF, buffer dam and new PCD at concentrator due to long term liner integrity, as well as the effectiveness of the	-	5	4	2	6	2	60	High	Maintain groundwater monitoring program and update contaminant flow and transport model with monitoring data Pending spatial and temporal trend analysis, investigate and implement alternative mitigation measures if and when required	2	3	1	4	2	16	Low	73.3

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
	preparation of the base of the North Waste Rock Dump																	
Noise	Increase in noise during the operation of the Buffer dam		3	4	2	2	2	24	Low	The activities (pumping of water) to be managed and the noise from the water pumps may not exceed the threshold value of 70.0dBA at the boundary of the mine.	2	4	2	2	2	16	Low	33.3
Surface water	Increased risk of flooding due to failure of the dam as a result of dam break	-	4	4	2	6	2	48	Moderate	The buffer dam has been designed to accommodate 1:50 year capacity with freeboard of 0.8 m. Operation of the dam must be in line with the design levels	1	4	2	4	1	10	Low	79.2
Biodiversity	The habitat at this site is modified due to current mining activities, roads, dumping of refuse and the extensive soil dump	-	5	4	2	8	3	70	High	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	5	4	2	6	3	60	High	14.3
	No natural vegetation will be present due to the operation of the buffer dam where the footprint was cleared for the construction of the buffer dam	-	5	4	1	6	3	55	Moderate	Manage areas of identified erosion, and vegetate exposed soils within the footprint area	5	4	1	4	3	45	Moderate	18.2
	The water resources will be impacted – potential seepage and increased runoff from hard surfaces	-	5	4	2	6	3	60	High	Rehabilitate any open spaces in the footprint area and re-vegetate with indigenous grass and indigenous trees	5	4	2	4	2	50	Moderate	16.7
	Water quality impact on a local and regional level for both the surface and groundwater resources	-	5	4	3	8	3	75	High	Ensure that the footprint area of the expansion section is as small as possible	5	4	3	4	3	55	Moderate	26.7
	The development will expose more open soils and create hard surfaces that will result in increased runoff and therefore a decrease in localised infiltration of water.	-	5	4	3	8	3	75	High		5	4	2	6	3	60	High	20.0
Operation phase impacts applicable to the proposed North Waste Rock Dump																		
Groundwater	Potential contamination of shallow groundwater resources from as well as the effectiveness of the preparation of the base of the North Waste Rock Dump	-	5	4	2	6	2	60	High	Maintain groundwater monitoring program	2	3	1	4	2	16	Low	73.3
										Update contaminant flow and transport model with monitoring data								
										Pending spatial and temporal trend analysis, investigate and implement alternative mitigation measures if and when required								
										Concurrent rehabilitation and intra-benching of the WRD as to reduce run-off								
Noise	Noise generation due to the dumping of waste rock at the North waste rock dump		3	4	2	6	2	36	Moderate	The dumping of waste rock to be managed and the distance between the waste rock tipping area to be calculated for the prevailing ambient noise level at the residential areas not to be exceeded. Noise survey to be done on a quarterly basis and after one year to change to an annual basis if the prevailing ambient noise levels at the residential areas will not be exceeded	3	4	2	4	2	30	Moderate	16.7
Surface water	Reduced availability of water to downstream water users due to changes in water quality	-	3	3	2	4	3	27	Low	Paddocks should be constructed to minimise uncontrolled runoff from the site entering the clean water system	2	2	2	6	2	20	Low	25.9
	Sedimentation of paddocks and thereby reducing their capacity	-	3	2	2	6	2	30	Moderate	Paddocks must be monitored and cleared as needed	3	2	1	4	1	21	Low	30.0
	Increased risk of contamination due to WRD failure	-	3	1	2	8	1	33	Moderate	The facility must be designed to accommodate 1:50 year storm event.	1	5	1	4	1	10	Low	69.7
	Reduced availability of water to downstream water users due to changes in MAR	-	3	4	1	4	2	27	Low	Reduction of unoccupied footprint area which may alter catchment hydrology	1	4	2	4	1	10	Low	63.0
Biodiversity	The impacts to water resources will be moderate during operation – with regard to runoff, siltation and erosion	-	5	4	2	6	3	60	High	Rehabilitate any open spaces in the footprint area and re-vegetate with indigenous grass and indigenous trees	5	4	2	4	2	50	Moderate	16.7
										Ensure that the footprint area of the expansion section is as small as possible								
	The impacts to water resources will be moderate during high – with regard to quality	-	5	4	3	8	3	75	High		5	4	3	4	3	55	Moderate	26.7

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
	The development will expose more open soils and create hard surfaces that will result in increased runoff and therefore a decrease in localised infiltration of water.	-	5	4	3	8	3	75	High	Manage areas of identified erosion, and vegetate exposed soils within the footprint area	5	4	2	6	3	60	High	20.0
Visual	Visual impact associated with the operation of the WRD	-	5	4	2	4	2	50	Moderate	Undertake progressive rehabilitation of the WRD practically possible Plant vegetation such as trees and shrubs on periphery of villages directly next to the proposed TSF and WRD to provide a screen/buffer of direct views towards these structures.	4	2	2	4	1	32	Moderate	36.0
Social	Dust and noise exposure Tipping and hauling of waste rock to the northern waste rock dump | Crushing activities at the Primary crusher | Additional traffic and hauling vehicle traffic Increase in dust in the immediate vicinity of the mining activities	-	4	4	3	8	4	60	High	Maintain the existing dust management/mitigation measures on-site. Should dust levels increase the management/mitigation measures should be reviewed to ensure dust levels remain below the respective standards Adhere to the air quality management measures provided in the air quality section Implement MM's social incident management procedure for the Project including the existing grievance procedures to capture community and stakeholder concerns and grievances regarding environmental impacts Where practicable, stockpiles of soils and materials should be located as far as possible from sensitive receptors, taking account of prevailing wind directions and seasonal variations in the prevailing wind	4	4	2	6	3	48	Moderate	20.0
	Replacement cost of environmental functions NWRD | TSF | Groot Sandsloot River diversion Reduced access to ecosystem services due to conversion of land use	-	4	4	2	8	4	56	Moderate	Develop a management plan to address situations where land currently used by communities, within the mining and surface lease areas, will be lost due to the proposed project activities. The management plan should ensure that there is no net negative impact on the land user Facilitate informed participation of all affected persons. Consultation to continue through the implementation, monitoring and evaluation phases AAP must communicate their grievance mechanism to the affected persons in order to address concerns raised by affected parties	4	4	2	6	3	48	Moderate	14.3
Operation phase impacts applicable to the proposed Contractors Camp																		
Biodiversity	Little additional impacts expected on vegetation as the site already severely modified from the previous activities	-	5	4	1	2	2	35	Moderate	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	5	4	1	2	3	35	Moderate	0.0
	Impacts on water resources due to runoff and pollution if not captured and recycled	-	5	4	2	6	3	60	High	Contaminated runoff must be contained and re-used	5	4	2	4	2	50	Moderate	16.7
	Impacts on water quality due to runoff and pollution if not captured and recycled	-	5	4	3	6	3	65	High		5	4	3	4	3	55	Moderate	15.4
	The development will expose more open soils and create hard surfaces that will result in increased runoff and therefore a decrease in localised infiltration of water.	-	5	4	3	6	3	65	High	Manage areas of identified erosion, and vegetate exposed soils within the footprint area	5	4	2	4	3	50	Moderate	23.1
	Impact on faunal diversity	-	4	4	2	4	2	40	Moderate	Where practical allow for faunal species to move through fences	4	4	2	2	2	32	Moderate	20.0
Operation phase impacts applicable to the proposed Contractors' Laydown Area																		

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
Biodiversity	Habitat is severely modified over the larger area due to current activities Further impacts as part of the proposed activities	-	5	4	1	2	3	35	Moderate	Rehabilitate any open spaces in the footprint area and re-vegetate with indigenous grass and indigenous trees	5	4	1	2	3	35	Moderate	0.0
	The natural vegetation is modified, although some basal and woody cover to the south is present – mostly pioneers species with low diversity and numbers of the climax species	-	5	4	1	4	2	45	Moderate	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	5	4	1	2	2	35	Moderate	22.2
	The water resources will be impacted by the runoff water – potentially high pollution from soils, sediments, fuels and oil	-	5	4	2	6	3	60	High	Manage areas of identified erosion, and vegetate exposed soils within the footprint area	5	4	2	4	2	50	Moderate	16.7
	The water quality will be impacted by the runoff water – potentially high pollution from soils, sediments, fuels and oil	-	5	4	3	6	3	65	High	Contaminated runoff must be contained and re-used	5	4	3	4	3	55	Moderate	15.4
	The development will expose more open soils and create hard surfaces that will result in increased runoff and therefore a decrease in localised infiltration of water.	-	5	4	3	4	3	55	Moderate	Rehabilitate flows to the site, manage areas of identified erosion, and vegetate exposed soils within the footprint area	5	4	2	2	3	40	Moderate	27.3
Operation phase impacts applicable to the proposed Workshop Expansion and Change house																		
Noise	Increase in noise levels associated with workshop activities		3	4	2	2	2	24	Low	The workshop activities to be managed and the noise from the mechanical activities may not exceed the threshold value of 70.0dBA at the boundary of the mine.	2	4	2	2	2	16	Low	75.0
Soils, Land Use and Land Capability	Continued loss of soil utilisation due to contamination from pipelines and pumps, hydrocarbons and/or reagents from vehicles and mechanical infrastructure	-	5	4	2	8	4	70	High	On-going management and control (auditing and monitoring) of vehicle maintenance, movement (access and haulage ways) and the covering to loads of raw materials and by-product during transportation Minimisation or prevent of spillage from haulage, and controlled maintenance of vehicles	3	4	2	4	2	30	Moderate	57.1
Biodiversity	The expansion will have limited added impact on the general habitat during operation	-	5	4	1	2	3	35	Moderate	Rehabilitate remaining habitat	5	4	1	2	3	35	Moderate	0.0
	Very little natural vegetation remains and will not be further impacted on by operations	-	5	4	1	4	2	45	Moderate	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees Rehabilitate any open spaces in the footprint area and re-vegetate with indigenous grass and indigenous trees Ensure that the footprint area of the expansion section is as small as possible Manage areas of identified erosion, and vegetate exposed soils within the footprint area Rehabilitate flows to the site, manage areas of identified erosion, and vegetate exposed soils within the footprint area	5	4	1	2	2	35	Moderate	22.2
	Main threat to water resources – runoff off buildings and hard surfaces, stores and all stored materials and vehicles	-	5	4	2	6	3	60	High		5	4	2	4	2	50	Moderate	16.7
	Impact on water quality from runoff off buildings and hard surfaces, stores and all stored materials and vehicles	-	5	4	3	6	3	65	High		5	4	3	4	3	55	Moderate	15.4
	The development will expose more open soils and create hard surfaces that will result in increased runoff and therefore a decrease in localised infiltration of water.	-	5	4	3	4	3	55	Moderate		5	4	2	2	3	40	Moderate	27.3
Operation phase impacts applicable to the proposed Groot Sandsloot River diversion																		
	Reduction in baseflow to the Sandsloot river downgradient of the re-aligned Sandsloot River Diversion (real or perceived)	-	4	4	2	2	2	32	Moderate	Install monitoring boreholes/piezometers along Sandsloot and flow meters to quantify loss of baseflow Implement a design that mimics the natural system as far as practically possible	2	4	2	2	1	16	Low	50.0

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
										Maximise the clean surface water run-off into the system as far as possible and prevent contaminated water from entering the system								
Noise	Groot Sandsloot River		3	4	2	2	2	24	Low	There will be no acoustic screening required unless water is pumped and noise monitoring to be done to ensure compliance	2	4	2	2	2	16	Low	33.3
Surface water	Reduced availability of water to downstream water users due to changes in MAR and potential decreased water quality	-	3	4	1	4	2	27	Low	During the operational phase of the mine, implement a storm water management plan which adheres to GN 704 requirements in terms of separation of clean and dirty water is required so as to ensure no mixing of clean and dirty water occurs.	2	4	4	4	1	24	Low	11.1
	Community issues with changes in flows (Quantity and Quality) in the Sandsloot River – some of it is perceived but going to be difficult to convince the communities that it is not the mine that caused the reduction in flows (Vaalkop 2 dam was upgraded in the last 10 years)	-	2	5	5	10	2	40	Moderate	During the operational phase of the mine, implement a SWMP, which adheres to GN 704 requirements in terms of separation of clean and dirty water is required, so as to ensure no mixing of clean and dirty water occurs The WRD along the edge of the diversion will require the construction of paddocks.	2	5	5	10	1	40	Moderate	0.0
Biodiversity	The habitat is modified by the proximity of the mine pit and rock dump on the banks of the river and diversion of the river will further impact on the habitat. • To an extent – the whole river channel and associated flood plain will be lost with the development	-	5	4	2	8	4	70	High	Rehabilitate any open spaces in the footprint area and re-vegetate with indigenous grass and indigenous trees	5	4	2	6	3	60	High	14.3
	The development will have a negative impact on the river habitat and to an extent on the vegetation. The erosion of sediments (alluvial clay material) from the rock dump has modified the soils on the right-hand bank. These deposits have changed the vegetation composition and the *Grewia vernicosa* dominate of this material	-	5	4	2	6	4	60	High	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	5	4	2	4	4	50	Moderate	16.7
Social	Replacement cost of environmental functions Expansion of WRD | TSF | Groot Sandsloot River diversion Reduced access to ecosystem services due to conversion of land use	-	4	4	2	8	4	56	Moderate	Develop a management plan to address situations where land currently used by communities, within the mining and surface lease areas, will be lost due to the proposed project activities. The management plan should ensure that there is no net negative impact on the land user Facilitate informed participation of all affected persons. Consultation to continue through the implementation, monitoring and evaluation phases AAP must communicate their grievance mechanism to the affected persons in order to address concerns raised by affected parties	4	4	2	6	3	48	Moderate	14.3

The tables below list the main project related activities that will be undertaken during the closure, rehabilitation and post closure phase of the proposed project. Refer to Section 30.4 for the closure actions and post closure monitoring.

