Unmitigated – summary of the rated impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Construction and operation						
Unmitigated	H	H	M/H	H	H	H
Decommissioning						
Unmitigated	H	H	M/H	H	L	M
Closure – not applicable						

Mitigated – summary of the rated impact per phase of the project

This rating assumes the mitigation measures as included in Table 38 (Section 19) and Appendix A are implemented by the mine. Key to this is correct exhumation and relocation of graves that will be destroyed, in line with regulatory requirements.

In this regard, the significance of the mitigated impact reduces to low due to a reduced severity, duration and likelihood of occurrence, as any heritage resources associated with the two graveyards will be preserved.

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Construction, operation, decommissioning						
Mitigated	L	L	M/H	L	L	L
Closure – not applicable						

7.2.15 ISSUE: DISTURBANCE (INDIRECT) OF HERITAGE RESOURCES

Information based on heritage specialist study (Pistorius 2011) (Appendix Q).

Introduction

Activities associated with the construction and operation of the TSF and the development of the waste dumps have the potential to indirectly damage heritage resources and result in the loss of the resource for future generations (see Section 3, Table 18 for further detail). Heritage resources, as above, include sites of archaeological, cultural or historical importance. The potential exists for these impacts to occur in the construction, operation and decommissioning phases.

Rating of impact

Severity / nature

A graveyard and historical house are located in close proximity to the TSF and northern waste dump. Unmitigated actions during the construction, operation or decommissioning of the site could result in these resources being unintentionally damaged or destroyed. These sites are considered to have a high significance and therefore damage to or destruction of these sites without proper mitigation has a high severity.

Duration

In the unmitigated scenario, in all applicable phases, the loss of heritage resources will be long term and will continue after the life of the project.

Spatial scale / extent

Although the actual loss of the resource will be within the site boundary, the unmitigated impact will extend beyond the site boundary.

Consequence

In all applicable phases, the consequence of this potential impact is high.

Probability

In the unmitigated phases, the loss of heritage resources will be possible.

Significance

The significance of this potential impact is high in the unmitigated construction and operational phases and medium in the unmitigated decommissioning phase.

Unmitigated – summary of the rated impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Construction, operation and decommissioning						
Unmanaged	H	H	M/H	H	M	H
Closure – not applicable						

Mitigated – summary of the rated impact per phase of the project

This rating assumes the mitigation measures as included in Table 38 (Section 19) and Appendix A are implemented by the mine. Key to this is establishing barriers for heritage sites that will remain on site, providing access to relatives as and when required, personnel awareness and training and emergency response.

In this regard, the significance of the mitigated impact reduces to low due to a reduced severity, duration and likelihood of occurrence, as any heritage resources remaining on site will be protected.

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Construction, operation, decommissioning						
Mitigated	L	L	M/H	L	L	L
Closure – not applicable						

7.2.16 ISSUE: LOSS OF PALAEONTOLOGICAL RESOURCES

Information based on palaeontological specialist study (BPI for Palaeontological Research 2011) (Appendix R).

Introduction

The development of the site during the construction and operational phases, when sub-surface ground will be disturbed, has the potential to result in the loss of palaeontological resources for future generations and research (see Section 3, Table 18 for further detail). No impacts are expected to occur during the decommissioning and closure phases as no further disturbance of the bed rock is expected during these phases.

Rating of impact

Severity / nature

The main geological formation being targeted by the project (the Mount Dowe group of the Beit Bridge Complex) hosts no potential for fossils due to its pre-cambrian age and its course-grained, heavily metamorphosed nature. The Triassic-aged Bosbokpoort Formation of the Karoo Supergroup and the Tertiary-Quaternary sand and calcrete layer found on site have the potential to host fossils. The uncovering of fossils on site would have some research potential. However the host formations are widespread and do occur outside of the site boundary. The severity of potential impacts is therefore expected to be low.

Duration

In the unmitigated scenario, the loss of resources will be long term and will continue after the life of the project.

Spatial scale / extent

Although the actual loss of the resource will be within the site boundary, the unmitigated impact could extend beyond the site boundary.

Consequence

In all applicable phases, the consequence of this potential impact is medium.

Probability

Even in the unmitigated phases, the loss of palaeontological resources is unlikely.

Significance

The significance of this potential impact is low in the unmitigated scenario.

Unmitigated – summary of the rated impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Construction and operation						
Unmanaged	L	H	H	M	L	L
Decommissioning – not applicable						
Closure – not applicable						

Mitigated – summary of the rated impact per phase of the project

This rating assumes the mitigation measures as included in Table 39 (Section 19) and Appendix A are implemented by the mine. In this regard, the significance of the mitigated impact remains low with a reduced duration as any chance finds will be subjected to an emergency response procedure.

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Construction and operation						
Mitigated	L	L	H	M	L	L
Decommissioning – not applicable						
Closure – not applicable						

SOCIO-ECONOMIC

In the broadest sense, activities associated with the project will have socio-economic impacts in all mine phases. Some of these are considered to be positive impacts and others are considered to be negative impacts. The separate groups of impacts are discussed below.

7.2.17 ISSUE: LOSS OF MINERAL RESOURCES THROUGH STERILISATION

It is important that no potential future resources be sterilised by the project as it may become feasible to mine them in the future. Significantly, there will be no sterilisation of minerals by the placement of surface infrastructure (the site layout took into consideration potential future mineable reserves) or disposal of tailings on the tailings dam.

7.2.18 ISSUE: ECONOMIC IMPACT (POSITIVE AND NEGATIVE)

Information based on the land use specialist study (Appendix P), socio-economic study (Appendix S) and Metago's observations and experience with mining related developments.

Introduction

The development of the mine as a whole has the potential to impact on the economy both positively through potential growth in the mining sector and negatively through the potential loss of existing economic activities. The project is located in area where the land uses both on site and in the surrounding area are mainly agriculture, tourism and hunting (Section 1.3.1). It is the view of many

stakeholders that these land uses cannot co-exist. This section focuses on the potential positive and negative economic impacts associated with the project and assesses these collectively.

Rating of impact

Severity / nature

There is expected to be a direct positive economic impact on the local, regional and national economies in both the construction and operational phases. Direct benefits will be derived from wages, taxes and profits. Indirect benefits will be derived through the procurement of goods and services, and the increased spending power of employees which is expected to accrue to the construction, transport, trade and financial sectors. The project is expected to employ approximately 1000 workers during the construction phase and 455 workers (inclusive of all shifts) during the operational phase. Mining is predicted to have a 1:4 multiplier effect, resulting in four secondary jobs for every job created through the need for support business and services and from the increased spending power of employees and contractors.

It is also expected that there will be a negative economic impact on the surrounding agriculture, hunting and tourism industry. The land use specialist has predicted that in the unmitigated scenario at least 5 neighbouring farms are expected to experience some form of loss in economic activity due to the development of the mine (contributing impact factors are air, noise, visual, blasting, dewatering, traffic). These farms are expected to employ on average 10 workers with a multiplier effect of 1:1.2. In addition, there is the possibility that the experience of tourists and hunters in the area around the mine may be compromised to the point that tourists, hunters and operators choose not to visit this area to the same degree in future. It may also indirectly impact on various components of the associated hospitality sector (e.g. accommodation, travel and food). The predicted gross domestic product (GDP) associated with the mine is R245 million. The predicted GDP of associated loss of agriculture and tourism is R11.6 million.

As a cumulative issue, in the unmitigated scenario, the economic benefits of the mine (over a 30 year period) are predicted to outweigh the potential losses to agriculture and tourism (over a 50 year period) and therefore the positive severity is considered to be moderate in the unmitigated scenario for all project phases.

Duration

In the normal course, the direct positive and negative economic impacts associated with the mine will occur for the life of mine. Post closure, in the unmitigated scenario, the scale of the impacts will be reduced. There may still be some positive impacts through maintenance and aftercare activities and because it is predicted that the mine would have contributed to a greater economic critical mass, skills, and wealth that can be used in other economic opportunities. There may also still be some negative impacts due to an un-rehabilitated site and the presence of final land forms.

Spatial scale

In the unmitigated scenario, the positive and negative impacts will be felt mainly in the Lephalale region.

Consequence

In the unmitigated scenario the consequence is high positive.

Probability

In the normal course of economic activity the net positive impacts are likely to occur.

Significance

In the unmitigated scenario, the significance of this potential impact is medium positive.

Unmitigated – summary of the rated impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Construction, operation. decommissioning						
Unmitigated	M+	H	M	H+	M	H+
Closure						
Unmitigated	L+	H	M	M+	M	M+

Mitigated – summary of the rated impact per phase of the project

This rating assumes the mitigation measures as included in Table 41 (Section 19) are implemented by the mine. Key to this is appointing the correct management team to implement the mitigation measures, proper closure planning in a timeously manner, minimising negative environmental impacts through the implementation of mitigation measures included in this report, enhancing positive impacts by working together with regulatory bodies and community structures and monitoring compliance with the commitments in this report.

In this regard, the significance of the mitigated impact remains a high positive with an increased severity. At closure, the significance increases to high positive due to increased severity and likelihood of impact occurring. It is expected that the land use potential on surrounding farms will return to current levels save for more clarity being required on the groundwater level recharge. For the project site, approximately 760ha associated with open pit, TSF and waste dumps will be compromised forever but the remaining areas could be used for grazing and hunting.