Closure / Rehabilitation	Decommissioning and demolition of project related infrastructure
	Handling of potential contaminated soils.
	Monitoring of groundwater.
Post-closure	This is a period of maintenance and monitoring of the various structures and infrastructure closed during the time of rehabilitation. The activities are limited to monitoring activities and maintenance or repairing of erosion and vegetation if necessary as detailed in Section 31.4.

Table 18-9: Closure/rehabilitation phase impacts applicable to all the proposed expansion activities

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
Groundwater	Post closure impacts associated with decommissioning and closure activities	-	4	4	4	8	4	64	High	Implementation of a rehabilitation and closure plan which allows for measures to be implemented that reduce rainwater ingress and infiltration	3	4	2	2	2	24	Low	62.5
										Maintenance of groundwater monitoring programmes and ensure effective follow-up and remedial action based on results								
										Effective remediation of all disturbed areas								
										Effective and legal remediation of all areas where there are demolition activities								
	Communities use the groundwater resources on the mine as potable water supply	+	4	5	2	6	3	52	Moderate	Decommission scavenger wells	4	5	4	8	4	68	High	-30.8
										Develop a long term handover strategy of the wellfields to communities as part of corporate social investment (CSI) projects								
										Evaluate sustainable usage of pit lakes as resource and possibly managed aquifer recharge (MAR), depending on final pit lake water quality								
Noise	Noise increase in the prevailing ambient noise level at the mining right boundaries during the removal of the infra-structure.	+	2	2	1	4	3	14	Low	Demolition activities to be done during daytime working hours with demolition machinery/equipment which complies with the manufacturers specifications on all times.	2	2	1	2	2	10	Low	28.6
	Noise increase along the mining right boundaries during the back-fill of disturbed areas.	+	2	2	1	4	3	14	Low	Earthwork activities to be done during daytime working hours with machinery/equipment which complies with the manufacturers specifications on all times.	2	2	2	2	2	12	Low	14.3
	Noise increase along the mining right boundaries during the planting of grass/vegetation at the disturbed areas.	+	2	2	1	4	3	14	Low	Planting of grass/vegetation activities to be done during daytime working hours with machinery which complies with the manufacturers specifications on all times.	2	2	2	2	2	12	Low	14.3
Soils, Land Use and Land Capability	Loss of soil nutrient and organic carbon stores while in storage and during replacement/rehabilitation process.	-	5	5	2	8	5	75	High	Replacement of nutrient and organic carbon matter needs and requirements at time of rehabilitation, landscaping of the topographic slope (free draining), cultivation of soils and replacement of vegetative cover as soon after replacement of materials as possible. Monitoring of vegetative growth until self-sustaining	4	4	2	6	3	48	Moderate	36.0
	Contamination of in-situ and stored materials by dirty water outwash and use of dirty water for irrigation during rehabilitation of sites.	-	5	5	2	8	5	75	High	Management of stormwater control systems and monitoring of water quality used for irrigation of vegetated areas	4	4	2	6	3	48	Moderate	36.0
	Hydrocarbon/reagent spillage from rehabilitation equipment during reinstatement of soils and vegetative cover, plus potential for compaction of replaced materials, erosion from water and wind of unprotected surfaces and impact on off-site streams and rivers/dams.	-	5	4	3	6	4	65	High	Maintenance and management of all vehicles and restriction on access of vehicles and grazing animals to rehabilitated areas and/or unprotected soils. Installation of erosion control measures along all drainage ways/channels and on any/all sensitive sites	4	4	2	6	2	48	Moderate	26.2
Surface water	Infrastructure not required after closure should be removed and the footprint areas rehabilitated. All rehabilitation activities should be monitored until vegetation is well established	-	3	4	1	6	2	33	Moderate	All rehabilitation activities should be monitored until vegetation is well established and no further surface water quality impacts are deemed likely.	2	1	4	6	2	22	Low	33.3

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
Visual	Visual impact associated with the closure of the South debottlenecking plant at South Concentrator and 3rd concentrator	-	2	5	2	2	1	18	Low	Adhere to the air quality management measures provided in the air quality section Appoint a rehabilitation specialist to implement the requirements of the Closure and Rehabilitation Plan	2	4	2	2	1	16	Low	11.1
Visual	Visual impact associated with closing the TSF and WRD	-	4	5	2	8	1	60	High	Adhere to the air quality management measures provided in the air quality section	2	4	2	2	1	16	Low	73.3
Air Quality	Dust generation potentially resulting in nuisance and health effects on nearby receptors due to materials handling, vehicle entrainment of dust on the haul roads and windblown dust from open and bare areas.	+	3	2	2	4	1	24	Low	Demolish all infrastructure and rehabilitate on the footprint exposed by demolition activities Revegetate all open and bare areas to reduce windblown dust Effective and expedient rehabilitation of dust and other emissions sources Continue to implement the routine air quality monitoring program and assess air quality results routinely	3	2	2	6	1	30	Moderate	25.0
Social	Access to services and facilities during decommissioning and mine closure Decommissioning of Infrastructure and handover to local government Lack of governmental capacity to ensure the sustainability of AAP developed infrastructure and essential services after mine closure	-	3	3	3	6	3	36	Moderate	Consult with provincial and national departments on sector specific programs for alignment throughout the life cycle of MM Ensure that provision is made for infrastructure development projects in the MM SLP with the aim of handing over these facilities to the MLM after closure	2	2	2	2	1	12	Low	66.7
	Level of Hazards and Risk Decommissioning of infrastructure; Rehabilitation of land Reduced level of hazards and risk	+	4	4	2	4	2	40	Moderate	Appoint a rehabilitation specialist to implement the requirements of the Closure and Rehabilitation Plan Consider surrounding land uses and design post-mining land use options to support and enhance long-term development options	5	4	2	8	1	70	High	75.0
	Loss of employment during downscaling or closure Decommissioning of Infrastructure Loss of employment during downscaling or closure	-	5	2	2	8	4	60	High	MM should consider reviewing their policies to ensure full compliance with Anglo American Standards and Policies It is proposed that AAP investigate alternative sustainable livelihood options for the workforce which can be developed as part of the closure plan while the mine is in operation. These alternative sustainable livelihood options can include agricultural programmes where produce can be sold to the surrounding operational mines and communities as well as alternative key skills development (plumbers, electricians etc.) The mine would need to engage with the communities from the planning phase already in order to identify what the communities and workforce would prefer in terms of alternative livelihood options. The Zimele programme should be used to build the capacity of businesses within the community, not with the ultimate goal of winning work at MM, but to gain experience at MM which they would then be able to use for future opportunities If not already the case the Zimele team's scope must be expanded to ensure they are creating lasting socio-economic opportunities for the community beyond mine closure	5	2	2	6	2	50	Moderate	16.7
	Capacity building and skills transfer during decommissioning Decommissioning of Infrastructure Lack in capacity building in preparation for closure	-	4	3	2	4	3	36	Moderate	It is advised that AAP provide training and skills development programmes specifically tailored to local persons interested in obtaining employment as part of municipal infrastructure programmes. It is furthermore advised that recognition of prior learning and training take place for all applicants with the relevant skills, but who may not have the necessarily qualifications In order to ensure that all AAP's policies and procedures translate into real time benefits to the local community it must become a requirement of all tender procedures that bidders comply with AAP principles and policies. The use of local business should also be promoted as far as possible by providing them with preferential	4	2	3	6	1	44	Moderate	22.2

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
	Environmental amenity value during decommissioning Closing and rehabilitation of WRD and TSF Restored access to cultural ecosystem services; Improved visual significance of WRD and TSF	+	4	5	2	6	2	52	Moderate	Appoint a rehabilitation specialist to implement the requirements of the Closure and Rehabilitation Plan Take into account surrounding land uses and design post-mining land use options to support and enhance long-term development options	5	5	2	8	1	75	High	44.2
	Replacement cost of environmental functions during decommissioning Closing and rehabilitation of WRD and TSF Restored access to ecosystem services	+	3	4	2	6	2	36	Moderate	Appoint a rehabilitation specialist to implement the requirements of the Closure and Rehabilitation Plan	4	4	2	8	1	56	Moderate	55.6

Table 18-10: Post-closure phase impacts applicable to all the proposed expansion activities

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
Groundwater	Rebound of groundwater table and formation of terminal pit lakes with possible decant to river sources	-	5	5	3	6	3	70	High	Improved understanding of groundwater flow and flow regimes - Continued understanding of impacts to groundwater resources Maintenance of monitoring programme for an adequate period of time to be confident in the determination of impact.	3	5	3	4	3	36	Moderate	48.6
Noise	Maintenance of disturbed areas	+	2	2	1	4	3	14	Low	Maintenance activities to be done during daytime working hours with machinery which complies with the manufacturers specifications on all times.	2	2	2	2	2	12	Low	14.3
Soils, Land Use and Land Capability	Addition of fertiliser and compost to rehabilitated sites have potential to contaminate the vadose zone and associated soil water if not well managed.	+	5	5	3	6	5	70	High	Assessment of soil physical and chemical requirements, water holding capabilities, hydro pedological considerations and calculation of fertiliser inputs as part of the soil utilisation plan and rehabilitation implementation programme. Ongoing monitoring of water quality, erosion and compaction concerns and the overall growth of the re-vegetation effort.	4	4	2	6	5	48	Moderate	-31.4
	Uncontrolled access to rehabilitated sites by animals, vehicles, people will result in compaction and erosion of unprotected/non vegetative sites (over grazing etc.).	+	5	5	2	4	3	55	Moderate	Control of access to rehabilitated sites until well established and sustainable.	4	4	2	6	3	48	Moderate	-12.7
Surface water	All infrastructures will have been removed, therefore the surface water quality should not be further impacted by any of the post-closure activities	-	2	1	2	2	1	10	Low	Surface water quality should not be further impacted by any of the post-closure activities.	2	1	1	2	1	8	Low	20.0
Air Quality	With rehabilitation plans expected to be implemented in the closure phase, it is envisaged that the impact will be positive and that the rehabilitation measures will improve the air quality within the study area	+	5	5	2	6	1	65	High	Effective implementation of the closure plan	5	5	2	8	1	75	High	-15.4

Table 18-11: Post-closure phase impacts applicable to the specific expansion activities

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
		Post-closure phase impacts applicable to the proposed construction of the 3rd Concentrator																
Air Quality	With rehabilitation plans expected to be implemented in the closure phase, it is envisaged that the impact will be positive and that the rehabilitation measures will improve the air quality within the study area	+	5	5	2	6	1	65	High	Effective implementation of the closure plan Continuation of monitoring and maintenance procedures to ensure rehabilitation measures have been implemented adequately	5	5	2	8	1	75	High	15.4
Surface water	All infrastructures will have been removed, therefore the surface water quality should not be further impacted by any of the post-closure activities	-	2	1	2	2	1	10	Low	Implement post closure monitoring as detailed in Section 31.4.6	2	1	1	2	1	8	Low	20.0
		Post-closure phase impacts applicable to the proposed construction the Blinkwater 2 TSF and NWRD																
Air Quality		+	5	5	2	6	1	65	High	Effective implementation of the closure plan	5	5	2	8	1	75	High	15.4

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
	With rehabilitation plans expected to be implemented in the closure phase, it is envisaged that the impact will be positive and that the rehabilitation measures will improve the air quality within the study area									Continuation of monitoring and maintenance procedures to ensure rehabilitation measures have been implemented adequately								
Surface water	All infrastructure not required after closure will have been removed, therefore the surface water quality should not be further impacted by any of the post-closure activities	-	2	1	2	2	1	10	Low	Implement post closure monitoring as detailed in Section 31.4.6	2	1	1	2	1	8	Low	20.0
Groundwater	Post closure impacts associated with waste disposal activities – TSFs and WRDs	-	5	5	3	6	2	70	High	Maintain an effective groundwater monitoring programme for an adequate time period to be confident in the determination of impact Ensure effective surface and stormwater management post closure Demonstrating, through review of monitoring data and/or predicted modelling, if required, that the effect of contaminant plumes that could be arising and/or are already evident from disposal areas could be remediated by natural attenuation	3	5	3	4	2	36	Moderate	48.6

18.4.1 Soil utilisation plan

A summary of the soil utilisation/conservation plan for the construction, operation, decommissioning and closure phases of the proposed project is provided in Table 18-12.

Table 18-12: Summary of the soil utilisation/conservation plan for the construction, operation, decommissioning and closure phases

Construction phase		
Step	**Factors to consider**	**Comments**
Delineation of areas to be stripped		Stripping will only occur where soils are to be disturbed by activities that are described in the design report, and where a clearly defined end rehabilitation use for the stripped soil has been identified.
Reference to biodiversity action plan		It is recommended that grasses and shrubs that can be recovered be stripped and stored as part of the utilisable soil. However, the requirements for moving and preserving fauna and flora according to the biodiversity action plan should be consulted.
Stripping and handling of soils	Handling	Soils will be handled in dry weather conditions so as to cause as little compaction as possible. Utilisable soil (Topsoil and upper portion of subsoil B2/1) must be removed and stockpiled separately from the lower "B" horizon, with the calcrete and/or any ferricrete layer being separated from the soft/decomposed rock, and wet based soils separated from the dry soils if they are to be impacted.
	Stripping	The "Utilisable" soil will be stripped to a depth of 750mm or until hard rock/calcrete and/or ferricrete is encountered. These soils will be stockpiled together with any vegetation cover present (only large vegetation to be removed prior to stripping). The total stripped depth should be 750mm, wherever possible.
Delineation of stockpiling areas	Location	Stockpiling areas will be identified in close proximity to the source of the soil to limit handling and to promote reuse of soils in the correct areas.
	Designation of Areas	Soils stockpiles will be demarcated, and clearly marked to identify both the soil type and the intended area of rehabilitation.
Operations		
Step	**Factors to consider**	**Comments**
Stockpile management	Vegetation establishment and erosion control	Rapid growth of vegetation on the Soil Stockpiles will be promoted (e.g. by means of watering or fertilisation). The purpose of this exercise will be to protect the soils and combat erosion by water and wind.
	Storm water control	Stockpiles will be established with storm water diversion berms to prevent run off erosion.
	Stockpile height and stability	Soil stockpile heights will be restricted where possible to <1.5m so as to avoid compaction and damage to the soil seed pool. Where stockpiles higher than 1.5m cannot be avoided, these will be benched to a maximum height of 15m. Each bench should ideally be 1.5m high and 2m wide. For storage periods greater than 3 years, vegetative cover is essential, and should be encouraged using fertilization and induced seeding with water. The stockpile side slopes should be stabilized at a slope of 1 in 6. This will promote vegetation growth and reduce run-off related erosion.
	Waste	No waste material will be placed on the soil stockpiles.
	Vehicles	Equipment movement on top of the soil stockpiles will be limited to avoid topsoil compaction and subsequent damage to the soils and seedbank.