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Construction, operation, decommissioning						
Mitigated	H+	H	M	H+	H	H+
Closure						
Mitigated	M+	H	M	H+	H	H+

7.2.19 ISSUE: INFORMAL SETTLEMENTS, SAFETY, SECURITY AND SERVICES AND ASSOCIATED SOCIAL ILLS

Introduction

Mining projects of this nature tend to bring with them an expectation of employment. This expectation can lead to the influx of job seekers to an area which in turn increases pressure on social services (education and health), housing, basic service delivery and raises concerns around safety and security. In some cases, the influx is into already established urban areas but for the most part, given the location of mining developments within remote areas, the influx results in the development of informal settlements close to the mine site. Land in the project area is mostly privately owned (Section 1.3.1). The nearest rural village is located approximately 8km from the site. This section focuses on the potential for the development of informal settlements and the associated issues.

Rating of impact

Severity / nature

In the unmitigated scenario, the proposed project could attract an influx of job seekers to the area, which could cause an increase of people moving through the area and the development of informal settlements. This situation can be worsened if the mine does not do adequate planning for employee and contractor housing (with linked basic services) and transport. In general, both increased movement of poor people into an area and informal settlements are associated with poor standards of living which can promote disease, crime and a general threat to the safety and security of an area. In addition, poor control of employees and contractors can lead to increased trespassing on private farm land. Linked to this influx of people is the ability of receiving areas to supply basic services such as water, food, electricity and sanitation. The severity of potential impacts is high in the unmitigated scenario.

Duration

In the normal course, social impacts associated with each phase of the project will occur for the life of the project. However, issues associated with inward migration take on a life of their own and are likely to extend long after the life of the project. This applies to the unmitigated scenario of all project phases.

Spatial scale

In the unmitigated scenarios, the impacts of inward migration will be felt mainly on the land and in the communities surrounding the site.

Consequence

In the unmitigated scenario the consequence associated with inward migration is high.

Probability

In the unmitigated scenario the impact is considered to be definite.

Significance

In the unmitigated scenario, the significance of this potential impact is high.

Unmitigated – summary of the rated impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Unmitigated	H	H	M	H	H	H

Mitigated – summary of the rated impact per phase of the project

This rating assumes the mitigation measures as included in Table 42 (Section 19) and Appendix A are implemented by the mine. Key for this is setting up and participating in a law enforcement forum, a clear and effective recruitment and training policy, a clear and effective housing policy, and a clear and effective transport policy.

In this regard, the significance of the mitigated impact reduces to medium-low as although the severity is reduced, mitigation measures require careful monitoring to ensure that they are implemented effectively.

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Mitigated	L	H	M	M	M-L	M-L

7.2.20 ISSUE: RELOCATION

Introduction

The development of the mine, if approved, will result in the displacement of landowners and farm workers within the site boundary. It is assumed that the private land on which Turquoise Moon wants to establish the mine will either be bought by the mine or leased by the mine for a period of time (minimum of 30 years). In this regard, it is expected that the private landowners will receive fair compensation for the loss of their property. Should they decide to sell to the mine, then they would be expected to cover their own relocation and moving costs as is the case with the commercial selling of any property. It should be noted that some of the landowners do not want to sell their properties due to sentimental value of the property to their families. This section therefore focuses on the potential relocation of farm workers.

Rating of impact

Severity / nature

The development of the project will necessitate the relocation of farm workers that work for the private landowners on two properties on the project site, unless these farmers make use of the workers on new/other farms and provide housing for the workers and their families accordingly. This is rated as a high severity in the unmitigated scenario.

Duration

Although the impact will occur prior to the start of the project, the negative impacts felt by the farm workers and their families in the unmitigated scenario could be long term.

Spatial scale

In unmitigated scenario, the impacts will be felt beyond the site boundary.

Consequence

In the unmitigated scenario the consequence is high.

Probability

In the unmitigated scenario the impact is definite.

Significance

In unmitigated scenario, the significance of this potential impact is high.

Unmitigated – summary of the rated impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Construction						
Unmitigated	H	H	M	H	H	H
All other phases – not applicable						

Mitigated – summary of the rated impact per phase of the project

This rating assumes the mitigation measures as included in Table 43 (Section 19) and Appendix A are implemented by the mine. Key to this is including specific conditions in purchase agreements with landowners should farm workers relocate with landowners, the development and implementation of a site-specific resettlement plan that meets World Bank standards and consideration for employment at the mine.

In this regard, the significance of the mitigated impact reduces to medium-low as although the severity and duration are reduced, mitigation measures require careful monitoring to ensure that they are implemented effectively.

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Construction						
Mitigated	L	L	M	L	M-L	M-L
All other phases – not applicable						

7.2.21 ISSUE: CHANGE IN LAND VALUES

Introduction

Concern has been raised by land owners about the impact of the project on surrounding land values, associated hunting/agricultural practises and future benefits for family. The mine development as a whole has the potential to impact on land values and associated economic activity. The impact on land values could be affected both positively and negatively. Positive impacts are observed where mining or mining related companies require land adjacent to mining operations and as such land owners often sell land at a premium. Negative impacts are observed when the productivity of land surrounding mines or the quality of life of landowners/users is compromised by unacceptable negative environmental and social impacts. It is assumed that there is less concern about the scenario where land is purchased at a premium. Land use related losses are discussed in Section 7.2.11. This section focuses on the possibility of land devaluation from unacceptable negative environmental and social impacts.

Rating of impact

Severity / nature

In the unmitigated scenario, some land surrounding the project site will experience unacceptable impacts which are likely to cause a loss in land values and/or economic activity. The severity of potential impacts is expected to be high for farms neighbouring the project site, with the severity reducing the further away the farm unit is from the mine.

Duration

In the unmitigated scenario, farm values and economic activity could be affected post-closure.

Spatial scale

Any property value impacts or loss of economic activity will be experienced beyond the site boundary.

Consequence

A high consequence is expected in the unmitigated scenario.

Probability

In the unmitigated scenario, it is possible that there will be a decline in property values and economic value of the farm unit.

Significance

In the unmitigated scenario, the significance of potential impacts is high.

Unmitigated – summary of the rated impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Unmitigated	H	H	M	H	M	H

Mitigated – summary of the rated impact per phase of the project

This rating assumes the mitigation measures as included in Table 44 (Section 19) and Appendix A are implemented by the mine. Key to this is establishing a base valuation prior to the project, effective implementation of mitigation measures included in the EIA and EMP report and compensation (if mine-related loss of land use and/or economic activity occurs after mitigation).

In this regard, the significance of the mitigated impact reduces to medium-low as although the severity and duration are reduced, mitigation measures require careful monitoring to ensure that they are implemented effectively.

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Mitigated	L	L	M	L	M-L	M-L

7.3 DEFINITION OF CRITERIA USED

Both the criteria used to assess the impacts and the method of determining the significance of the impacts is outlined in Table 20. This method complies with the method provided in the EIA guideline document. Part A provides the approach for determining impact consequence (combining severity / nature, spatial scale and duration) and impact significance (the overall rating of the impact). Impact consequence and significance are determined from Part B and C. The interpretation of the impact significance is given in Part D. Unmitigated scenario is considered for each impact.

7.4 PHASES AND TIMEFRAMES OF POTENTIAL IMPACTS

An indication of the phases in which impacts could occur is included in Section 7.2. This section also provides an indication of the duration of potential impacts. Potential impacts associated with the project have the potential to occur in almost all project phases and on a continuous basis if unmitigated. With the implementation of the mitigation as presented in Section 19 and Appendix A, the monitoring programmes as presented in Section 21 and the emergency response procedures as presented in Section 20 the timeframe of potential impacts will be reduced significantly.

TABLE 20: CRITERIA FOR ASSESSING IMPACTS

PART A: DEFINITION AND CRITERIA		
Definition of SIGNIFICANCE		**Significance = consequence x probability**
Definition of CONSEQUENCE		**Consequence is a function of severity / nature, spatial extent and duration**
Criteria for ranking of the SEVERITY/NATURE of environmental impacts	**H**	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action. Irreplaceable loss of resources.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints. Noticeable loss of resources.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints. Limited loss of resources.
	L+	Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	H+	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.
Criteria for ranking the DURATION of impacts	**L**	Quickly reversible. Less than the project life. Short term
	M	Reversible over time. Life of the project. Medium term
	H	Permanent. Beyond closure. Long term.
Criteria for ranking the SPATIAL SCALE/ EXTENT of impacts	**L**	Localised - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national

PART B: DETERMINING CONSEQUENCE					
SEVERITY / NATURE = L					
DURATION	Long term	**H**	Medium	Medium	Medium
	Medium term	**M**	Low	Low	Medium
	Short term	**L**	Low	Low	Medium
SEVERITY / NATURE = M					
DURATION	Long term	**H**	Medium	High	High
	Medium term	**M**	Medium	Medium	High
	Short term	**L**	Low	Medium	Medium
SEVERITY / NATURE = H					
DURATION	Long term	**H**	High	High	High
	Medium term	**M**	Medium	Medium	High
	Short term	**L**	Medium	Medium	High
			L	**M**	**H**
			SPATIAL SCALE / EXTENT		

PART C: DETERMINING SIGNIFICANCE					
PROBABILITY (of exposure to impacts)	Definite/ Continuous	**H**	Medium	Medium	High
	Possible/ frequent	**M**	Medium	Medium	High
	Unlikely/ seldom	**L**	Low	Low	Medium
			L	**M**	**H**
			CONSEQUENCE		

PART D: INTERPRETATION OF SIGNIFICANCE	
Significance	**Decision guideline**
High	It would influence the decision regardless of any possible mitigation.
Medium	It should have an influence on the decision unless it is mitigated.
Low	It will not have an influence on the decision.

***H = high, M= medium and L= low and + denotes a positive impact.**

8 COMPARATIVE ASSESSMENT OF IDENTIFIED LAND AND DEVELOPMENT ALTERNATIVES

8.1 ALTERNATIVE LAND USES WHICH COULD BE IMPACTED ON

The site is currently used for game farming, cattle farming, hunting and residential. Surrounding land uses are similar to this with the additional of irrigated crop farming and larger scale hunting and tourism operations (farms providing accommodation) (Section 1.3.1).

As an alternative to the development of the mine, these current land uses could continue with the addition of larger scale hunting and tourism activities as seen in the broader area. A key limiting factor for further development is the availability of water resources. No other land uses are considered feasible at this stage, given the surrounding land uses.

The proposed mining development will temporarily prevent the current land uses on site from continuing, for the life of the mine. At closure, it is expected that with mitigation, approximately 760ha associated with open pit, TSF and waste dumps will be compromised forever but that the remaining areas could be used for grazing and hunting.

8.2 RESULTS OF SPECIALIST COMPARATIVE LAND USE ASSESSMENT

A comparative land use assessment was undertaken by the socio-economic specialist, based on information provided by the land use specialist. Results from the study informed the impact assessments described in Sections 7.2.11 and 7.2.18. Full copies of the specialist reports are included in Appendix P and Appendix S, respectively.

9 LIST OF SIGNIFICANT IMPACTS

A list of significant impacts, when considered **without mitigation**, as identified in the assessment conducted in Section 7 is provided below.

- Hazardous structures / excavations (high)
- Loss of soil resources and associated natural land capabilities (high)
- Physical destruction and general disturbance of biodiversity (high)
- Alteration of drainage patterns (including ephemeral pan-like structures) (medium)
- Pollution of surface water resources (high)
- Dewatering impacts on third party users (high)
- Contamination of groundwater (high)
- Increase in air pollution (medium-high)
- Increase in disturbing noise levels (medium-high)
- Negative landscape and visual impacts (high)
- Loss of current land uses (high)
- Blasting hazards (high)
- Project-related road use and traffic (high)
- Destruction of heritage resources (medium-high)
- Disturbance (indirect) of heritage resources (high)
- Economic impacts (positive and negative) (high)
- Informal settlements, safety, security and services and associated social ills (high)
- Relocation (high)
- Change in land values (high)

10 STAKEHOLDER ENGAGEMENT PROCESS

This section provides a description of the engagement process with interested and affected persons (IAPs) followed during the course of the environmental assessment process. It outlines how IAPs were identified, confirms the details of the engagement process (with supporting documentation included as appendices), and how issues raised have been addressed.

10.1 IDENTIFICATION OF INTERESTED AND AFFECTED PARTIES

The stakeholder engagement process commenced with a stakeholder analysis that was aimed at identifying parties to be involved during the environmental assessment process and associated communication structures. This was done through a deeds search of the relevant properties within the project site and immediately adjacent portions of land, social scans including site visits in the surrounding areas, networking and direct discussions with IAPs. Key stakeholders identified for the project include:

- **IAPs:**
  - landowners, land occupiers and communities on and surrounding the project areas
  - tribal authorities/communities
  - mines and industries in the area
  - non-government organisations and associations including farmer and agricultural unions
  - Koedoesrand Grondeienaars (landowners) Forum
- **Regulatory authorities:**
  - LEDET - Environment, Air Quality and Waste Management sections
  - National Department of Environment Affairs (DEA)
  - Provincial DMR
  - Provincial Department of Water Affairs (DWA)
  - South Africa Heritage Resource Agency (SAHRA) and/or Limpopo Heritage Resources Agency (LHRA)
  - National Department of Agriculture (NDA)
  - Provincial Department of Rural Development and Land Reform (DRDLR) (Land Affairs)
  - Limpopo Department of Parks and Tourism (LDPT)
  - Limpopo Department of Roads and Public Transport (LDRPT)
- **Local authorities:**
  - Waterberg District Municipality (WDM), Lephalale Local Municipality (LLM) and relevant ward councillors.

A full list of landowner names, local communities, other IAPs and non-government organisations consulted is provided in the IAPs and regulatory authorities' database included in Appendix D. The database is updated on an ongoing basis throughout the environmental process.

10.2 DETAILS OF ENGAGEMENT PROCESS

Stakeholder engagement is an integral component of any development process. The goal of stakeholder engagement is to facilitate and improve communication between stakeholders (including the applicant) in the interest of facilitating better decision-making and more sustainable development (DEAT, 2002). In accordance with the requirement of Chapter 6 of the EIA Regulations, 2006, a stakeholder engagement programme has been developed to set out a coordinated process through which IAPs are informed of the proposed development and environmental assessment process and provided with an opportunity to provide input into the project plan and proposed mitigation measures. By consulting with authorities and IAPs, the range of environmental issues to be considered in the EIA has been given specific context and focus. Included below is an outline of the process followed, and the people engaged. Refer to Section 10.3 for a list of issues that were identified during the engagement process.

10.2.1 STEPS IN THE PUBLIC PARTICIPATION PROCESS

Steps in the process that have been conducted to date are set out in Table 21 below.

TABLE 21: PARTICIPATION PROCESS WITH IAPS AND AUTHORITIES

Task	Description	Date
Notification - regulatory authorities and IAPs		
Application to DMR, LEDET and DEA	Formal applications were submitted to the relevant departments.	June and December 2010
Consultation with land claims commissioner	The land claims commissioner was consulted in order to verify if any land claims had been lodged on any of the proposed farms. Refer to Appendix C for a copy of the response received from the land claims commissioner.	October 2008 and June 2011
Social scan	A social scan of the Moonlight project site was conducted by Metago. The purpose of the social scans was: • to identify relevant municipal ward councillors, landowners, land occupiers, and other interested and affected parties; • to obtain contact details for IAPs; • to identify appropriate communication structures; and • inform IAPs of the project, upcoming public process and associated scoping and EIA/EMP processes. As part of the social scan, notification and information-sharing took place through informal discussions, focussed meetings and/or telephonic discussions. A record of discussions and minutes of meetings are included in Appendix E. Issues raised are included in the comments and response report in Appendix F. One output of the social scan is an IAP database (Appendix D).	June/July 2010

Task	Description	Date
Distribution of background information document (BID)	A background information document (BID) was compiled by Metago for information-sharing purposes. The purpose of the BID was to inform IAPs and authorities about the project, the environmental assessment process, possible environmental impacts and means of inputting into the environmental assessment process. Attached to the BID was a registration and response form, which provided IAPs with an opportunity to submit their names, contact details and comments on the project. BIDs were distributed to IAPs by email, post and fax using contact details obtained during the social scan, at the scoping meetings and by fax and/or e-mail to authorities on the project's public involvement database. A copy of the BID in English, Afrikaans, Sepedi and Setswana is attached in Appendix E.	August to October 2010
Site notices	Laminated A2 site notices in English, Afrikaans and Sepedi were placed at key conspicuous positions in and around the project sites. For Moonlight, this included: Lephalale local municipality entrance, Lephalale library, Waterberg district municipality, Koedoesrand farmers union hall in Baltimore, Mr Coetzee's property fence, Ga-Seleka store, Ga-Seleka Uncle John filling station, Ga-Seleka convenience store, Ga-Seleka Hospital, Ga-Seleka NTK, Marnitzkraal Lodge, Dr Pienaar's property fence, Tom Burke NTK store, Baltimore NTK store and Swartwater post office. Copies of the site notices are included in Appendix E together with photos of where the site notices were placed.	August 2010
Newspaper advertisements	Block advertisements were placed in one national and two local newspapers to cater for the different project sites. In this regard, advertisements were placed in The Star (27 August 2010), Bosvelder Bulletin (27 August 2010) and Capricorn Voice (25-27 August 2010). Copies of the advertisements are included in Appendix E.	August 2010
Scoping stage meetings and comments received		
Focussed stakeholder scoping meetings	Focussed stakeholder scoping meetings were held with stakeholder groups through the planned stakeholder engagement programme and/or requests received from IAPs. The meetings were held in English, Sepedi, Afrikaans, Setswana depending on the attendees present. The purpose of these focussed meetings was to identify and understand the stakeholder groups and to understand and agree communication structures to be used for the process. In addition to this, the purpose of the meetings was also to provide IAPs with an outline of the project and environmental assessment process, identify potential issues to be investigated further, provide input into the terms of reference for specialist studies and agree on the way forward. These groups included landowners and farmers at Moonlight and the Ga-Seleka tribal authority council. Minutes of the meetings are included in Appendix E. Issues raised are included in the comments and response report in Appendix F.	August and October 2010
Public scoping meetings	A public scoping meeting was held in Baltimore. The meeting was held in English and Afrikaans. The purpose of the meeting was to provide IAPs with an outline of the project and environmental assessment process, identify potential issues to be investigated further, provide input into the terms of reference for specialist studies and agree on the way forward. Minutes of the meetings are included in Appendix E. Issues raised are included in the comments and response report in Appendix F.	02 October 2010
Written comments	Written comments were received by Metago during the scoping process. Copies of the comments are included in Appendix E and a summary is included in the comments and response report in Appendix F.	August to November 2010