Decommissioning and Closure		
Step	**Factors to consider**	**Comments**
Rehabilitation of disturbed land and restoration of soil utilisation	Placement of soils	Stockpiled soil will be used to rehabilitate disturbed sites either ongoing as disturbed areas become available for rehabilitation and/or at closure. The utilizable soil (500mm) removed during the construction phase or while opening up of open cast workings, shall be redistributed in a manner that achieves an approximate uniform stable thickness consistent with the approved postmining land use (Low intensity grazing), and will attain a free draining surface profile. A minimum layer of 300mm of soil will be replaced.
	Fertilisation	A representative sampling of the stripped soils will be analysed to determine the nutrient status of the utilizable materials. As a minimum the following elements will be tested for: EC, CEC, pH, Ca, Mg, K, Na, P, Zn, Clay% and Organic Carbon. These elements provide the basis for determining the fertility of soil. based on the analysis, fertilisers will be applied if necessary.
	Erosion control	Erosion control measures will be implemented to ensure that the soil is not washed away and that erosion gulleys do not develop prior to vegetation establishment.
Pollution of soils	In-situ Remediation	If soil (whether stockpiled or in its undisturbed natural state) is polluted, the first management priority is to treat the pollution by means of in situ bioremediation. The acceptability of this option must be verified by an appropriate soils expert and by DWS, on a case by case basis, before it is implemented.
	Off-site disposal of soils	If in situ treatment is not possible or acceptable then the polluted soil must be classified according to the Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste (DWAF 1998) and disposed at an appropriate, permitted, off-site waste facility.

18.5 Cumulative impacts

Localised cumulative impacts have been identified as part of the specialists' investigations conducted for the proposed Expansion Project. The localised cumulative impacts are those where the magnitude of the combined impacts is greater than the sum of the individual effects.

Cumulative effects or aspects thereof generally uncertain and therefor difficult to quantify, due to limited data availability and accuracy, and uncertainty about the status, description, technical details and management measures in place or planned for neighbouring projects in the area.

The cumulative impacts identified for the Expansion Project include:

- **Groundwater:** Development of the North WRD resulting in possible long term impacts due to presence of possible permeable structures (fault zones) within proposed footprint**.**
- **Surface water:** Alterations to the flow of surface waters in the same catchment area causing altered flow regimes and leading to potential conflicts and competition between water users and changes in water availability for communities and ecosystems;
- **Soils:** Continued loss of soil utilisation due to sterilisation from the expansion infrastructure and associated infrastructure if not stripped and stockpiled
- **Biodiversity**: Clearance of vegetation for the expansion infrastructure will result in further habitat modification, increased run off, erosion and vegetation loss. Certain proposed activities will also have an impact on the river habitat and to an extent, on the vegetation
- **Social**: Social differentiation and inequality due to competition over scarce resources such as employment and procurement opportunities leading to social differentiation and conflict. In addition to this, impacts to the cultural heritage as a result of the proposed Expansion project will also occur.

Overall cumulative impact is the reduction in ecosystem services as a result of changes to water resources, loss of soil and land capability and loss or fragmentation of habitat.

19 Specialist Recommendations

Several specialist studies were undertaken to inform the impact assessment and develop the associated management measures which has been included in Section 18 and Appendix 14. The specialists' area of investigation were considerably larger than the required footprint of the proposed Expansion Project infrastructure to allow for alternative placement within the investigation area. This approach allowed the mine to avoid identified sensitive areas as far as possible within the footprint areas. Specialist recommendations which specifically informed the final site layout or design is listed in Table 19-1.

Table 19-1: Summary of specialist recommendation which informed the final site layout or design of the proposed infrastructure

List of studies undertaken	Recommendations of specialists' reports	Specialists recommendations that have been included in the EIA report (mark with an X where applicable)	Reference to applicable section of the report where the specialist recommendations have been included
Biodiversity	• **Blinkwater 2 TSF:** Recommendation regarding the protection of the wetland situated in close proximity of the proposed Blinkwater 2 TSF • **River diversion:** Include roughness (cobbles and boulders) to ensure that the channel doesn't erode, and that the floodplain created will act as a natural system to slow flow velocity • **Biodiversity of rivers:** o Witrivier: it is recommended that the monitoring of the Wit River is included as part of the programme for the Mogalakwena Mine o Groot Sandsloot: Extensive monitoring plan for the system to ensure more detailed data are gathered to update information related to the PES	X	Recommendations have been included as part of the management measures for the impacts identified by each specialist. These management measures will form part of the conditions of the environmental authorisation if the project is approved. Refer to section 18.4 for the management measures for each of the project phases
Heritage	• **Blinkwater 2 TSF:** The design of the proposed TSF will be slightly modified to fall outside the area where heritage sites were identified in close proximity to the north western corner of the proposed Blinkwater 2 TSF.	X	
Groundwater	• **North WRD and Blinkwater 2 TSF:** Proposed ground water protection measures	X	
Surface water	• **North WRD Position:** The North WRD has been positioned within the investigation area to avoid encroachment on the watercourse western side of the investigation area • **North WRD:** Surface water protection measures	X	

20 Environmental Impact Statement

The impact assessment as detailed in Section 18 assessed the types of impact, duration of impacts, likelihood of potential impacts occurring and the significance of impacts.

Assuming all phases of the project adhere to the conditions stated in the EMPr (Section 18) it is believed that the impacts associated with the proposed Expansion Project can be appropriately managed.

20.1 Final site map

A map which superimposes the proposed infrastructure associated with the proposed Expansion Project on the environmental sensitivities of the proposed location of the infrastructure, including buffers is provided in Appendix 17.

20.2 Positive and negative associated with the proposed activity and alternatives

Refer to Section 18 for positive and negative impacts identified for the proposed project.

21 Proposed Impact Management Objectives

Impact management objectives are provided in in Table 21-1. The impacts associated with the proposed Expansion Project and the identified management measures are provided in Section 18. The significance rating of each impact has been re-evaluated post-implementation of management commitments to provide an indication of the effectiveness of the management measures. Through the implementation of the management measures, Mogalakwena Mine will aim to achieve the management objectives associated with the proposed Expansion Project. The closure objectives is detailed in Section 30.1.

Table 21-1: Impact management objectives

Aspect	Objective
Socio – Economic	• To enhance benefits from the development of the project activities • To maximise opportunities for local residents • To facilitate employment of local labour on the Mine • To avoid creating unrealistic expectations • To prevent or minimise negative impacts resulting from the construction and operation of the project activities
Surface and Ground Water	• Manage water use (including abstraction, storage, use and discharge) at the mine in an efficient and effective manner to minimise disturbance to water resources and the users of those resources • Limit erosion and the consequent degradation of soil and pollution of air and water • Manage clean and dirty water systems effectively • Linear infrastructure will be designed to minimise the impact on the flow of water in affected watercourses • Locate, design and construct mine infrastructure to minimise the risk of flooding both to the mine and to any other riparian users • Monitor surface water and groundwater quality during the life of the mine and post closure
Air Quality	• Manage mine residue deposits to minimise risk of injury to humans and animals; damage to infrastructure; and contamination of the environment

Aspect	Objective
	• Manage mine water storage facilities to minimise risk of injury to humans and animals; damage to infrastructure; and contamination of the environment • Minimise the risk of pollution associated with the road transport of material • Minimise the risk of pollution arising from mine residue deposits post closure • To minimise the amount of dry material susceptible to wind erosion • To minimise the entrainment potential of dust • To respond with corrective action to public complaints about dust related health and nuisance impacts • To reduce the emissions from the vehicles
Cultural Heritage	• To respect the culture and heritage of the people in the area • To avoid disturbance of graves and where not possible to undertake relocating of graves according to legal requirements and to determine mitigation in consultation with local communities
Biodiversity	• To demonstrate active stewardship of land and biodiversity • To avoid the damage or loss of plants and where not possible to ensure the conservation of representative habitats • To avoid the loss or disturbance of fauna populations and migration paths and where not possible to ensure the conservation of representative habitats • Mitigate impacts of the proposed Blinkwater 2 TSF on the wetland such that the quantity of water, quality of water, soil and vegetation is protected.
Soils and Land Capability	• To remove and store soil to enable its reuse for rehabilitation • To prevent and minimise soil erosion and contamination
Noise	• To minimise adverse noise impacts from construction and operation • To respond with corrective action to public • complaints about noise

21.1 Final proposed alternatives

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

21.2 Aspects for inclusion as conditions of authorisation

Over and above the management measures detailed Section 18. The following conditions should be included in the authorisation:

- Mogalakwena mine should continue to reassess the risks and impacts of the development throughout its operational life. Should any change in the risk and impact profile of the development be determined, additional management controls and mitigation measures must be implemented and the EMPr amended to reflect these changes;
- Any substantial change to the infrastructure site layout as represented in the heritage report must be subjected to a field survey;
- The process for the relocation of graves must be followed;
- The specific management measures for the protection of the wetland included in the design of the Blinkwater 2 TSF and to be submitted to DWS as part of the WULA must be complied with; and
- Monitoring of surface and groundwater will be undertaken in line with the monitoring programmes as detailed in the WUL associated with the proposed Expansion Project.
- Environmental noise monitoring to be carried out during the different phases of the project as detailed in Section 31.4.4.

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

The following assumptions, limitations and constraints highlighted and considered as part of the EIA for the proposed Expansion Project:

Table 21-2: Assumptions, limitations and constraints

Study	Assumption/limitation/constraint
General assumptions	• The impact assessment was conducted based on the design information provided by the client at the time of compiling this report and it is assumed that the proposed expansion activities will be constructed in line with these designs.
Air Quality	• Ambient air quality baseline and emissions monitoring have not been undertaken as part of the air quality assessment and SRK have relied on ambient air quality data collected by the client • The air quality assessment is limited to assessing the impacts associated with the proposed Mogalakwena Mine operations and its additional impact on the air quality in the surrounding area. • Any impacts relating to health have not been included in the scope of the air quality study • The model-predicted ambient pollutant concentrations are reflective of contributions from the site and exclude contributions from other emission sources in the surrounding area
Noise	• The prevailing ambient noise levels for the study area was created by far and near noise sources associated with traffic, mining activities and seasonal agricultural activities with the result that the prevailing ambient noise level may change at times; • Noise measurements in the presence of winds in excess of 3.0m/s may impact the outcome of the environmental noise results; • The influx of traffic into an area will have an influence on the prevailing ambient noise levels; • The noise from the mining activities in the open pits will vary depending on the depth of mining and the point of mining at a specific time. • There will be a difference in the prevailing ambient noise levels between the summer and winter periods as the insect activities such as crickets and cicadas raise the prevailing ambient noise levels during the summer period whereas the prevailing ambient noise levels will not be influenced by insects during the winter period.
Biodiversity	• The survey was conducted during daytime only. All the different habitats at the site were investigated and it was therefore possible to complete a rapid survey and obtain information on the habitats that are present at the site, or that are likely to occur there. No long-term studies were conducted. • Weather conditions during the period were hot with a light wind blowing. The region had received some rainfall prior and during the site visits and the vegetation was in a fair condition and still green in areas. There was some water in the veld during the time of the survey. This will have obvious implications on the biodiversity that are likely to occur in the area. Nevertheless, the conditions during the survey were ideal for a survey (rapid) of this nature
Geohydrology	• Numerical models were developed by Itasca based on the Conceptual Hydrogeological Model. The groundwater flow and solute-transport models were calibrated to the available groundwater-level and groundwater-quality data available at the Mine site. The models used site-specific hydraulic parameters and geologic data provided by the Mine • Seepage predictions do not account for the evaporation and absorption of water in loosened material • Site-specific hydraulic parameters are only available up to depths of 250 mbgs for four boreholes. At this time, the K values of the geologic units were assumed to decrease with depth, based on Itasca's other project experience. Additional hydraulic parameter data are required to help reduce the model uncertainty.