Task	Description	Date
Distribution of draft scoping report for review		
Authority review of draft scoping report	The following authorities were involved in the review process: DMR, LEDET, DEA, DWA, SAHRA and/or LHRA, NDA, DRDLR, LDPT, LDRPT, Waterberg District Municipality, Capricorn District Municipality, Lephalale Local Municipality, Molemole Local Municipality and Aganang Local Municipality.	July 2010 to January 2011
Public review of scoping report	Copies of the scoping report and summary were made available for public review at Koedoesrand Farmer's Union office in Baltimore, Baltimore Post Office, Ga-Seleka tribal office, Marnitzkraal Lodge, Koedoesrand Groundeienaars (Landowners) Forum , Lephalale Public Library and at Metago's offices in Fourways, Johannesburg.	November 2010
Scoping stage meetings held following the distribution of the report		
Regulatory authority scoping meeting	A regulatory authorities scoping meeting, including site visit, was held on 12 November 2010 at the request of some of the authorities. The purpose of the meeting was similar to that of the public scoping meetings, that is, to provide regulatory authorities with an outline of the project and environmental assessment process, identify potential issues to be investigated further, provide input into the terms of reference for specialist studies and agree on the way forward. Minutes of the meeting are included in Appendix C. Issues raised are included in the comments and response report in Appendix F.	November 2010
Additional IAP scoping meetings	At the request of specific stakeholder groups, additional scoping meetings were held in November 2010. These included: • a scoping meeting with the broader communities that fall under the Ga-Seleka traditional authority on 12 November 2010 – this meeting was arranged through the tribal office, and • a follow up meeting in Baltimore on the 13 November 2010 once the draft scoping report was distributed for review – notification for this meeting was done through the Koedoesrand Grondeienaars Forum at Moonlight as agreed to during the public scoping meeting. Metago was also invited to present the proposed project and environmental assessment process at a local municipality forum meeting. Minutes of the meetings are included in Appendix E. Issues raised are included in the comments and response report in Appendix F.	November 2010
Written comments	Written comments were received by Metago following the review of the draft scoping report. Copies of the comments are included in Appendix E, and a summary is included in the comments and response report in Appendix F.	November 2010 to January 2011
Withdrawal of original mining right application and submission of new mining right application – December 2010 – January 2011		
Updating - regulatory authorities and IAPs		
Newspaper advertisements	Block advertisements have been placed in one national and two local newspapers. In this regard, advertisements were placed in The Star (4 February 2011), Bosvelder Bulletin (4 February 2011) and Capricorn Voice (2-4 February 2011). Copies of the newspaper advertisements are included in Appendix E.	August 2010
Distribution of newsletter	A newsletter updating IAPs on changes relating to the project and environmental assessment process was distributed by Metago via post and email to all parties registered on the project's public involvement database. The newsletter notified IAPs that the final scoping report is available for review and invited IAPs to attend meetings were the proposed changes will be discussed. A copy of the newsletter in English, Afrikaans, Sepedi and Setswana is attached in Appendix E.	February 2011

Task	Description	Date
Stakeholder meetings	Follow-up meetings were held with IAP groups to provide them with an update on the project and environmental assessment process. The following meetings were held: • Bakenberg Traditional Authority • Seleka community • Koedoesrand District Farmers and landowners. Minutes of the meetings are included in Appendix E. Issues raised are included in the comments and response report in Appendix F.	February – March 2011
Distribution of final scoping report for review		
Authority review of final scoping report	The scoping report was submitted to the DMR, LEDET and DEA for review and consideration.	February 2011
Public review of scoping report	Copies of the final scoping report were made available to IAPs in the same manner as the draft scoping report was made available for review.	February 2011

10.2.2 SPECIALIST TEAM

Upon input from IAPs on the potential impacts that may arise as a result of the proposed development, several specialists (see Table 3 for a complete list of all appointed specialist, their roles and responsibilities) were appointed to assess the potential impact of the proposed development. Where required, specialists consulted with stakeholders directly during their specialist studies. Details are provided in the specialist reports included as appendices.

10.2.3 REVIEW OF EIA AND EMP BY REGULATORY AUTHORITIES

Seven copies of the draft EIA and EMP report were submitted to the DMR for review on 04 July 2011. At the same time, the report was uploaded electronically into the DMR electronic filing system.

Following public review, five copies of the final EIA and EMP report (including IAP comments) will be forwarded by Metago to LEDET and four copies to DEA in line with NEMA.

Once the DMR, LEDET and DEA have issued their respective records of decisions, the IAPs will be notified by e-mail and post in accordance with the instructions from the DMR, LEDET and DEA respectively.

10.2.4 REVIEW OF THE EIA AND EMP BY IAPS

Copies of the draft EIA and EMP report will be made available for public review at the following places:

- Koedoesrand Farmer's Union office in Baltimore
- Baltimore Post Office
- Ga-Seleka tribal office
- Marnitzkraal Lodge

- Koedoesrand Groundeienaars (Landowners) Forum c/o Riaan de Beer
- Lephalale Public Library
- Lephalale Local Municipality
- Metago's offices in Fourways, Johannesburg

Electronic copies of the report will be made available to IAPs on request (electronically on CD).

All comments received from IAPs during the review period will be forwarded to the DMR and included with the final report that is submitted to LEDET and DEA.

10.2.5 FEEDBACK OPEN DAYS

Two feedback open days have been arranged, one in Baltimore and one in Seleka. The purpose of these is to provide IAPs with:

- an opportunity to interact with specialist consultants
- an opportunity to discuss the outcomes of the EIA process
- a chance to submit comments on the EIA and EMP report.

The details of the feedback open days have been distributed to IAPs together with a summary of the EIA and EMP report.

10.3 MANNER IN WHICH ISSUES RAISED WERE ADDRESSED

Stakeholder meetings and public review of the scoping reports provided IAPs an opportunity to comment on the baseline environment and potential impacts of the project (including social and cultural impacts). **All views, issues and concerns raised have been captured into the comments and response report (Appendix F).** The comments and response report provides responses to issues raised and identifies where the issues have been addressed in the EIA and EMP report.

11 ADEQUACY OF PREDICTIVE METHODS AND ASSUMPTIONS, AND UNCERTAINTIES

This section identifies knowledge gaps and reports on the adequacy of predictive methods, underlying assumptions and uncertainties encountered in the compilation of specialist reports and this EIA and EMP report. Information is based on the specialist reports and findings of the Metago EIA team.

Technical project information

The EIA is being completed prior to the completion of the feasibility study. The level of detail for the technical information was therefore limited.

It is assumed that concentrate product will be transported by pipeline off-site. A separate transport EIA is being undertaken for this component of the project. The impact assessment and mitigation measures as presented in this report are based on this scenario. Should the transport EIA result in a different outcome, the relevant sections of this report would need to be revisited.

This report assumes that water will be available for the project from external sources. Apart from dewatering to ensure safe on-site mining conditions, there is no provision in this EIA report for sourcing water on site. It is expected that a separate EIA will be undertaken depending on the preferred water supply option.

Soils and land capability study

It has been assumed that the total area of possible disturbance was included as part of the area of study, that the mining plan as tabled has documented and catered for all actions and activities that could potentially have an impact on the environment, and that the recommendations made and impact ratings tabled for the soils and land capability will be re-assessed if the mine 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 are based on "composite" samples taken from the dominant soil types mapped in the study area.

The area in question has been mapped on a 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 mapped, and the interplay of geomorphological aspects (ground roughness, slope, aspect and geology etc.).

Accessibility on site was restricted in some instances due to the density of the natural bush and areas that had been subjected to historical over grazing, resulting in extremes of thorn bush and pioneer grasses. This inability to easily access portions of the site has led to some degree of uncertainty on portions of the study area albeit that the areas are moderately small in spatial extent and extrapolation from areas of similar geomorphology increased the ability to predict with better confidence the probable soil forms.

Biodiversity

Standard methods for assessment were used for flora and all faunal groups. These are believed by the specialist to be adequate for a sample of the biodiversity present.

The field surveys aimed at coinciding with the flowering times of most plants expected to occur on site and the peak periods of fauna activity. No natural aquatic ecosystems were found on site and therefore an aquatic assessment was not done.

There is always some measure of uncertainty in a sample, particularly with regards to how representative that sample is of the whole. The main uncertainties in this study were the possibility of species being overlooked in such a large study area and the lack of data for certain invertebrate groups.

Overlooked species

The floristic assessment was based on a single field survey during the rainy season, which was considered appropriate for the purposes of locating species of conservation concern. However, a number of species that flower in early or late summer may have been overlooked. Certain plant species, particularly geophytes, will only flower in seasons when conditions are optimal and may thus remain undetected over several seasons. Other plant species may be overlooked because of very small size and/or extreme rarity. A sampling strategy will always represent merely a subset of the true diversity of the study area.

No survey can cover all invertebrate species present, so the biodiversity estimates provided represent only a few indicator taxa; it is possible that diversity in other groups follows a significantly different pattern from these and hence re-establishment of the selected taxa is not a guarantee that rehabilitation has been equally successful for all invertebrates. A far greater number of invertebrate species belonging to less studied taxa will be present in the study area, and these may include many species that are rare or threatened. No quantified baseline surveys of indicator groups were carried out, although data to inform selection of information groups for future reference was gathered, on the understanding that such surveys will be carried out prior to development of the site if the project proceeds.

A single early/mid-summer invertebrate survey, with a brief follow-up just after mid-summer, was carried out; this was considered adequate for the taxa of conservation importance predicted for the site.

Experience has shown that obtaining sufficient data on scorpions, mygalomorph spiders and ground beetles to allow their meaningful inclusion in a monitoring programme is extremely time-consuming; these groups were therefore omitted from the quantified survey component of the field work and only surveyed for on the basis of checking for presence of protected and / or rare species.

Lack of data for invertebrate groups

Assessment of the importance of the study area for invertebrates is hampered by the lack of detailed knowledge on most invertebrate species and groups. The assessment in the specialist report was thus based primarily on 1) a desktop assessment of the likelihood of occurrence of species of known conservation significance, and 2) adjustment of these probabilities where confirmation of presence or absence of individual species on the site and/or within specific habitat types was obtained during the field survey. Due to seasonal constraints, for some species such confirmation was not possible during the field survey carried out.

Hydrology

Hydrological calculations were based on climatic data sourced from the Marnitz station, north of the site. Although this station closed in 1980 it provides the longest rainfall record and is at the same altitude as the project site. The data also provides a conservative assessment for hydrological calculations.

Standard methods for the calculation of flood peaks for specific return periods were used based on inputs using as much site specific information as possible. The calculation of flood peaks remains an estimation with uncertainties increasing with higher return periods.

Assumptions are based on inputs into flood hydrology modelling being as representative as possible. Where uncertainties are prevalent, a degree of conservatism was used.

Groundwater

This study required significant input of information pertaining to the project description. The information used in the study is included in the specialist report. This information was provided by the technical project team and it is assumed that this information is correct.

It is important to note that a numerical groundwater model is a representation of the real system. It is therefore at most an approximation, and the level of accuracy depends on the quality of the data that are available. In addition, the model assumes that the fracture network is connected enough to be simulated as a porous media at the regional scale. As a result to develop a model of an aquifer system, certain

assumptions have to be made and are necessary to allow numerical stability and robustness of the model. More specific assumptions relating to the groundwater model include:

- Prior to development the groundwater system is in equilibrium and therefore in steady state.
    - In any natural system, natural climatic variations (as well as human activities) are constantly affecting the equilibrium of the groundwater system. Nevertheless, steady state is an appropriate starting point for any numerical model where the objective is to determine the impact on groundwater associated with a specific stressor.
- In the absence of a time series of groundwater level data for the mining area, a steady-state model was chosen for the groundwater model.
- The aquifer is unconfined to semi-confined and recharged directly by rainfall. No other recharge sources exist.
- Constant head boundaries were used to simulate the Lephalala and Mogolakwena Rivers. Constant head boundaries can potentially allow a limitless supply (or sink) of groundwater to or from a system, however, these boundaries were regarded as a sufficient distance away from the proposed mining area to minimise this effect.
- A conservative approach was followed so that the real case should be better than the modelled case.
- The excavation of the open pit was simulated as a one-time excavation for a single time step. This condition will apply a very high stress on the system and is likely to overestimate groundwater inflows, as it does not account for the increasing dewatering of the aquifer with time due to pit inflows and hence reduced yields.
    - In the absence of transient data at the time of the study (e.g. long-term groundwater levels and mine development plans) the chosen approach is justified and is considered an acceptable approach.
    - Results of this kind of simulation allow having a first estimation of pumping requirements or mine dewatering.
- A pit depth of 160 m was assumed over the proposed lateral extent of the open pit.
- In the absence of data for the leachate composition, a constant unit (recharge) source concentration was assumed. All source concentrations were specified as 100% and the modelled plumes represent therefore percentages of actual source concentrations.

Numerical groundwater models are the best tool available to quantify groundwater and mass balances, which can be used to make decisions. Improvements to the model predictions can be realized through appropriate hydrogeological analysis and data collection to fulfil critical information gaps.

Air

Available on-site meteorological data were not available for the site and use was made of calculated UMD as provided by the SAWS. During the project scoping phase, 2009 was the most recent year for meteorological data. The potential exist for variations in the meteorological parameters between years. However, historical meteorological data for Lephalale indicate consistent north-easterly winds for this region (GES, 2009 as cited in Airshed 2011). This can be updated to cover a longer meteorological period with the update of the model, once the mine is operational.

No ambient monitored concentration data or dust fallout data are available for the site. A general description of the air quality within the greater Waterberg District was obtained from the Waterberg Air Quality Management Plan compiled in 2009. The design of a dust monitoring system forms part of this study.

Emissions were based on the process description and mine layout plan as provided.

Since it is a proposed mine, no site specific particle size fraction data for the various sources were available and use was made of information obtained from existing iron ore mines in the region. Particle size distribution was provided for the TSF and is assumed to present a worst-case scenario. The surface of TSFs at other iron ore mines tend to harden if undisturbed and it is likely that the predicted windblown dust from the TSF followed a conservative approach. Once the mine is operational, particle size distribution should be determined for the various wind dependent sources and the dispersion model simulations updated.

Routine emissions for the proposed operations were simulated. Blasting is regarded as non-routine (upset) event, occurring only intermittently for short durations. Blasting was accounted for in the modelling, simulated as if occurring for an hour every day.

Dispersion models don't contain all the features of a real system but contain the feature of interest for the management issue or scientific problem to be solved (MFE, 2001 as cited in Airshed 2011). Gaussian plume and puff models are regarded to have an uncertainty range of between -50% to 200%. It has generally been found that the accuracy of off-the-shelf dispersion models improve with increased averaging periods. The accurate prediction of instantaneous peaks are the most difficult and are normally performed with more complicated dispersion models specifically fine-tuned and validated for the location. The duration of these short-term, peak concentrations are often only for a few minutes and on-site meteorological data are then essential.

The dispersion model (AERMOD) cannot compute real time mining processes, therefore average mining process throughputs were utilised. Thus even though the nature of open pit mining operations (pit utilisation and roads) change over the life of mine, the proposed open pit mining area was modelled to

reflect the worst-case condition (i.e. resulting in the highest impacts). For example, retention of dust generated within the open pit will result in up to 50% reduction in TSP emissions and 5% of PM10 emissions according to the NPi but was modelled as if at surface without any pit retention.

The impact assessment was limited to airborne particulates (including TSP and PM10). Mechanical operations such as those associated with mining give rise to particles mainly in the TSP and PM10 fraction whereas combustion sources result in the finer PM2.5 fraction. For this reason, the main focus of this study was on TSP and PM10.

The construction, decommissioning and closure phases were assessed qualitatively. It was assumed that all processing operations will have ceased by the closure phase. The potential for impacts during this phase will depend on the extent of demolition and rehabilitation efforts during closure and on features which will remain. Information regarding the extent of demolition and/or rehabilitation procedures were limited and therefore not included in the emissions inventory or the dispersion modelling.

Noise

The baseline ambient noise levels were measured and estimated based on a physical and aural inspection, aided by sampling and probing measurements. It should be cautioned that ambient noise in itself is not absolutely constant, the level averaged over daytime, night-time or a 24 hour period is subject to a degree of daily fluctuation and seasonal variance. The results of the survey are based on samples that were taken at single points over a certain period of time. As in any noise monitoring survey, the results are valid for the meteorological and other conditions which prevailed during the time of the investigation.

According to Acusolv, confidence in the predictions, assuming the information supplied by the mine is valid, is high. It should nevertheless be cautioned that predicted noise levels and contours are not to be taken as absolute. Noise predictions are based on internationally accepted and proven methods. Sufficient information was available for acoustic modelling of mining and plant noise, as well as the prediction of road traffic noise for the preferred pipeline product transport method. Although the confidence level in the acoustic model is high, predicted levels are valid for the assumptions made in respect of meteorological and other conditions. Since meteorological conditions in particular are highly variable, distant noise levels produced by a source at a constant acoustic output will vary considerably, even during the course of a single day-time or night-time period. Variance in noise level due to changes in atmospheric conditions increases with distance from the source.

Uncertainties in the information provided are relatively small and do not compromise the validity of the significance ratings or the main findings of the specialist study.

Visual

This study required significant input of information pertaining to the project description. The information used in the study is included in the specialist report. The methods used are standard best practise visual assessment methods. The only assumptions made are that the residents of houses within the mine boundary will move from the area and the information provided by the technical project team is correct.

Land use

All the impacts listed and discussed in the specialist report were derived from the specialist studies and reports conducted by the relevant specialist areas, where necessary interpretation of the impacts on land use were made, however the impacts considered are largely those provided by the individual specialists.

The land use specialist assumed that each specialist gave a correct representation of the potential impacts that will result from the proposed projects. Should these impacts not be correct, it will influence the conclusions of the report.

The scope of the study was neither a land valuation process nor an extensive game and cattle count survey. The focus of this report was to determine the current land use in the area and to determine how the proposed project will impact and possibly threaten the current land-use on farming units at varying distances from the proposed mining operation.

Most people/land users did not return the questionnaires and therefore it was not possible to determine whether some farms may be breeding farms for rare game species. Due to a lack of information from these farms, the general land-use of the area (cattle and game farming) was assumed to be the enterprise on their land.

Veld condition assessment

The veld condition assessment was limited to the project site and provides a snap-shot of current veld condition. Given the relatively uniform nature of the area and land uses, this was assumed to be adequate for the purposes of this study.

The approach of this survey was to assimilate the veld condition of each site into the broader ecological units identified in the terrestrial ecology survey; for this purpose, 18 sites were deemed sufficient.

Blasting

Considering the stage of the project, the blast specialist believes that the data observed was sufficient to conduct the initial study. Surface surroundings change continuously and this should be taken into account prior to any final design. The specialist report is based on data provided by the technical project team and internationally accepted methods and methodology used for calculations and predictions.

Traffic

This study required significant input of information pertaining to the project description. The information used in the study is included in the specialist report. This information was provided by the technical project team and it is assumed that this information is correct.

The condition of the road surface did form part of the traffic study scope. This is usually an in-depth study, requiring disturbance to the road surface, and conducted by a pavement design specialist. It is expected that, if needed, this type of study will be done in consultation with the roads authorities during the detailed design phase of the project.

The traffic specialist has noted that the proposed number of heavy vehicle trips that could be generated by road transport of product, would have a manageable impact at the relevant intersections under investigation in terms of safety, capacity and levels of service. However, the vast number of heavy vehicle movement on the relevant road network would be a major concern in terms of road surface deterioration; safety, capacity and level of service at other intersections that were not investigated as part of the traffic study, other road users and movement of heavy vehicles through Lephalale. Should road transport be chosen as the preferred option during the Transport EIA, then the impact assessment and mitigation measures presented in this report will need to be revisited.

Heritage and cultural aspects

Heritage and cultural

It is possible that the study may have missed heritage resources in the project area as heritage sites may occur in thick clumps of vegetation while others may lie below the surface of the earth and may only be exposed once development commences. If any heritage resources of significance is exposed during the project the South African Heritage Resources Authority (SAHRA) will be notified immediately, all construction activities will be stopped and an archaeologist accredited with the Association for Southern African Professional Archaeologist (ASAPA) will be notified in order to determine appropriate mitigation measures for the discovered finds.