Study	Assumption/limitation/constraint
	• No consistent records of the surface-water run-off or seepage into the pits were available. • The loss of groundwater seepage due to the loosened soils and evaporation was assumed without site-specific data • Records of abstraction rates from dewatering and water-supply boreholes were available for 2016 and 2017. As indicated by the data, flowmeters were typically inoperable, and dewatering rates are estimated • No domestic pumping rate data was available
Heritage	• Heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. In fact, due to the vegetation found within sections of the study area, it is highly likely that the present identified heritage sites are not a complete record of all the archaeological and heritage resources located within the study area • Sites which may be located within the study area include a sacred tree and sacred water site located near Sekuruwe, and which may be located within the Blinkwater 2 TSF footprint area. Consultation with members of Sekuruwe should be conducted before construction commences
Soils and land capability	• It has been assumed that the total area of possible disturbance has been included in the project description, that the development plan as tabled caters for all actions and activities (existing and cumulative) that could potentially have an impact on the soils and land capability, and that the recommendations made and impact ratings tabled will be re-assessed if the development plan changes • Limitations to the accuracy of the pedological mapping (as recognised within the pedological industry) are accepted at between 50% (reconnaissance mapping) and 80% (detailed mapping), while the degree of certainty for the soils physical and chemical (analytical data) results has been based on “composite” samples taken from the dominant soil types mapped in the study area • The areas in question have been mapped on a comprehensive reconnaissance base, the degree and intensity of mapping and geochemical sampling being considered and measured based on the complexity of the soils noted in field during the field mapping, and the interplay of geomorphological aspects (ground roughness, slope, aspect and geology etc.)
Surface water	• SRK assumes that the data provided by Mogalakwena Mine is correct. The surface water report was based on preliminary designs and mitigation measures may have to be reviewed depending on final designs which will be included as part of the WULA • Specific future effects of climate change are uncertain and may have an effect on rainfall which may in turn impact on surface and groundwater, biodiversity, soils and air quality may also be impacted on.
Visual	• The viewshed illustrates the area from which the proposed expansion activities are likely to be visible. It does not take local undulations, existing vegetation and man-made structures into account • At the time of compiling the VIA report detailed design information, including the final heights, arrangements and dimensions were still being undertaken. As such, SRK was provided with the average heights of the key structures, based on similar pre-existing infrastructure on the mine • A VIA, by nature, is not a purely objective or a quantitative process, but is dependent on the subjectivity of the judgments made. Where required, appropriate criteria and motivations have been clearly stated

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

The environmental authorisation process associated with the proposed Expansion Project for Mogalakwena Mine was undertaken in terms of the relevant environmental authorisation requirements as detailed in Section 5. The environmental authorisation process was underpinned by an extensive stakeholder engagement process with in-depth consultation undertaken through various forms of

engagement as detailed in Section 13. As part of this engagement, additional pre-application meetings with the leadership structures were conducted prior to the commencement of the environmental authorisation process.

During the consultation processes, various comments were received as detailed in the CRR in Appendix 13. Many of these comments related to historical issues which have been summarised in Section 13.8. The specialists' studies as detailed in Section 14 were undertaken and the findings took into account and addressed (as far as practically possible) the project-specific issues which were raised.

In terms of the locality of the proposed project related infrastructure, areas of sensitivity were taken into consideration during the design phase and were avoided as far as practically possible. Where avoidance could not be achieved in terms of the design requirements of the proposed infrastructure, appropriate mitigation measures were developed to be implemented to reduce the impacts on the environment, as detailed in Section 18. The proposed mitigation measures were developed based on the nature, duration, severity and probability of the impact and based on the recommendations made by the specialists, as presented in Appendix 14.

In addition, since Mogalakwena Mine is an existing operational mine, mine personnel are presently managing impacts in line with exiting environmental management requirement. These impacts are of a similar nature to the proposed Expansion Project.

It is SRK's reasoned opinion that this project should be authorised based on the following:

- The impacts which have been identified can be mitigated through the implementation of the identified management measures in Section 18;
- The proposed Expansion Project is unlikely to result in the generation of any significant cumulative impacts when managed in accordance with the management measures specified in Section 18; and
- Should the proposed Expansion Project not be implemented, Mogalakwena Mine will continue to operate at its current capacity and any additional local economic development opportunities as well as procurement of local goods and services to support the mine activities will not be realised. In addition to this, projected temporary employment opportunities during the construction phase will not be fulfilled.

22.1 Period for which the environmental authorisation is required

The EA is required for the duration of the LoM which is currently estimated to be beyond 2080.

23 Financial Provision

The infrastructure and activities associated with the proposed Expansion Project will increase the existing Mogalakwena Mine liability by an amount of R189 713 390.54 (Refer to Appendix 15 and Appendix 16).

AAP will provide for the closure liability associated with the project through the purchase of a Bank Guarantee as allowed by the Financial Provision for Prospecting, Exploration, Mining or Production Operations Regulations, with the Bank Guarantee provided to the DMR following authorisation of the Expansion Project.

23.1 Explain how aforesaid amount was derived

The liability has been estimated using the approach documented in the "DMR Guideline" (Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine – 2005). Rates have been annually updated with the prevailing Consumer Price Index (CPI) as obtained from StatsSA. The rates included in the assessment are those relevant for 2019.

24 Deviations from the Approved Scoping Report and Plan of Study.

The following deviations from the approved scoping report have reference:

- Subsequent to the approval of the scoping report, more information on the design and location of the proposed bulk ore sorter has become available and has been assessed as part of the draft impact assessment report
- The location of the potential contractor's camp has moved from the original position west of the north pit to an area east of the MSC. This area has been assessed as part of the EMPr conducted for the South Concentrator
- The location of the proposed additional change house has moved from the proposed position to an already disturbed area within the North Mining area;
- The extension to the NEMA regulated timeframes for the submission of the final EIA/EMPr was requested from the DMR and granted on 3 September 2019. Refer to Appendix 2 for the relevant communication.

25 Other Information Required by the Competent Authority

The DMR approved the Final Scoping Report and requested that the items detailed in Table 1-2 be addressed in the EIA/EMPr. Responses to the information request is also included in this table.

26 Impact on the Socio-economic Conditions of any Directly Affected Person

Based on the review of the potential environmental, social and economic impacts associated with the proposed project, the overall social benefit outweighs the potential negative impacts, which overall are of low significance. The main concern that has been identified through the stakeholder engagement was legacy issues, as well as the lack in employment opportunities available for the immediately affected communities. The social impacts can be mitigated where negative, but by enhancing the positive impacts, the mine will have a far greater positive impact, especially if they implement the AAP Policies such as the Anglo American Social Way and mitigation measures of the SIA and EMPr.

There is a risk that vulnerable persons living within the surrounding communities may be disproportionately affected by the project because of their lack of access to information and political power. AAP should propose and implement differentiated measures so that adverse impacts do not fall disproportionately on them and they are not disadvantaged in sharing development benefits and opportunities. Special care should be taken to ensure that benefits flowing from the SLP, procurement and employment process benefit the vulnerable members of the community.

Since most of the new mining and construction activities will take place within the mine's existing boundary, it is not anticipated that significant impacts on the social environment from the construction and operation of the mine's additional activities will occur. However, despite this, all of the project phases will result in some socio-economic impact that will need to be addressed based on the mitigation measures recommended in this report. It is anticipated that proactive and sustainable mitigation measures will mitigate most of the negative impacts and enhance the positive to an extent that the mine becomes an asset to the local community and enhances their current standard of living.

27 Impact on Heritage Sites.

In terms of the proposed Expansion Project, as well as other activities which have already taken place at Mogalakwena Mine as part of previously approved EMPrs, grave relocation is a relevant activity which has been undertaken and may need to be considered for the proposed project. As cemeteries and graves have Medium to High Heritage Significance, the best option is to change the development footprint to allow for the in-situ preservation of these sites. However, should it not be possible to preserve these sites in situ, the required mitigation measures are outlined below.

- A grave relocation process must be undertaken if required;
- A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation;
- Bilingual site and newspaper notices indicating the intent of the relocation;
- Permits from all the relevant and legally required authorities need to be obtained;
- An exhumation process that keeps the dignity of the remains and family intact needs to be conducted;
- An exhumation process that safeguards the legal rights of the families as well as that of the mining company needs to be undertaken;
- The exhumation process must be done by a reputable company well versed in the mitigation of graves; and
- Test excavations to physically confirm the presence or absence graves need to be conducted. If no evidence for graves is found, no further mitigation measures would be required; and if evidence for graves is found, a full grave relocation process must be implemented.

28 Other Matters Required in terms of Sections 24(4)(a) and (b) of the Act

Not Applicable.

29 Part B: Environmental Management Programme Report

The structure of the EMPr in terms of Appendix 4 of the 2014 NEMA Regulations, as amended is provided in Table 29-1.

Table 29-1: Structure of the EMPr report in terms of Legislation Requirements as detailed in Appendix 4 (contents of an EMPr of GNR 982)

Appendix 4	Legislated requirements as per the NEMA GNR 982 in Appendix 4	Relevant Report Section
(1)(a)	details of-	
	(i) the EAP who prepared the EMPr	Section 2.1
	(ii) the expertise of the EAP, including a curriculum vitae;	Section 2.2
(1)(b)	A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description	Section 6
(1)(c)	a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers;	Figure 6-1 and Figure 6-2
(1)(d)	A description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-	Section 18
	(i) planning and design;	
	(ii) pre-construction activities;	
	(iii) construction activities;	
	(iv) rehabilitation of the environment after construction and where applicable post closure; and	
	(v) where relevant, operation activities;	
(1)(e)	*Removed from Appendix 4 during 2017 NEMA Regulations Amendment and included in 1 (f) below*	
(1)(f)	a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to -	Sections 18 and 0
	(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	
	(ii) comply with any prescribed environmental management standards or practices;	
	(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and	
	iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable	
(1)(g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 31
(1)(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	

Appendix 4	Legislated requirements as per the NEMA GNR 982 in Appendix 4	Relevant Report Section
(1)(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	
(1)(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	
(1)(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	
(1)(l)	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations	
(1)(m)	an environmental awareness plan describing the manner in which-	
	(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	Section 31.6
	(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	
(1)(n)	any specific information that may be required by the competent authority	Section 31.7
(2)	Where a government notice gazette by the minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	Not Applicable

29.1 Draft environmental management programme

29.1.1 Details of EAP

Refer to Section 2.1 for the details of the EAP.

29.1.2 Description of the aspects of the activity

Refer to Section 6 of the report that detailed the aspects related to this activity.

29.1.3 Composite map highlighting sensitive areas

The broad placement of the surface infrastructure was informed by mapping the environmental sensitivities which considered the location of all known sensitive physical, social and environmental features within the mining rights and surface lease areas (

Figure 29-1). The environmental sensitivities that were taken into account have been included in Table 29-2:

Table 29-2: Environmental sensitivities

Sensitive feature	Description
Cultural heritage sits	Heritage sites have been found located within the proposed project area. These include archaeological and heritage sites located within the Blinkwater 2 TSF footprint and the North WRD area.
Noise sensitive receptors	Sensitive noise receptor areas during the construction and operational phases have been identified and include the receptors in close proximity to the proposed M3C, Blinkwater 2 TSF and North WRD.
Wetland	The wetland identified to the north east of the Blinkwater 1 TSF is considered to be a sensitive area. A 50 m buffer zone has been created around the wetland. The natural but largely modified wetland can be classified as a hill slope seepage wetland in accordance with SANBI's Classification System for Wetlands.
Soils	The mining and associated support activities being proposed could, if not well managed, have a moderate to high negative impact on the surface conditions. This is especially true of the areas being considered for the Groot Sandsloot River Blinkwater 2 TSF and North WRD.
Air Quality (dust sensitive receptors)	Sensitive receptors located in close proximity to the mine will be affected by the proposed expansion project, however, the predicted increase in dust levels at these receptors will remain below the PM_{10}, $PM_{2.5}$ and dust fallout standards. However, the increase may lead to nuisance levels of dust at these sensitive receptors.
The Sandsloot River	The Groot Sandsloot River is a sensitive area that will be impacted on by the proposed river diversion. It will have a negative impact on the river habitat and vegetation. The whole river channel and associated flood plain will be lost due to the proposed river diversion.
Witvinger Nature Reserve	The Witvinger Nature Reserve (WNR) is located in the Waterberg District of Limpopo Province, South Africa and is situated approximately 80 km to the west of Polokwane and 17 km to the north of Mokopane. This reserve has unique features and beautiful landscapes, important cultural attributes and a vast biodiversity aspect connected with a community surrounding this unique and special reserve. The reserve is 5 400 ha in extent, and it is a proclaimed Nature Reserve. The reserve has a variety of habitats and landscape, including open plains and mountains. Wildlife species include bushbuck, kudu, reedbuck, Tsessebe, Leopard and Zebra. The proposed Expansion Project will not impact on the Witvinger Nature Reserve.

Buffer distances (minimum safe distances), determined primarily from legislation, including GN704 and the MHSA (Table 29-3), were then overlain on the sensitive areas mapped. The placement of proposed site infrastructure options in relation to the identified sensitive areas is shown in Appendix 17. Following the completion of the scoping phase, input from I&APs and the findings of the specialist studies were used to refine the preferred development footprint. The specialist studies did not identify any fatal flaws associated with any of the infrastructure site layout options.

Table 29-3: Buffer distances associated with the Mogalakwena Mine Expansion Project

Infrastructure	Buffer (m)	Legislation/comment
Buildings Roads Railways TSF and WRD Structures	100	MHSA and Regulations
Restricted areas	50	MHSA GN93
Watercourses	100	NWA GN704
Wetlands	500	NWA GN704 GN1199
Potential sensitive receptors	500	A buffer has been suggested for noise, dust and air quality impacts
Powerlines	25	A proposed buffer (either side of centre-line) for protection of powerline infrastructure
Explosives magazine	500	A proposed buffer for safety and avoidance of damage to new infrastructure (in the event of an explosion)

The current activities and infrastructure at Mogalakwena Mine are given in 4.2 Section and shown Appendix 10.

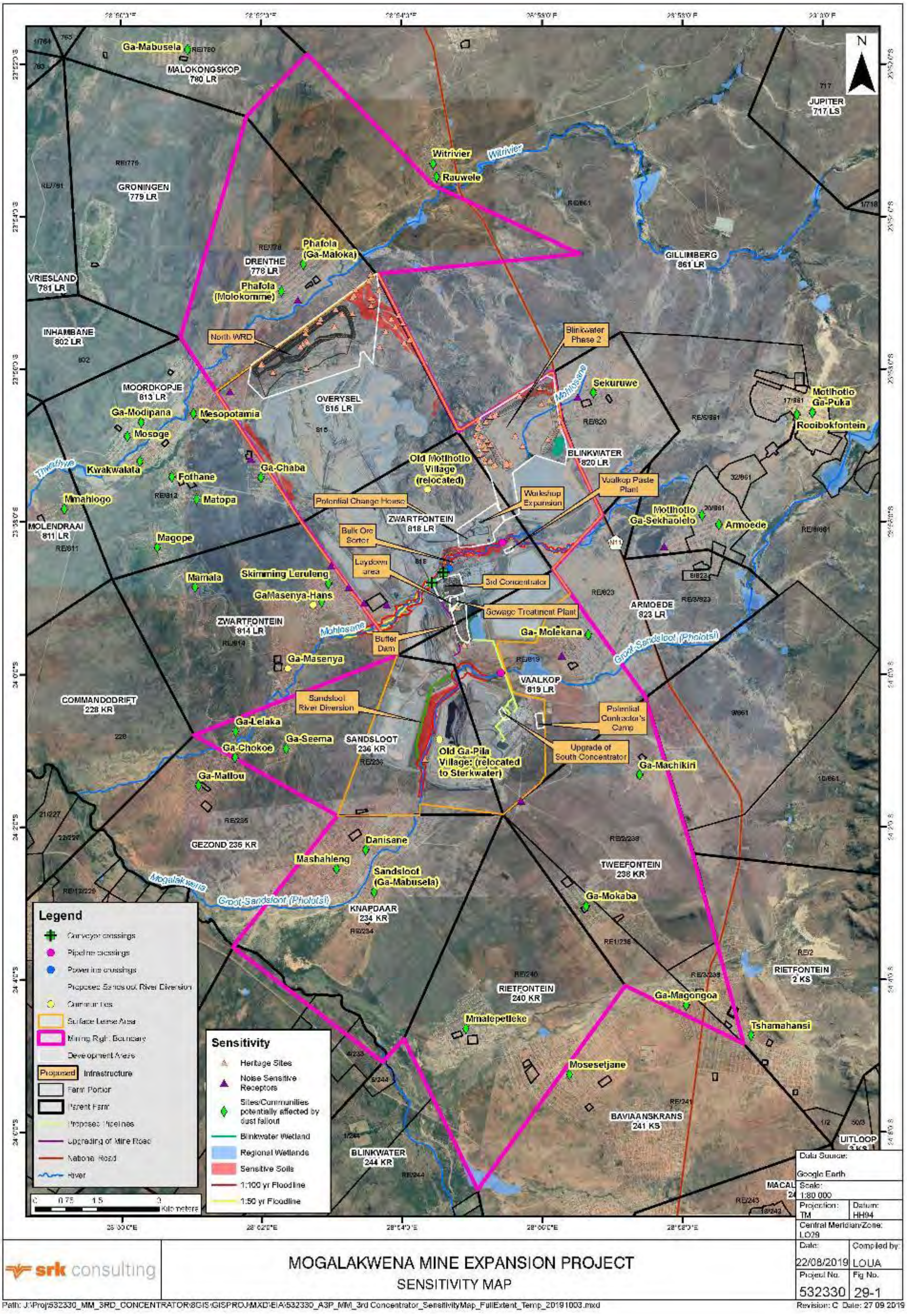

Figure 29-1: Sensitivity map

29.2 Description of impact management objectives including management statements

29.2.1 Determination of closure objectives

The closure objectives detailed in Section 30.1 are based on an extensive environmental database and baseline information gathered during the LoM so far, as well as the baseline studies undertaken as part of the specialist investigations, as detailed in Section 14.

A baseline closure risk assessment was undertaken during 2016 using the Anglo American Plc risk assessment process, where the risk is described and then a determination is taken to assess the nature of the risk and then the risk is ranked according to predetermined criteria for probability and consequence. This baseline was subsequently updated in 2017 and 2018. For purposes of this report, the 2018 risk assessment has been updated to reflect possible closure risks associated with the Expansion Project. The nature of the risks requiring mitigation were used to inform the closure objectives.

29.2.2 Process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity

Through the implementation of the management measures by the relevant responsible persons, any potential environmental impact associated with undertaking listed activities associated with the proposed project will be managed accordingly.

29.2.3 Potential risk of acid mine drainage

Geochemical characterization and waste classification were undertaken on 40 samples from the Mogalakwena Mine to evaluate the acid generation potential and neutralisation potential of the orebody, country rock, waste rock and tailings. From the results of the classification the following can be concluded:

- All materials sampled have a low potential to generate acidity, with all the samples, with the exception of a single medium grade pyroxenite ore, having a sulphur content below the recommended threshold of 0.3%. In addition, testing indicates that there is an excess of neutralising material providing sufficient buffering capacity, associated with the different lithologies. The testing therefore indicates that the leachate potential generated from residue facilities is likely to be neutral during operations, closure and post closure.
- The results to date support the conclusions from the previous geochemical testing work undertaken by SRK (2002) that the waste rock dump should not produce a leachate with low pH and high sulphate concentrations, although manganese was flagged as a potential metal of concern in seepage from the waste rock dump.
- Waste characterization of the tailings material (SRK 2015) from the Mine was found to be non-acid generating. However due to the As, Cu, Mn and Ni > leachable concentration threshold (LCT0), the tailings were classified as Type 3 material requiring disposal in a landfill engineered with a Class C or equivalent barrier system.
- The samples from the tailings, WRD and pit wall samples had B, Ba, Cu, Ni, Pb, V and Zn exceeding the total concentration threshold TCT0 in some samples but not the TCT1 limits (TCT0<TC<TCT1). The LCT0 threshold was not exceeded in any of the samples (Itasca, 2018).
- Based on the results of the Itasca 2018 Waste Classification, most of the samples from both the tailings material, ore stockpile and WRD fall within the category TC≤TCT1 AND LCT0 < LC<LCT1 and are classified as Type 3 waste requiring a Class C or Class C equivalent barrier system.
- Lining of the WRD area is impractical and not likely to be effective in the longer term. Consideration should be given to the design and preparation of the footprint area of the proposed North WRD to minimise the risk of seepage from the WRD from reaching the groundwater.

Although the geochemical characterization indicates a low risk of acid generation from the waste rock dump and tailings materials, leaching of sulphate, nitrate and chloride may result in increased salt

loading to the groundwater and must be taken into consideration in the design for the proposed new facilities i.e. Blinkwater 2 TSF and North WRD.

29.2.4 Water use licence requirements

MM currently operates under several existing approved Environmental Management Programmes (EMPrs) (refer to Figure 1-2) and two Water Use Licences (WULs) (approved in March 2007 and October 2017). A WUL is being applied for as part of the integrated environmental authorisation process for the Expansion Project. As agreed with DWS at the pre- application meeting, the water uses from the 2007 and 2017 WULs be consolidated and included in the new WULA for the Mogalakwena Mine expansion project.

Table 29-4 provides a summary of the infrastructure units and associated existing water uses at Mogalakwena Mine with the proposed new water uses associated with the Expansion Project in grey text. The new water uses associated with the proposed Expansion Project are shown in Appendix 15. Further details on the proposed Expansion Project infrastructure is provided in Section 6 and details relating to the existing infrastructure is provided in Section 8.

Table 29-4: Existing water uses and proposed new water uses associated with the Expansion Project

Farm	Section 21 Water Uses		Infrastructure
	Description		
Overysel 815 LR	a	Abstraction of groundwater 2 Mℓ/d	• PPL Wellfield (Including on the farms Vaalkop 819 LR, Zwartfontein 818 LR, and Sandsloot 236 KR)
	j	Removing water found underground	• PPRust North open pit
	g	Disposing of water containing waste	• PPRust north open pit • West WRD • East WRD • Rock dump runoff dam (runoff from pit and WRD) No. 1 • Roads (irrigation of roads with water containing waste for dust suppression) • Zinc dam north (pit water for use as dust suppression on roads) • North WRD and associated ore stockpiles
Blinkwater 820 LR	c	Impeding or diverting the flow of water in a water course	• Tailings dams 1 & 2 (diversion of headwaters, due to positioning of the Blinkwater TSF on the Mohlosane River) • Boundary fence • East diversion channels around the Blinkwater TSF • West diversion channels around the Blinkwater TSF • Blinkwater TSF 2 Cleanwater Diversion • Blinkwater 1 and 2 TSF within 500 m of a wetland • Groundwater feed via channel to wetland 1 • Groundwater feed via channel to wetland 2 • Stormwater feed via channel to wetland • Blinkwater TSF 1 Protection Berm
	i	Altering the bed, banks, course or characteristics of watercourse	• Tailings dams 1 & 2 (diversion of headwaters, due to positioning of the Blinkwater TSF on the Mohlosane River) • Boundary fence • East diversion channels around the Blinkwater tailings dam • West diversion channels around the Blinkwater TSF • Blinkwater TSF 2 Cleanwater Diversion • Blinkwater 1 and 2 TSF within 500 m of a wetland

Farm	Section 21 Water Uses		Infrastructure
	Description		
			• Groundwater feed via channel to wetland 1 • Groundwater feed via channel to wetland 2 • Stormwater feed via channel to wetland • Blinkwater TSF 1 Protection Berm
	g	Disposing of water containing waste	• Tailings dams • Roads (irrigation of roads with water containing waste for dust suppression) • Blinkwater 2 Tailings Storage Facility
Zwartfontein 818 LR	a	Abstraction of groundwater 2 Mℓ/d	• PPL Wellfield (including on the farms Vaalkop 819 LR, Overysel 815 LR, and Sandsloot 236 KR) • MNC dewatering boreholes (incorporated into • PPL wellfield • Five new pollution control dewatering boreholes along Mohlosane River
	c	Impeding or diverting the flow of water in a water course	• Conveyer and adjacent road crossing river • Haul road bridge over Mohlosane River • Pipeline crossing • Portion of west clean water diversion channel • Haul road crossing • Bridge, ford and conveyor crossing • Access road crossing • Service road crossing • Two tar road crossings • Potable water pipeline and lattice bridge • Two tailings return water pipeline crossing and adjacent road • Two haul road crossings • RWD Extension • Temporary Coffer Walls CW 1 to CW 9 • Permanent Retaining Walls PRW 1 to PRW 3 • Temporary Filter Walls TFW 1 and TFW 2 • Gantry crossing the Mohlosane River carrying pipelines • Powerline 1 crossing Mohlosane River • Powerline 2 crossing Mohlosane River

Farm	Section 21 Water Uses		Infrastructure
	Description		
			• Conveyor Crossing 1 over the Mohlosane River to the third concentrator • Conveyor crossing 2 over the Mohlosane River to the third concentrator • Conveyor crossing 3 over the Mohlosane River to the third concentrator • Conveyor crossing 4 over the Mohlosane River to the third concentrator • Conveyor crossing 5 over the Mohlosane River to the third concentrator • Conveyor crossing service road 1 over the Mohlosane River to the third concentrator • Conveyor crossing service road 2 over the Mohlosane River to the third concentrator • Vehicle access road 1 over the Mohlosane River to the third concentrator • Vehicle access road 2 over the Mohlosane River to the third concentrator • Conveyor crossing service road 3 over the Mohlosane River to the third concentrator
	i	Altering the bed, banks, course or characteristics of a watercourse	• Conveyer and adjacent road crossing River • Haul road bridge over Mohlosane River • Pipeline crossing • Portion of west clean water diversion channel • Haul road crossing • Bridge, ford and conveyor crossing • Access road crossing • Service road crossing • Two tar road crossings • Potable water pipeline and lattice bridge • Two tailings return water pipeline crossing and adjacent road • Two haul road crossings • RWD extension • Temporary coffer walls (CW 1 to CW 9) • Permanent retaining walls (PRW 1 to PRW 3) • Temporary filter walls (TFW 1 and TFW 2) • Gantry crossing the Mohlosane River carrying pipelines • Powerline 1 crossing Mohlosane River • Powerline 2 crossing Mohlosane River • Conveyor Crossing 1 over the Mohlosane River to the third concentrator • Conveyor crossing 2 over the Mohlosane River to the third concentrator

Farm	Section 21 Water Uses		Infrastructure
	Description		
			• Conveyor crossing 3 over the Mohlosane River to the third concentrator • Conveyor crossing 4 over the Mohlosane River to the third concentrator • Conveyor crossing 5 over the Mohlosane River to the third concentrator • Conveyor crossing service road 1 over the Mohlosane River to the third concentrator • Conveyor crossing service road 2 over the Mohlosane River to the third concentrator • Vehicle access road 1 over the Mohlosane River to the third concentrator • Vehicle access road 2 over the Mohlosane River to the third concentrator • Conveyor crossing service road 3 over the Mohlosane River to the third concentrator
	j	Removing water found underground.	• PPRust north open pit (including central and south pits) • Zwartfontein south open pit • MNC dewatering boreholes
	g	Disposing of water containing waste	• West WRD • East WRD • Pollution control dam (PCD) • WRD run off pollution control dam • MNC pollution control dam: excess plant water and runoff (PCD-NC) • Mining complex stormwater dams 1 & 2 – truck and heli pollution control dams • MNC sewage works (sewage effluent reused in the process) • Contractors camp sewage works • Landfill site with dirty water dam • RWD extension (tailings return water) • Vaalkop TSF 1 & 2 • Zinc dam central (pit water for use as dust suppression on roads) • Zinc dam wash bay (plant water from MNC for use as dust suppression on roads) • Roads (irrigation of roads with water containing waste for dust suppression) • Ore stockpiles • Concentrator Pollution Control Dam • M3C Bulk Ore Stockpile 1 (low grade) • M3C Bulk Ore Stockpile 2 (low grade) • M3C Bulk Ore Stockpile 3 (low grade) • M3C Bulk Ore Stockpile 4 (low grade)

Farm	Section 21 Water Uses		Infrastructure
	Description		
			• M3C high grade ore stockpile • Buffer Water Storage Dam
Vaalkop 819 LR	a	Abstraction of groundwater 2 Mℓ/d	• PPL wellfield (including on the farms Overysel 815 LR, Zwartfontein 818 LR, and Sandsloot 236 KR)
	c	Impeding or diverting the flow of water in a water course	• Pipeline and haul road crossing • Bridge crossing the Groot Sandsloot River carrying pipelines and upgrade of existing access road
	i	Altering the bed, banks, course or characteristics of watercourse	• Pipeline and haul road crossing • Bridge crossing the Groot Sandsloot River carrying pipelines and upgrade of existing access road
	j	Removing water found underground	• Zwartfontein south open pit
	g	Disposing of water containing waste	• Vaalkop TSFs 1 & 2 • RWD and portion of extension - tailings return water • Southern concentrator sewage works - sewage effluent reused in the process • Dam 1160 - pit water and treated sewage effluent • SP dam - runoff from workshop in settling pond (in series with sump) • Erichsen dam - process water at MSC • SWS dam - runoff from workshop in stormwater sump dam (in series with settling pond) • OS1 (oil sump) • OS2 (old and new dams) - water from workshop oil trap stored in oil sump dam • Roads - irrigation of roads with water containing waste for dust suppression • Zinc Dam ZFT - (pit water for dust suppression on roads) • Landfill site • WRD W01 • WRD W04 • WRD W10 • WRD W07 (Sandsloot and Vaalkop) • Ore stockpiles
Sandsloot 236 KR	c	Impeding or diverting the flow of water in a water course	• Haul road over culvert crossing • Culvert

Farm	Section 21 Water Uses		Infrastructure
	Description		
			• Diversion of the Groot Sandsloot River
	i	Altering the bed, banks, course or characteristics of watercourse	• Haul road over culvert crossing • Diversion of the Groot Sandsloot River
	j	Removing water found underground	• Sandsloot open pit • Portion of Zwartfontein open pit
	g	Disposing of waste rock	• WRD RS3 • WRD W07 (Sandsloot and Vaalkop) • Ore Stockpile SS, ZWS
Blinkwater 244 KR and Rietfontein 240 KR	a	Abstraction of 1.8 Mℓ/day	• Blinkwater wellfield
Molendraai 811 LR, Moordkopje 813 LR Commandodrift 811 LR.	a	Abstraction of 1.0-1.4 Mℓ/d	• Commandodrift wellfield

29.2.5 Impacts to be mitigated in their respective phases

The impact assessment in Section 18 details the potential impacts associated with proposed Expansion Project during the pre-construction, construction, operational, closure and rehabilitation and post closure phases.