The methods used and underlying assumptions are based on human effort (search and observe, outcomes of earlier/previous surveys in wider area) and as such is subject to human error.

Palaeontological

The methods used and assumptions made are very adequate for this study area as most of the rocks of the area are Precambrian in age and thus have almost no chance of delivering fossils. Precambrain rocks do not have fossils of Metazoa, except for the youngest Precambrain rocks which are not present in the area affected.

It is not possible to determine whether the overlying Quaternary sand deposits may have fossils buried in them. This will only be determined if they are unearthed by construction activities.

Socio-economic

This study required significant input of information pertaining to the project description. The information used in the study is included in the specialist report. This information was provided by the technical project team and it is assumed that this information is correct.

Geochemistry

No tailings or waste rock sample were available for testing during the EIA. Project specific samples of core material (oxidised and fresh mineralisation) from the 2008 drilling program were used for geochemical analyses (a mineralogical assessment, acid base accounting and paste pH testing). The methodology and techniques used follow international best practice as found in the Guidelines from the British Columbia Ministry of Employment and Investment of Canada The underlying assumptions were consistent and adequate with the type of deposit in this study and within the limits of the methods used. There is always some degree of uncertainty in any study; however the results presented are consistent with this type of deposit.

It is planned by the feasibility team to undertake leachate tests during the definitive feasibility study. If required, the results of these tests will be made available to the regulatory authorities and will be used to inform any changes required to the management of the residue facilities.

Once tailings and representative waste rock samples can be obtained, Turquoise Moon will conduct acid base accounting testing and acid leach tests to verify the initial findings of the feasibility study. If required, the results of these tests will be made available to the regulatory authorities and will be used to inform any changes required to the management of the residue facilities.

Engineering design

The run of mine (ROM) production is expected to be 6.5 million dry tonnes per annum, that will be converted into: 2.819 million dry tonnes of product (43.4%), 3.291 million dry tonnes of tailings (50.6%) and 0.390 million dry tonnes of discard/waste rock (6.0%). The conversion of ROM to tailings is therefore approximately 50.6%. The life of mine is anticipated to be 30 years (or more). For TSF design purposes, a more conservative approach has been adopted whereby it is assumed that 6.5 million dry tonnes ROM will generate 4.266 million dry tonnes of tailings i.e. the conversion of ROM to tailings is approximately 65.6%.

The predictive methods and tools used in the analyses and preliminary design of the TSF are considered best practise, and are based on the legislative requirements above (especially the MPRDA), as well as,

industry established standards and guidelines, namely: SANS 10286:1998, "Code of Practise for Mine Residue" and the Chamber of Mines of South Africa, 1996, "Guidelines for Environmental Protection – The Engineering Design, Operation and Closure of Metalliferous, Diamond and Coal Residue Deposits".

All underlying assumptions made throughout the analyses and preliminary design of the TSF have been conservative (i.e. presenting the worst case) until such time that it can be proven otherwise. Wherever possible, these assumptions have also been based on similar TSF operations and/or design philosophies.

Uncertainties regarding any information provided and/or used in the analyses and preliminary design of the TSF have been highlighted in the specialist report and recommendations have been made that will need to be addressed during the bankable feasibility design phase, detailed design phase and/or operations phase of the TSF.

Closure cost calculations

The closure cost calculations are based on the technical information and site layout as provided by the technical project team, and are assumed accurate at the time of compiling this report.

Cumulative impacts

The baseline conditions as presented in the EIA and EMP report are presented taking into account existing activities that may influence the environment.

With respect to other mining-related projects, Metago is aware of one other prospecting right application in the surrounding area, namely the Capricorn Project, a prospecting right application for vanadium and iron ore (located approximately 25km north of the project site). The status and timing of this application is unknown. Only if both projects, the current Moonlight project and proposed Capricorn project, are approved and developed could this result in potential cumulative impacts. Until such time, this project cannot realistically be taken into account.

12 ARRANGEMENTS FOR MONITORING AND MANAGEMENT OF IMPACTS

This section describes the arrangements for monitoring and management of environmental impacts. It identifies the impacts that require monitoring programmes and outlines the functional requirements, roles and responsibilities and timeframes for the monitoring programmes. Further detail on each monitoring programme is included in Section 21.

12.1 IMPACTS THAT REQUIRE MONITORING PROGRAMMES

Impacts that require monitoring include:

- Hazardous excavations and structures (failure of TSF and water dams)
- Physical destruction and general disturbance of biodiversity
- Dewatering impacts on third party users
- Contamination of groundwater
- Increase in air pollution
- Increase in disturbing noise levels
- Blasting hazards
- Project-related road use and traffic

In addition to the above, the commitments as included in the EMP report will require monitoring to a) ensure that they are being implemented and b) that they are effective in mitigating potential impacts on the environment, socio-economic conditions of third parties and heritage/cultural aspects. This will be done through regular internal auditing by mine personnel.

12.2 FUNCTIONAL REQUIREMENTS OF MONITORING PROGRAMMES

The purpose of the monitoring programmes is to review the mine's impact on various aspects of the environment and to report on changes needed to the management programme as proposed in this report.

As a general approach, the mine will ensure that the monitoring programmes comprise the following:

- a formal procedure
- appropriately calibrated equipment
- where samples require analysis they will be preserved according to laboratory specifications
- an accredited, independent, commercial laboratory will undertake sample analyses
- parameters to be monitored will be identified in consultation with a specialist in the field and/or the relevant authority
- if necessary, following the initial monitoring results, certain parameters may be removed from the monitoring programme in consultation with a specialist and/or the relevant authority
- monitoring data will be stored in a structured database

- data will be interpreted and reports on trends in the data will be compiled by an appropriately qualified person on a quarterly basis
- both the data and the reports will be kept on record for the life of mine.

12.3 ROLES AND RESPONSIBILITIES

The roles and responsibilities for the execution of the monitoring programmes are defined below.

- Environmental manager:
  - ensure that the monitoring programmes are scoped and included in the annual mine budget
  - identify and appoint appropriately qualified specialists/engineers to undertake the programmes
  - appoint specialists in a timeously manner to ensure work can be carried out to acceptable standards

12.4 TIMEFRAMES FOR MONITORING AND REPORTING

The timeframes for monitoring and reporting thereof are detailed in the monitoring programme (see Section 21). A summary is provided below:

Programme	Timeframe and frequency	Reporting
TSF, waste dumps and water dams	All project phases Daily and monthly by dam operators and quarterly by professional engineer	Monthly internally and quarterly by professional engineer
Biodiversity	All project phases Annually	Annually by specialist
Groundwater and process water	All project phases Monthly (water levels), quarterly (water qualities), annually (update groundwater model and climatic water balance)	Quarterly and annually by specialists Annually to Department of Water Affairs (DWA)
Air	All project phases Quarterly (dust) and daily (PM10)	Quarterly and annually by specialist Annually to Department of Mineral Resources (DMR) and Limpopo Department of Economic Development, Environment and Tourism (DEDET)
Noise	From the start of construction to the end of decommissioning Annually	Annually by specialist
Blasting	During operation of the mine Every blast	Monthly by specialist
Traffic aspects	From the start of construction to the end of decommissioning Annually during construction and decommissioning, every 5 years during operation	Annually by specialist Every two years to relevant authorities
Internal auditing	From start of construction to end of closure Every two weeks during construction and decommissioning, and quarterly during operation and closure.	Monthly internally during construction and decommissioning Quarterly internally during operation and closure
External auditing	From start of construction to end of closure Every two years	Every two years to DMR

13 TECHNICAL SUPPORTING INFORMATION

Technical and supporting information included as appendices to this report are listed below.

- conceptual management plans (Appendix A)
- project alternatives considered (Appendix B)
- information-sharing with regulatory authorities (Appendix C)
- stakeholder database (Appendix D)
- information-sharing with IAPs (Appendix E)
- comments and response report (Appendix F)
- soil and land capability specialist report (Appendix G)
- biodiversity specialist report (Appendix H)
- veld assessment and grazing management specialist report (Appendix I)
- hydrological specialist report (Appendix J)
- geo-hydrological specialist report (Appendix K)
- air quality specialist report (Appendix L)
- noise specialist report (Appendix M)
- visual specialist report (Appendix N)
- land use study (Appendix P)
- heritage specialist report (Appendix Q)
- palaeontological specialist report (Appendix R)
- socio-economic specialist report (Appendix S)
- traffic specialist report (Appendix T)
- preliminary design report for the tailings storage facility and return water dam (Appendix U)
- water balance specialist report (Appendix W)

SECTION 2 – ENVIRONMENTAL MANAGEMENT PROGRAMME

14 ENVIRONMENTAL OBJECTIVES AND SPECIFIC GOALS FOR CLOSURE

14.1 ENVIRONMENTAL ASPECTS THAT DESCRIBE THE PRE-MINING ENVIRONMENT

Environmental aspects that describe the pre-mining environment as informed by the baseline description (Section 1) are listed below. This list serves to guide the setting of environmental objectives for mine closure.

- Relatively flat topography
- Soils that support arable land capability (with good water management), low intensity grazing and wilderness potential
- Biodiversity that ranges in sensitivity from very low to medium-high based on vegetation communities, vertebrate and invertebrate groups identified on site
- Ephemeral drainage patterns
- Moderate to good groundwater quality
- Stable water table providing groundwater as a water supply source
- Quiet rural environment
- Open wilderness bushveld supporting low intensity agriculture and tourism related industries

14.2 MEASURES REQUIRED FOR CONTAINMENT OR REMEDIATION

Measures required to contain or remedy any causes of pollution or degradation or migration of pollutants, both for closure of the mine and post-closure are listed below.

- Implement a waste management procedure for general and hazardous waste on site throughout the project life
- Ensure immediate clean-up of any spills as per the emergency response procedures
- Establish and maintain dirty stormwater control measures in line with regulatory requirements, until such time as potentially polluting areas are rehabilitated
- Contain pollutants at source by storing and handling potentially polluting substances on impermeable substrates, within bunded areas and with the capacity to contain spills
- Design, construct and operate the TSF with decant and drainage systems and runoff control measures
- Design, construct and operate the waste dumps with runoff control measures
- Rehabilitate the site in line with a detailed closure plan to be developed at least five years prior to decommissioning

Further detail on the proposed action plans and mitigation measures is included in Section 19 and Appendix A.

15 ENVIRONMENTAL OBJECTIVES AND SPECIFIC GOALS FOR MANAGEMENT OF IDENTIFIED ENVIRONMENTAL IMPACTS

The environmental objectives and specific goals for the management of identified environmental impacts are detailed in this section.

15.1 IMPACTS THAT REQUIRE MONITORING PROGRAMMES

Impacts that require monitoring include:

- Hazardous excavations and structures (failure of TSF and water dams)
- Physical destruction and general disturbance of biodiversity
- Dewatering impacts on third party users
- Contamination of groundwater
- Increase in air pollution
- Increase in disturbing noise levels
- Blasting hazards
- Project-related road use and traffic
- Heritage aspects

15.2 SOURCE ACTIVITIES

The source activities of potential impacts which require management are detailed in Section 2.3 and listed below.

- Exploration
- Earthworks
- Changes to public roads
- Waste rock management
- Tailings management
- Water supply and use
- Stormwater management
- General and hazardous waste management
- Site support services
- Site/contract management
- Rehabilitation
- Site preparation
- Civil works
- Open pit mining
- Mineral processing operations
- Power supply and use
- Process water management
- Transport systems
- Sewage sludge management
- Storage and maintenance services/ facilities
- Demolition
- Maintenance and aftercare

15.3 MANAGEMENT ACTIVITIES

Management activities which will be conducted to control the project actions, activities or processes which have the potential to pollute or result in environmental degradation are detailed in Section 19 and Appendix A.

15.4 ROLES AND RESPONSIBILITIES

Prior to the start of the project, Turquoise Moon will establish a management team for the mine. The key personnel in terms of this EIA and EMP report will be a Safety, Health, Environment (SHE) Manager and Human Resources Manager. As a minimum, these roles as they relate to the implementation of monitoring programmes and management activities will include:

- SHE manager:
  - ensure that the monitoring programmes and audits are scoped and included in the annual mine budget
  - identify and appoint appropriately qualified specialists/engineers to undertake the programmes
  - appoint specialists in a timeously manner to ensure work can be carried out to acceptable standards
- Human Resources manager:
  - manage labour-related aspects for the mine
  - liaise with the relevant structures in terms of the commitments in the SLP
  - ensure that commitments in the SLP are developed and implemented in a timeously fashion
  - establish and maintain good working relations with surrounding communities and landowners

16 ENVIRONMENTAL OBJECTIVES AND SPECIFIC GOALS FOR SOCIO-ECONOMIC CONDITIONS

16.1 ASPECTS OF THE SOCIO-ECONOMIC CONDITIONS

The socio-economic conditions in the vicinity of the mine are described in Section 1.3.5.

16.2 OBJECTIVES AND GOALS

Specific environmental objectives and goals to control, remedy or stop potential impacts emanating from the mine which may impact on communities and IAPs identified in the social and labour plan are described below. The information is presented in tabular format (Table 22).

TABLE 22: ENVIRONMENTAL OBJECTIVES AND GOALS – SOCIO-ECONOMIC CONDITIONS

Aspect	Environmental objective	Goals
Land uses	To prevent unacceptable impacts on surrounding land uses and their economic activity	To co-exist with existing land uses To negatively impact existing land uses as little as possible
Blasting	To minimise the potential for third party damage and/or loss	To protect third party property from mine-related activities, where possible Where damage is unavoidable, to work together with the third parties to achieve a favourable outcome
Traffic	To reduce the potential for safety and vehicle related impacts on road users	To ensure the mine's use of public roads is done in a responsible manner
Socio-economic	To enhance the positive economic impacts and limit the negative economic impacts To limit the impacts associated with inward migration	To work together with existing structures and organisations To establish and maintain a good working relationship with surrounding communities and land owners

17 ENVIRONMENTAL OBJECTIVES AND SPECIFIC GOALS FOR HISTORICAL AND CULTURAL ASPECTS

Environmental objectives and goals in respect of historical and cultural aspects are listed in the table below (Table 23).

TABLE 23: ENVIRONMENTAL OBJECTIVES AND GOALS – HISTORICAL AND CULTURAL ASPECTS

Aspect	Environmental objective	Goals
Heritage and cultural	To prevent unacceptable loss of heritage resources and related information	To protect heritage resources where possible If disturbance is unavoidable, then mitigate impact in consultation with a specialist and the SAHRA and in line with regulatory requirements
Palaeontological resources	To minimise loss of fossil resources and related information	To protect palaeontological resources where possible through mitigation If disturbance is unavoidable, then provide opportunity for research

18 APPROPRIATE TECHNICAL AND MANAGEMENT OPTIONS

18.1 PROJECT ACTIONS, ACTIVITIES AND PROCESSES

All activities associated with the project have the potential to cause pollution or environmental degradation. These are described in Section 2 of this EIA and EMP report.

18.2 TECHNICAL AND MANAGEMENT OPTIONS

Appropriate technical and management options chosen to modify, remedy, control or stop any action, activity or process associated with the project which will cause significant impacts on the environment, socio-economic conditions and historical and cultural aspects are listed in the table below (Table 24) and described in detail in Section 19 and Appendix A. In addition to these, the mine will implement an environmental management system to assist in the implementing and monitoring of commitments included in this EIA and EMP report.

TABLE 24: TECHNICAL AND MANAGEMENT OPTIONS

Potential impact	Technical and management options
Hazardous structures	Establish and maintain site security measures Control site and facility access Appropriate design of stockpiles with the potential to fail (and by qualified person) Establish and maintain infrastructure security measures Undertake third party awareness training Implement emergency response
Loss of soil resources	Restrict project footprint Implement a site-specific soil management plan Establish and maintain containment measures for hazardous substances Establish and maintain stormwater controls Implement a non-mineralised waste management procedure Rehabilitate disturbed areas (as soon as possible) and the site (at decommissioning)
Biodiversity	Restrict project footprint Develop and implement a biodiversity management plan Establish and maintain containment measures for hazardous substances Establish and maintain stormwater controls that meet regulatory requirements Control dust generation Implement a monitoring programme Rehabilitate disturbed areas (as soon as possible) and the site (at decommissioning)
Alternation of drainage patterns	Appropriate design of stormwater controls (and by qualified person) Restrict project footprint Implement and maintain stormwater controls that meet regulatory requirements Implement emergency response

Potential impact	Technical and management options
Surface water pollution	Appropriate design of polluting facilities and pollution prevention facilities (and by qualified person) Control access to the site and infrastructure Implement and maintain stormwater controls that meet regulatory requirements Implement site-specific soil management plan Install flow meters and refine water balance Implement a monitoring programme (water use, process water quality, rainfall-related discharge quality) Maintain groundwater model with monitored results Implement emergency response
Groundwater dewatering	Verification hydrocensus of boreholes in zone of influence Purchase/lease farms within application boundary Operate in line with water use license (to be obtained) Implement a monitoring programme (water levels on and off site) Maintain groundwater model with monitored results Revisit mitigation measures if updated model predictions change Compensation for loss
Groundwater contamination	Appropriate design of polluting facilities (and by qualified person) Construct and operate professionally engineered TSF and waste dumps Appropriate lining of dirty water dams Verify leachate quality of TSF and overburden once site is operational Implement a monitoring programme (water qualities on and off site) Maintain groundwater model with monitored results Revisit mitigation measures if updated model predictions change Compensation for loss Rehabilitate disturbed areas (as soon as possible) and site (at decommissioning) Implement emergency response
Air pollution	Concentrate activities as close to each other as practically possible Develop and implement air quality management plan Establish dust collection measures at equipment Control dust plumes Implement a dust monitoring programme Implement a PM10 monitoring programme Establish and maintain a meteorological station on site
Disturbing noise	Maintenance of equipment and machinery Establish and maintain noise berms, where possible Reduce operating hours of noise polluting equipment Blast when conditions are more favourable Establish and maintain acoustic barriers Educate workers Investigate use of alternative reverse alarms Implement a monitoring programme (off site) Compensation for economic loss Implement grievance procedure