29.2.6 Impact management outcomes

In addition to the implementation of the management measures detailed in Sections 18 the compliance standards, that are applicable to the identified impacts are included in Table 19-2 below.

Table 19-2: Compliance Standards to be achieved with regards to social and environmental aspects

Environmental aspect	Phase/Time period	Standard to be achieved	Compliance with standards
Soils, Land Use and Land Capability Terrestrial Ecology	Continuous during construction, operations and closure.	To prevent soil contamination by implementation of: • Inspection and maintenance Plan; • Leak/Spill Procedure' • Emergency Preparedness Plan; • Waste Management; and	Manage soils in line with the requirements of the National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GN 37603 No 331). Anglo American Policies and Guidelines to manage and remediate spills.
	Continuous during construction, operations and closure.	To demonstrate active stewardship of land and biodiversity by: • Identifying and removing relevant species if necessary;	Anglo American Biodiversity Performance Standards Manage soils in line with the requirements of the National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GN 37603 No 331). Anglo American Policies and Guidelines to manage and remediate spills. GNR 893 Minimum Emission Standards.
Surface water	Continuous during construction, operations and closure.	To avoid or where not possible, minimise and remedy pollution of water • Implementing a Leak/Spill Procedure; • Continuously implementing the surface water monitoring programme; • Compiling monitoring report; • Implementing Stormwater Management Plans; and • Responding to complaints and implementing a grievance mechanism. • Compliance to WUL	Water Quality Objectives as specified in the Water Use License issued by DWS Anglo American Policies and Guidelines to manage and remediate spills.
Groundwater	Continuous during construction, operations and closure.	No dirty water spillage to the catchment thereby preventing contamination of waterbodies downstream by:	Anglo American Policies and Guidelines to manage and remediate spills. Water Quality Objectives as specified in the Water Use License issued by DWS

Environmental aspect	Phase/Time period	Standard to be achieved	Compliance with standards
		• Continuously implementing the groundwater monitoring programme and model; and • Responding to complaints and implementing a grievance mechanism with regards to groundwater. • Compliance to WUL	
Air Quality	Continuous during construction, operations and closure.	To minimise the entrapment potential of dust. • To keep PM_{10} (and in the future, $PM_{2.5}$) and dust fallout levels at key receptor sites around the project area within guideline levels. As the guidelines vary depending on the priority area and year, the South African Air Quality Information System (http://www.saaqis.org.za/) will be consulted for the most recent guidelines. These aforementioned standards will be achieved by: • Continuously implementing the dust monitoring programme; and • Appropriate dust suppression techniques.	GNR 893 Minimum Emission Standards. Anglo Air Quality Performance Standards.
Noise	Continuous during construction, operations and closure.	To minimise noise impacts on sensitive receptors by: • Developing a complaints register to record complaints regarding noise. • To maintain noise levels at the standards for suburban areas (SANS 10103) as far as practicable.	Compliance with SANS 10103 Acceptable Ambient Levels and SANS 10210 of 2004, the national standard for the calculating and predicting of road traffic noise SANS 10328 of 2008 Noise Control Regulations – General Notice R154 of 10 January 1992
Heritage	Continuous during construction, operations and closure.	To ensure heritage resources are not damaged during the mining process	Ordinance on Excavations (Ordinance no. 12 of 1980) (replacing the old Transvaal Ordinance no. 7 of 1925).
Social	Continuous during construction, operations and closure	To enhance benefits from the development of the Project; • To maximize opportunities for local residents; • To facilitate employment of local labour on the Mine; and • To avoid creating unrealistic expectations. These standards will be achieved by the implementation of the SLP and Social Management Plan, SED Plan, Stakeholder Engagement Plan and other Social Performance policies, procedures and plans.	Anglo American Closure Toolbox. Anglo American Social Way Anglo American Environmental Way

30 Financial provision and closure plan

The information provided in this section is sourced from the closure plan developed for the proposed Expansion Project (Refer to Appendix 15 and 16).

The infrastructure and activities associated with the proposed Expansion Project will increase the existing Mogalakwena Mine liability by an amount of R 189 713 390.54.

AAP will provide for the closure liability associated with the project through the purchase of a Bank Guarantee as allowed by the Financial Provision for Prospecting, Exploration, Mining or Production Operations Regulations, with the Bank Guarantee provided to the DMR following authorisation of the Expansion Project.

30.1 Closure Objectives

Closure objectives for Mogalakwena Mine have been developed as part of the closure plan and include the following:

- Adhere to all statutory and other legal requirements.
- To develop landforms and land-uses that are stable, sustainable and aesthetically acceptable on closure.
- Ensure safety & health of all stakeholders during closure and post closure and that communities using the site after closure are not exposed to unacceptable risks.
- Ensure that closure supports productive uses, where practical, considering pre-mining conditions and agree with commitments to with stakeholders.
- Physically and chemically stabilise remaining structures to minimise residual risks.
- Promote biodiversity and biological sustainability to the maximum extent practicable.
- Utilize closure strategies that promote a self-sustaining condition with little or no need for ongoing care and maintenance.
- To achieve agreed quality targets set by the Catchment Management Agency (CMA) and the DWS as far as practical relative to impacts and reasonability to achieve.

The infrastructure associated with the Expansion Project which will be rehabilitated is provided in Figure 6-2 and described in Section 6.

The closure objectives listed above were based on an extensive environmental database and baseline information gathered during the LoM so far, as well as the baseline studies undertaken as part of the specialist investigations as detailed in Section 14.

Although the final closure quantum will be refined once the project is completed, commissioned and fully operational, SRK is of the opinion that the estimate of liability is a reasonable reflection of the anticipated closure costs and is of the opinion that the liability is sufficient for the operation to adhere to the closure objectives.

A baseline closure risk assessment was undertaken during 2016 using the Anglo American Plc risk assessment process, where the risk is described and then a determination is taken to assess the nature of the risk and then the risk is ranked according to predetermined criteria for probability and consequence. This baseline was subsequently updated in 2017 and 2018. For purposes of this report, the 2018 risk assessment has been updated to reflect possible closure risks associated with the Expansion Project. These risks and the mitigation thereof informed the development of the closure objectives.

30.2 Consultation with landowners and interested and affected parties

The objectives in relation to closure as detailed in Section 30.1 and rehabilitation will be made available for landowner and public consultation as part of the public participation process detailed in Sections 13.6 and 13.7

30.3 Rehabilitation Plan

The final rehabilitation plan will only be developed once sufficient information is collected from the monitoring of areas where rehabilitation concurrent with mining activities has been undertaken. The learnings from the areas already rehabilitated will be utilised to inform scientifically sound, safe and technically feasible solutions to achieving the rehabilitation objectives. The intention of the plan will be to achieve the objectives in Section 30.1.

30.4 Closure Actions

The rehabilitation actions that the operation intends undertaking at the end of the life of the Expansion Project are described below, with these based on the closure actions for the remainder of the operation as described in the Final Decommissioning, Rehabilitation and Closure Plan (FDRCP) (SRK, 2018). These actions are designed to comply with the requirements of this rehabilitation plan's objectives and the requirement for the development of risk mitigation closure strategies identified during the risk assessment.

30.4.1 North Waste Rock Dump

The strategy will be to undertake closure activities that will result in a stable landform, capable of supporting a vegetation community analogous with surrounding grasslands, where the generation of contact water and sediment laden runoff is limited by the incorporation of appropriate covers in the closure design. Aesthetics associated with the dumps will be improved as a consequence of the establishment of vegetation on these facilities.

Trials will be undertaken to identify the optimal closure slope angles, with there being a possibility that different angles can be used on different positions on the dump and on different morphological aspects. It is likely that the closure angles will be between 18° to 24°.

Historical information indicates that opportunistic vegetation is limited, implying that a form of growth medium is required. During operations, trials will be conducted to determine whether there is a blend of saprolite and topsoil that can be formed to sustain vegetation, without the blend being dispersive and subject to slumping and erosional influences. The cover placement strategy, after reshaping to the desired angle, is likely to include:

- Growth medium placed on the lower slopes of all facilities. This is required to limit sediment washout from higher up the slopes, migrating to the toe of the facilities. It is also required to limit sediment generation from the lower slopes. Vegetation will be established in line with the Vegetation Management Plan (VMP) that will be developed to support revegetation activities at the mine.
- Islands of growth medium placed on the higher slopes to form nodes from which plants may be distributed to other portions of the slopes. The size and spacing of these nodes will be determined from field trials established during the operational period. Vegetation will then be established in line with the VMP.
- The top surfaces of all facilities may require cover with growth medium and vegetation establishment to limit dust generation. Trials will be conducted to determine whether saprolite with appropriate ameliorants will support a vegetation population on these surfaces.
- Access ramps to the top of the dumps will remain while the top is being reclaimed. Once complete, ramps will be reshaped to a profile similar to the rest of the dump.

Where the potential exists, as determined by the physical and geochemical characteristics of the waste rock, the waste rock facilities will remain open for processing by third parties.

30.4.2 Tailings storage facility

Closure activities that will result in a stable landform capable of supporting a vegetation community analogous with surrounding grasslands, where the generation of contact water is limited by the

incorporation of vegetation covers in the closure design, will be implemented for Blinkwater 2 TSF. This is in line with the requirements for the existing Blinkwater 1 TSF.

Closure actions will include the following:

- As there is a negative meteoric water balance, excess inventory on the TSF's and in the Return Water Dams will be evaporated and no active dewatering is anticipated.
- All civil structures not required for the management of the facility will be decommissioned, which includes the backfilling of the decant structures.
- The final design profile of the Blinkwater 2 TSF will be downstream embankment at a slope of 2.4H: 1V slopes. Reshaping requirements will be assessed based on the outcomes of the vegetation trials to be undertaken by Mogalakwena Mine on the operational WRDs. Vegetation will then be established in line with the requirements of the VMP.
- A system of paddocks created on the top surface may limit vegetation establishment, depending on how saturated these paddocks remain. Therefore, storm water management will include the construction of spillways discharging to the environment to manage the 1:100 year return flood events, rather than containing water for evaporation in paddocks on the top surface. Mogalakwena Mine assumes that the quality of the contact water will achieve discharge standards, particularly as there will be limited evaporative concentration of any rain water falling on the surface.
- During the final stages of the life of the TSF, deposition will be undertaken to achieve a beach which drains towards the spillways on each of the facilities.
- Experience indicates that vegetation can be established directly onto the surface of the tailings without the placement of growth medium. Therefore, vegetation will be established straight onto the tailings surface. However, a growth medium cover will be required on the rock embankments. Given the material size distribution on the embankment, an intermediate cover of crushed waste rock may be required to provide a more homogenous surface for growth medium placement. The requirement for this will be determined during future iterations of the closure plan. Vegetation will be established in line with the requirements of the VMP.
- Energy dissipaters will be used on the downstream side of the conveyance structure from the spillway to reduce velocity prior to discharge of the water to the receiving water body.
- The existing seepage control structures at the toe of the TSF will be retained for the closure period.

30.4.3 Concentrators and associated infrastructure

All infrastructure for which there is no approved third party post closure (either at the proposed M3C or at the upgrades to the MNC) use will be decommissioned and the footprints reclaimed for the establishment of grasslands. Infrastructure where there is a third party use will be legally transferred to the relevant third parties.

Material inventories will be managed near the end of operations to minimize any surplus materials at closure. Fuel, lubricants and other materials needed to support the closure activities will be utilized during the closure period. The majority of the fuel storage facility will be closed during the first year of operations, but some fuel storage capacity will be required until all equipment has been demobilized from the site at the end of the closure period.

Where practicable, equipment and materials with value not needed for post closure operations will be sold and removed from the site. All other equipment will be demolished and disposed of on-site. Equipment with scrap or salvage value will be removed from the plant and stored either in the existing salvage yard or a facility designated for this purpose during the closure period.

A soil contamination investigation will be conducted on completion of demolition activities, particularly in excavations remaining open following decommissioning. The purpose of this will be to identify areas of possible contamination and design and implement appropriate remedial measures to ensure that the soil closure criteria are obtained.

Excavations remaining following demolition, foundation and slab removal and those where contamination remediation has been undertaken will be filled with waste rock and covered with growth medium. The depth of growth medium placed and the vegetation established will be dependent on the outcomes of VMP. Sufficient growth medium will be placed to allow for the successful establishment of vegetation. Cover and growth medium placement will be undertaken to promote proper runoff drainage and prevent the formation of low points where water may pond.