Potential impact	Technical and management options
Landscape and visual	Restrict land disturbance Retain natural vegetation as screens Establish screens, if needed Paint buildings and structures in colours that reflect landscape Control dust plumes Careful use of night lights Prevent litter Operate waste dumps as low as possible Concurrent rehabilitation of facilities such as the TSF Input from a professional landscape architect in closure design Rehabilitate disturbed areas (as soon as possible) and site (at decommissioning) Compensation for economic loss
Land uses	Purchase/lease farms within application boundary Effective implement of mitigation measures Compensation for economic loss
Blast hazards	Design and implement blast to meet threshold criteria Control of blasts and use of electronic detonators Conduct pre-blast survey Restrict blast times Set a standard blast time and communicate blast schedule with stakeholders Monitor blasts Rectify damage to third party structures Compensation for economic loss
Traffic	Appropriate design of road improvements and road diversion (and by qualified person) Approval of road improvements and road diversion from the relevant roads department Establish joint road maintenance plan Upgrade intersections Divert district road around mine infrastructure Provide traffic and information signs, road markings and lighting Provide dedicated taxi and bus stops Co-ordinate heavy loads with roads department Comply with hazchem requirements for transport of hazardous substances Monitor and evaluate project use of roads Compensation for economic loss Implement emergency response
Heritage (and cultural)	Apply for permits to disturb heritage sites (if applicable) Obtain permission to exhume and relocate graves Limit project footprint to that identified in this report Mark remaining heritage sites on plan Inspect sites for encroachment and/or damage Educate workers Implement emergency response
Mineral sterilisation	Design site taking cognisance of potential ore reserves
Economic (positive and negative) Informal settlements, safety, security and services	Establish and implement clear and effective recruitment, training, procurement, housing and transport policies and procedures Establish and participate in law enforcement forum Implement commitments in SLP Undertake on-going stakeholder engagement Start closure planning as soon as practically possible

Potential impact	Technical and management options
Relocation	If farm workers and their families relocate with landowners, stipulate such condition in landowner purchase agreements If farm workers and their families remain, design and implement appropriate resettlement plan Consider training and employing farm workers at mine
Land values	Establish a base case valuation Effectively implement mitigation measures outlined in this report Compensation for economic loss

19 ACTION PLANS TO ACHIEVE OBJECTIVES AND GOALS

Action plans to achieve the objectives and goals set out in Section 15 (bio-physical environment), Section 16 (socio-economic conditions) and Section 17 (historical and cultural) above, are listed in tabular format together with timeframes for each action. The action plans include the timeframes and frequency for implementing the mitigation measures as well identifies the responsible party.

TABLE 25: ACTION PLAN – HAZARDOUS STRUCTURES

Phase of operation	Activities (see Table 15)	Sig		Technical and management options *(Refer to Appendix A for further detail on mitigation measures)*	Action plan		
		UM	M		Timeframe	Frequency	Responsible parties
Construction	Earthworks Civil works	H	L	• Establish security control measures. • Undertake regular patrols of mine perimeter. • Educate third parties on potential dangers • Design and construct all stockpiles in line with stockpile management plan • In case of injury or death due to hazardous excavations, follow emergency response procedure in Section 20.2 will be followed.	At start On-going On-going As required As required	Once off Daily Quarterly As required As required	Site Manager Security Manager SHE Manager SHE Manager SHE Manager
Operation	Open pit mining Waste rock and tailings management Mineral processing Process water management Stormwater management Site/contract management Rehabilitation	H	L	• Maintain security control measures • Undertake regular patrols of mine perimeter. • Operate all stockpiles in line with stockpile management plan • Educate third parties on potential dangers. • In case of injury or death due to hazardous excavations, follow emergency response procedure in Section 20.2 will be followed.	On-going On-going On-going On-going As required	As required Daily Constant Quarterly As required	SHE Manager Security Manager SHE Manager SHE Manager SHE Manager
Decommission	Waste rock and tailings management Rehabilitation Process water management	H	L	• Rehabilitate the site in line with recommended rehabilitation plan • Educate third parties on potential dangers • In case of injury or death due to hazardous excavations, follow emergency response procedure in Section 20.2 will be followed.	On-going On-going As required	As required Quarterly As required	SHE Manager SHE Manager SHE Manager
Closure	Final landforms (open pit, TSF, waste dumps)	H	M-L	• Repair and maintain security measures at dams • Repair and maintain pit berm wall	6 years 6 years	As required As required	SHE Manager SHE Manager

TABLE 26: ACTION PLAN – LOSS OF SOIL RESOURCES

Phase of operation	Activities (see Table 15)	Sig		Technical and management options *(Refer to Appendix A for further detail on mitigation measures)*	Action plan		
		UM	M		Timeframe	Frequency	Responsible parties
Construction	Exploration Site preparation Earth- and civil works Process- and stormwater Transport systems Non-mineralised waste Site support services Storage and maintenance services / facilities Site/contract management	H	M-L	• Limit the project footprint to that identified in this EIA and EMP report. • Strip, store maintain soils in line with the soil management plan (this includes measures for erosion control) • Prevent dirty water runoff and spillages from entering the environment (impermeable substrates, bunds, stormwater control, catchment paddocks) • Implement and maintain a non-mineralized waste management plan • Where practical, rehabilitate in line with rehabilitation plan as soon as possible. • Handle major spillage incidents in accordance with emergency response procedure (see Section 20.2).	On-going As required On-going On-going Where possible As required	On-going As required As required On-going As required As required	SHE Manager SHE Manager SHE Manager SHE Manager SHE Manager SHE Manager
Operation	Exploration Open pit mining Waste rock and tailings Mineral processing Process- and stormwater Transport systems Non-mineralised waste Site support services Storage and maintenance services / facilities Site/contract management	H	M-L				
Decommission	Process- and stormwater Demolition Waste rock and tailings Rehabilitation	H	M-L	• Limit the project footprint to that identified in this EIA and EMP report. • Replace soils in line with soil management plan. • Prevent dirty water runoff and spillages from entering the environment until such time as infrastructure is removed. • Rehabilitate disturbed areas in line with recommended rehabilitation plan. • Handle major spillage incidents in accordance with emergency response procedure (see Section 20.2).	On-going As required On-going Where possible As required	On-going As required As required As required As required	SHE Manager SHE Manager SHE Manager SHE Manager SHE Manager
Closure	Maintenance and aftercare Final land forms (open pit, TSF, waste dumps)	H	M-L	• Repair erosion gullies and maintain erosion control facilities	6 years	As required	SHE Manager

TABLE 27: ACTION PLAN – BIODIVERSITY

Phase of operation	Activities (see Table 15)	Sig		Technical and management options *(Refer to Appendix A for further detail on mitigation measures)*	Action plan		
		UM	M		Timeframe	Frequency	Responsible parties
Construction	Exploration Site preparation Earthworks and civil works Transport systems Power supply Site support services Storage and maintenance services / facilities Site/contract management	H	M	• Limit the project footprint and activities to that identified in this EIA and EMP report. • Develop and implement a biodiversity management plan to minimize destruction and disturbance by the mine • Prevent dirty water runoff and spillages from entering the environment (bunds, stormwater control) • Control dust in line with dust management plan • Set up and undertake biodiversity monitoring (see programme in Section 21). • Rehabilitate any disturbed areas in line with rehabilitation plan	On-going Pre-construction and on-going On-going On-going Pre-construction and on-going As required	On-going Once off and on-going On-going On-going Once off and on-going As required	SHE Manager SHE Manager SHE Manager SHE Manager SHE Manager SHE Manager
Operation	Exploration Open pit mining Waste rock and tailings Mineral processing Power supply Transport systems Site support services Storage and maintenance services / facilities Site/contract management	H	M	• Limit the project footprint to that identified in this EIA and EMP report. • Implement and maintain biodiversity management plan • Prevent dirty water runoff and spillages from entering the environment (bunds, stormwater control, catchment paddocks) • Minimise groundwater pollution in line with tailings and waste rock management plan (drainage systems, concurrent rehabilitation where possible) • Control dust in line with the dust management plan • Control blast hazards in line with the blast management plan • Undertake biodiversity monitoring programme (see Section 21). • Rehabilitate any disturbed areas in line with rehabilitation plan	On-going On-going On-going On-going On-going On-going On-going As required	On-going On-going On-going On-going On-going On-going On-going As required	SHE Manager SHE Manager SHE Manager SHE Manager SHE Manager SHE Manager SHE Manager SHE Manager
Decommission	Demolition Waste rock and tailings Power supply Transport systems Site support services Site/contract management Rehabilitation	H	M	• Limit the project footprint to that identified in this EIA and EMP report. • Implement and maintain biodiversity management plan • Prevent dirty water runoff and spillages from entering the environment until such time as infrastructure is removed • Minimise groundwater pollution in line with tailings and waste rock management plan • Control dust in line with dust management plan • Undertake biodiversity monitoring programme (see Section 21). • Rehabilitate any disturbed areas in line with rehabilitation plan	On-going On-going On-going On-going On-going On-going As required	On-going On-going On-going On-going On-going On-going As required	SHE Manager SHE Manager SHE Manager SHE Manager SHE Manager SHE Manager SHE Manager
Closure	Final land forms (open pit, TSF and waste dumps)	H	M	• Monitor vegetation establishment in line with rehabilitation plan	6 years	As required	SHE Manager

TABLE 28: ACTION PLAN – ALTERATION OF DRAINAGE PATTERNS

Phase of operation	Activities (see Table 15)	Sig		Technical and management options *(Refer to Appendix A for further detail on mitigation measures)*	Action plan		
		UM	M		Timeframe	Frequency	Responsible parties
Construction	Exploration Site preparation Earthworks Stormwater management Site/contract management	M	M	• Detailed design of stormwater facilities to be done by an appropriately qualified engineer in line with stormwater management plan • Limit the project footprint to that identified in this EIA and EMP report. • Establish and maintain stormwater controls in line with stormwater management plan • Maintain stormwater controls (through inspection and repair). • In case of significant breach of stormwater controls, implement emergency response procedure (Section 20).	Design On-going At start On-going As required	Once off On-going Once off On-going As required	SHE Manager SHE Manager SHE Manager SHE Manager SHE Manager
Operation	Exploration Stormwater management Site/contract management	M	M				
Decommission	Rehabilitation Stormwater management Site/contract management	M	M				
Closure	Final land forms (open pit, TSF, waste dumps)	M	M	• Maintain stormwater controls (through inspection and repair) until such time as facilities can be removed • Monitor re-instated drainage patterns to ensure natural flow patterns occur as far as possible	6 years On-going	On-going As required	SHE Manager SHE Manager