Closure actions for the buildings will include the following:

- The water and power reticulation and associated infrastructure will be retained until such time as water and power are no longer needed on site. Once no longer required, all power and water services to be disconnected and certified as safe prior to commencement of any demolition works.
- All remaining inert equipment and demolition debris will be placed in the base of the nearest open pit.
- Salvageable equipment will be removed and transported offsite prior to the commencement of demolition.
- All fittings, fixtures and equipment within buildings will be dismantled and removed to designated temporary salvage yards until removed as scrap or disposed as waste.
- All tanks, pipes and sumps containing hydrocarbons to be flushed or emptied prior to removal to ensure no hydrocarbon/chemical residues remain.
- All above ground electrical, water and other service infrastructure and equipment to be removed and placed designated temporary salvage yards until removed as scrap or disposed as waste.
- All pond liners to be removed for disposal in designated landfills.
- Electrical, water and other services that are more than 400 Mogalakwena Mine below ground surface will remain.
- All pipes and structures deeper than 400 mm need to be sealed to prevent possible ingress and ponding of water.
- Concrete slabs and footings will be removed to a depth of 500 mm below ground surface. This concrete (and metal) will be broken up and disposed of in the pit.
- All concrete below 500 mm depth will remain underground with the invert of all structures broken/sealed to prevent possible ingress and ponding of water.
- Soils beneath the plant, storage tanks and chemical storage areas will be sampled. Any contaminated soils found will be removed for disposal as per the mines Waste Management Plan.
- All subsurface cavities such as reinforced concrete tunnels under stockpiles and septic tanks will be backfilled.
- All excavations resulting from demolition of plant, buildings, roads, conveyor platforms, etc. and earth structures will be left in a safe manner.
- All telecommunication towers and dishes to be dismantled and removed.

30.4.4 Roads, laydown and parking areas

Mine roads that are not needed for closure and post closure uses at the site (e.g. security and monitoring) will be closed. Where possible the larger roads that are retained will be resized for post closure use by regrading and ripping to a width that is appropriate for anticipated post closure traffic.

Closure actions for the roads, laydown and parking areas will include the following:

- Removal of all signage, fencing, shade structures, traffic barriers, etc.
- All ‘hard top’ surfaces to be ripped and bitumen removed along with any culverts and concrete structures.
- Where possible preserve existing vegetation – native trees and plants that may currently be incorporated in parking areas.
- All concrete lined drainage channels and sumps to be broken up and removed.
- All excavations or vertical walls resulting from removal of foundations or structures are to have sides slopes battered to 2H:1V and are to be made safe pending final reclamation work.
- All potentially contaminated soils are to be identified and demarcated for later remediation.
- All haul routes that have been treated with dust suppression water need to be sampled to determine whether they need to be treated as “sealed” roads with the upper surface ripped and removed and disposed of as per the mines Waste Management Plan.

30.4.5 Buffer dam

The dam will ultimately be reclaimed and the area shaped to form a stable landform congruent with the surrounding landscape. The dam will, however, be retained during the majority of the closure period to provide water for closure activities as well as to capture any residual seepage and contact water which may be generated on the site.

Closure actions for the dam will include:

- Demolish all concrete structures.
- Remove any silt that accumulated in the dam and classify in line with regulations. Silt to be managed as per the mines Waste Management Plan.
- Remove liners and following waste classification testing, dispose appropriately. If the liner is not identified as a potential future contamination risk, the liner will be buried in situ. Prior to burial, the liner will be punctured or cut so that that natural geohydrological conditions are minimally impacted at closure.
- Backfill excavations with material removed during construction which will be located adjacent to the dams.
- Profile footprint to be free draining with no low points to accumulate water.

30.4.6 Waste management

Waste will be classified as necessary and then depending on the classification handled according to the mines Waste Management Plan. Likely activities are:

- Designated temporary salvage yards will be developed for the storage of mobile equipment, structural steel and mechanical equipment or other equipment with a potential resale or scrap value. The location of these yards will be dictated by existing permitted land clearance. Material will be stored in these salvage yards until opportunities for resale/reuse are exhausted. Residual material will be disposed of according to the Waste Management Plan;
- It may be necessary for security reasons to fence temporary salvage yards particularly where these are located close to public roads.
- Once material is removed from the yards (either through sale or disposal), temporary infrastructure will be demolished, compaction loosed by ripping and the footprint revegetated as per the VMP.

30.4.7 Storm water management

Prior to closure, a water management plan will be prepared to identify which structures are required at closure and which can be decommissioned. Ditches decommissioned will be closed by backfilling the excavations with the material removed and placed adjacent to the structures. Bunds not required will be flattened by redistributing the material across the footprint used to borrow the material for construction.

30.4.8 Fencing and walling

Walls will be demolished by breaking the concrete panels or bricks and mortar and removing support posts from the ground. Rubble and scrap metal will be recycled and where there are not alternatives be disposed to landfill. Excavations for support posts will be backfilled with growth medium. The footprints of the demolished walls will then be rehabilitated as per the footprints for other infrastructure being demolished.

Security fencing around individual infrastructure will be removed once fences are redundant. Support posts will be removed by excavating to base level if necessary. Excavations will be backfilled with growth medium and vegetation established.

30.4.9 Vegetation and wildlife

Successful revegetation will help control erosion of soil resources, maintain soil productivity and reduce sediment loading in streams. As part of biodiversity management, revegetation will enhance the resulting biodiversity opportunities by utilizing non-invasive plants that fit the criteria of the habitat (e.g. soils, water availability, slope and other appropriate environmental factors). Invasive species will be avoided, and the area will be managed to control the spread of these species.

The slopes at the mine residue facilities are likely to be susceptible to erosion, even after reshaping the facilities to a lower gradient. To counter the effects of erosion, naturally occurring grassland species will be planted on the slopes and tops of the facilities. At this time, these species will provide soil

holding capacity and reduce runoff velocity. The composition of the natural species and their planting strategy will be determined through revegetation trials conducted concurrently with mining.

The flatter areas, such as those not on mine residue facilities, will be revegetated with the objective of creating a sustainable ecosystem similar to an analogues reference plots.

No specific measures will be taken to reintroduce wildlife as the different animals still occupying the remaining habitat are expected to expand their territories into the Mogalakwena Mine area.

30.5 Future land use after decommissioning

Post closure land use (PCLU) is determined in consultation with stakeholders so that the PCLU meets the requirements of the stakeholders, within the context of what can reasonably be achieved on site. This activity is undertaken for the whole mine lease area affected by mining activities and integrates stakeholder requirements with risk mitigation. As specific consultation regarding PCLU has not been undertaken at this stage of the closure process for the Expansion Project nor has it been undertaken for the large mining rights area, for purposes of current planning and liability costing for the Expansion Project, various assumptions relating to closure have been developed.

Given the extent of the disturbance within the lease area, with the majority of the disturbance remaining post closure in the form of mine residues (tailings and waste rock) and various open pits, post closure land use is unlikely to contain alternatives that could be utilised sustainably by the community. However, should infrastructure be demolished, there are opportunities that the footprints could be utilised for sustainable post closure uses.

Based on the limitations presented by the permanence of the disturbances associated with the mining activities, the overall post closure land use for the mine has been determined to be:

- Landforms, that sustain indigenous vegetation which limits water and wind erosion.
- Mosaic of nodes where existing infrastructure is utilised by stakeholders for a variety of post closure activities surrounded by areas rehabilitated back to a land capability possible of supporting indigenous vegetation as well as land capable of supporting the various community initiatives in which the mine is involved.

The land capability developed on the footprints where covers are placed, and vegetation established will be a land capability defined as grazing by the Chamber of Mines[16], with these covers expected to support landforms that support indigenous vegetation. Flat areas where decommissioning activities are undertaken will be converted to a mosaic of land where the intended use is industrial and agricultural.

As the nature of the disturbance associated with the Expansion Project is similar to that which already exists for the operational infrastructure, the PCLU for the Expansion Project is aligned with the above. It is likely that on closure of the expansion infrastructure, the residues will present few sustainable land use options to the communities, however, infrastructure that remains, as well as the footprints that remain, after decommissioning may have associated sustainable post closure land uses.

As the demographics of the areas surrounding the mine may change at closure as communities potentially move in seek of other livelihoods, pressures on the land may reduce. This may however, be countered by population growth between now and when the mine closes. It is likely that for the next 20 to 30 years, land use will be associated with mining and will remain so until closure. After closure, the mine is likely to enter into a period of care and maintenance on the rehabilitated areas, further

[16] Now known as Minerals Council South Africa

limiting opportunities for community use. However, once sufficient data has been obtained to indicate that the mine has met its relinquishment criteria, use of rehabilitated areas may commence.

31 Mechanisms for Monitoring Compliance

Internal and external environmental monitoring is undertaken on an ongoing basis at Mogalakwena Mine as required in the relevant authorisations, permits and licences. Details associated with the compliance monitoring is provided in the sections below.

31.1 Monitoring of impact management actions

A performance assessment against this EIA/EMPr, which includes all the previously approved EMPr undertaken for Mogalakwena Mine, will be undertaken every second year to assess the compliance against:

- Impact management measures for the:
  - the Expansion Project infrastructure and activities as detailed in Section 18; and
  - previously approved EMPrs detailed in Appendix 8

31.2 Responsible persons for implementation of management actions

The responsible persons for the implementation of the management measures, as listed in 31.1, and the monitoring of environmental compliance at Mogalakwena Mine is provided in Table 2-5.

31.3 Time period for implementation of management actions

The infrastructure and activities associated with the Expansion Project are aligned with the planned LoM of Mogalakwena Mine. The time period for the implementation of the management actions associated with the proposed Expansion Project will be aligned with the different phase of the expansion activities as detailed in Section 18 .

31.4 Specific environmental monitoring requirements

This section details the existing and proposed specific environmental monitoring requirements for Mogalakwena Mine and includes the monitoring of the following:

- Surface and ground water;
- Biomonitoring;
- Air quality;
- Noise;
- Soils;
- Post Rehabilitation monitoring.

31.4.1 Surface and groundwater

MM has an extensive monitoring program which includes all water and waste management facilities and has been aligned with BPG G3 (DWAF, 2006), as well as the objectives set out in the Anglo Water Management Guideline (GTG 21). According to the Anglo guideline this program must include as a minimum:

- responsibility for the monitoring program;
- locations of routine samples to be taken and purpose;
- required sampling and preservation guidelines (surface / groundwater);
- analytical parameters required per sample;

- frequency of sampling;
- sample quality/custody controls; and
- data management, and reporting.

Sampling of surface water and groundwater is done by Mogalakwena Mine staff and external appointed companies.

Water resources are currently monitored in the Mohlosane and Groot Sandsloot (Pholotsi) River, upstream and downstream of mining activities and on Vaalkop Dam. Samples are submitted to an approved laboratory for analyses and check samples are sent to the SABS laboratories to verify results. Surface, process and groundwater are monitored monthly, and rest water levels are measured biannually.

The sampling protocol is reviewed every two years and all parties involved in the monitoring are informed of updates (Groundwater and Surface water Monitoring Procedures MS-SHE-ENV-PRO-0009 and MS-SHE-ENV-PRO-0004, respectively).

MM's WULs identifies the groundwater and surface water monitoring points required to be sampled. The monitoring program has expanded considerably since the issuing of these WULs. The intention of the WULs is to ensure protection of the resource and downstream users. The current monitoring program in place is designed to:

- monitor process water, discharges, effluents and receiving water to identify impacts caused by Mogalakwena Mine operations;
- measure compliance to WUL;
- determine the extent of groundwater pollution plumes;
- determine the fitness for use of water for potential downstream/down gradient users;
- inform Mogalakwena Mine's water management strategy, which is reliant on the implementation of a well-designed and maintained monitoring program and database.

Quantity monitoring includes water consumption and metering of the various water and waste streams on the mine. The data is reflected in the mine water balance.

A WUL is being applied for as part of the integrated environmental authorisation process for the Expansion Project. As agreed with DWS at the pre- application meeting, the water uses from the 2007 and 2017 WULs be consolidated and included in the new WULA for the Mogalakwena Mine expansion project. Refer to Section 29.2.4 and Appendix 15 for further details relating to the new water uses associated with the proposed Expansion Project.

Surface and groundwater monitoring at the mine will be undertaken in line with the requirements specified in the WUL, which will include additional monitoring requirements associated with the Expansion Project.

31.4.2 Biomonitoring

Stream assessment scoring system (SASS5) aquatic biomonitoring is not undertaken at Mogalakwena Mine due to the intermittent flows experienced in the rivers only during rainfall events and the main river flow being subsurface. Mogalakwena Mine requested that the biomonitoring conditions within the 2007 WUL be removed and this was granted by the Department in 2010. As a result, biomonitoring is not conducted regularly at Mogalakwena Mine, however, habitat assessments of the rivers have been undertaken during specialist field investigations.

31.4.3 Air quality monitoring

Air quality at Mogalakwena Mine is monitored through 32 Dust Fallout (DFO) monitoring and three PM_{10} monitoring points situated across the mining area. Currently the DFO sampling stations consist of 18 residential area DFO units and 13 non – residential area DFO units. The location of the monitoring stations is listed in Table 14-13 and shown in Figure 14-11.

31.4.4 Noise monitoring

Noise monitoring was undertaken as part of the noise impact assessment. The location of the monitoring points is listed in Table 14-5 and shown in Figure 14-6.

The Noise Impact Management Plan for the proposed mine expansion project is shown in Table 31-1.

Table 31-1:Noise monitoring plan for the mine expansion project

Action	Description	Frequency
Management objective	To ensure that the legislated noise levels will be adhered to at all times.	Quarterly for a period of a year after which the frequency can change to an annual basis.
Monitoring objective – Construction phase	Measure the environmental noise levels during the construction phase of the project to ensure compliance to the recommended noise levels.	Quarterly for a period of a year after which the frequency can change to an annual basis.
Monitoring objective – Operational phase	Measure the environmental noise levels during the operational phase of the project to ensure compliance to the recommended noise levels.	Quarterly for a period of a year after which the frequency can change to an annual basis.
Monitoring technology	The environmental noise monitoring must take place with a calibrated Class 1 noise monitoring equipment.	Quarterly for a period of a year after which the frequency can change to an annual basis.
Specify how the collected information will be used	The data must be collated and discussed on a monthly basis during the construction phase and on a monthly basis during the operational phase for the first two years thereafter on an annual basis.	Quarterly for a period of a year after which the frequency can change to an annual basis.
Spatial boundaries	At the boundaries of the identified abutting residential areas as well as at the boundaries of the different mining areas.	Quarterly for a period of a year after which the frequency can change to an annual basis.
Define how the data will be analysed and interpreted and how it should be presented in monitoring reports	Reports must be compiled for each monitoring cycle and the results must be compared to the previous set of results to determine if there was a shift in the prevailing ambient noise.	Quarterly for a period of a year after which the frequency can change to an annual basis.
Accuracy and precision of the data	The noise surveys will have to be conducted in terms of the recommendations of the Noise Control Regulations and SANS 10103 of 2008.	Calibrated equipment must be used at all times and at noise monitoring points.

31.4.5 Soils

During the rehabilitation of the impacted areas soil quality monitoring should be carried out to accurately determine the fertiliser requirements that will be needed. Additional soil sampling should also be carried out on the re-instated soils as required until the levels of nutrients are at the required levels for sustainable growth.

Once the desired nutritional status has been achieved, it is recommended that the interval between sampling is increased. An annual environmental audit should be undertaken as part of the monitoring strategy.

If growth problems develop, ad hoc, sampling should be carried out to determine the problem.

Monitoring should always be carried out at the same time of the year and at least six weeks after the last application of fertilizer

Soils should be sampled and analysed for at least the following parameters:

- pH (H_2O)
- Phosphorus (Bray I)
- Electrical conductivity
- Calcium mg/kg
- Cation exchange capacity
- Sodium mg/kg;
- Magnesium mg/kg;
- Potassium mg/kg
- Zinc mg/kg;
- Clay Organic matter content (C %)

The following management and maintenance is also recommended:

- During rehabilitation and the establishment of the vegetative cover the sites must be fenced, and all animals kept off the area until the vegetation is self-sustaining;
- Newly seeded/planted areas must be protected against compaction and erosion ;
- Traffic should be limited were possible while the vegetation is establishing itself;
- Plants should be watered and the sites weeded as required on a regular and managed basis were possible and practical;
- Check for pests and diseases at least once every two weeks soon after planting, and treat if necessary;
- Replace unhealthy or dead plant material;
- Planted (Hydro seeded and grassed) areas should be fertilised soon after germination, and
- Repair any damage caused by erosion

31.4.6 Closure and post closure period

The purpose of implementing closure actions detailed in Section 30.4, is to reduce closure risk to an acceptable residual risk timeously. Based on the work required, AAP has determined that closure will be implemented over a five-year period, based on the premise that significant remedial work will have been undertaken on the WRDs and decommissioned infrastructure during the remaining Life of Mine.

Once the closure activities have been completed, the operation will enter a ten-year post closure period. During this time, erosion repair and vegetation establishment will be undertaken, if monitoring activities indicate that it is required. This is within the context that the areas under consideration in this plan are flat and are not likely to be subject to significant erosion.

A post closure period of ten years is considered by AAP to be sufficient time as biological process can be demonstrated to be occurring, leading to vegetation covers being stable and sustainable, within this timeframe. Furthermore, sufficient data can be collected to demonstrate that the achievement of the specific relinquishment criteria comply with the trend for the biophysical category under consideration.

31.4.7 Continuous maintenance

The mine undertakes continuous maintenance on infrastructure that has the potential to affect the environment. This infrastructure includes pipelines, roads, conveyors and infrastructure traversing watercourses. The maintenance is a result of planned inspections on these facilities where specific requirements for maintenance on the above infrastructure is required and is conducted in line with a maintenance schedule.

31.5 Frequency of the submission of the performance assessment report

A formal audit of the performance assessment of the EMPr will take place every 2 years.

31.6 Environmental awareness plan

The proposed project will utilise the existing Mogalakwena Mine SHE Department Environment – Competence, Training and Awareness procedure attached in Appendix 18.

31.7 Specific information required by the competent authority

The DMR approved the Final Scoping Report and requested that the items detailed in Table 1-2 be addressed in the EIA/EMPr. Responses to the information request is also included in this table. Please refer to the DMR acceptance letter in Appendix 2

31.8 Undertaking.

I Franciska Lake herewith confirm:

- The correctness of the information provided in the reports;
- The inclusion of comments and inputs from stakeholders and Interested and Affected parties;
- The inclusion of inputs and recommendations from the specialist reports where relevant; and
- The acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.

Signature of the EAP

DATE: 3 October 2019

I Ashleigh Maritz herewith confirm:

- The correctness of the information provided in the reports;
- The inclusion of comments and inputs from stakeholders and Interested and Affected parties;
- The inclusion of inputs and recommendations from the specialist reports where relevant; and
- The acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.

Signature of the EAP

DATE: 3 October 2019

I Kavilan Naidoo herewith confirm:

- The correctness of the information provided in the reports;
- The inclusion of comments and inputs from stakeholders and Interested and Affected parties;
- The inclusion of inputs and recommendations from the specialist reports where relevant; and
- The acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.

Signature of the EAP

DATE: 3 October 2019

32 Statement of SRK Independence

Neither SRK nor any of the authors of this Report have any material present or contingent interest in the outcome of this Report, nor do they have any pecuniary or other interest that could be reasonably regarded as being capable of affecting their independence or that of SRK.

SRK has no prior association with Mogalakwena Mine in regard to the mineral assets that are the subject of this Report. SRK has no beneficial interest in the outcome of the technical assessment being capable of affecting its independence.

SRK's fee for completing this Report is based on its normal professional daily rates plus reimbursement of incidental expenses. The payment of that professional fee is not contingent upon the outcome of the Report.

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All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

33 References

Anglo American (Date unknown), Our Plans, Policies, and Progress. Available from: https://www.angloamerican.com/~/media/Files/A/Anglo-American-PLC-V2/documents/climate-change-supplement.pdf. Last Accessed 09/09/2019

Anglo American Platinum, 2003. Potgietersrus Platinum's Limited - Environmental Management Porgramme Chapter 9 Addendum, Creation of Three Ore Stockpiles and Relocation of Old Disused Tailings Dam (Report No. CED/030/03).

Anglo American, 2019: Sustainability Approach and Policies, Position statement on climate change. Available from: https://www.angloamerican.com/sustainability/approach-and-policies. Last Accessed: 09/09/2019

BioAssets Biological Assessments, May 2019. Biodiversity Report, Anglo American Platinum, Mogalakwena Platinum Mine – Expansion of Existing Facilities.

Cave Klapwijk & Associates cc, 2003. Environmental Management Porgramme Report for the Doorndraai Pipeline Borrow Pits in the Limpopo Province (Report No.03007)

Earth Science Solutions, 2019. Soils and Land Capability Specialist Studies - Mogalakwena Mine Expansion and Project (Reference Number: SRK.532330.MK.S.18.12.00.)

Final Basic Assessment Report for the Proposed Road Deviation (D4380) at Mogalakwena Platinum Mine (Report No. 435183/1).

I.W Terblanche & Associates Environmental Consultants, 2013. Draft Environmental Management Plan – Proposed Relocation/Decommissioning of ANPP Silos at Mogalakwena Platinum Mine

International Council of Mining and Metals, 2011: ICMM principles for climate change policy design and position statement. Available from: http://www.icmm.com/en-gb/members/member-commitments/position-statements/icmm-principles-for-climate-change-policy-design-position-statement. Last Accessed 09/09/20149

Itasca Africa (Pty) Ltd, 2019. Hydrogeological Specialist Report for Mogalakwena Mine, Mokopane, Limpopo (Project No. SA-160.

Jones and Wagener (2019), Anglo American Platinum Mogalakwena Mine: Groot Sandsloot River Diversion Conceptual Design Summary

Palaeo Field Services, 2019. Palaeontological desktop study for proposed infrastructure development and associated activities at Mogalakwena Mine, Mokopane, Limpopo Province.

Shangoni Management Services (Pty) Ltd, 2013. Proposed Diesel Depot – Final Environmental Impact Assessment Report (Report No. ANG-MOG-16-09-11).

Shangoni Management Services (Pty) Ltd, 2014. Anglo American Platinum Limited – Mogalakwena Mine, Pit-dewatering Pipeline Upgrade – Final Basic Environmental Assessment Report (Report No. ANG-MOG-14-04-02).

Shangoni Management Services (Pty) Ltd, 2015. Anglo American Platinum Limited – Mogalakwena Mine, Fuel Depot Expansion – draft Environmental Management Programme (Report No. ANG-MOG-14-03-20).

Shangoni Management Services (Pty) Ltd, 2016. Anglo American Platinum Limited – Mogalakwena Mine, Construction of the Bridge and Gravel Road – Basic Assessment Report and Environmental Management Programme Report.

Shangoni Management Services (Pty) Ltd, 2017. Anglo American Platinum Limited – Mogalakwena Mine, Proposed Explosives Depot Expansion - Basic Assessment Report and Environmental Management Programme Report (Report No. ANG-MOG-15-01-27).

SRK Consulting, 1990. Johannesburg Consolidated Investment Co Ltd Overysel Open Cast Platinum Mine, Preliminary Environmental Impact Assessment to Identify Cost Implications of Environmental Considerations. Report No. 184663/1

SRK Consulting, 1991: Johannesburg Consolidated Investment Limited: Rustenburg Platinum Holdings Limited - Potgietersrus. Environmental Impact Assessment (Report No. 184663/3).

SRK Consulting, 1996: Potgietersrust Platinum Limited: Environmental Management Programme Report (Report No. 223405).

SRK Consulting, 2001: Anglo Platinum Limited: Addendum to the Environmental Management Programme Report for the Overburden Dump at Potgietersrust Platinum Limited (Report No. 271433/1).

SRK Consulting, 2001: Anglo Platinum Limited: Addendum to the Environmental Management Programme Report for the extension to the tailings dam at Potgietersrust Platinum Limited (Report No. 271433/2).

SRK Consulting, 2002: Potgietersrust Platinum Limited (PPRust) – Zwartfontein South Project Addendum to the Environmental Management Programme Report (Report No. 305804/1/2).

SRK Consulting, 2002: Potgietersrust Platinum Limited (PPRust) – PPRust North Mine. Addendum to the Environmental Management Programme Report (Report No. 305804/3/1).

SRK Consulting, 2006: Potgietersrust Platinum Limited (PPRust) – PPRust North Mine. Amendment to the Environmental Management Programme Report (Report No. 360311).

SRK Consulting, 2007: Potgietersrust Platinum Limited (PPRust) – PPRust North Mine. Amendment to the Environmental Management Programme Report (Report No. 376197).

SRK Consulting, 2013. Anglo American Limited – Mogalakwena Mine, Final Environmental Impact Assessment and Environmental Management Plan Report for the Proposed Waste Site Project (Report No. 347793/4).

SRK Consulting, 2013: Anglo American Platinum Limited - Mogalakwena Mine– Consolidated Environmental Management Programme for Anglo American Platinum - Mogalakwena Mine (Report No. 462905).

SRK Consulting, 2014. Mogalakwena Platinum Mine (MPM) Revised Final Environmental Impact Assessment Report and Environmental Management Programme (EIAR/EMP) for the Proposed Expansion of the North Concentrator (MNC) Debottlenecking Project (Report No. 447122/1SR).

SRK Consulting, 2015: Anglo American Platinum Limited - Mogalakwena Mine – Integrated Environmental Authorisation Process for Anglo American Platinum's Mogalakwena Mine - Drenthe and Witrivier Infill Drilling and Witrivier Waste Rock Dump, near Mokopane, Limpopo Province (Report No. 470894).

SRK Consulting, 2015: Anglo American Platinum Limited - Mogalakwena Mine – Integrated Environmental Authorisation Process for the Anglo American Platinum's Mogalakwena Mine – Blinkwater Tailings Storage Facility Expansion and additional water management infrastructure project, near Mokopane, Limpopo Province (Report No. 475735).

SRK Consulting, 2017. Amendment to the Mogalakwena Mine's Environmental Management Programme (EMPr) to include the proposed Tailings Scavenger Plant (TSP) (Report No. 489872/EMPr1).

SRK Consulting, 2017: Anglo American Platinum Limited - Mogalakwena Mine– Integrated Water and Waste Management Plan Update (Report No. 495186).

SRK Consulting, 2018: Anglo American Platinum Limited - Mogalakwena Mine– Integrated Water and Waste Management Plan Update (Report No. 528020).

SRK Consulting, 2019. Air Quality Impact Assessment for the Proposed Mogalakwena Mine Expansion Project (Report No. 532330/Air Quality Specialist Study).

SRK Consulting, 2019. Integrated Environmental Authorisation Process for the Amendment of the Environmental Management Programmes to Include Components of the Proposed Expansion Project at Mogalakwena Mine, Limpopo Province - Surface Water Specialist Report (Report No. 532330/SW).

SRK Consulting, 2019. Mogalakwena Mine Proposed North Waste Rock Dump Design Report (Report No. 532330 / North Waste Rock Dump Design Report)

SRK Consulting, 2019. Rehabilitation and closure plan for the proposed expansion project at Mogalakwena Mine (Report No. 532330/MM Expansion Closure)

SRK Consulting, 2019. Visual Impact Assessment for the Proposed Expansion of the Mogalakwena Mine (Report No. 532330/VIA).

Tekplan Environmental, 2008. Basic Assessment Report for the Proposed Private Lodge on the Farm Groenfontein 227 KR, Lephalale Local Municipality, Limpopo Province.

Waterberg District Municipality Environmental Management Framework. Available from: https://www.environment.gov.za/sites/default/files/docs/waterberg_finalreport.pdf. Last Accessed 09/09/2019

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